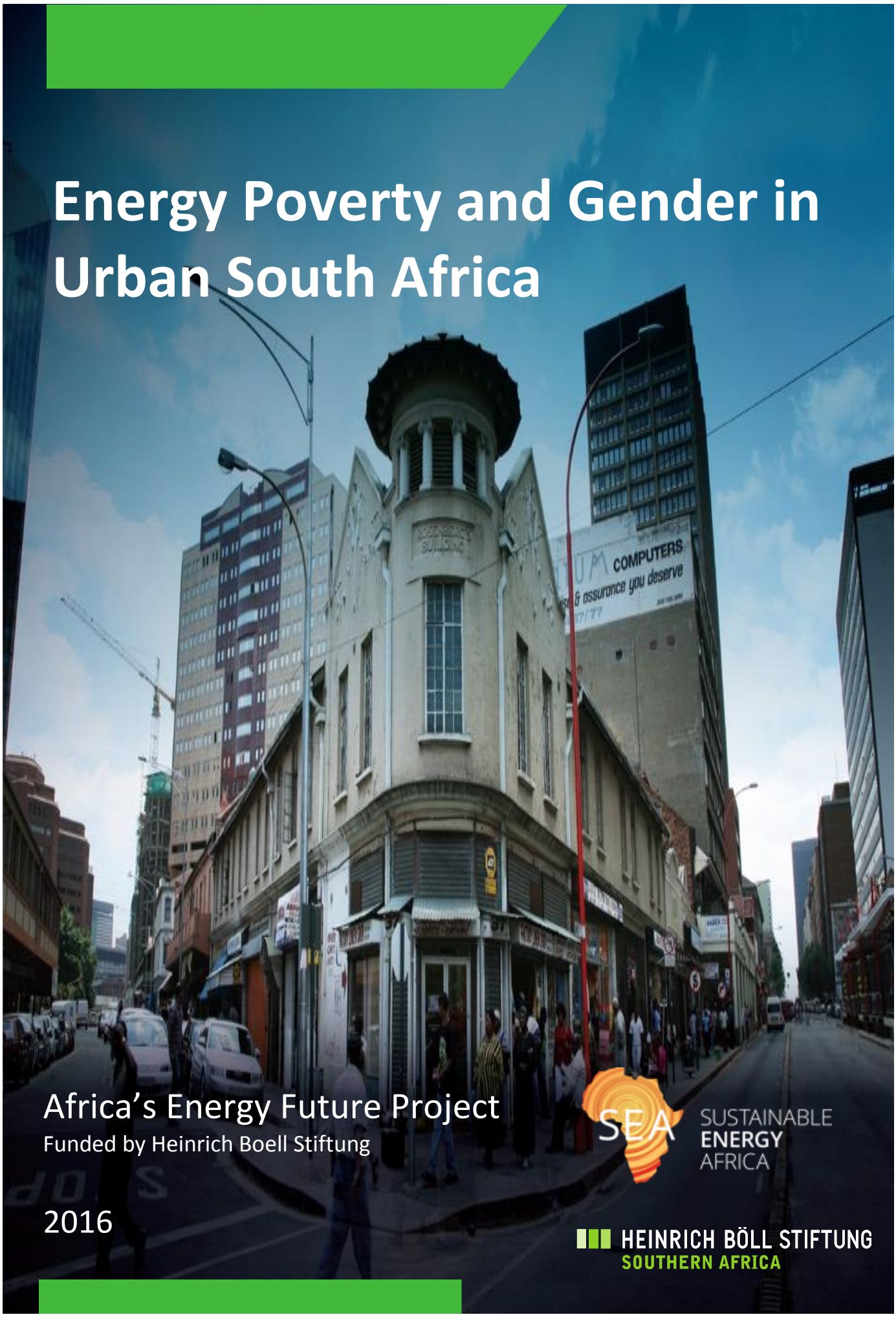
Energy Poverty and Gender in Urban South Africa



Africa's Energy Future Project

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SEA SUSTAINABLE ENERGY AFRICA

HEINRICH BÖLL STIFTUNG SOUTHERN AFRICA

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1. Introduction

Twenty three years after democracy, South Africa continues to experience and grapple with the challenges of poverty. Although poverty has decreased since 1994, more than 20 million people (almost half of the population) were reported to be living in poverty in 2011 (StatsSA, 2014) with at least 20% living in extreme poverty (Budlender *et al*., 2015). The most striking growth in poverty has been evident in the urban areas (Leibbrandt *et al*., 2010), as the rural poor move to the cities.

Poverty has left people living in conditions of deprivation, without access to basic services such as water, sanitation and energy. Several national programmes, notably the Reconstruction and Development Programme (RDP) has built close to three million homes to date (Wilkinson, 2015; Wilkinson, 2016), and the Integrated National Electrification Programme (INEP) increased the rate of electrification from 36% in 1994 to the current 87%[1] (DoE, 2016), have made notable inroads to alleviating poverty. However, poverty still persists and close to half of the population is unable to afford modern energy – an essential requirement for human development.

In order to successfully address the energy issues of the poor, it is essential that the energy use patterns of low income households are well understood. This is so that energy policy interventions which are aimed at enhancing the welfare of low-income households through improved access to clean, safe, reliable, convenient and affordable energy services, can be appropriately informed and targeted.

This report presents an update on the current state of energy poverty in South African cities and is a follow up to the 'Tackling Urban Energy Poverty in South Africa' report that was published in 2014 by Sustainable Energy Africa. Importantly, it also explores the energy poverty-gender nexus in the urban environment, an aspect that is largely overlooked. The report is structured such that Part A addresses some of the key factors influencing energy poverty and presents the manifestations of urban energy poverty, followed by Part B which reviews the impact of key pro-poor energy policies. Taken together, the document aims to further develop suitable gender-sensitive energy solutions for urban municipalities.

Access to clean, adequate and affordable modern forms of energy is vital for human well-being and development (UNDP, 2000). The International Energy Agency asserts that access to modern energy is directly influenced by income levels. The lack of or limited access to modern energy results in the use of fuels such as wood, coal, candles and paraffin, all of which pose severe health threats and safety risks. Women and children are particularly vulnerable as they use these unsafe fuels for cooking, heating and cleaning – a role typically held by females (Clancy, 2003). Furthermore, in the context of climate change, access to modern energy is important for building resilience to the impacts of extreme weather events such as heat waves and extreme cold, and decreases household reliance on traditional energy forms such as firewood as it becomes scarce.

[1] This is an official figure and is based on the proportion of people using electricity for lighting as a proxy for electrification. It includes approximately 1.1 million households that are not metered. If non-metered connections are taken into consideration, then the actual electrification figure is closer to 77%.

There are several definitions of e*nergy poverty* (Trinomics, 2016). The United Nations Development Programme defines e*nergy poverty* as a lack of access to clean, safe and affordable energy. In South Africa, the expenditure based measure is typically used whereby when households spend more than 10% of their income on energy, they are deemed energy poor (DoE, 2013). Using this measure, 47% of households in South Africa are considered energy poor (DoE 2013). On average, South Africans spend 14% of their income on energy, however, in the poorest income quintile, this figure is 27% (DoE, 2012).

2.1. Factors influencing urban energy poverty

Energy poverty is complex and multi-faceted issue and is driven by a diverse range of social and economic factors such as rising electricity prices, household incomes, energy inefficient homes to name a few. To do justice to developing energy poverty solutions, these issues need to be well understood. The key root challenges are discussed below.

2.1.1. Energy burden

Low-income households are burdened with a high share of energy related costs to meet their basic energy needs which include cooking, water heating, space heating and lighting, the former three being energy intensive i.e. they use a large amount of energy.

Additionally, poor households, including those living in government delivered RDP homes built prior 2014, lack ceilings and other forms of thermal insulation. This lack of insulation is linked to poor health and severe thermal discomfort due to poor thermal protection against extreme temperatures requiring space heating on extremely cold days.

To add to this energy burden, poor households, including the former RDP houses are typically located on the margins of cities[2] leaving the poor far from places of work and social activities. This has resulted in high energy costs associated with travel/commuting.

2.1.2. Electricity costs

While the government's award-winning electrification programme, INEP has resulted in 87% of households having access to electricity, affordability remains a challenge, as poor households struggle to bear the cost of electricity for an entire month (SEA, 2014; Vermeulen, 2016). This results in households resorting to traditional forms of energy such as wood, candles, paraffin, etc. to meet their basic energy needs, which are perceived to be cheaper because they can be bought in smaller quantities than electricity. The use of firewood and paraffin for cooking and lighting respectively, are generally not cost efficient compared to using modern fuels for the same end-uses (Barnes *et al*., 2005). As a result poor households tend to spend a higher proportion of their income on energy services than those households with more resources (Reddy, 2008). Close to 50% of households in South Africa use electricity in combination with other fuels such as firewood, paraffin and gas for cooking due to affordability (DoE, 2013).

[2] Due to South Africa's history of segregated spatial-land distribution policies under Apartheid, poor households are still located on the periphery of cities. This still persists as land is cheaper on the outskirts of the city, and is where government has built low-cost housing for the poor.

2.1.3. Urbanisation

Approximately 64% of the country is urbanised of which 40% are located in the eight metropolitan municipalities (StatsSA, 2011). Urbanisation is largely as a result of rural-urban migration as people move to the cities in search of employment and access to basic services. According to StatsSA, urban centres are witnessing rapid population growth, growing on average at a rate of 2.3% per annum for metros and at 2% per annum for secondary cities (StatsSA, 2001 and 2011) (Table 1). Urbanisation is projected to reach 70% by 2030 and 80% by 2050 (NPC, 2011; SACN, 2011; DCOG, 2013) (Figure 1).

Table 1: Population and household growth in South Africa's metros (largest cities) over time

METROPOLITAN MUNICIPALITY	POPULATION					HOUSEHOLDS		
	Number (2001)	**% of national (2001)**	**Number (2011)**	**% of national (2011)**	**Annual growth (2001-2011)**	**Number (2001)**	**Number (2011)**	**Annual growth (2001-2011)**
Buffalo City	704 855	1.6%	755 200	1.5%	0.7%	191 958	223 568	1.5%
City of Cape Town	2 892 243	6.5%	3 740 026	7.2%	2.6%	759 484	1 068 572	3.5%
City of Johannesburg	3 226 055	7.2%	4 434 827	8.6%	3.2%	1 006 910	1 434 855	3.6%
City of Tshwane	2 142 322	4.8%	2 921 488	5.6%	3.2%	606 025	911 535	4.2%
Ekurhuleni	2 481 762	5.5%	3 178 470	6.1%	2.5%	745 576	1 015 465	3.1%
EThekwini	3 090 122	6.9%	3 442 361	6.6%	1.1%	786 746	956 713	2.0%
Mangaung	645 440	1.4%	747 431	1.4%	1.5%	185 014	231 921	2.3%
Nelson Mandela Bay	1 005 779	2.2%	1 152 115	2.2%	1.4%	260 799	324 292	2.2%
Total Metro	**16 188 578**	**36.1%**	**20 371 918**	**39.4%**	**2.3%**	**4 542 512**	**6 166 921**	**3.1%**
Total Secondary Cities	**6 472 450**	**14.4%**	**7 882 295**	**15.2%**	**2.0%**	**1 671 159**	**2 291 223**	**3.2%**
National	**44 819 777**	**100.0%**	**51 770 561**	**100.0%**	**1.5%**	**11 205 706**	**14 450 162**	**2.6%**

Source: StatsSA, 2001, 2011.

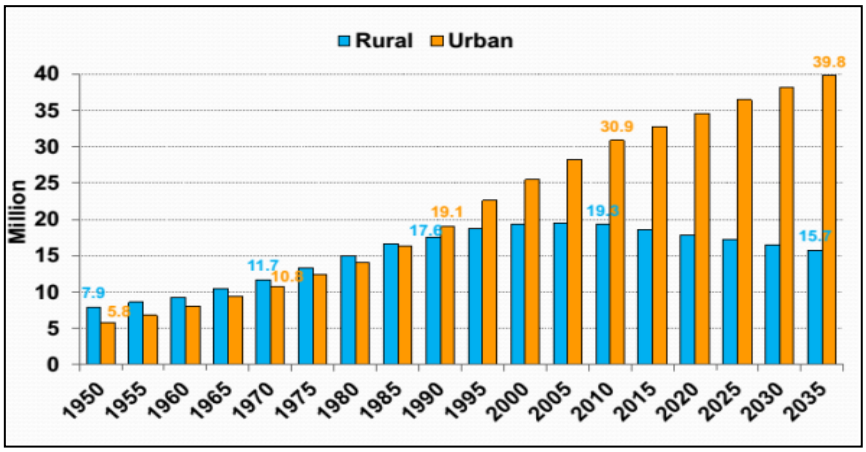

Figure 1: Historical and projected rural-migration in South Africa

Source: Institute for Futures Research, University of Stellenbosch, 2013

In contrast to developed countries where urbanisation has been linked to improved economic growth in cities, in South Africa, political and economic challenges and spatial segregation have prevented sustained and inclusive growth (Turok and Borel-Saladin, 2013). This division has produced urban centres that are exceedingly unequal (OECD, 2015), with a substantial

number of people remaining in poverty without formal housing and access to basic services, despite improvements in the provision of housing and basic services.

According to Stat SA, in 2014, 13.1% of urban households were informal[3], slightly less than 13.6% recorded in 2002. While a decline in informality is positive, informality is nevertheless still growing. This clearly indicates that despite improved housing and delivery, government simply cannot keep pace with rapid urbanisation. The housing backlogs remain at 2.1 million households since 2013 (Creamer News, 2016; Ndenze, 2013). It is also important to note that experts in the field indicate that informality and housing backlog are substantially underestimated (Misselhorn, 2010; Huchzermeyer, 2010, Tissington, 2011).

2011 Census data reveals that metropolitan cities are experiencing a greater increase in the growth of informality relative than secondary cities, (Table 2) (StatsSA, 2001 and 2011).

Table 2: Growth of informality in South Africa's major cities 2001-2011

METROPOLITAN MUNICIPALITY	INFORMAL HOUSEHOLDS				
	Number (2001)	**Number (2011)**	**% of total households (2001)**	**% of total households (2011)**	**Annual growth (2001-2011)**
Buffalo City	55 056	49 790	28.7%	22.3%	-1.0%
City of Cape Town	142 981	218 780	18.8%	20.5%	4.3%
City of Johannesburg	212 693	249 823	21.1%	17.4%	1.6%
Ekurhuleni	213 334	218 259	28.6%	21.5%	0.2%
EThekwini	150 390	149 289	19.1%	15.6%	-0.1%
Mangaung	43 811	32 747	23.7%	14.1%	-2.9%
Nelson Mandela Bay	59 795	38 861	22.9%	12.0%	-4.2%
Total Metro	**1 017 542**	**1 121 563**	**22.4%**	**18.2%**	**1.0%**
Total Secondary Cities	**365 621**	**390 027**	**21.9%**	**17.0%**	**0.6%**
National	**1 836 231**	**1 962 731**	**16.4%**	**13.6%**	**0.7%**

Source: StatsSA, 2001, 2011.

The proliferation of informality is likely to persist for many years to come, especially if the levels of national unemployment, which currently stand at 27% - using the official definition and 36% - using the expanded definition[4], continue on the upward trajectory. Similar figures are mirrored in the metropolitan municipalities (StatsSA, 2016a). While some municipalities are showing a decline in informality, in general, Gauteng (Johannesburg, Ekurhuleni and Tshwane) continues to be experience high numbers of informal households due to high rates of urbanisation and unemployment.

In summary, energy poverty can also be understood in terms of dwelling types, as follows:

1. Formalised low-cost housing- energy poverty is as a result of unaffordability but also includes times when grid quality is low because of an over-burdened system due to illegal connections.
2. Backyard dwellings- these are informal households located in the backyards of formal properties. Backyard dwellers typically rely on their landlords, who tend to

[3] Informal dwellings include backyard dwellings located on the same property as formal households.
[4] The expanded unemployment rate refers to those who are unemployed but not looking for work.

resell electricity at exorbitant prices, making it unaffordable. Furthermore, backyarders are unable to access any of the pro-poor subsidies such as the Free Basic Electricity (FBE) subsidy, subsidized tariffs or the Inclining Block Tariff (IBT).

3. Informal dwellings- typically do not have access to electricity, unless they connect illegally.

2.2. Manifestations of energy poverty

As a result of the complex poverty dynamics, households that cannot afford to buy electricity thus resort to cheaper energy forms, usually using a range of fuels and technologies which are unsafe. Common fuels include coal, wood, paraffin and candles. This pattern of fuel use by low-income households is referred to as 'Multiple Fuel Use' (MFU) which is best described as a suite of energy sources, dependent on budget, need, availability and preferences (i.e. a complexity of social and economic factors determine household fuel use) (Masera *et al*., 2000; DoE, 2012). Figure 2 below illustrates the prevalence of MFU in low-income households in South Africa, even when electricity is present.

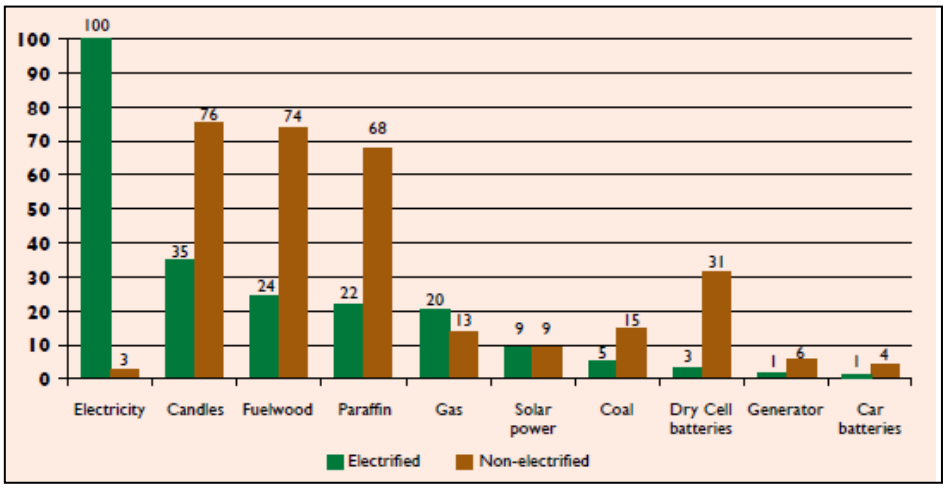

Figure 2: Multiple fuels used by electrified and unelectrified poor households in South Africa

Source: DoE, 2013

Energy poverty is particularly widespread in informal settlements including those living in backyard shacks, due to lack of access to electricity and severe poverty (affordability).

Table 3 below shows that even when electricity is available in informal settlements, MFU is common with paraffin and candles being used extensively.

Table 3: The variation in energy use between urban formal and informal households

	Electricity	Candles	Firewood	Paraffin	Gas	Solar power	Coal	Dry cell batteries	Generator	Car batteries	Unweighted N
GEOGRAPHIC LOCATION											
Urban formal	99	36	11	18	24	11	4	4	1	1	1552
Urban informal	83	38	17	47	7	7	13	16	1	2	223

Source: DoE, 2013

Table 4 highlights the increasing use of electricity to meet household needs in metropolitan municipalities, as is consistent with increased access to electricity over time. However, the use of electricity for lighting, cooking and heating is varied – while on average 89% of these households use electricity for lighting, only 85% use it for cooking and only 70% for space heating. This is in large part due to affordability when energy intensive end-uses are required.

Table 4: Electricity use to meet basic household energy needs

Households that use electricity for…	Lighting			Cooking			Space Heating		
	1996	**2001**	**2011**	**1996**	**2001**	**2011**	**1996**	**2001**	**2011**
Buffalo City	47%	63%	81%	42%	43%	74%	39%	36%	41%
City of Cape Town	87%	89%	94%	80%	80%	88%	75%	75%	63%
City of Johannesburg	85%	85%	91%	80%	79%	87%	79%	77%	82%
City of Tshwane	77%	80%	89%	71%	71%	84%	70%	69%	74%
Ekurhuleni	75%	75%	82%	64%	66%	79%	60%	62%	66%
EThekwini	74%	80%	90%	71%	72%	86%	69%	72%	76%
Mangaung	61%	85%	91%	52%	61%	88%	49%	54%	53%
Nelson Mandela Bay	71%	75%	90%	65%	65%	86%	60%	59%	54%
Metro average	**77%**	**81%**	**89%**	**71%**	**72%**	**85%**	**68%**	**68%**	**70%**
National average	**58%**	**70%**	**85%**	**47%**	**51%**	**74%**	**44%**	**49%**	**59%**

Source: StatsSA 1996, 2001, 2011

StatsSA regularly publish data[5] on household energy fuel use highlighting trends and the persistent problem of unsafe fuels. Despite this, the full extent of MFU is still unclear as these surveys only capture the primary source of fuels. MFU data is crucial for understanding the depth of energy poverty. Whilst 87% of the population has access to electricity, the continued

[5]StatsSA publishes the General Household Survey annually and the Community Surveys on a frequent basis.

reliance on energy carriers such as firewood, paraffin and candles have adverse potential impacts on health, children's education, productivity, mental well-being, and environmental degradation (DEA, 2013).

2.3. The urban-energy-gender nexus

2.3.1. Gender inequality

Gender equality is important for the realisation of equal rights, opportunities including economic opportunities, and power and influence in society. Globally, it is acknowledged that women are the disadvantaged on the gender balance scale, and this has ultimately resulted in poverty imbalances (UNFPA, 2016). The importance of gender equality in the global fight against poverty has been increasingly recognised in recent years (Department of Women, 2015). South Africa has a constitution that supports women rights and empowerment and is intended to ensure that there is gender equality both economically and socially. While the South African Constitution supports women empowerment, few programmes prioritise women resulting in women still lagging behind. This is exemplified in education, employment and income, property ownership, health and access to basic services such as electricity and water (Department of Women, 2015, StatsSA, 2013a).

2.3.2. Gender inequality and urban energy poverty

The urban-energy-gender nexus aims to understand the role of women within the urban context, with regard to energy access, household energy decision-making and how this influences energy choices and behaviours, and influence in the household and society on energy matters (Clancy *et al*., 2003). This nexus however, is not well understood as there is little to no research and empirical evidence in this respect (Clancy *et al*., 2003). In South Africa, as well as other developing countries, research has largely focussed on the impact of energy poverty on women living in rural areas. The noticeable dearth in research on the energy-gender dimension in the urban environment is likely due to migrant men dominating the urban poverty space until very recently (Casale and Posel, 2006). In 2011, a third of women were living in urban informal settlements, and almost half (47%) in urban formal settlements (Figure 3) (StatsSA, 2011).

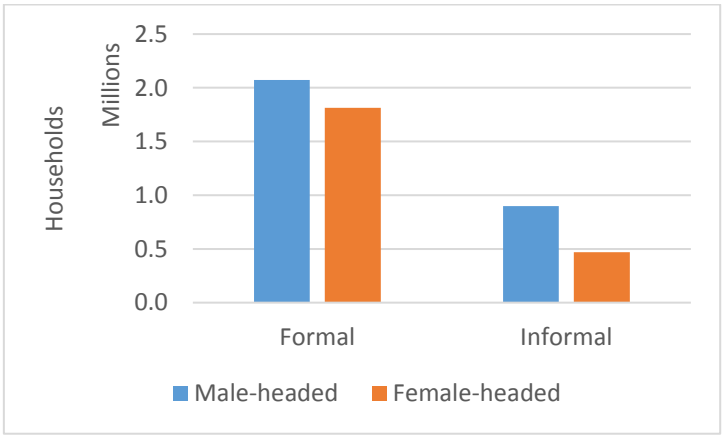

Figure 3: Dwelling type by gender in urban lower-income households nationally
Source: StatsSA, 2011

While women in urban areas have access to more opportunities than those living in rural areas, there are still barriers limiting women in the decision-making and participation. This

document intends to outline some of the energy challenges facing low-income urban women in the context of energy.

In general, energy poverty impacts women and children more severely than it does men (Barnes *et al*., 2000; Eberhard and Van Horen, 1995), because women tend to do the domestic chores of the household such as cooking, cleaning and child care (Department of Women, 2015, Clancy *et al.*, 2003). Females spend substantially more time and energy on unpaid care tasks and domestic tasks (by a factor of six with regard to care-giving, and a factor of 2 on domestic chores) relative to men (Department of Women, 2015). Therefore women typically tend to forego opportunities to actively engage in income generating and livelihood enhancing activities. Moreover, in low-income households, research shows that women generally tend to have little control over household resources and decision-making and therefore have minimal influence on energy purchases and the choice of fuels used in the household (Clancy, 2003). Thus women and children tend to endure increased exposure to unsafe fuels and the harmful health impacts of these fuels, rendering them more vulnerable to the impacts of energy poverty than men.

Energy poverty in female-headed households is particularly severe as fewer women are employed and those that are, generally earn less than their counterparts (Department of Women, 2015). In 2011, male-headed households earned an average annual income of R126 444, while female-headed households earned almost half of this amount at R63 434. According to StatsSA (2013b), 51% of women earn no more than R2500 compared to 33% men (Table 5) (Department of Women, 2015).

Table 5: Distribution of the employed across monthly wage bands, by gender (%)

Wage bands	Female	Male	Total	Female Share
None	0.80	0.60	0.70	51.20
R1-R500	6.40	4.40	5.20	53.30
R501-R1 000	12.10	6.60	9.00	59.00
R1 001-R2 500	27.10	21.60	24.00	49.50
R2 501-R4 500	13.90	17.80	16.10	37.80
R4 501-R11 000	15.80	19.60	17.90	38.60
R11 001-R30 000	12.40	14.10	13.40	40.80
R30 000+	2.00	3.90	3.00	28.60
Refuse	9.40	11.50	10.60	39.00
Total	**100.00**	**100.00**	**100.00**	**43.80**

Source: Department of Women, 2015

Within the low-income wage bands, female-headed households are compelled to use cheaper and unsafe fuels such as coal, wood, paraffin and candles when they cannot afford electricity. This, as mentioned above, puts women and children at risk of indoor pollution and poor health. Furthermore, female-headed households are more likely not to afford household appliances such as fridges, heaters and safe and cleaner stoves.

Differing income levels between male and female-headed households also results in differences in household expenditure (

Figure 4). Male-headed households spend more annually on food, transport, housing and other expenses relative to women. Female-headed households however are shown to spend more than male-headed households on food purchases only. This may be attributed to female-headed households being larger than that of male-headed households (4.1 and 3.6 per people per household respectively) 2011 (StatsSA, 2014).

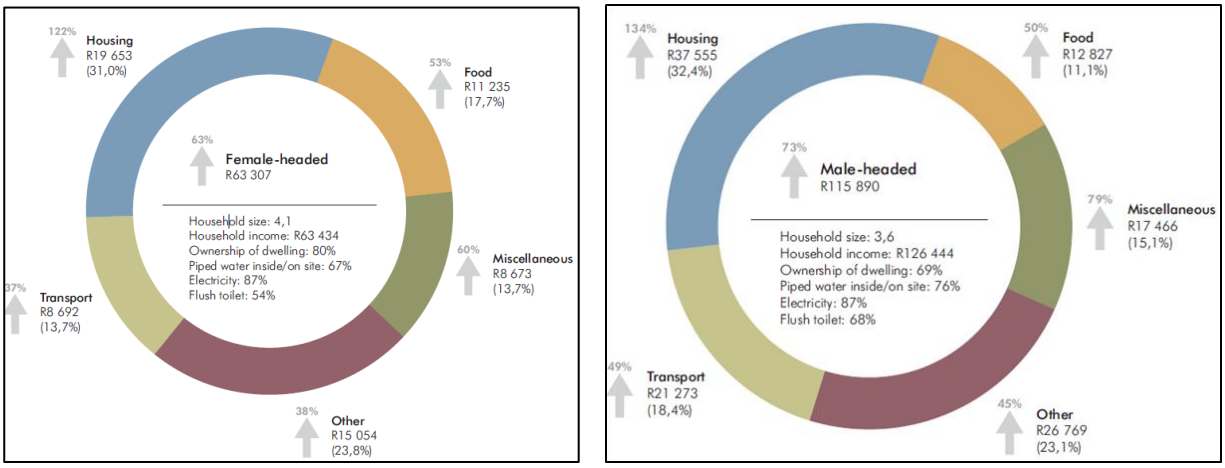

Figure 4: A comparision of annual household expenditure measured over time by gender
Source: Statistics South Africa, 2014

In the urban context, crime and in particular gender-based crime is a grave problem particularly in non-electrified informal townships. The lack of street lighting and interior lighting places women at high risk – toilets are often located a distance from the household dwelling and open public spaces without light are sites of high crime (Davis, 2013). However, statistics on gender-based crime is very difficult largely due to the nature of the crime itself (Stats SA, 2013a; South African Parliament, 2013).

2.3.3. A gendered perspective of urban low income household energy use patterns

2.3.3.1. Demographics

The following section illustrates the energy use patterns in low-income households by gender, i.e. using male and female-headed households as proxies for gender differences in decision making.

Low-income[6] households in urban areas are predominantly male-headed (StatsSA, 2011). Figure 5 shows that female- headed households constitute 45% of low income electrified households and 34% in unelectrified households in South Africa.

[6] Households that earn less than R3200 per month

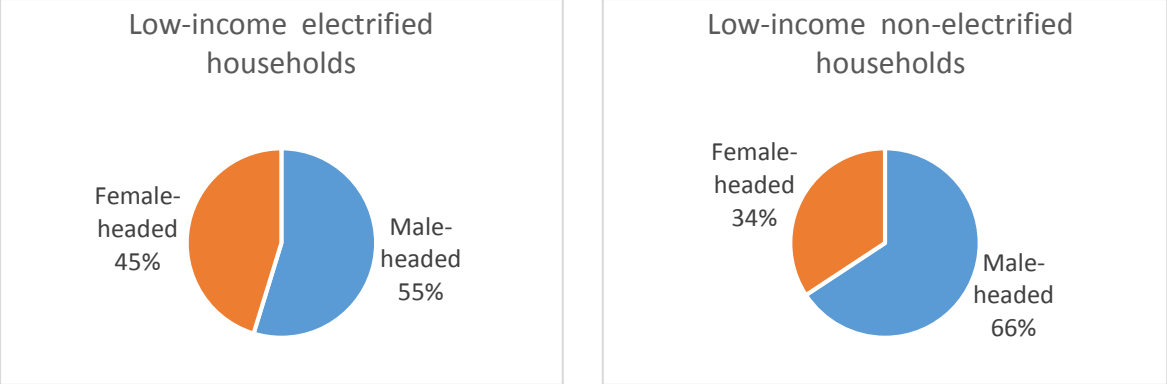

Figure 5: Percentage of female versus male- headed households in the low-income electrified and unelectrified sectors.

Source: StatsSA, 2011

2.3.3.2. Energy use patterns for main household end-uses

2.3.3.2.1. Cooking

In contrast to international research findings indicating a gender differentiation in the fuels used for cooking among low-income households, no such patterns are apparent in South Africa. 94% of both male and female-headed low income households use electricity for cooking, and gas (2%) and paraffin (2%) as alternatives. (Figure 6) (StatsSA, 2011).

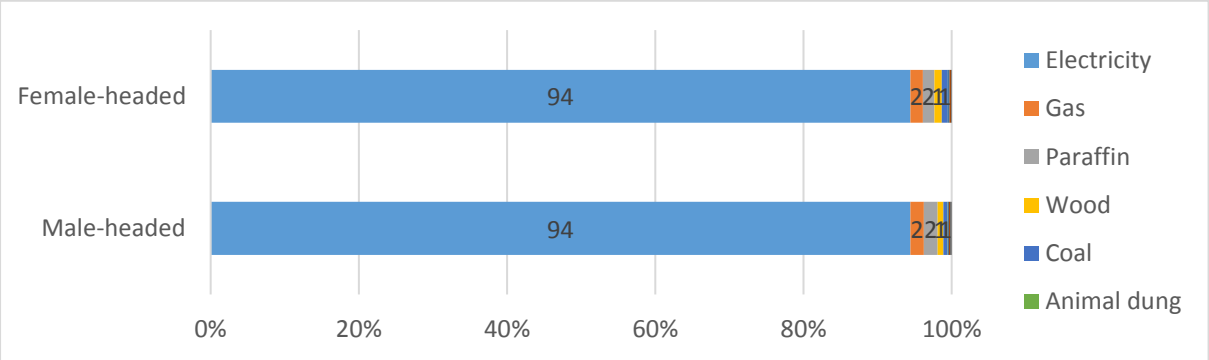

Figure 6: Main fuel used for cooking by urban lower-income electrified households nationally

Source: StatsSA, 2011

In unelectrified households, no significant gender differentiation is apparent in fuels used for cooking. While paraffin is the dominant fuel used, it is slightly more prevalent in males headed households (80%) compared to female (76%) (Figure 7) (StatsSA, 2011).

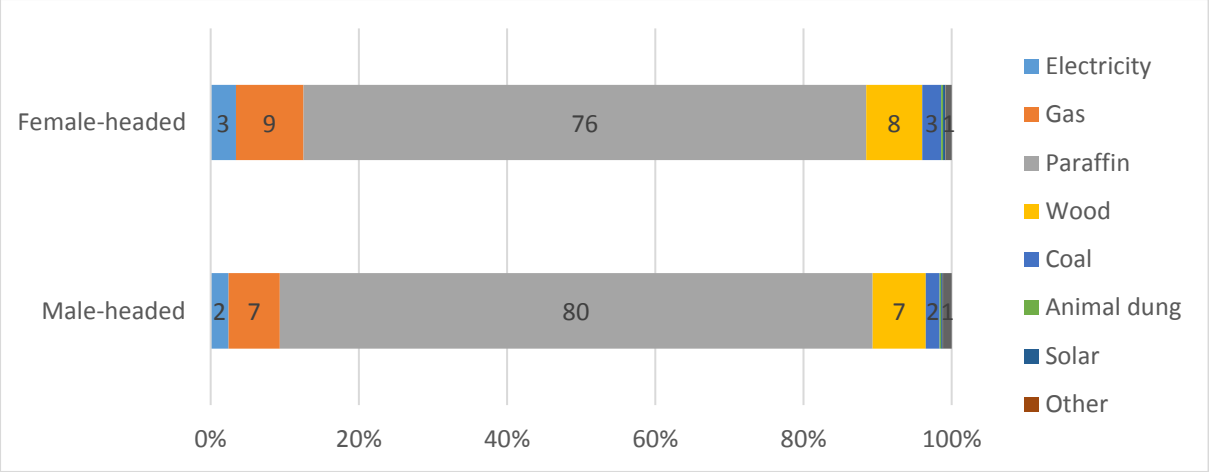

Figure 7: Main fuel used for cooking by urban lower-income non-electrified households nationally

Source: StatsSA, 2011

Energy use for cooking with respect to dwelling type reveals a larger difference relative to gender (

Table 6). As little as 40% of female headed informal households and 34% male headed informal households use electricity for cooking. This could largely attributed to access to electricity and affordability constraints experienced informal households. As discussed earlier, backyard dwellers typically have access to electricity, however, they are exposed to extremely high costs, which could explain why backyarders are resort to paraffin and other fuels. In informal households, paraffin is the main fuel used, followed by electricity. This pattern in informal households also appears to be similar along gendered lines (StatsSA, 2011).

Table 6: Urban low-income household fuel use for cooking (%)

	No and low-income								
	Electricity	Gas	Paraffin	Wood	Coal	Animal dung	Solar	Other	None
Formal									
Male-headed	89	2	6	1	1	0	0	0	0
Female-headed	91	2	4	1	1	0	0	0	0
Informal (in backyard)									
Male-headed	75	2	20	2	1	0	0	0	1
Female-headed	76	2	18	2	1	0	0	0	0
Informal (not in backyard)									
Male-headed	34	4	55	4	1	0	0	0	0
Female-headed	40	5	49	4	2	0	0	0	0

Source: StatsSA, 2011

2.3.3.2.2. Space heating

No gender differences are apparent in the use of energy for space heating. In electrified households, electricity is the primary energy source for space heating. In female-headed households, 72% of households use electricity, compared to 73% in male-headed households.

A small proportion of male-headed (14%) and female-headed (12%) households do not use any form of space heating. (StatsSA, 2011) (Figure 8).

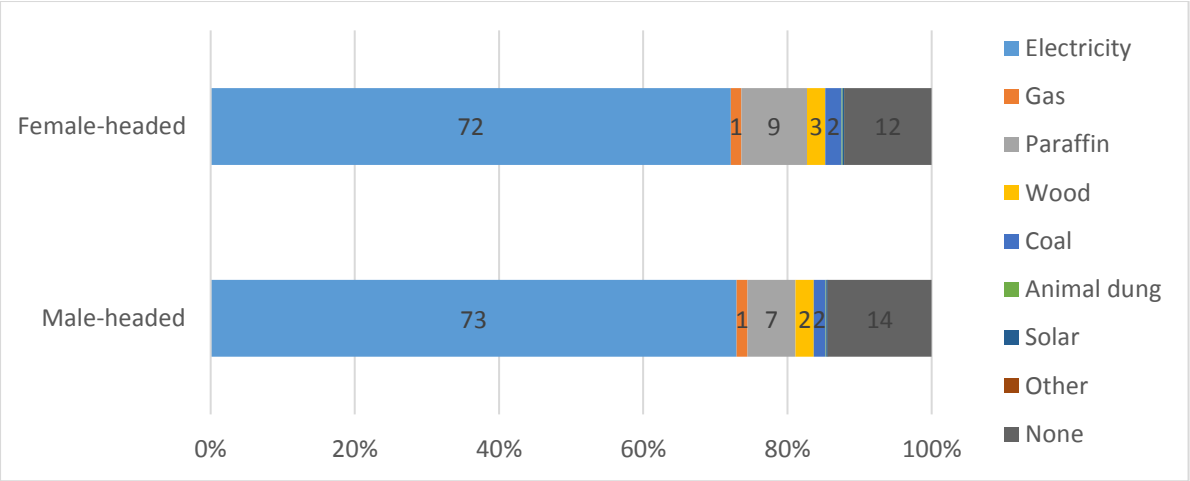

Figure 8: Main fuel used for space heating by urban lower-income electrified households nationally
Source: StatsSA, 2011

In unelectrified households, the use of paraffin for space heating is predominant and in nearly equal proportions between male-headed (41%) and female-headed households (42%). 27% of male-headed households do not space heat compared to 24% of females-headed households (StatsSA, 2011) (Figure 9).

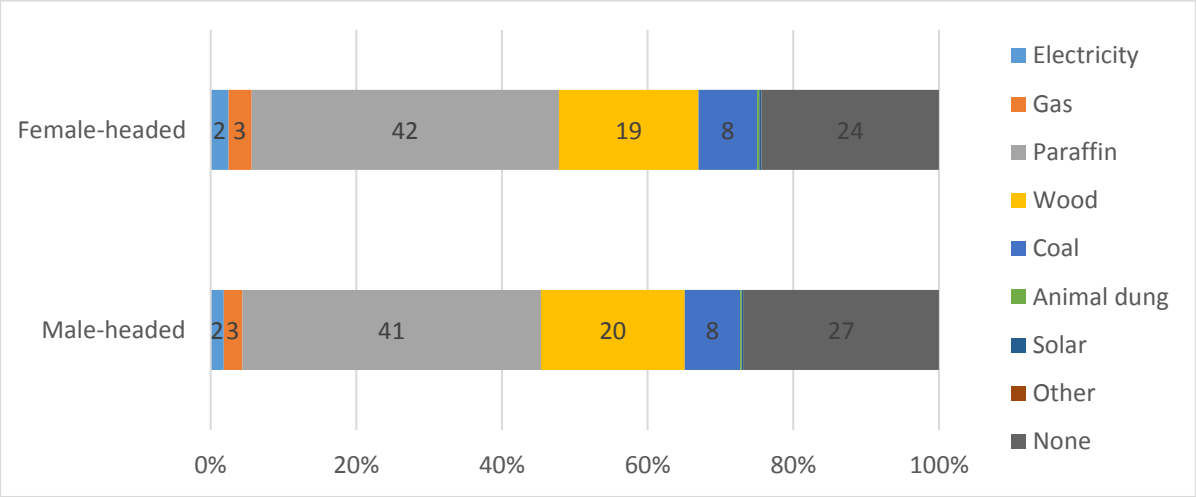

Figure 9: Main fuel used for space heating by urban lower-income non-electrified households nationally
Source: StatsSA, 2011

Again, the most notable difference was according to dwelling type (Table 7). Fuel usage is much lower due to blankets and warm clothes being used (as referred to in the 'none' category. In informal households, electricity is only used by approximately a quarter, and paraffin is again dominant.

Table 7: Urban low-income household fuel use for space heating (%)

	No and low-income								
	Electricity	Gas	Paraffin	Wood	Coal	Animal dung	Solar	Other	None
Formal									
Male-headed	70	2	8	3	2	0	0	0	14
Female-headed	71	2	10	3	2	0	0	0	12
Informal (in backyard)									
Male-headed	54	1	14	6	2	0	0	0	22
Female-headed	54	1	16	6	3	0	0	0	19
Informal (not in backyard)									
Male-headed	22	2	32	14	7	0	0	0	24
Female-headed	25	2	32	13	7	0	0	0	21

Source: StatsSA, 2011

2.3.3.2.3. Lighting

Lighting in low-income households

In general, households that have access to electricity use it for lighting (DoE, 2013). According to household energy survey by DoE in 2013, 97% of electrified households used electricity almost exclusively for lighting.

Looking across the low-income household in particular, a range of fuels are used for lighting, with majority of households (83%) using electricity for this end use (Figure 10). Figure 11 shows a slight difference in the proportion of female and male-headed households using electricity for lighting (84% and 79% respectively). It is evident that informal household rely heavily on the use candles and paraffin for illumination (Table 8). This could be attributed in part to lack of access to electricity and affordability constraints. In unelectrified households, 65% of women headed households and 68% of male-headed households use candles, complemented by paraffin, 30% and 27% respectively (Figure 12).

Candles are especially unsafe as they are known to be a leading cause of fires and associated fatalities and burns when accidentally overturned, wreaking immense devastation, particularly in dense informal settlements of crowded, improvised shacks (Panday *et al*., 2007).

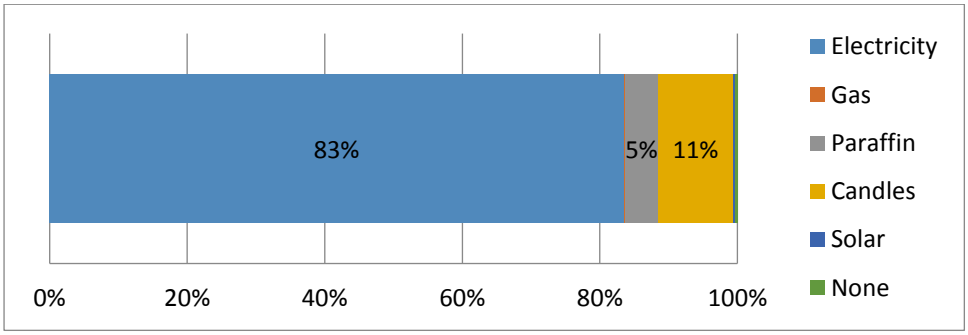

Figure 10: Main fuel used for lighting by urban lower-income households nationally
Source: StatsSA, 2011

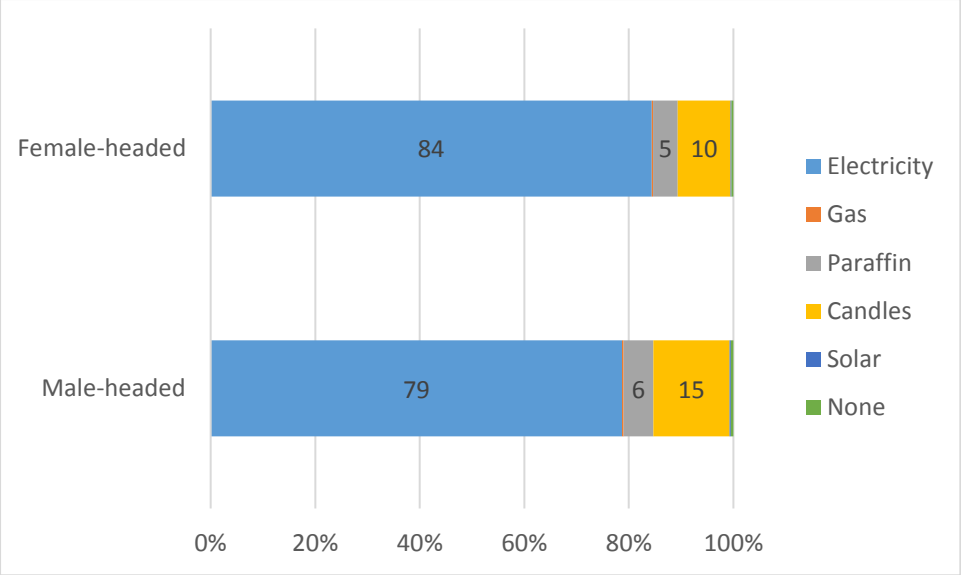

Figure 11: Main fuel used for lighting by urban lower-income households nationally according to gender
Source: StatsSA, 2011

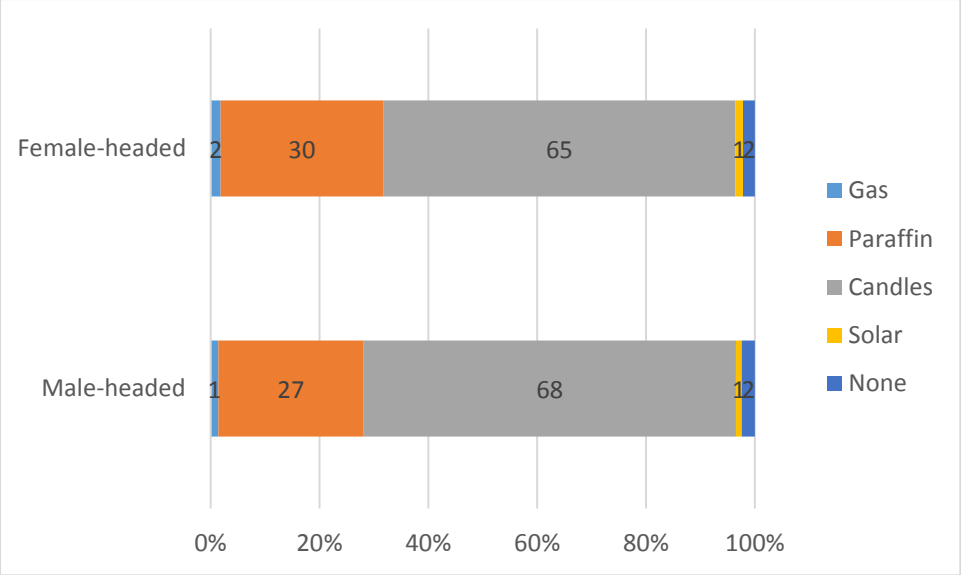

Figure 12: Main fuel used for lighting by urban lower-income unelectrified households nationally
Source: StatsSA, 2011

Table 8: Urban low-income household fuel use for lighting (%)

	No and low income					
	Electricity	Gas	Paraffin	Candles	Solar	None
Formal						
Male-headed	93	0	1	5	0	0
Female-headed	95	0	1	3	0	0
Informal (in backyard)						
Male-headed	78	0	5	16	0	1
Female-headed	80	0	5	14	0	0

Informal (not in backyard)						
Male-headed	37	0	20	42	0	1
Female-headed	42	1	20	36	0	1

Source: StatsSA, 2011

2.3.4. Conclusion

Contrary to international findings (Barnet, 2000; Clancy, 2003; Khamati-Njenga and Clancy,2003), data on the urban low-income household energy use in South African shows that there is no significant difference in the energy forms used for cooking, water heating, space heating and lighting between female and male-headed households. This is in accordance with research carried out by Reddy (2008) in South Africa and studies undertaken more recently in other developing countries (Pachauri and Rao, 2013). This is not to say that there are no gender differences in household energy use patterns. At present, there is a dearth in gender related data on how energy is used, energy preferences, times of day that energy is required, safety, appliances (affordability, access, appropriateness, etc.) including the priority given to energy relative to other basic needs. Much more details is required before any conclusions can be drawn. There needs to be greater clarity on the causal pathways and processes undertaken when energy choices and decisions are made.

The review of energy poverty in South Africa highlights the gaps to be addressed and provides some direction on how government can further improve on pro-poor energy policies, in a gender-sensitive manner. Part B of this document explores these policies and their impacts. .

3. Part B: Pro-poor energy policies

3.1. National policies

3.1.1. Macroeconomic policies

Since democracy in 1994, there have been a myriad of policies and plans to address poverty and inequality in the country. The first of these socio-economic policies was the RDP, which promoted the expansion of infrastructure development in the country, giving rise to the INEP. Following the RDP, in 1996, the Growth, Employment and Redistribution (GEAR) plan was developed to stimulate faster economic growth for the provision of social investment needs. GEAR was then replaced in 2005 by the Accelerated and Shared Growth Initiative for South Africa (ASGISA), which was in turn was replaced with the New Growth Path (GNP) in 2010. The GNP was the predecessor to the current National Development Plan (NDP) 2030. The NDP currently provides an overarching plan for the country, advocates the need to grow the economy, create jobs, and at the same time substantially reduce inequality and poverty. The NDP also speaks to greenhouse gas emissions and the need to transition to a more sustainable path, together with tackling inefficient and unjust spatial planning and human settlements. The NDP is now a key master plan for the country and underpins all policies and frameworks into the future. The Back to Basics Programme spearheaded by Department of Cooperative Governance and Traditional Affairs (CoGTA) supports the NDP by increasing the capability of municipalities to better serve their communities. The approach includes among others supporting service delivery and as such comprises infrastructure maintenance including electricity as well as the provision of FBE and maintenance of the indigent register (CoGTA, 2014).

3.1.2. National pro-poor energy policies

South Africa has a number of pro-poor policies specifically targeted at energy which began with the adoption of the White Paper on Energy Policy in 1998. The policy provides guidance on energy security for all through affordable energy sources, improved governance and a better economy. Subsequent policies have been developed to assist in the implementation of the White Paper. These have been implemented and revised over time. These policies are discussed below.

3.1.2.1. Integrated National Electrification Plan (INEP)

The INEP is a programme aimed at providing universal access to electricity. The INEP programme has been remarkable, increasing electrification from 36% in 1994 to 87% (DoE, 2016). Most of electrification success was in the early years and was concentrated in the urban areas. By 1996, 77% of urban households were electrified, which increased to 89% by 2011 (StatsSA, 2011). Majority of urban households have access to electricity, but government now faces the challenge of keeping pace with the rapid growth of new households resulting in universal access targets being amended to 2025[7].

3.1.2.2. The Free Basic electricity (FBE)

During the INEP programme, government realised that newly electrified low-income households were constrained in their use of electricity due to affordability constraints (ERC, 2002). In response to this, in 2005 the Free Basic electricity (FBE) subsidy was introduced to assist households to shift from using inefficient and unsafe fuels to electricity (DME, 2005). The FBE subsidy allows for a free monthly allowance of 50kWh[8] . This amount of free electricity enables the poor to meet some of their basic energy needs namely lighting, powering a radio and TV, and some water-heating (Winkler, 2006). The impact on FBE on those households who have received the subsidy has been extremely positive. It has enabled the transition to electricity thus making it the dominant energy form used in the home (StatsSA, 2011 – refer to Part A of this report). While municipalities are responsible for the implementation of this subsidy, not all municipalities are able to afford this and therefore cannot provide the subsidy. Together with this, and the divergent methods of implementation of the subsidy between municipalities, many poor households do not benefit from the subsidy. There are also gaps in the data which make it difficult to determine how many people receive the subsidy and if this subsidy is indeed effective (SEA, 2014). According to the DoE (2013), 69% of poor households are benefitting from free basic energy subsidy.

3.1.2.3. The Free Basic Alternative Energy (FBAE)

The Free Basic Alternative Energy (FBAE) policy was introduced in 2007 to assist unelectrified households with subsidised alternative energy (DME, 2007). Although initially targeted at rural municipalities, some metros have adopted it due to the number of unelectrified informal settlements. Nevertheless, adoption of this subsidy remains low and only 10% of informal unelectrified households nationally receive the subsidy (StatsSA, 2014). According to the StatsSA Non-financial Census of Municipalities (2016d), in 2015, some households received

[7] The 2025 universal access target is divided into 97% grid access plus 3% solar home systems.

[8] At the time of the FBE policy development, 56% of households connected to the grid consumed less than 50kWh per month

the subsidy in the form of safe fuels i.e. solar home systems (75 000) and fire gel (19 000) while the majority received it for paraffin.

3.1.2.4. The Inclining Block Tariff (IBT)

The Inclining Block Tariff (IBT) subsidy was introduced in 2010 to further cushion low-income households from increasing electricity prices (Eskom, 2011). The subsidy is designed to take into consideration consumption levels, where the price of electricity is subsidised to lower consuming households, with the price steeply increasing the more one consumes. Due to the lack of appliances, it is assumed that low-income households consume smaller amount of electricity than other households however, low-income households typically tend to be connected to one meter (through informal connections), as well as for these households to have large families living under one roof (PDG, 2013; SEA, 2014).

3.1.2.5. National Solar Water Heater Social programme

The National Solar Water Heater Programme was a direct outcome of the White Paper on Renewable Energy. In 2009, the Department of Energy developed the National Solar Water Heater Programme and set a target of one million solar water heaters (SWHs) by 2014. The programme began as a load reduction programme in response to the national electricity generation constraints, but shifted to a Social Programme with job creation and household services as a central objective over time. The programme has suffered staggered implementation since 2010 when it started due to a variety of institutional, financial and technical challenges. This has resulted in only a negligible number of households in the country having the technology. In 2014, the Department of Energy reported to parliament, that a total of 395 088 systems had been installed (PMG, 2014). Of this, only 30 000 were delivered to low-income households via the social component of the programme (SEA, 2015). More recently, the programme was halted due to localisation content. According to the South African German Energy Programme (SAGEN), the DoE will resume the programme with procurement and installation functions centralised, but with strong support from municipalities that are interested in participating in this programme (SAGEN, 2016). Under the new plan, municipalities will be responsible for identification of areas for implementation, and community engagement. The clear advantage of the central institutional setup of this programme, is the low cost at which the SWHs can be procured due to economies of scale, as well as the capacity to roll out the programme.

3.2. Policy implementation

3.2.1. How effective are these policies?

Against the successes of the INEP, and the supportive subsidies, energy poverty still persists - more than 43% of the country is energy poor. While these policies are sound in their concepts, they fall short of their implementation for reasons noted below:

- Coordinating housing and electrification programmes still remain challenging resulting in electrification backlogs.
- The subsidies FBE, FBAE and IBT are the responsibility of electricity distributers (municipalities) to implement, but only if affordable.
- There is no definitive method for municipalities to roll these policies out resulting in a range of implementation approaches (SEA, 2014). This has resulted in very few households receiving and/or benefitting from these subsidies.

- Illegal and informal connections mostly in informal settlements and in backyarders' households render these subsidies irrelevant as these households cannot access them. The absence of these subsidies places a burden on these households especially in the face of the recent price hikes. Unelectrified households that do not have a formal connection have to resort to procuring electricity through illegal means or compelled to use other sources of energy like paraffin, charcoal and candles etc. which are expensive and unsafe.
- Households that are connected informally succumb to exorbitant electricity prices from illegal third party electricity resellers.

To this end, NERSA, DoE, SALGA and COGTA have been working together to overcome these challenges.

3.2.2. Policy impacts on urban women

Access to modern energy has made a significant impact to the lives of women and children. Electrification for lighting allows women to work into the night and/or socialise allowing flexibility and empowerment. Children (of which there are more females) in particular are able to benefit as electrical lighting allows them read and do homework at night. Thom and Mohlakoana (2001), also found that access to electricity resulted in significant time and labour savings for women with regard to cooking and water heating.

There is also empirical evidence to show that in those households that have received the FBE, the subsidy has made a huge impact in reducing the burden of collecting firewood for cooking and heating (Thom *et al*., 2001). Thus FBE's intentions to promote gender equality particularly in the rural areas have materialised (CURES, 2009). While huge strides have been made, MFU still exists, especially in the urban space where paraffin is commonly used fuel for both cooking and heating (DoE, 2013). Therefore, women are still vulnerable as they are exposed to indoor air pollution smoke and fires.

Given these challenges, government has been tasked with developing a comprehensive integrated low-income household energy strategy which will take all household energy sources especially paraffin and biomass into consideration (Swart and Bredenkamp, 2012). In order to achieve this, broad stakeholder engagements amongst the spheres of government and between government and the community are essential. These co-created policies also need to take into consideration the needs of women (and children) as women constitute almost half of the urban low-income households (StatsSA, 2011).

Yet more research needs to occur to determine how the anticipated impact of access to affordable modern energy will unfold. As with the provision of electricity, enabling factors needed to be supplied for the uptake of electricity as the main energy form – so too must enablers be in place such that the income-earning opportunities and other benefits for women can be materialised. This is the next step in energy planning process to achieving gender equality.

3.2.3. Pro-poor policy implementation by local government

Municipalities, being the seat of service delivery and policy implementation are responsible for electricity reticulation. While the electrification programme has been successful, municipalities recognising the challenges in the implementation of FBE and IBT. Municipalities are now starting to tackle the problems in creative ways. Being responsible to act on energy

and climate change (Constitution, 1996[9]), and recognising that 47% of the population are deemed energy poor, many metropolitan municipalities have used this as a delivery vehicle to implement renewable energy and energy efficiency interventions to deal with service delivery and energy poverty challenges.

Beyond, energy poverty and climate change challenges, it is beneficial for municipalities to alleviate energy poverty as low-income households also threaten local government functioning and revenues in a myriad of ways:

- Electricity theft from illegal connections causes revenue losses.
- Peak electricity use - low-income households that are electrified drive a short, sharp morning and evening spike in electricity demand which is extremely costly to municipal distributors due to demand charges, as well as the need to cross-subsidise these households when Eskom prices are at their highest.
- Cross-subsidisation of electricity tariffs forces the department to charge business and residential customers high tariffs to compensate for the subsidy. This not only drives away large businesses, but also makes it financially feasible for all customers to invest in solar PV and energy efficient technologies, ultimately decreasing revenue to the municipality, and in turn the funds available for the subsidy.

To address these complexities, municipalities have implemented programmes that deal with energy poverty and climate change by embarking on a move away from total grid domination to diversifying the energy mix with cleaner, alternative fuels and technologies. While some of these programmes have been initiated by national government, others are implemented at the local level. In addition, municipalities tackle energy poverty challenges in different ways with a learning-from-doing approach. Table 9 is a compilation of some progressive strategies and programmes currently being implemented or piloted.

Table 9: Municipal pro-poor programmes

Programme	Objective	Municipality
Participated in the SWH social programme[10]	Reduce electricity burden on formal low-income households.	• eThekwini • Musina Municipality • Polokwane
Electrification of backyard dwellings policy	Allows backyard households to access FBE and subsidised electricity tariffs. Prevents reselling of electricity by landlords at inflated prices	• City of Cape Town (pilot phase)
Provision of electricity to informal settlements	Electrification and access to FBE, IBT (if implemented) and subsidised electricity	• City of Cape Town • eThekwini • City of Joburg

[9] Constitutional objectives accorded to local government, namely: the provision of services to communities in a sustainable manner, promotion of social and economic development and a safe and healthy environment (Section 152 (1)). The Constitution sets out the powers and functions of municipalities (Section 56 (1) and Schedules 4B and 5B), which include aspects relating to air pollution, building regulation, electricity and gas reticulation and, municipal planning. The National Energy Act, 1998 also has as objectives the need to diversify our energy supply, effective management of energy demand and energy conservation.

[10] There is uncertainty in the number of SWHs installed between the Eskom Load Reduction Programme and the Social SWH Programme (SEA, 2015).

Provision of electricity to informal settlements via stand-alone solar systems	Reduce the dependency of households on unsafe fuels through access to modern energy	• Ekurhuleni Metropolitan Municipality • Nelson Mandela Bay Metro
Retrofitting low-income households (previous RDP houses) with ceilings	Increases thermal comfort and reduces the amount of energy needed for space heating (and cooling)	• City of Cape Town
Installing solar water heaters	Alleviate the high cost burden related to water heating, and reducing dependency on unsafe fuels. It also reduces the electricity subsidisation burden on the municipality	• The City of Johannesburg
Low-income energy services	Delivering a suite of appropriate energy technologies.	• City of Cape Town (Developing a Strategy) • City of Joburg (Pilot phase)

4. Energy delivery as a new way of thinking

Globally, there seems to be a growing acceptance of the need to provide energy services which meets the needs of people rather than merely connecting households to electricity (UN, 2015). It is understood that energy is not consumed for itself, but for what it can do i.e. the services it provides such as cooking, lighting, heating, cooling and the production of goods and services (UNDP, 2000). Therefore households should receive energy in the most appropriate form for its use. Of the United Nation's Sustainable Development Goals (SDG) adopted world-wide, the energy SDG (SDG 7) aims to ensure universal access to affordable, reliable, and modern energy services by 2030 (UN, 2015). In South Africa, the NDP makes reference to the wider energy needs of poor households and the need for an integrated programme to address energy poverty. The Department of Energy is also in the process of developing an Integrated Household Energy Policy for the country.

In the interim, there has also been a small but noticeable shift in the way that municipalities are thinking of supplying energy. For example, the City of Joburg, City of Cape Town, and Polokwane Municipality are all investigating alternative energy technologies which supplement electricity. The Gauteng Department of Agricultural and Rural Development (GDARD), has also recently undertaken a feasibility study into alternative energy technologies for unelectrified informal settlements in the province (GDARD, 2015). Findings reveal that since affordability is a the key challenge for majority of households, the use of affordable alternative technologies such as solar lights, hot boxes and solar water heaters could reduce household energy consumption as well as energy costs. These alternative technologies are energy-efficient, cleaner, safer and more affordable to households (GDARD, 2015; SEA, 2016a, SEA, 2016b). However, given the frequency of service delivery protests and the expectation of electricity as the prime source of energy for all needs, government needs to run extensive awareness raising programmes on these new technologies to attain buy-in from communities, as well as undertake thorough community consultation on needs assessments to ensure that the appropriate technologies are supplied.

5. Low-income community expectations of service delivery and access to affordable energy

Community participation in municipal affairs and decision-making is a key objective of local government as defined in section 152 of the Constitution, however, although the local government mandate exists, municipalities have not been successful in engaging civil society. The Back to Basics document of COGTA recognises local government's failure to connect with local citizens (CoGTA, 2014) and the need to comply with legislation concerning community participation. The IDP, including sector planning processes fail to adequately support active citizenry and social activism, and to promote responsive planning and responsible implementation. Government itself has recognised that the weak development planning capacity in municipalities has resulted in municipalities being unable to develop quality sector plans. Consultations that do happen are largely about municipalities informing communities of what they plan to do, without any meaningful interaction and debate (GGLN, 2015).

Civil society has grown increasingly dissatisfied with government's failure to adequately deliver material benefits such as houses and access to services such as water and electricity, but also with government's non-consultative, often extremely severe approach to urban governance. Thus the consequent rise in incidences of 'service delivery protests' in townships and informal settlements across South Africa over the last several years has been as much about the failures of local governance, and the lack of appropriate channels for communities to articulate their needs, as they are about delivery of services.

6. Conclusions and recommendations: Overcoming the challenges of urban energy poverty in a gender-sensitive way

Access to modern energy services by poor households underlies many of the objectives of the NDP including poverty reduction and improved quality of life, the health and safety of all citizens, the delivery of adequate services and infrastructure, as well as overall economic development for the country.

It is clear that tackling energy poverty in urban South Africa is a complex issue (SEA, 2014) and thus requires a range of solutions to meet the differing needs of those living in low-cost housing, backyard dwellings and informal settlements. In the informal sector, where energy poverty is particularly prevalent, solutions beyond electrification is required. Due to the fast pace of urbanisation, the eradication of informality is simply unattainable in the short to medium term thus ensuring continued energy poverty if electrification is the only goal.

While electrification has allowed low-income households access to electricity, the electrification programme itself has not alleviated energy poverty substantially. Electricity use by low-income households remains unaffordable and may only cover energy demands for a few days of the month (Vermeulen, 2016) indicating that households continue to use a range of polluting and unsafe fuels even after electricity has been delivered. This mismatch between consumer demand and supply needs to be addressed to the benefit of low-income households. The focus needs to shift from the provision of only electricity as single energy carrier to include a range of clean energy carriers and technologies. Policy-makers need to be responsive and adaptive to changing conditions both locally and globally, and thus need to continually monitor and evaluate the prevailing contexts, household needs and energy service

delivery mechanisms. It also calls for a flexible approach that progresses past the entrenched grid electrification for all needs approach.

Climate change compounded by municipal financial sustainability challenges offer unique and exciting opportunities to address energy poverty using cleaner fuels and alternative energy technologies. In these changing times within the energy sector, municipalities would need to be innovative in their design of energy service delivery to the poor, in line with community needs. These solutions need to take into account gender aspects of energy use and challenges.

Although, the results presented show that there is no significant difference in energy usage between men and female-headed households, women and men hold different knowledge and experiences about energy. Affordability and the roles of women make women more vulnerable to energy poverty than men. Thus, in drawing up strategies and policies around sustainable urban energy, the interventions should ensure that solutions are tailored to address both women and men's needs, building on expertise of the different genders. Questions such as who chooses the forms of energy to be used by the household and who the main beneficiaries are around the adoption of modern energy services need to be asked. Policies and programmes that address these different gender needs together with the multiple dimensions of modern energy service provision, will have a beneficial impact on female-headed households.

Furthermore, much work still needs to be done to enable all low-income households to access FBE and the existing subsidised tariffs. On a macro level, all types of poverty need to be eradicated through the creation of employment opportunities – a key priority of the NDP. The provision of energy for development and productive uses will also create an enabling environment for entrepreneurs further enhancing poverty eradication efforts.

Although the country lacks a clear guideline on developing an integrated household energy strategy for municipalities, the mandates to act on energy poverty are several. Confronting energy poverty addresses not only household poverty, but also the country's energy shortages, municipal sustainability, environmental sustainability and climate change issues concurrently.

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