

Need Electricity

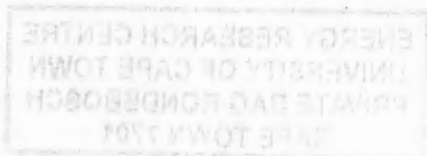
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Energy Usage by Farmworker Households on Commercial Farms in South Africa

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Terms of Reference

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Energy usage by farmworker households on commercial farms in South Africa

1. Introduction

The aim of this report is to:

- assess the farmworker households' access to energy services;
- present a general summary of the current consumption patterns of farmworker households in South Africa;
- identify constraints experienced by farmworker households;
- assess the physical, social and environmental implications of current patterns of energy use; and
- assess the extent of support from farmers for improving the farmworker household's access to energy services.

Both secondary and primary data sources have been used.

The secondary data sources do not follow a uniform methodology or report format. Some are national in focus, while others are regional. Some distinguish between respondents that do or do not have electricity, and other do not. All studies report comprehensively on fuel use. When data from both primary and secondary sources has been synthesised, account has been taken of the study area, sample size, the number of returns to postal-questionnaires, as well as whether respondents were the farmers or the farmworkers.

It is difficult to gauge the accuracy of the consumption data presented because of the varying formats and research methodologies of the studies consulted, and because in many cases farmers provided information on behalf of farmworkers. Nevertheless, this report provides an indication of the consumption patterns of farmworker households and circumstances regarding access to, and the supply of, energy services.

1.1 Secondary data

Secondary data sources include eight studies that focus on the farmworker household's access to energy services and patterns of energy use, and a questionnaire sent by the Rural Foundation to all member farms. These are summarised below.

One of the earliest studies was published by Moller (1985). The report sets out to assess the quality of life in South Africa and basic needs priorities of black people in various circumstances. It is based on the results derived from interviews with about 2 400 people including 299 workers on commercial farms in Natal and the Pietersburg district of the Transvaal. The report describes the different levels of consumption of

goods such as food, clothing and fuel, and the quality of service provision such as education and health. It examines the relationship between basic needs provision and a sense of well-being. Data is presented on farmworker households' access to fuelwood, and their use of various energy carriers for cooking, heating and lighting.

Eberhard (1986) undertook a study on the energy consumption patterns in underdeveloped areas in South Africa which included a section on farmworkers. 1 100 questionnaires were sent to white farmers in South Africa and at the time the report was written, 382 had been returned (23% in the winter rainfall area, 23% in the Eastern Cape, 11% in Natal, 28% in the Karoo, 1% in the Orange Free State, and 16% in the Transvaal). No qualitative data is presented and quantitative data is confined to the percentage of households using various energy carriers for particular end-uses.

As part of a degree in Electrical Engineering at the University of Cape Town, Lieberman (1987) undertook a study on farm employees' right to electricity. The scope of the study includes information on the energy consumption patterns of farmworker households, the relationship between the farmer and farmworker, the law pertaining to farmworkers and general living standards experienced by farmworkers. The consumption data presented is derived from about 50 interviews with farmers, and 40 interviews with farmworker communities in the western OFS, eastern and central Natal, the southern Transvaal and the western Cape. The study aims to investigate the economic viability of extending electricity supplies to farmworker houses.

A study by Jooste and Nortje (1987) on the potential demand for electricity from a group of farmworkers and urban 'blacks' in the Orange Free State was commissioned by Eskom. Results from 530 interviews with farmworkers are presented. The study set out to obtain background data on the demographics and living conditions of farmworkers, establish current consumption patterns, and assess the attitudes to electrification, of farmworkers living in non-electrified households.

Lieberman and Dingley (1988) published an interim report which contains a summary of the information from the first Lieberman study as well as energy consumption data from 200 postal questionnaire returns from the eastern OFS, northern Cape, Natal coast and southern Transvaal.

A study by Tobich and Dingley (1989) on the supply of electricity to farms and farmworkers' households, is based on a postal questionnaire to the western, northern and eastern Cape, eastern and central Natal, the PWV and the east Transvaal, and 28 interviews with farmers and farmworkers in the underdeveloped farming areas of the Karoo. 100 questionnaire returns were received. The results of the interviews are presented as 'anecdotal' information. The research was carried out between April 1988 and March 1989.

The most comprehensive information on energy consumption patterns and access to energy services of farmworker households is provided in the study by Gandar (1991). It includes data on on-farm fuelwood resources, the source of 'transitional fuels' and the role of the farmer in the provision of energy to farmworkers. The report includes information about the general circumstances of farmworkers, and identifies

constraints and opportunities for improving the availability of domestic energy for farmworker households. The data presented is derived from 642 postal questionnaires from Natal (a return rate of 37%), 306 postal questionnaires from the eastern and western areas of the Transvaal (a return rate of 20%), and 44 direct interviews with farmers and farmworkers.

Kotze and Wolhuter (1992) undertook a study for Eskom which assessed farmworker attitudes to electricity, and the affordability of electrical appliances and electricity supply. Background information focuses on the type of housing and the economic status of workers. Interviews were conducted with 34 workers on a farm in the Barkley-West district, none of whom had access to electricity.

A questionnaire sent by the Rural Foundation (1989) to member farms, the results of which were made available to the author, contained extensive questions on the circumstances of workers such as type of housing, proximity to facilities such as schools and clinics and the level of education of the head of the household. Energy specific information was confined to the percentage of farmworker households that have access to electricity and the percentage ownership of various electrical and other appliances.

General information on the status of electrification of worker's houses on commercial farms in South Africa was made available by Eskom, and data on employment and wage levels of workers on commercial farms was obtained from the Centre for Rural Legal Studies.

1.2 Primary data

Primary data was collected through visits to farms and a postal survey of farmers.

Initially, an attempt was made to undertake a national postal survey of farms both with, and without grid electricity. However, difficulties in accessing addresses of farmers without electricity and subsequent time constraints resulted in the postal questionnaire being addressed only to those farmers provided with Eskom electricity.

The postal questionnaire sample was structured to incorporate different farming activities and bio-climatic zones. A random sample, of about 3000 farms, within the above stratification, was drawn from Eskom's customer base. The national average return rate was 24%. The total number of farmworkers represented in the returned questionnaires is in the region of 30 000, and the number of dwellings 5 000.

The postal questionnaire (Appendix 1) concentrated on asking farmers about their current role in supplying energy to workers, and their potential support for improving their farmworker household's access to energy services.

In total 7 farms were visited and 36 workers or family members interviewed: some individuals; a couple of family groups; a group of male workers; a group of female and male workers, and a group of women workers and wives. All the workers and family members interviewed had access to electricity.

Data was coded, processed and analysed using Quattro Pro for Windows spreadsheets. Information from the S&C Transvaal has not been included because of the small number of returns. All national averages were calculated using an estimation of the number of regular farmworkers in each of the areas represented.

There is almost certainly a bias in the results from the postal survey. Farmers who are concerned about their worker's welfare are more likely to reply to a survey concerning farmworker households, than those who are not. The extent of support reflected in subsequent tables is therefore probably higher than in reality. This should be kept in mind by the reader.

2 Farmworker households

2.1 Demographics

The farmworkers' households referred to in this report are the regular and seasonal farm and domestic workers, and their families, that are housed on commercial white-owned farms in South Africa.

From the available statistics it is difficult to establish the numbers of farmworker households or the total size of the farmworker community resident on commercial farms in South Africa. The number of regular employees as calculated by the Central Statistical Services is estimated to be 1 226 619, housed in 583 975 dwellings on 67 000 farming units. The Rural Foundation estimates the number of commercial farms in South Africa to be 60 000 (Annual Report, 1992-1993: 6) and Gandar (1991: i) estimated the size of the commercial farmworker community to be between 4 and 5 million people.

2.2 Current circumstances of farmworkers

From the study by Moller (Table 2.2) it is apparent that, in terms of quality of life and basic needs fulfilment, farmworkers see themselves as worse off than people in the rural areas.

Table 2.2 Indicators of well-being

	Percentage dissatisfied	
	Rural	White farm
General life satisfaction	53	61
Personal happiness	43	47
Life for blacks in South Africa	48	56

(Moller 1986: 14)

There were no statutory provisions for regulating the conditions of farmworker's employment, wages or the enforcement of contracts, before 1993. Although workers are nominally protected by common law, contracts are seldom negotiated, and workers are entirely dependent on their employers for conditions of employment.

The tradition of remunerating farmworkers with payment in kind (which puts a value on housing, food rations and support for health-care and schooling) is a system open to abuse and has undoubtedly been used as an excuse for low wages. This, together with the general practice of preventing workers or family members from working off the farm, has left farmworkers in a particularly weak economic position (Appendix 2: Incomes of farmworkers and farmworker households).

There are currently no regulations governing the living conditions of farmworkers. The type of housing and provision of services, such as water or sanitation, are at the discretion of employers. In the light of the current farmer-worker relationship, which is for the most part a quasi-feudal one riddled with patriarchal and racist values, it is not surprising that on the whole both conditions of employment and living conditions for workers resident on farms are inadequate.

Housing can range from a three-bedroomed brick house to a mud hut, a place in a shed or nothing. Farmworkers have no security of tenure, and housing is directly tied to employment and dismissal is automatically accompanied by eviction. Nevertheless as easily as one worker may leave the farm in the quest for their 'own' home another may join the farm as the quickest and safest way to house their family.

Less than 50 % of farmworker dwellings have piped water inside or on stand outside the dwelling (Table 2.3). Where electricity is provided, it is usually reticulated via the farm homestead, with the farmer in control of supply. The area where workers do benefit from their situation is access to fuelwood, which is generally freely available.

Table 2.3: Percentage farmworker dwellings with piped water

Region	Dwellings with piped water / %
Cape	55
Natal	22
OFS	43
Transvaal	48

(Author 1993)

Moller's study (1985) indicated that the level of sanitation for farmworkers is lower than that of other rural communities (Table 2.4).

Table 2.4: Type of toilet used by residence - percentages.

Sector	Flush inside	Flush outside	Pit/bucket	Bush/veld
Rural	3	3	79	15
White farm	1	15	35	49

(Moller 1986: 23)

The general level of health of farmworkers and their families is very low as a result of unhygienic conditions, the high cost of transport associated with rural health care and the workers' reliance on the farmer for health care support. Moller (1985) reported that 23% of workers travel to health care facilities in a private car, the remainder walk or rely on public transport. The situation regarding workers' safety is similarly neglected. Where safety regulations nominally apply to farmworkers, as in the use of pesticides, farmers are advised, rather than forced to comply. Mechanisation without sufficient training has resulted in a high incidence of accidents resulting in serious injury. In the 1980s about 2 000 cases of permanent disablement in accidents were reported every year (Davies 1990: 17).

There is currently no law requiring rural African children to attend schools and coloured children are required to attend school only if resident within three kilometres of a school. Workers therefore tend to be highly reliant on the farmer for the schooling their children receive: as a result about 40% of the 1.5 million black children on commercial farms receive no schooling at all. For the remainder only 2.5% have access to school beyond Standard 5 (Margo 1991: 22). The incidence of farm children of school-going age not attending school given by (Moller 1989: 25) is 30% and the reason given in 51% of cases is financial constraints. Literacy amongst farmworkers and family members is in the region of one in eight (Margo 1991:23).

Owing to the lack of protective legislation and the total dependence of workers on their employers there is a tremendous diversity of conditions between different areas of the country and different farming activities. Table 2.7 reflects these differences in the level of worker households' access to electricity and water, average household and per capita income and support for electrification in two areas of the Cape Province.

Table 2.6: Regional variations in workers circumstances

Region	Average income		Access % houses		%farmers who support electrification
	household	per cap	Elect	Water	
SW-Cape	544	126	71	80	92
N-Cape	326	55	11	22	71

(Author 1993)

Farmers' attitudes to farm workers are shaped by both economic and socio-political forces. Broadly speaking, conditions of farmworkers are directly related to the economic health and political 'liberalism' associated with a particular area. The south west region of the Cape, is one of the wealthier farming regions of the country, it is the region where workers receive the highest wages and have a higher level of service provision. It is also the region where incentives have been undertaken by farmers to improve the farmworker's situation. The level of service provision and household income for farmworkers in the northern Cape are generally below the national average. However the fact that there is a much greater difference in the extent of electricity provision than in the extent of support for providing worker's with electricity perhaps indicates the economic constraints faced by farmers.

3 Farmworker households' access to and use of energy services

3.1 Introduction

The poverty of farmworker households and the fact that they live on farms has an overriding effect on their patterns of energy use. Fuelwood is generally freely available and is extensively used as a cooking and heating fuel. Electricity is sometimes available and often free. The extent to which other energy carriers are used by farmworker households, is largely dependent on the availability of these two fuels.

3.2 Percentage of households using different fuels for various end-uses

There is a considerable amount of information on the proportion of households that use particular fuels for cooking, heating and lighting purposes: these are therefore presented separately for comparison, and to give an overall picture of the extent to which fuels are used by worker households. More detailed information on end-uses, amounts consumed, cost of energy sources to workers and farmers, appliances used, together with the problems associated with fuel use, are presented in the sections that follow.

Table 3.1 and Table 3.2 give fuel consumption data from seven previous reports. Table 3.1 gives the percentage of farmworker households that use a particular energy carrier for cooking and heating purposes. A single figure for both uses is given, as fuels used for cooking are generally also used for heating, and when wood, coal and farmwaste are used, a single fire often serves both purposes. Table 3.2 gives the percentage of households using particular energy carriers for lighting purposes.

Table 3.1: The percentage of farmworker households using different fuels for cooking and heating

Source	Sample size and region	Percentage households					
		Fuelwd	Frmwst	Coal	Parff	LPG	Elect
Moller(1985)	299 NE-Tvl / Natal	88	34	17	42	2	2
Eberhard(1986)	382 National	97	4	5	19	9	4
Lieberman(1987)	45 National	88	8	8	25	-	6
Jooste and Nortje(1987)	530 W-OFS	86	59	8	9	1	0
Lieberman & Dingley(1988)	200 E-OFS/S-Tvl N-Cape / Natal-Cst	88	9	8	25	-	8
Tobich & Dingley(1989)	100 W/N/E-Cape/W E Natal / S&C-Tvl	73	0	14	-	-	-
Gandar(1991)	948 Tvl / Natal	96	4	0	-	-	-
Weighted average		91	20	6	21	4	3

Table 3.2: The percentage of farmworker households using different fuels for lighting

Source	Sample size and region	Percentage households				
		Candles	Paraffin	LPG	Elect	Fuelwd
Moller(1985)	299 NE-Tvl / Natal	90	67	2	10	5
Eberhard(1986)	382 National	14	65	3	14	-
Lieberman(1987)	45 National	46	37	-	25	-
Jooste and Nortje(1987)	530 W-OFS	91	68	-	0	5
Lieberman & Dingley(1988)	200 E-OFS / S-Tvl N-Cape / Natal-Cst	56	37	-	35	-
Tobich & Dingley(1989)	100 W / N / E-Cape W/E-Natal / S&C-Tvl	25			22	6
Gandar(1991)	948 W / E-Tvl / Natal	96	-	-	27	-
Weighted average		75	62	3	18	5

The figures for fuelwood use are relatively consistent between different studies and fuelwood is, by a significant margin, the main energy source used by farmworker households for cooking and heating. This is not surprising, for workers are often situated on farms with natural woodland or woodlots, fuelwood is generally free, and

can be used without a stove - an appliance which is often not affordable to the farmworker household.

The use of farm wastes for cooking and heating is inefficient and unpopular, and farmworkers consider it an unpleasant fuel. Dung was said to burn slowly and not to liberate enough heat, while crop residues were said to burn too quickly (Lieberman 1987:29). The extent to which farmwaste is used is depends largely on the suitability of the waste produced by the particular farming activity and on the availability of fuelwood.

Coal is a little used fuel by farmworker households. Its use appears to be dependent on the proximity of coalfields and on the accessible distribution depots.

Paraffin is the most commonly used commercial fuel for cooking, heating and lighting purposes. The fact that paraffin can be obtained in small quantities, with little cash outlay, almost certainly affects the extent to which it is used, making it the popular next best option when fuelwood is scarce or the electricity supply restricted. Where electricity is unavailable paraffin is widely used for lighting, while it appears that some 20% of farmworker households also use paraffin for cooking and heating purposes. The percentage of farmworker households using paraffin for both cooking and lighting was given as 36% and 59% by Tobich (1989) and Gandar (1991) respectively.

LPG is the least used fuel for cooking, heating and lighting. Probable constraints are the capital outlay required for the gas cylinder and appliances, and the difficulties associated with the refill process, such as availability and cost of transport. Respondents to interviews found LPG a 'cleaner' and more efficient fuel than paraffin.

Candles were reported as the most frequently used energy carrier for lighting purposes in all studies bar that of Eberhard (1986), where the majority of farmworker households used paraffin (65%). The extensive use of candles is not surprising because candles can be bought with a relatively small cash outlay and are used without the need of an appliance. However, the studies show great variations in their estimates of candle usage.

Though difficult to quantify, giving the inconsistent survey methodologies used in the different studies, there are undoubtedly regional trends in the extent to which different fuels are used for various end-purposes.

Fuelwood use showed the least regional variation of the fuels despite the fact that the availability of wood is related to regional factors such as farming activity and bio-climatic zone. The regions where fuelwood appear to be the least used are the SW-Cape and the eastern Transvaal. In the West Cape this is possibly because of the extent of electrification of workers' houses and the use of LPG, both of which are highest in the W-Cape. The eastern Transvaal, is the region where the most coal is used, and where Gandar (1991:19) reported fuelwood harvesting to be 'opportunistic', with workers often relying on residues from activities such as fruit and vegetable cultivation.

The fuel which shows the highest regional specificity is farmwaste, which appears to be confined mainly to the OFS and, to a lesser extent, Natal. Lieberman noted that 42% of farmworker households used cobs in the OFS, while the average use among his entire sample was 8%. Jooste (1987), whose sample was drawn from the OFS, reports a much higher figure for the use of farmwaste than other studies.

The use of coal also appears to be regionally specific, and is used mainly in the E-Tvl, and is probably dependant on the proximity of coalfields and accessible distribution depots.

There are also variations in the extent to which paraffin and candles are used for lighting purposes. More households use paraffin for lighting in Natal and the Transvaal than the OFS and Cape where candles are more commonly used.

The only region where gas is used to any significant extent is in the SW-Cape, possibly because this is an area of high-density farming with community stores that are relatively easy to reach.

3.3 Households with and without electricity

Those studies that reported on electrified households found that most electrified dwellings used electricity for lighting. But the use of electricity for cooking and heating purposes was generally low.

The Lieberman study compared respondents with and without access to electricity. Table 3.3 shows the difference in fuel use between these two groups.

This comparison indicated that access to electricity had little impact on fuelwood use for cooking and heating purposes, which is understandable considering that only about 8% percent of farmworker households own an electric stove (Rural Foundation 1989).

Table 3.3: Percentage households using fuels in electrified and non-electrified dwellings

Energy Carrier	Non-Electrified	Electrified
Fuelwood	91	85
Paraffin	62	25
Coal	7	8
Farmwaste	25	10
Candles	63	29
Batteries/all	15	13

(Lieberman 1987:28)

The use of farmwaste, paraffin and candles is significantly reduced as a result of electrification. The reduction in the use of candles and paraffin probably reflects the fact that most electrified worker dwellings use electricity for lighting purposes. The practice by farmers of placing a time-limit on electricity use, or the unreliability of some electricity supply, could be factors explaining why more than 25% of workers still used candles.

The use of farmwaste for cooking and heating was substantially lower in electrified households (despite the low stove ownership), probably reflecting the better living standards associated with access to electricity. The unpopularity of burning farmwaste would make it an option to avoid when alternatives are possible.

3.4 Electricity

3.4.1 Current extent of farmworker house electrification

There are varying reports of the extent to which both farms and farmworkers dwelling are connected to the grid. Table 3.4 gives results from previous studies. Table 3.5 and Table 3.6 give an indication of the proportion of workers' houses that have been electrified on farms with grid electricity according to region, and farming activity.

Table 3.4: Percentage farms and farmworker households connected to the grid

Report	Eskom electricity provision	
	Farms	Worker households
Moller	-	10
Eberhard	57	14
Lieberman	71	25
Lieberman / Dingley	69	35
Eskom	-	21
Gandar	-	27
Tobich/Dingley	77	23
Average	68	22

The actual percentage of workers' houses that have electricity is probably lower than the figures given in Tables 3.5 and Table 3.6. The study sample did not include workers' houses on non-electrified farms, and as noted above, farmers who provide electricity to workers are more likely respond to a questionnaire concerning their conditions. From the national average percentage electrification of worker dwellings

(Table 3.5) and using the figure for the extent of farm electrification (68%) from Table 3.6, an estimated average percentage electrification of farmworker houses on all farms (electrified and not) was calculated to be in the region of 22%. This is similar to percentages given in previous studies.

The regional variations and those dictated by farming activity are, in many cases, similar. The general wealth of the area and economic health of the farming activity will be influential in both cases - the cost of electrification is the most commonly reported constraint to providing workers with electricity.

Table 3.5: Percentage electrification of farmworker houses on farms with electricity according to region

Region	%Elect
National	32
SW-Cape	71
W-Cape	32
N-Cape	11
E-Cape	26
OFS	26
Natal	15
E-Tvl	22
N-Tvl	27
W-Tvl	26

(Author 1993)

In the SW-Cape, where farmers are known for their 'progressive' attitude to farmworker needs, more worker households have access to electricity by a significant margin. Natal has the lowest percentage of electrified workers' houses. Further disaggregation of regional data shows significant variations within regions. Access to electricity by worker households in Natal ranges from 5% to 19% and in the OFS from 11% to 38%.

It is possible that the spacial layout of worker dwellings has a significant effect on the extent of electrification according to farming activity. Smaller fruit and vegetables farms, where dwellings are grouped for reasons of land availability and the farm homestead is closer to worker dwellings, are more likely to have electricity than larger livestock or cereal farms. Gandar (1991:32) found that a greater proportion of farms with timber and sugar supplied workers with electricity than farms without, and farms with cereals and livestock are the least likely to have supplied workers with electricity. Similar results were reported by Lieberman (1988:7); 18% and 15%

of workers' houses had electricity on cattle and maize farms respectively, compared to 66% on sugar farms.

Table 3.6: Percentage electrification of farmworker houses according to farming activity

Farming Activity	%Elect
Vines / wine / grapes	65
Fruit	50
Vegetables	60
Wheat	28
Maize	39
Mixed crops / other vegetation	37
Mixed - animal and vegetable	16
Diary cattle	21
Beef/cattle	18
Sheep/goats	32
Other animal	33

(Author 1993)

It is possible that the number of supply points on a farm, which is related to the electricity demand of the farming activity, and the type of housing, which is in turn related to both region and farming activity, may also have an effect on access to electricity by farmworkers. The high degree of electrification on sugar farms could relate to the fact that workers are often housed in compound type accommodation which makes electrification easier.

Table 3.7 and Table 3.8 demonstrate the differences in the extent of electrification of worker dwellings according to the household income of farmworkers and the building material from which dwellings are constructed.

There is a clear indication from Table 3.7 that the extent of electrification has direct correspondence with the farmworker household income. The higher the household income, the more likely they are to have electricity.

From Table 3.8, it can be seen that brick houses are much more likely to be electrified and iron houses least. The fact that there is little difference in the extent of electrification of houses built from other materials, possibly relates access to electricity to the overall living standards of workers rather than to a particular housing material.

Table 3.7: Percentage electrification of farmworker houses according to farmworker household income

Household Income	%Elect
R60 to R150	10
R160 to R200	20
R210 to R300	25
R320 to R400	26
R420 to R500	48
R520 to R650	54
R700 to R980	66
R1000 to R2000	87

(Author 1993)

Table 3.8: Percentage of workers houses with and without electricity according to type of housing material.

Material	Houses without Electricity	Houses with electricity
Cement	11	9
Mud	13	10
Thatch	4	4
Stone	10	—
iron	57	11
brick	5	66

(Lieberman 1987:27)

Table 3.9 shows the percentage of farms where some, all, or none of the worker dwelling have been electrified, from the authors survey.

Table 3.9 Percentage of farms with all, some, and no electrified worker houses

Electrification status	Percentage of farms
No houses	64
Some houses	16
All houses	20

The large number of farms on which some rather than all of the workers' dwellings have been electrified can probably be accounted for by the cost of electrification as well as the status of the workers. Dwellings closer to an electricity supply point grid, or those of more senior workers, are more likely to have electricity. On about 36% of farms in this sample, some farmworker households have access to electricity.

3.4.2 Electricity end-uses and appliances used

Few households that are electrified use electricity for all their energy needs and multiple fuel use is common. The pattern and mix of fuel use will depend on the level of access to electricity which will dictate the extent to which electricity substitutes for other fuels. Access depends on both availability and affordability. Electricity is commonly made available only for lighting. The use of electricity for other purposes other than lighting is often restricted by the farmer or by the inability of workers to pay for consumption costs.

Tables 3.1 and Table 3.2 indicate the extent to which electricity is used for cooking, heating and lighting respectively. Table 3.10 gives more detail of electricity end-uses and the use of appliances by farmworker households.

Most electrified worker households can use electricity for lights and media and about third for cooking and refrigeration, but the use of electricity for space or water heating is very limited. The overall figures from the postal survey are higher than those from other studies. The national averages were pushed up by the percentage use of appliances by farmworker households in the western Cape, which is also an area with a high farmworker population.

There are similar regional trends in the use of electricity services by farmworker households and the extent of access. Worker households in areas which have a higher proportion of electrified dwellings e.g. the SW-Cape and OFS, use a wider range of electrical appliances than those in areas where fewer dwellings are electrified like Natal and the northern Cape. In some areas the use of TV was very high. This could result from the use of a single TV in a communal room for all workers rather than individual ownership.

The use of electricity for cooking in Table 3.10 does not indicate what cooking appliance is used by worker households. From the Lieberman (1987:36) study, it is clear that, of the 27% farmworker households that used electricity for cooking, 15% had the use of an oven.

Table 3. 10: Percentage of electrified workers' houses using electricity for particular end-uses

Region	End-Use %							
	Light	Cook	Kettle	Heat	Fridge	Geyser	Radio	TV
SW-Cape	100	80	80	34	57	42	71	54
W-Cape	97	54	62	8	25	8	67	29
E-Cape	100	33	53	4	27	7	63	58
N-Cape	100	15	16	0	15	0	50	40
OFS	100	54	48	5	11	5	84	40
Natal	100	28	28	1	12	0	80	43
W-Tvl	100	36	25	1	0	0	82	39
N-Tvl	98	32	38	0	5	0	62	13
E-Tvl	100	43	17	3	0	0	88	33
Nat. average	98	43	39	8	17	12	76	40

(Author 1993)

Lieberman (1987)	100	24	-	-	32	2	76	-
Tobich/Dingley	100	44	57	8	16	17	67	36
Gandar (1991)	100	28	11	-	6	-	44	17

From the interviews conducted with 36 farmworkers and family members in the Western Cape, I found that few workers used an electric iron - in most cases the irons used were heated on an electric stove. Similarly households used the electric stove, and not a kettle, to heat water for washing and for tea or coffee. Reasons given by respondents for this practice were their inability to afford an electric kettle or iron, that limiting the ownership and use of appliances would keep the cost of electricity down, and that there was, as far as they could see, no practical difference to using the stove or the particular electrical appliance.

Fridge ownership amongst respondents interviewed was particularly high, and most households had the use of a fridge.

Few worker households interviewed used electric space-heaters. When questioned on the use of electricity for space heating, users had either retained their woodstove for use in the winter or 'used blankets'. It is unclear to what extent the use of electricity for heating would replace fuelwood if the cost of the appliances and the electricity to use them were more affordable.

One respondent still used batteries at considerable expense, though the household had electricity, because he could not afford to replace his radio.

In many cases appliances used by worker households are owned by the farmer. When workers buy appliances, cash is often borrowed from the farmer and deducted from the worker's wages. Workers spoken to expressed gratitude for access to a credit facility. Nevertheless, because of the low cash wages workers receive, cash loans are often difficult to repay and can result in a perpetual cycle of household debt. If a worker changes jobs whilst in debt to a farmer the debt is often transferred to the new employer.

3.4.3 Amounts consumed

It is not easy to gauge the amount of electricity consumed by worker households because there is often no individual metering and because of the use of communal facilities. Estimates that have been made indicate that the consumption levels in farmworker households are low.

Table 3.11 shows the consumption levels of farmworker households (Authors' survey). These are considerably higher than those reported by Gandar(1991:33), who reported that consumption levels ranged from 22 to 200 kWh per household per month with an average of about 89 kWh per household per month.

Table 3.11: Electricity consumption per farmworker household

Development Region	Consumption kWh /month
National	203
SW-Cape	310
W - Cape	260
N - Cape	110
E - Cape	189
OFS	226
Natal	140
E - Tvl	204
N - Tvl	189
W - Tvl	153

(Author 1993)

The amount of electricity consumed by farmworker households is generally very low. Practices by farmers that affect the extent to which workers use electricity are: limits being placed on the type of appliances households may use; restricting the number of hours per day that workers have access to electricity; limiting the number of units a household may use before they are charged; and, where pre-payment meters are installed, giving workers a monthly ration of disposable cards.

Where farmworker households pay for their electricity, they are limited by both the cost of appliances and the cost of the electricity required to use them. None of the respondents who payed for their electricity, used electric heaters. It is unclear to what extent consumption levels would increase if appliances or the electricity to use them were more affordable.

The regional variation in the use of electrical appliances corresponds with the amount of electricity consumed. Areas where a greater percentage of households use a range of electrical appliances, such as the western Cape and the OFS are also those where more electricity is consumed, and the areas with the lowest consumption levels (N-Cape and Natal) are the two areas where power intensive appliances are least used.

Table 3.12 reflects the amount of electricity worker households consume and the mean household income in respect of consumption categories. The relationship is not direct, for, in many cases farmers pay for the electricity their workers consume.

Table 3.12 Farmworker household's mean monthly household income and electricity consumption

Mean household income R/month	Consumption category kWh/month
404	Less than 80
385	80 - 150
486	150 - 250
775	more than 250

(Author 1993)

There is not much difference in the mean household income up to a consumption level of 150 kWh. Above 150 kWh, increased household incomes correspond with increased consumption levels.

3.4.4 Consumption cost

The practice of farmers paying for the cost of the electricity used by worker households is widespread. In the survey undertaken by the author, 92% of farmers

contributed to the cost of the electricity used by their workers.

Table 3.13 gives the contributions by farmers and workers for electricity per farmworker household per month (from the total sample of worker houses with electricity).

On average, farmers pay 83% of the cost of workers' electricity. In the region of a third of workers do contribute, though they only pay about 17% of the cost of electricity.

Table 3.13: The average payments for electricity by farmworker households

Region	Cost R/month	Cost R/month paid by the		Percent of cost paid by the	
	Total/hsh	Farmer	Worker	Farmer	Worker
National	28	22	6	81	19
W - Cape	42	26	18	62	48
N - Cape	16	17	0	100	0
E - Cape	29	24	5	83	17
OFS	33	27	5	84	16
Natal	21	19	2	90	10
E - Tvl	28	25	7	78	22
N - Tvl	25	28	0	97	3
W - Tvl	20	14	4	78	22

(Author 1993)

The two regions where workers contribute most and least to the cost of electricity, the W-Cape and N-Cape respectively, are also the regions with the highest and lowest consumption levels.

Of the 21 households I interviewed in the W-Cape and SW-Cape, 10 paid for their electricity, those with geysers in the region of R50/month, those without about R30/month. Respondents spoken to were well aware of the relative cost of the different electricity uses. These figures are much higher than those represented in Table 3.13, indicating that consumption at this level is not widespread.

The percentage of the farmworker households' income that is spent on electricity is shown in Table 3.14. Gandar (1991) reported that in the region of 1% of the farmworkers' income was spent on electricity.

Table 3.14 Percentage of farmworker income spent on electricity

Region	%-Income
E-Cape / Karoo	4
W / SW-Cape	3
Natal	2
OFS	3
Transvaal	4

(Author 1993)

Households interviewed in the western Cape without geysers spent in the region of 5% of their income on electricity, while those with geysers spent about 8%. Workers who had access to a wider range of electricity services contributed more to the cost of their electricity consumption.

3.4.5 Workers' attitude to electricity and response to electrification

Both Lieberman (1987) and Gandar (1991) reported that electricity was not an important factor in choosing a job. The attitudes of workers to electricity as reported by Gandar(1991) are given in Table 3.15.

The more senior workers who had fewer restrictions placed on their use of electricity and were better paid therefore able to experience more of the benefits of electricity, believed it to be important.

Table 3.15: Percentage of farmworkers agreeing that electricity is important

Attitude	Percentage farmworkers
important	41
only a bit	24
not at all	35

(Gandar 1991:34)

The response to electrification among the households interviewed was positive. Most said electricity was 'important' along with the quality of housing. However, those interviewed enjoyed a wide range of electricity uses, received higher than average cash wages, contributed the highest percentages of consumption costs and had a greater control over their use of electricity, compared with more typical circumstances in other parts of the country.

When asked 'If you had electricity for one function what would it be?', respondents who had electricity for light, cooking and media uses, had difficulty choosing, and needed to be encouraged by rephrasing the question to 'which electricity use would you be most loath to give up?'

Only four end-uses were mentioned in various orders of priority. Electricity for cooking and lighting competed for first place, (surprisingly even amongst some men), and TV and refrigeration for second and third place. Nobody gave TV as their first choice.

Table 3.16: Percentage of interviewees expressing preference for appliances/ fittings

Appliance	Percentage households expressing choice		
	1st Choice/%	2nd Choice/%	3rd Choice/%
Lights	56	44	-
Stove	44	45	9
TV	-	7	52
Fridge	-	2	39

(Author 1993)

Reasons given for finding electricity important related to: affordability, convenience, reliability - 'always being there, never running out' - the safety of not having open flames as in candles and fires, and the increased security of being able to have instant light when arriving home in the dark.

Fridge owners referred to cold storage potential. Some typical responses were: 'can buy meat on a special and keep'; 'now some food immediate, before not'; and, 'wonder how I ever did without'.

For TV users electricity made significant savings. Comments were: 'pay two rand a month towards the TV; and, 'used to pay in the region of R14 for batteries'.

Electricity was said to be faster and better and to make everything easier. None of the families I interviewed considered abandoning electricity and going back to previous fuels used for any task. Aside from the use of fuelwood for heating, no worker mentioned the use of any other fuel as a preference.

A study to gauge the potential demand and willingness to pay for electricity amongst a community of 34 workers who did not have access to electricity was undertaken for Eskom by Kotze and Wolhuter in 1992 in the Barkley-West district. Some of the results are presented in Tables 3.17, 3.18, and 3.19. All the workers spoken to (100%) said they would like to have access to electricity.

The two appliances worker households most wanted to buy by a significant margin are a kettle and an iron. Next are a TV and a fridge. The fact that stoves and heaters are of less importance is perhaps an indication of the extent to which fuelwood is used.

Table 3.17: The percentage households that would like to buy (have the use of) various electrical appliances

Appliance	Workers %
Stove	36
Fridge	53
Heater	36
Kettle	93
Iron	82
Geyser	11
Hi-Fi	29
TV	64

(Kotze 1992)

Table 3.18:How much workers are willing to pay for house wiring

Amount willing to pay	Workers %
Nothing	50
R50 - R500	46
Don't know	4

(Kotze1992)

Table 3.19:Percentage workers willing to use a redi board

	Workers %
Yes, definitely	96
Maybe	0
Dent know	4

(Kotze 1992)

3.4.6 Farmers' attitude to the electrification of farmworker houses

The extent to which farmers support the electrification of workers' houses and the amounts they are willing to contribute to the cost of connection, the purchase of appliances and the consumption costs are presented in Table 3.20 and Table 3.21.

Table 3.20: Farmer support for the electrification of worker houses

Region	Percent support
SW-Cape	92
W-Cape	82
N-Cape	71
E-Cape	83
OFS	83
Natal	75
E-Tvl	68
N-Tvl	79
W-Tvl	89

(Author 1993)

There is a relatively even spread of support offered for most regions in the country. Where differences do occur, there is a broad regional correlation between the extent of support and the current percent electrification of workers houses (Table 3.5). Of those who support the electrification of workers houses most offer some money for the initial cost of extending the grid, and about a half to two-thirds offer money for appliances and electricity consumption costs.

Table 3.21: Extent of support and amounts offered by farmers for electrification, appliance purchases and electricity use

Region	Initial cost		Appliance cost		Use cost	
	%support	Money/ R	%support	Money/ R	%support	Money/ R
SW-Cape	86	516	59	317	51	37
W-Cape	65	473	59	325	42	42
N-Cape	19	245	42	187	38	39
E-Cape	29	302	29	179	32	23
OFS	60	361	42	203	42	28
Natal	62	356	33	300	35	32
E-Tvl	60	240	36	439	36	32
N-Tvl	74	450	42	425	53	35
W-Tvl	72	408	61	128	59	44

(Author 1993)

In response to the postal survey, farmers mentioned a total of twenty benefits resulting from the electrification of workers' houses, both for the farmer and for the workers and their families. Altogether 90% of farmers mentioned benefits to electrification, 7% said there was no difference and 3% said things were worse. For example, relatives and friends were said to 'flock' to the farm, those workers without were dissatisfied and the cost involved was too high and not worth it. The main benefits of electrification and the percentage of farmers who identified them are presented in Table 3.22.

Table 3.22: Percentage farmers identifying benefits of worker house electrification

Benefits from the electrification of workers' houses	%
Improved living conditions, quality of life and environment	33
Improved attitude to work and better farmer/worker relationship	21
Saved time and money	17
Happier and more stable workforce	11
Improved workers self-esteem	6

(Author 1993)

Lieberman (1987:54) reported that more than half the farmers questioned did not notice any change in workers' attitudes. Those that did listed similar responses. The three main benefits given by Lieberman were: improved quality of lifestyle, 32%; workers worked harder, 20%; and the electrification of workers houses attracted a better quality of worker, 18%. Other reasons given related to health and safety of worker families and fuelwood shortages on the farm. Similar responses were obtained from farmers by Gander, who noted that electrification of workers' houses were not seen by farmers in hard financial terms.

Some farmers think of workers as being 'raw and unsophisticated' (Gander 1991:35), implying that workers do not know how to look after appliances with the result that many systems currently only provide minimal use of electricity in the form of lighting.

3.4.7 Problems relating to electricity consumption

Problems associated with the use of electricity by worker households are identified as resulting from restrictions on supply, the inability to pay for appliances or are associated with the fact that only some of the some workers' dwellings on a farm or in a district have been electrified. None relate directly to the use of electricity as such.

From the interviews I undertook there is little doubt that workers appreciate electricity and are willing to consume and pay for it to the extent that they find it affordable.

Access to electricity appears to be associated with better conditions, higher household incomes, improved housing and better working relationships. One interviewee enthusiastically responded that conditions were 'getting better step by step. Together with farming operations our conditions improve'.

3.5 Fuelwood

Fuelwood is the most used fuel for cooking and heating by farmworker households.

3.5.1 Farmworker households' access to fuelwood

The study by Moller (1986: 24) summarised in Table 3.23, indicates that fuelwood is more readily available to workers on commercial farmland than to other rural dwellers in the Pietersburg region of the Transvaal and Natal.

Table 3.23: Availability of fuelwood to farmworkers compared to other rural dwellers

Fuelwood	Rural/%	'White' Farm/%
Collected nearby	45	90
Collected 30min away	10	1
Bought	45	9

(Moller 1986)

Table 3.24 shows the percentage of farmers who supply their farmworker households with fuelwood.

Table 3.24: Percentage of farmers who provide farmworkers with fuelwood

Region	Percent of Farmers
National Average	90
E-Cape	90
Karoo	98
N-Cape	100
SW-Cape	86
W-Cape	95
N-Natal	81
S&C-Natal	90
E-OFS	100
N-OFS	86
W&S-OFS	95
W-Tvl	91
N-Tvl	100
E-Tvl	74

(Author 1993)

The percentage of farmers who provide their worker households with fuelwood are high throughout the country, and do not appear to be affected by differences in bioclimatic zones. There was also little variation in extent of supply according to type of farming activity. There is no indication, however, of how much of the fuelwood used by worker households is provided by the farmer.

Gandar's (1991) study investigated farmers' and farmworkers' perceptions about the availability of fuelwood (Table 3.25 and Table 3.26).

Gandar (1991) found that in many instances farmers regulated and managed their workers' harvesting of indigenous species by allowing only dead wood to be cut or by specifying and limiting harvesting areas, and access was further constrained by the farmer's own need for wood, for example for fencing poles. The shortages reflected in Table 3.26 could relate to access, and may result from farmers' restrictions on use rather than reflect the fuelwood resource.

Table 3.25: Farmer perceptions of fuelwood availability

Availability	% farmers
Will not be a problem for the foreseeable future	79
Will soon be a problem	12
Is already a problem	9

(Gandar 1991:24)

Table 3.26: Farmworker perceptions of fuelwood availability

Availability	% Farmworkers			
	Natal Midland	Natal Coast	E-Tvl	W-Tvl
no shortage	65	55	50	100
slight shortages	11	27	42	0
serious shortages	24	18	8	0

(Gandar 1991:24)

None of the workers I spoke to in the western Cape had trouble obtaining fuelwood. However, Gandar's report clearly indicates areas of fuelwood shortages. Comparing the figures on the availability of fuelwood from Tables 3.25 and 3.26 it appears as if some farmers may not be fully aware of their workers' fuelwood needs or may have an unrealistic impression of their role in fulfilling these needs.

In one instance labourers said it was necessary to steal from a neighbouring farm in order to provide fuelwood for the winter fires in the farmer's own home. That particular farmer assured me there was no shortage of fuelwood on his farm (Gandar 1991:27).

In general it seems that farmworkers have reasonably good access to fuelwood but there are no doubt many examples where fuelwood is in short supply.

3.5.2 Fuelwood use by farmworker households

It is generally accepted that there is a cultural association with the use of fuelwood, and that fuelwood is used by certain farmworker households for purposes other than cooking, heating and light.

Table 3.27 and Table 3.28 give reasons for fuelwood uses and the manner in which worker households burn fuelwood. It should be noted that these figures were obtained from farmers and not workers.

Table 3.27: Percentage households using fuelwood for particular reasons

Reasons	Percent
Cooking	48
Warmth	21
Possessed no electric stove	15
Tradition	9
Habit	6
To pray	1

(Lieberman 1987:27)

Table 3.28: Percentage households using different wood burning stoves

Stove	Percentage households
Open fire	63
Brazier fire	18
Mud / Metal	38

(Lieberman 1987:34)

Gandar (1991:17) found that in Natal 53% of respondents had wood burning stoves compared to only 8% in the Transvaal. Workers in houses that had been upgraded were often provided with stoves, while many of those in self-built houses did not have a stove. The Dover and the Burnell wood burning stoves are actively promoted in the farming sector and farmers have expressed pros and cons regarding the use of both by farmworker households. For example, the Burnell is favoured for its lower cost and simple inexpensive devices for water heating. One farmer, however, found them less durable than the Dover (Gandar 1991:17).

Although many of the workers interviewed in the western Cape had electric stoves, they had retained their wood stoves to double up as space heaters and for heating water and cooking during the winter months, particularly those respondents who paid all, or part, of their electricity costs. A farmer replying to the postal survey undertaken by the author commented that though workers had the use of electricity for cooking, they 'used their wood stoves daily to bake bread in the traditional manner'.

3.5.3 Amounts of fuelwood consumed

Two studies reported on the amount of fuelwood consumed by farmworkers, as summarised in Table 3.29. The national figures on consumption of fuelwood in kilograms per capita per year were calculated from fifty-four farmers who provided estimates of the annual fuelwood consumption of all their workers in response to the Eberhard survey (1986:104). Regional figures are from the study by Gandar (1991:14-15).

Table 3.29: Per capita consumption of fuelwood by farmworker households

Region	Source	Kg/cap/year
National	Eberhard (1986:105)	800
E-Tvl	Gandar (1991:14)	792
W-Tvl	"	818
Natal	"	934

The use of compound kitchens and the informal movement of fuelwood between farms makes the estimation of per capita fuelwood consumption difficult. Nevertheless, there appears to be a correspondence between the regional figures presented by Gandar (1991) and the national figure of Eberhard (1986), despite the fact that Eberhard's figure was estimated from a postal questionnaire and those of Gandar from interviews with workers.

Compared to the rural areas of South Africa that are not commercial farming areas, where estimates vary between 300 and 750 kilograms per capita per year (Gandar 1991), the amounts of fuelwood consumed are relatively high. This may reflect the generally better access to fuelwood amongst farmworkers.

Table 3.30: Total consumption of fuelwood by farmworker households

Region	Tonnes
Natal	560
Transvaal	1630

(Gandar 1991:15)

3.5.4 Cost of fuelwood

Farmworkers were reported to obtain fuelwood free of charge except in the study by Moller (1986:24), where 9% of farmworkers said they paid for fuelwood.

The percentage of farmers who attached a cost to providing workers with fuelwood and the average amount spent per household per month are given in Table 3.31. Although 90% of farmers supply fuelwood, only about 27% estimated the costs involved. It is unclear how much of the cost involved in providing wood is the price of purchased wood or on-farm costs of harvesting and preparing wood for use, such as petrol or diesel for transport and wear and tear on vehicles and saws.

Table 3.31: Percentage farmers who attached a cost to providing fuelwood and the amount spent

Region	% Farmers	Average amount spent / farmer / household / month R
A: W-Cape	23	10
B: N-Cape	28	7
D: E-Cape	31	17
C: OFS	25	15
E: Natal	38	8
Transvaal	19	30
National	27	15

(Author 1993)

Gandar (1991:27,29) reports one farmer as estimating the cost of cutting and delivering a 3 tonne load to the compound at about R100. Another said he preferred to buy wood at a cost of R35 / tonne rather than have the 'hassle' of using and maintaining farm equipment, and another mentioned the opportunity cost of land as a reason for buying fuelwood for workers rather than planting trees.

3.5.5 Problems associated with the use of fuelwood

Farmworkers are probably better off than many other rural, urban or peri-urban fuelwood users. In general, fuelwood is available, the cost is not a significant constraint and some workers have the use of farm equipment for fuelwood collection and processing. Nevertheless, the extent of fuelwood use and the total reliance on wood for essential energy end-uses such as cooking, has repercussions. One of the main problems experienced by worker households relates to the time and effort required for collecting and using wood.

The time spent collecting wood by male farmworkers in a survey by Jooste in the OFS (1987:55) is given in Table 3.32.

There is no indication of whether other household members also spent time collecting wood to supply the household. In general, fuelwood is collected by women, children or unemployed family members and, when collected by employees, it usually takes place outside working hours. Even in the SW-Cape where shortages were not experienced, a head-load a day was still collected. In areas of fuelwood scarcity, the time spent collecting fuelwood and the distances that need to be covered, show an increase. Lieberman (1987:29) interviewed two women who 'spent up to eight hours a day walking the koppies to collect wood'.

Table 3.32: Time spent collecting wood.

Hours / week	% of farmworkers
none	37
1-2	13
3-4	14
5-6	10
7-8	20
more than 8	6

(Jooste 1987)

Besides the time taken to collect wood, fires still have to be made and there is further waiting before cooking can resume, or hot water is available for washing. Some of the household members I interviewed gave time saved as one of the main reasons for preferring electricity to wood for cooking and water heating purposes.

Other problems associated with using fuelwood relate to the exposure to pollutants released into the atmosphere during fuelwood combustion. During the average seven hour period in which most households were using fires each day, it is estimated that levels of respirable suspended particulates are in the region of 3500 to 4000 μgm^{-3} . These are considerably higher than WHO (World Health Organisation) recommendations for exposure to particulate matter for the general population, which are 100 to 150 μgm^{-3} with an average time of 24 hours. (van Horen:1993)

Indoor pollution has been reported to contribute to a variety of respiratory illnesses, among other ailments. It is clear from the stove use information presented earlier that many farmworker households use fuelwood without the use of a stove. Together with bad ventilation, it is likely that the pollution levels experienced by these households put users at considerable risk of respiratory illness, particularly the more vulnerable, such as the very young and the elderly.

3.6 Other fuels used by farmworker households

3.6.1 Farmworker households' access to paraffin and candles

The extent to which fuels are purchased from different supply stores is given in Table 3.33 and the percentage of farmers who provide their workers with these fuels is given in Table 3.34.

The price of fuels and the availability of transport influences the extent to which fuels are used. Gandar (1991) found that the prices of paraffin and candles varied greatly between rural shops and shops situated in the nearest towns. Workers frequently did without or borrowed items rather than purchase from rural shops.

Table 3.33: Percentage households buying fuels from various sources

Source	Candles	Paraffin
Farmer	25	13
Local / Farm shop	25	32
Mobile shop	3	-
Town	57	32

(Gandar 1991:42)

Table 3.34 Percentage of farmers who provide different fuels to farmworkers

Region	Percentage of farmers who provide fuels used			
	Paraffin	Gas	Candles	Coal
National	12	4	15	1
W-Cape	14	20	14	1
N-Cape	22	1	16	0
E-Cape	23	1	20	0
Natal	8	0	21	2
OFS	12	0	18	-
Tvl	10	0	8	3

(Author)

On average, less than a fifth of worker households that use paraffin and candles, are supplied by the farmer.

There appears to be a broad correlation between the numbers of farmers providing fuels and the percentage of households using (Table 3.1) these fuels. Areas which report a higher use of a particular fuel, are correlated to those where farmers provide.

There is a similar regional trend in the percent of farmers who provide workers with paraffin, LPG and candles and the percent of worker who have access to electricity (Table 3.5), perhaps indicating that farmers who provide electricity are also more likely to help their workers to access other fuels.

3.6.2 Use of paraffin, LPG, coal and candles

Paraffin and candles are used widely by farmworker households; there are conflicting reports on the extent to which coal is used; and LPG is little used. The use of paraffin, gas and coal for cooking is directly related to the household's access to fuelwood, and the use of these fuels in general is related to the fact that many farms are remote, and many worker households are particularly poor. Fuel cost, the cost of appliances and transport are all constraints on their use.

The effect of workers' access to fuelwood, and constraints on the use of paraffin, gas and coal can be seen when the number of farmworker households that use these fuels is compared with those in other rural areas (Table 3.35). Though the areas sampled are not the same, the evidence on the extent of the farmworker households use of paraffin, LPG, and coal compared to other rural areas represented in Table 3.35 is generally accepted. Gandar (1991:40) reported that 59% of farmworker households use paraffin compared to almost 100% in other rural areas in Natal and the Transvaal, and that in areas where fuelwood was abundant, no paraffin was used. Coal was not used by workers on any of the farms he visited. Farms are often more remote than rural villages and this further reduces the use of these fuels when compared to other rural areas.

Table 3.35: The use of paraffin, LPG, and coal candles on commercial farms and other rural areas

Fuel	Percentage households using fuels for					
	Lighting		Cooking		Heating	
	Rural	Farm	Rural	Farm	Rural	Farm
Paraffin	74	67	70	52	48	33
LPG	4	2	6	2	4	1
Coal	1	0	52	19	51	16

(Moller 1986:23)

The extent to which paraffin is used by a particular household for cooking is possibly influenced by the number of household members working on the farm. Where most

of the household members are employed on the farm there is less time available for collecting wood, and paraffin is perhaps more affordable because the household income is probably higher. This corresponds with the fact that families using paraffin tend to be smaller, 5.73 persons compared to 7.95 persons for those who do not (Gandar 1991:40). The use of paraffin for cooking was reported to replace fuelwood among younger 'less traditional' households.

The number of households that use paraffin and candles for lighting is similar. Constraints to obtaining and using the lighting fuels are the same except that candles can be used without an appliance.

The extent to which all lighting fuels are used is affected by access to electricity, since most electrified workers dwellings have light fittings.

There is not much information on the use and ownership of appliances employed with paraffin, coal or LPG. From the Lieberman study (1987:34), 31% of workers use a gas or paraffin stove, and 27% a coal stove. The use of paraffin and gas stoves corresponds closely with the sum of paraffin and LPG users (28 %), while the use of coal stoves is quite a bit higher than the estimation of the number of coal users. Possibly indicating that a coal is used for woodburning. Paraffin and LPG can only be used with the appropriate appliance.

3.6.3 Amounts of paraffin and candles consumed

Some indication of paraffin and candles consumed by farmworker households is given by Gandar (1991:13).

There is a correspondence between the regional variations in the use of paraffin and the availability of fuelwood. The consumption of paraffin is lowest in the W-Tvl where fuelwood was found to be abundant, and highest in the E-Tvl where fuelwood gathering was reported as opportunistic.

Table 3.36: Paraffin Consumption

Region	Paraffin consumption Litres / hsehold / year
E-Tvl	119
W-Tvl	35
Natal	74

(Gandar 1991)

3.6.4 Cost of paraffin and candles

Most of the direct expenditure on energy by farmworkers households is for paraffin, candles, and batteries. Gandar (1991:13) reports that roughly two thirds of the total R270 spent by a household per year on energy, is spent on paraffin and candles.

The amounts spent by worker households on paraffin, candles, LPG and batteries from the Gandar (1991:13) and Kotze (1992:6) studies are given in Table 3.37. The generally higher figures from the Kotze study could relate to the study region, the fact that no respondents in the Kotze survey had electricity, and the fact that Gandar study was undertaken in 1991 and the Kotze study in 1992.

Table 3.37: Average farmworker household fuel expenditure

Energy Carrier	Expenditure/hsh R/year	
	Kotze (N-Cape)	Gandar (Natal / Tvl)
Paraffin	93	90
Candles	141	75
Total average	117	82

Jooste's (1987) study in the OFS provided estimates of expenditure on all fuels used by workers (without electricity). The figures in Table 3.34 indicate that in this sample, less than R100 per year was spent on energy by some 80% of farmworkers. The figures for the different studies are relatively consistent, despite factors such as regional variations in fuel costs and the fact that figures in the Jooste study represent 1987 rands.

Table 3.38: Expenditure by worker households on fuels

Amount spent / year	Percent of workers
Less than R 60	38.4
R 60 - R 100	43.4
R 100 - R 240	14.3
R 240 - R 360	2.6
R 360 or more	1.3

(Jooste 1987)

The percentage of the workers' household income that is spent on all fuels is in the region of 6%, with a figure of 9% for the Eastern Transvaal (Gandar 1991:16). The

difference between the two regions corresponds with the lower use of fuelwood and the extent to which paraffin is used in the Eastern Transvaal.

The cost of paraffin, candles, LPG and coal to farmers who provide worker households with these fuels is shown in Table 3.39.

Table 3.39 Amounts spent by farmers on paraffin, candles, LPG and coal per worker household per month

Region	R / month / household				
	Paraffin	Gas	Candles	Coal	Total
Weighted avg	5	3	4	2	14
W-Cape	3	14	6	2	25
N-Cape	3	1	3	0	7
E-Cape	3	2	4	0	9
Natal	4	0	3	4	11
OFS	10	0	4	-	14
Tvl	6	0	3	5	14

(Author 1993)

The average amount spent by farmers on paraffin, LPG, candles and coal for a worker household is in the region of R168 per year. Comparing this figure with the cost of these fuels to workers (Table 3.37), it appears that farmers who provide these fuels subsidise most of the cost.

From the Lieberman (1987:31) study the average cost of supplying workers with the fuels tabled and fuelwood (but excluding electricity) is R60 per household per month, which is almost double the sum of the cost to farmers for providing fuelwood (Table 3.31) and their subsidisation of other fuels (Table 3.32). Lieberman noted that, in general, those farmers who provide electricity spend more on the provision of other fuels than those who do not.

3.6.5 Problems associated with the use of paraffin, gas, coal and candles

The use of all these fuels is inconvenient when compared with electricity. Obtaining these fuels is frequently problematic, in rural areas if there is no ready access to transport. Affordability problems arise from the expense of fuels, transport and appliances. Environmental and health hazards may be associated with the use of fuels that burn with an open flame, that release fumes, and in the case of paraffin, a fuel which is a poisoning hazard to children. Interview respondents in the W-Cape, who used paraffin prior to access to electricity, were very pleased to be rid of it.

3.7 The use of batteries

Not many reports have provided information on the use of batteries, although batteries are used widely by farmworker households, mainly for radios. About 70% of farmworker households have been estimated to own a radio (Rural Foundation 1989). The national figure for the percentage of worker houses that are electrified is in the region of 22%, and many therefore rely on the use of mainly dry-cell batteries.

On 10% of farms visited by Gandar (1991:41) at least one worker used rechargeable batteries.

The proportion of workers buying batteries from various sources (according to Gandar) is given in Table 3.40.

Table 3.40: Percentage households buying batteries from various sources

Source of batteries	Percentage workers
Farmer	23
Local / Farm shop	14
Mobile shop	4
Town	55

(Gandar 1991:42)

The extent to which farmers subsidise their workers' use of batteries is given Table 3.41, and the average expenditure on batteries by farmworker households in Table 3.42. Of the farmers who provide battery charging facilities about 7% indicated they did so free of charge.

Table 3.41: Percent of farmers who subsidise the use of batteries

Region	Percent of farmers	
	Batteries	Battery charging
National	6	17
Cape	6	14
Natal	2	7
OFS	3	23
Tvl	9	23

(Author 1993)

When comparing the worker household expenditure on batteries with the average annual cost of paraffin and candles (Table 3.37), both studies indicate that the highest fuel cost to worker households is for batteries. Gandar estimated that about a third of the households' total expenditure on energy carriers was on batteries.

Table 3.42: Average household expenditure on batteries

Energy Carrier	Expenditure/hsh R/year	
	Kotze (N-Cape)	Gandar (Natal / Tvl)
Batteries/all	168	102

3.8 The use of farmwaste

Farmwaste is used by workers when fuelwood is not available. The residues used are mainly dung and maize cobs, and the area where there is the highest reported use of farmwaste is the OFS. Farmwaste is reported as an unpleasant fuel to use. Table 3.43 shows the time spent by workers collecting farmwastes in Jooste's (1987) OFS study.

Table 3.43 Time spent by workers collecting farmwastes

Dung		Cobs	
Hours / week	Percent of workers	Hours / week	Percent of workers
none	59	none	49
1 - 2	14	1 - 2	19
3 - 4	10	3 - 4	7
5 - 6	9	5 - 6	5
7 - 8	3	7 - 8	18
more than 8	4	more than 8	2
Average	1.6 hours/week	Average	2.3 hours/week

(Jooste 1987:55)

3.9 Solar

From my postal survey, there was no use of photovoltaics found among farmworkers, and the use of solar water heaters is not widespread. The only area where solar water heaters are used to any extent is in the South West Cape (Table 3.44).

Table 3.44: Use of solar water heaters by worker households

Region	Number	Average Cost / hsh R
SW-Cape	52	435
W-Cape	1	1000
N-OFS	1	600

(Author 1993)

Solar water heaters were used by some of the worker households on two farms visited by the author. The other households had geysers. Respondents who had solar water heaters were satisfied: they obtained hot water from their neighbours with geysers when they were without.

Gandar (1991:44) reports that on none of the farms surveyed in the Transvaal (by post or a visit) was either form of solar energy used by farmworker households. In Natal 19 out of 260 farms used solar water heaters and 2 used PV systems .

4 Conclusions

Farmworker households' energy consumption patterns are dictated by their access to energy services. The single circumstance of choice encountered was the preferential use of fuelwood for space heating.

Access is dependent on both the availability of energy sources and the capacity of the household to afford a particular energy source and appliance where applicable. An important aspect of both availability and affordability is the worker households' access to transport.

Fuelwood is used by most farmworker households because it is generally available and free, and can be used without the need for an appliance. In many cases workers also have the use of farm equipment for the transport and preparation of wood such as a tractor and chain saw.

Few farmworker households use electricity to any significant extent; both the range of electricity services available to households (which is dependant on the farmer), and the ability to afford electricity, are limited.

The use of other fuels such as paraffin and LPG appears to be inversely related to the worker households' access to fuelwood and electricity. Further factors that affect the

households' access to these fuels is their expense at local outlets and difficulties in reaching other supply sources, largely as a result of poor rural transport facilities.

The cost of appliances certainly has an effect on the extent to which fuels that require an appliance are used. This can be seen by the multiple use of an electric stove by workers with access to electricity in the SW-Cape.

Problems encountered as a result of the consumption patterns of worker households primarily result from inadequate access to energy services. Low levels of electrification mean that workers rely on the use of energy carriers that are unsafe and inconvenient. The lack of transport and cost of other fuels in rural shops and the low cash wages received by workers means they are reliant on fuelwood for cooking and heating purposes regardless of how much time and effort it takes to collect and use.

The numerous physical, social and environmental effects on farmworker household of their current consumption patterns, unlike those of 'First World' energy consumers, are directly experienced by the energy user.

What fuels worker households would choose if they had the choice one can only speculate. Considering the problems relating to the households reliance on, and continued use of fuelwood, and the problems experienced in obtaining other fuels as a result of living in remote locations, many would probably opt for electricity for most end-uses. But it is difficult to speak for that preference without assessing the affordability of electricity. If fuelwood use was replaced by electricity, at current income levels, workers would end up spending in the region of 17% of their household income on energy services (Gandar 1991).

All the evidence presented indicates that wood is widely used largely because it is cheapest; the use of paraffin and LPG is restricted by affordability and availability; and, where available, the use of electricity is limited by expense to the user and the farmer.

There is a fairly strong impression that better paid workers on wealthier farms have improved access to energy services.

QUESTIONNAIRE FOR A SURVEY OF FARMS AND FARMWORKER HOUSEHOLD ENERGY SUPPLY ON ELECTRIFIED FARMS IN SOUTH AFRICA

Instructions: 1) Please enter answers in the space provided. 2) For * questions, mark the appropriate box/boxes with an X.

The FARM and ELECTRICITY

What is the name and district of your farm ? _____

How large is your farm in hectares ? _____

What farming activity is the main contributor to the farm's income ? _____

What do you pay for a unit of electricity ? (c/kWh) _____

What is the farm's average electricity bill per month ? R _____

FARMWORKER HOUSES and HOUSEHOLDS

How many farmworker dwellings are there on your farm ?

Total	With Electricity	With Piped Water	Both

How many people in total (adults and children) live in farmworker dwellings ? _____

What is the average monthly income of a farmworker household ? R _____

WORKER HOUSEHOLD ELECTRICITY PROVISION

Are any workers' houses electrified ? If all, answer questions A; if none, questions B; if some, both A and B.

A.1 What was your total initial cost of providing workers with electricity ? R _____

A.2 What is the average monthly cost of worker electricity per household ?

Cost To You: R _____ To Workers: R _____

A.3 How many of the electrified dwellings use each of the itemised appliances ?

Lights	Stove	Kettle	Fridge	Geyser	Heater	Radio	TV

A.4 Did you subsidise the purchase of appliances ? If yes, how much per household ? R _____

A.5 What is the most significant impact of worker dwelling electrification Please comment over the page.

B.1 What is the spatial layout of non-electrified worker dwellings ?

If clustered fill in Frame I; if spread-out Frame II; if both Frame I and II.

FRAME I: Clustered

Number of clusters on your farm

Average number of dwellings in each cluster

Average distance between dwellings in a cluster in metres

Average distance between clusters in metres

Shortest distance to an electricity supply point in metres

FRAME II: Spread-out

Number of spread-out dwellings

Shortest distance between two dwellings in metres

Longest distance between two dwellings in metres

Shortest distance to an electricity supply point in metres

B.2 Would you support a programme to electrify workers' dwellings ? _____

B.3 * How much would you contribute to the initial cost of electrification per house ?

Nothing	R100	R250	R500	R750	R1000	R1200	R1500
---------	------	------	------	------	-------	-------	-------

B.4 How much would you contribute towards the purchase of appliances / household ? R _____

B.5 How much would you give towards the monthly cost of electricity use / household ? R _____

B.6 Are you aware of tax benefits and financial assistance available for electrification ? _____

**VRAELYS VIR 'N OPNAME VAN PLASE EN PLAASWERKERS SE HUISHOUELIKE ENERGIE VOORSIENING
OP GEËLECTRIFISERDE PLASE IN SUID - AFRICA**

Opdrag: 1) Skryf antwoorde in beskikbare ruimte. 2) By * vrae, dui toepaslike blok/blokke met 'n X aan.

Die PLAAS en ELEKTRISITEIT

Wat is die naam van u plaas en distrik? _____

Hoe groot is die plaas in hektaar? _____

Watter boerderybedryf dra die grootste by tot u plaas se inkomste? _____

Wat betaal u per elektrisiteitseenheid? (kWh) _____

Wat is die plaas se gemiddelde maandelikse elektrisiteitsrekening? R _____

PLAASWERKERS se HUIS en HUISHOUDINGS

Hoeveel werkershuise is daar op u plaas?

Total	Met elektrisiteit	Met Lopende Water	Albei

Wat is die somtotaal van mense (volwassenes en kinders) wat in die huise woon? _____

Wat is die gemiddelde maandelikse inkomste per werkershuishouding? R _____

ELEKTRISITEITVOORSIENNING vir WERKERSHUISE

Is u werkershuise geëlektrifiseer? Indien almal, antwoord A; indien geen, afdeling B; indien sommige, beide A en B.

A.1 Wat was die totale aanvanklike koste van dië elektrifisering? R _____

A.2 Wat is die gemiddelde maandelikse koste van elektrisiteit per werkershuis?

Koste aan U: R _____ Aan Werkers: R _____

A.3 Hoeveel geëlektrifiseerde werkerswonings gebruik die volgende toestelle?

Ligte	Stoof	Ketel	Yskas	W/W Tenk	Verwarmer	Radio	TV

A.4 Het u bygedra tot die aankoop van toestelle? Indien ja, hoeveel per huishouding? R _____

A.5 Wat is die hoofresultaat van werkershuis elektrifisering? Lewer kommentaar agterop asseblief.

B.1 Hoe is nie-geëlektrifiseerde werkershuise uitgelê?

Indien in groepe gebruik Raam I; indien versprei, Raam II; indien albei, Raam I en II.

RAAM I: Groepe

Aantal groepe huise op u plaas

Gemiddelde aantal huise in elke groep

Gemiddelde afstand tussen huise in elke groep in meter

Gemiddelde afstand tussen groepe huise in meter

Afstand na die naaste

elektrisiteitsvoorsieningspunt in meter

RAAM II: Versprei

Aantal verspreide huise

Korste afstand tussen twee huise in meter

Verste afstand tussen twee huise in meter

Afstand na die naaste elektrisiteitsvoorsieningspunt in meter

B.2 Sou u 'n program om werkershuise te elektrifiseer ondersteun? _____

B.3 Hoeveel sou u bydra tot die aanvanklike elektrifiseringskoste per huis?

Niks	R100	R250	R500	R750	R1000	R1200	R1500

B.4 Hoeveel sou u bydra tot die aankoop van toestelle per huishouding? R _____

B.5 Hoeveel sou u bydra tot die maandelikse koste van elektrisiteit per huishouding? R _____

B.6 Is u bewus van belastingvoordele en finansiële bystand vir elektrifisering? _____

Income levels of farmworker households

1. Introduction

A comprehensive literature search has revealed relatively little information on farmworkers' incomes. Information has been obtained from the Rural Foundation, the Central Statistical Service, the Farmworkers Resource and Research Project and research reports by Moller, Lieberman, Gandar and Jooste.

Farmworkers are paid for their labour in both cash and in other forms of remuneration. There is a large variation in the monthly cash incomes of worker households. These depend on amongst others, the extent of worker's skill, the value of payments in kind and the type of ownership and profitability of the farm. In general better wages are found amongst workers on crop rather than livestock farms and it is also apparent that coloured workers are on the whole better paid than black workers.

Payments in kind include a value placed on accommodation and land use as well as rations which often include some form of free energy. The tradition of remunerating farmworkers with payment in kind is a system which is open to abuse and which has undoubtedly been used as an excuse for low wages.

2. Tables

Table 1 gives the Central Statistical Services average total monthly remuneration of regular farmworkers, including cash wages and the value of payments in kind.

Table 1: Total monthly remuneration received by farmworkers

Region	Average remuneration/worker/month		
	Cash	Other	Total
West Cape	R 142	R 35	R 177
North Cape	R 64	R 33	R 97
East Cape	R 68	R 37	R 105
Orange Free State	R 80	R 43	R 123
Natal	R 113	R 38	R 151
East Transvaal	R 100	R 33	R 133
North Transvaal	R 79	R 27	R 106
S&C Transvaal	R 99	R 35	R 134
West Transvaal	R 64	R 30	R 94

(CSS 1988)

The value of payments in kind is similar for all regions, between R27 and R43. Generally, in regions where workers receive a lower cash wage (between R64 to R80), the value of payments in kind are about 50% of the cash wage. In regions where cash wages are higher (R99 to R142) the value of payments in kind is about 30% of the cash wage.

Moller (1986) reported that the median per capita income of farmworkers is substantially lower than that of other groups, Table 2.

Table 2: Estimated median per capita income per month in rands

Rural	White Farm	Townships	Shacks
R 25	R 12	R 52	R45

(Moller 1985:25)

These figures are substantially lower than those provided by the Rural Foundation, Table 3.

Table 3: Estimated median per capita income per month in rands

Region	Income R / month
West Cape	R 130.97
North Cape	R 45.96
East Cape	R 45.11
Orange Free State	R 26.90
Natal	R 84.55
East Transvaal	R 61.01
North Transvaal	R 61.40
S&C Transvaal	R 46.46
West Transvaal	R 28.66

(Rural Foundation 1990)

The difference in the remuneration paid to coloured and black workers given by Lieberman (1987:22) is shown in Table 4, and the difference in cash wages paid to coloured and black farmworkers according to region in Table 5 Lieberman (1987:21).

The value of rations is the same for both groups, but coloureds receive a cash wage that is about 30% higher. From Table 5 it can be seen that this difference is reflected in all four provinces.

Table 4: Remuneration received by coloured and black farmworkers

Remuneration	Coloured Employee	Black employee
Cash Salary	R 70	R 44
Ration Value	R 19	R 19
Total	R 89	R 63

(Lieberman 1987)

Table 5: Regional variations in cash wages received by coloured and black farmworkers

Region	Rands / month	
	Coloured Workers	Black Workers
Cape	90	70
OFS	70	60
Tvl	95	70
Natal	210	70

(Lieberman 1987)

Table 6 Lieberman (1987:21) shows the changes in farmworkers remuneration from 1980 to 1985.

Table 6: Cash wages and rations all employees from 1980 to 1985

Year	Rands / month		
	Cash	Rations	Total
1980	36	10	46
1981	44	14	48
1982	no data	-	-
1983	60	16	76
1984	no data	-	-
1985	66	24	86

(Lieberman 1987:21)

The increase in both the cash wage and the value of rations over the five year period is in the region of 50%.

The remuneration received by farmworkers and families according to the Gandar study is given in Table 7.

Table 7: Earnings of farmworkers and farmworker households

Earnings	Natal	Transvaal
Mean wage / month	R 204	R 213
Mean earnings: casual workers /family /month	R 2.93	R 5.90
Cash income / family / month	R 343	R 314
Non-farm cash income / family / month	R 65	no data
Total cash income / family / month	R 407	no data
Rations R equivalent / family / month	R 53	R 108

(Gandar 1991:7)

Household incomes given in the Jooste report are shown in Table 8.

Table 8: Household monthly incomes

Income Rands	Percentage households
Less than R200	10
200 to 399	23
400 to 599	27
600 to 799	20
800 to 999	13
1000 and more	6

(Jooste 1987:5)

Gandar's (1991) study indicates that the farmworker household income is in the region of R350 and the Jooste (1987) study shows that the income of most farmworker households, is between R200 and R800.

The minimum and maximum wage paid to workers Gandar (1991:7), minimum and maximum farmworker household income (Authors survey), and the minimum and maximum wages according to region and sector (FFRP), are presented in Table 9.

Table 9: Minimum and maximum cash wages in rands

Sector	Region	Minimum Wage / R	Maximum Wage / R
Black Workers	Natal / W&E.Tvl	70	700
Households	All regions	60	2000
Maize	Tvl / OFS	100	150
Livestock	All regions	30	100
Fruit	E.Tvl / E.Cape	150	220
Vegetables	E.Tvl / W.Tvl	120	150
Cotton	N.Cape / OFS	120	180

The distinction between casual and permanent workers is not always clear cut. Some casual workers work full-time although they are paid on a very low daily rate such as R1.50 to R10.00, but usually in the region of R3 to R4 (Gandar 1991:8).

Gandar found that the payment of unskilled labour was in the range of R100 to R200 per month.

There are inconsistent reports about whether the wages of farmworkers are increasing or decreasing. Marcus (1989:183) states that the wages of unskilled labourers have declined both in absolute terms and relatively to other sectors since 1960. Since the mid-eighties farm wages increased by about 2% per year in absolute terms (Robertson 1988:79).

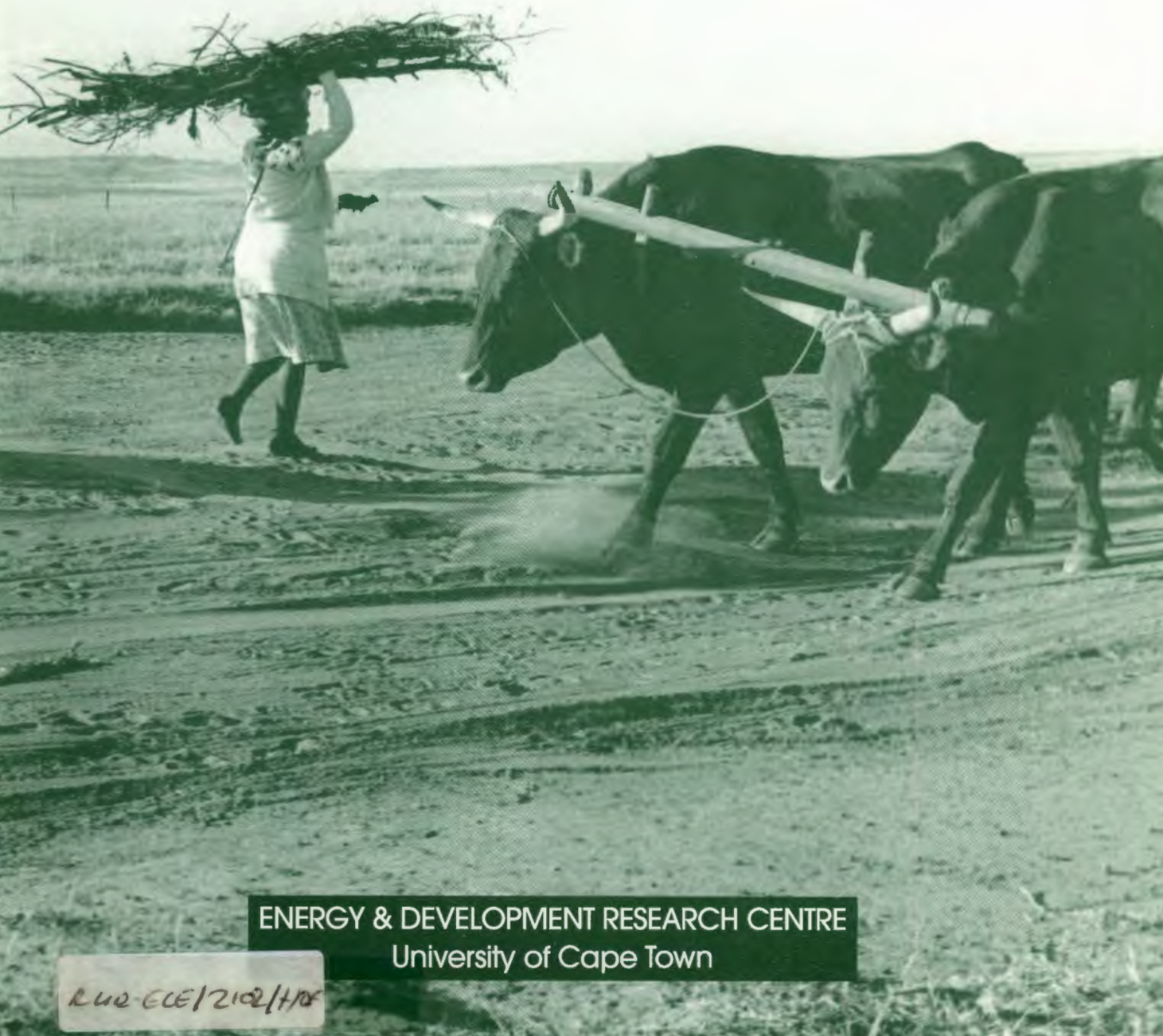
The two findings indicate that there is a widening gap between low paid unskilled labour, and better paid skilled and semi-skilled farmworkers.

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Energy usage by farmworker households on commercial farms in South Africa

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