GHS Series Volume V

Energy 2002 – 2012

In-depth analysis of the General Household Survey data

Statistics South Africa

The South Africa I know, the home I understand

GHS Series Volume V

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Foreword

The General Household Survey has been measuring key indicators with regards to the use of different energy sources since 2002 when the survey was first introduced. In 2009, additional questions regarding households' access to and use of electricity was added together with questions to assess the perceived quality of electricity services rendered by service providers such as Eskom and the municipalities. These questions also requested information about the number of interruptions experienced by households as well as the use of call-centres. In consultation with the Department of Energy, a more comprehensive section on energy and electricity was developed and covered during 2012. This study provides an in-depth analysis and thus sheds insights on changes in the use of energy over time.

The data shows significant improvements in the percentage of households that were electrified since 2002. In this regard, between 2002 and 2012, the percentage of households with access to electricity increased from 77,1% to 85,3%. Despite this large increase, however, 11% or (1,45 million) households did not have access to electricity in 2012, while another 3,6% or 578 005 accessed electricity informally or illegally. Of these 420 000 households, 73% were connected to a source that the households paid for (an informal connection) and 12,% reported that they were connected to a source for which the household was not paying, an illegal connection.

While 98,2% of electrified households used electricity for lighting, the proportion dropped to 84,5% for cooking. This drop is significant as electricity use for lighting is estimated to account for only about 5–10% of the energy consumed by poor households, while cooking, and space heating, is estimated to account for most of the remainder (90% or more) of the total energy demand.

Government attempts to address energy deficits amongst the poor has generally been driven through an aggressive and hugely successful programme to electrify homes. Policy changes in 2003 were introduced to guarantee access by the poor through the introduction of the Free Basic Electricity (FBE) programme. The percentage of electrified households that received FBE has, according to the GHS, hovered around the 25% mark since 2005. However, access through FBE is very uneven by province and by urban-rural divide. In this regard only about one-tenth of households in Limpopo reported receiving FBE compared to 42,7% of households in Western Cape. The difference can, at least in part, be explained by differential propensities in density in population distribution, municipal capacities and finance.

As seen earlier, 11% of households, nationally, did not have access to electricity at all. Households without adequate access and or affordability of electrical energy often utilize multiple sources of energy such as wood and paraffin. These sources of energy increase the exposure of household members to health risks, such as indoor pollution, or ingestions of paraffin by infants and children as well as injury as a result of collecting these alternative sources over long distances and under hazardous conditions. Furthermore and importantly in densely populated shack settlements fire accidents caused by burning matter especially fluids such as paraffin are predominant and citizens perennially lose their hard earned valuables especially in the winter months. The use of solid fuels was particularly prevalent in rural areas where more than three-quarters of households without access to electricity falling below quintile 3 income category used solid fuels for cooking, heating and lighting. Within the rural environment this compares unfavourably with quintiles 3-5 income bandwherein about 50% of this relatively better off rural band does not have access to electricity.

The report finds that, nationally, about 50% of households spent less than 5% of their income on electricity, and that about three-quarters (74,9%) spent less than 10%. In total, 8,8% spent more than 20% of their income on electricity.

Households that lived in subsidised or RDP dwellings were most likely to spent more than 20% of their household income on electricity, while only 3,4% of households in traditional did so. This corroborates the findings from the IES 2010/2011 that found that households in the bottom income decile spent 3,6% of their income on electricity compared to 1.8 % that is spent by the top decile. Poor households in rural areas were less likely to spend as much of their income as those in urban areas, largely due to in part the availability of affordable alternative energy sources such as wood. This also supports findings from the IES 2010/2011 that showed that households in the bottom income per capital decile on average spent more on solid fuels (R105) than those in the top decile (R64) or than the average expenditure (R80).

The 2010 Time Use Survey conducted by Stats SA also exposed a stubborn pattern showing that women are much more likely to fetch wood and/or animal dung than men across all geographical locations. Nationally, women were responsible to fetch wood and/or dung in 72% of households that use such sources of fuel. The survey showed that household members who lived more than 1 kilometre away from a fuel source spent approximately 135 minutes per day to collect fuel and that women were more likely than men to be responsible for this activity. In fact, men generally spent less than half the time on household activities, including fetching wood, compared to women.

The percentage of households that rated the quality of electricity supply services they received as 'good' declined from 67,4% in 2010 to 61,6% in 2012 while the percentage that rated it as 'poor' increased from 5,7% in 2010 to 9,4% over the same period.

Households, almost universally, reported that it would be unacceptable to not pay for electricity (96,8%) or to steal electricity cables (98,6%). However, 83,2% felt that protesting against high electricity prices could be condoned sometimes or always.

Mr. PaliLehohla
Statistician-General: Statistics South Africa

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Glossary of abbreviations

WC	Western Cape
EC	Eastern Cape
NC	Northern Cape
FS	Free State
KZN	KwaZulu-Natal
FS	Free State
GP	Gauteng
MP	Mpumalanga
LP	Limpopo
SA	South Africa
DME	Department of Minerals and Energy
DOE	Department of Energy
Eskom	Electricity Supply Commission of South Africa
FBE	Free Basic Electricity
GHS	General Household Survey
IARC	International Agency for Research on Cancer
IDP	Integrated Development Programmes
IEA	International Energy Agency
IES	Income and Expenditure Survey of Households
INEP	Integrated National Electrification Plan
INEP	Integrated National Electrification Programme
LCS	Living Conditions Survey
LP	Liquid Petroleum
LPG	Liquid Petroleum Gas
LSM	Living Standard Measure
MDG	Millennium Development Goals
MTSF	Medium Term Strategic Framework
NDP	National Development Plan
NEP	National Electrification Plan
NEP	National Electrification Programme
NERSA	National Energy Regulator of South Africa
OECD	Organisation for Economic Cooperation and Development
PASASA	Paraffin Safety Association of South Africa
PSU	Primary Sampling Unit
RDP	Reconstruction and Development Programme
SA	South Africa
Stats SA	Statistics South Africa
TUS	Time Use Survey
UN	United Nations

Glossary of concepts

Energy poverty: The International Energy Agency (IEA, 2010) defines energy poverty as a lack of access to modern sources of energy, and a reliance on biomass for cooking and heating.

Formal dwelling: Structure built according o approved plans, i.e. house on a separate stand, flat or apartment, townhouse, room in backyard, rooms or flatlet elsewhere.

Free Basic Electricity: The amount of energy which is deemed sufficient to provide basic electricity services to poor households.

Household: a group of persons who live together and provide themselves jointly with food and/or other essentials for living, or a *single* person who lives alone.

Informal connection: extensions of electricity supply from one household to another. Electricity is, however, still metered and paid for.

Illegal connection: Connection to the distribution grid by households by bypassing the metering system and not paying for electricity used.

Informal dwelling: Makeshift structure not erected according to approved architectural plans, for example shacks of shanties in informal settlements or backyards.

Living Standard Measure: LSMs groups people and households into ten distinct groups based on criteria such as their level of urbanisation, ownership of vehicles and major electrical appliances. The measurement is classified from LSM 1 to LSM 10. For the purposes of this report, these categories are combined as follows:

Low LSM: comprising LSM 1 to LSM 4
Intermediate LSM: comprising LSM 5 to LSM 7
High LSM: comprising LSM 8 to LSM 10.

Monthly household income: Total amount of income accrued by a household on average.

Per capita monthly household income: The amount of income accrued by a household per month divided by the household size.

Quintile: A quintile is one-fifth of 20% of a given number. The poorest per capita quintile (quintile 1) represents households that fall into the lowest fifth or 20% of the data. Quintile 2 represents households that fall into the second fifth (21% – 40%). Quintile 3 represents households that fall into the third fifth (41% – 60%). Quintile 4 represents households that fall into the fourth fifth (61% – 80%). The final and wealthiest quintile, quintile 5, represents households that fall into the highest fifth of the data (81% – 100%) of the data. The monetary cut values for income quintiles are as follows:

Quintile 1: R0 – R390
Quintile 2: R391 – R764

Quintile 3: R765 – R1499
Quintile 4: R1500 – R3997
Quintile 5: Larger than R3997

Rural:farms and *traditional area*s characterised by low *population* densities, low levels of *economic activity* and low levels of *infrastructure.*

Rural formal settlements consist of farms and traditional areas and are characterised by low population densities, low levels of economic activity and low levels of infrastructure.

Solid fuel: Solid material such as wood, coal and animal dung that is used as fuel to produce energy.

Traditional dwelling: Dwelling /hut/structure made of traditional materials.

Tribal area is an area that is legally proclaimed to be under tribal authorities.

Urban: Cities and towns that are usually characterised by higher *population* densities, high levels of economic activities and high levels of *infrastructure*. Includes formal and informal areas for the purposes of the report.

Urban informal settlements, or 'squatter camps', are usually located in urban areas. The dwelling units in informal settlements are usually made of materials such as zinc, mud, wood, plastics, etc. They are typically disorderly and congested and are sometimes referred to as squatter settlements.

1. Introduction

Each Household requires an adequate amount of energy to conduct domestic chores such as cooking, heating, lighting and communicating. Having adequate access to appropriate forms of energy is critical for improving living standards and health, increasing livelihoods and generally reducing poverty. Although rapid progress has been made in electrifying households since 1996(when prevalence of electrification in South Africa was at around 54%) through programmes such as the Integrated National Electrification Programme (INEP), 11% of households remain without electricity, while others cannot afford to use electricity for all domestic chores. In the absence of accessible or affordable modern energy, many households turn to multiple sources of energy, including fuels such as wood, cow dung and coal. While some of these sources provide practical alternatives for household energy requirements, the use of fuels such as wood, dung and coal do not only exposes households to health hazards but also contributes to environmental degradation. The use of these sources of energy is very common amongst low-income households and these household often spend a higher proportion of their household resources and time than wealthier households to acquire enough energy to maintain even modest household activities.

By using GHS datasets for the period 2002–2012, this report aims to contribute towards the assessment of progress made towards meeting energy related targets in South Africa, to explore general households satisfaction with electricity services and prices in the country, and to gauge households' positions for measures that can be used to limit electricity use.

2. Overview of the energy sector

2.1 Legislative framework

The Constitution of South Africa adopted in 1996 directs government to establish a policy that ensures that energy is made available to all residents, irrespective of geographical location, at affordable prices. The production and distribution of energy should be sustainable and should lead to an improvement in the standard of living of the population.

The Bill of Rights (section 24) provides that:

"*Everyone has the right*:

- *to an environment that is not harmful to their health or well-being; and*
- *to have the environment protected, for the benefit of present and future generations through reasonable legislative and other measures that —*
  - *prevent pollution and ecological degradation;*
  - *promote conservation; and*
  - *secure ecologically sustainable development and the use of natural resources while promoting justifiable economic and social development."*

According to the annual report of the Department of Energy for the financial year 2012/2013, the Department's work is informed by a number of key legislative, policy and regulatory frameworks.

Of these, the National Energy Act [No. 34 of 2008] directly mentions households. The Act aims to ensure that diverse energy resources are available in sustainable quantities and at affordable prices in the South African economy to support economic growth and poverty alleviation, while also taking into account the environmental concerns. In particular the National Energy Act (2008: s5(1)) states that the "Minister must adopt measure that provide for the universal access to appropriate forms of energy or energy services for all people of the Republic at affordable prices."

The act was preceded by the White paper on energy policy (DOE, 1998: 3) which affirmed the Government's commitment to the promotion of access to affordable and sustainable energy services for the population that was hitherto largely ignored, including disadvantaged households and those in rural areas. In addition to the overarching national policy objectives aimed at securing a stable supply; governing the energy sector; and stimulating economic growth, two of the further goals (DOE, 2008:8-9) refers directly to poor households, namely;

- ***"Increasing access to affordable energy services****: Government will promote access to affordable energy services for disadvantaged households…";*
- ***"Managing energy-related environmental and health impacts:*** *Government will promote access to basic energy services for poor households, in order to ameliorate the negative health impacts arising from the use of certain fuels" and " Government will work towards the establishment and acceptance of broad national targets for the reduction of energy-related emissions that are harmful to the environment and to human health".*

The White paper (DOE, 1998) recognizes that households' access to adequate energy services for cooking, heating, lighting and communication is a basic need and it affirms the importance of providing energy security to low−income households due to its vital importance for improving living standards, including health, increasing livelihoods and reducing poverty. Although the White paper (1998:48) accepts that households' energy needs can be met by various combinations of fuel, it states that human development potential will ultimately be constrained without access to clean, convenient and desirable fuel such as electricity. Where the provision of grid-electricity is uneconomical, the policy paper calls for the implementation of appropriate, clean and safe off-grid alternatives.

2.2 National Development Plan

The National Development Plan (National Planning Commission, 2011a: 140) envisions greater social equity with regards to access to energy services by 2030. According to the plan this would be achieved by expanding access to energy (to 90% by 2020, and 95% by 2030), maintaining affordable tariffs, and maintaining targeted and sustainable subsidies for poor households. Although the plan acknowledge the significant achievements over the past 20 years, it points out that the energy needs of twenty percent or more of poor households still needs to be met. The plan therefore calls for integrated plans to address energy poverty where households either have no access to electricity, or where households can only afford modest quantities of electricity and are forced to use multiple sources of energy that are often costly and harmful. The plan also warns that the reliability of electricity supply has deteriorated and that prices are rising at unaffordable rates.

2.3 Medium Term Strategic Framework and the national energy profile

The Medium Term Strategic Framework (MTSF) for the period 2009 to 2014 was approved by Cabinet on 1 July 2009. Twelve outcomes, that combined reflects Governments' delivery and

implementation plans for its foremost priorities, were defined based on the MTSF. The energy sector is addressed in at least five Outcomes, namely:

- Outcome 6: An efficient, competitive and responsive economic infrastructure network;
- Outcome 7: Vibrant, equitable and sustainable rural communities and food security for all;
- Outcome 8: Sustainable human settlements and improved quality of household life;
- Outcome 9: A responsive, accountable, effective and efficient local government system;
- Outcome 10: Environmental assets, and environmental resources that are valued, protected and continually enhanced.

The delivery agreements for each Outcome contain a limited number of measurable outputs with targets, as well as specific activities to achieve. The documents also clarify the roles and responsibilities of the various delivery partners.

In terms of achieving universal access to basic services, the agreements aim to increase access to electricity by domestic households to 92% by 2014. Outcome 1, output 2 aims to "ensure reliable generation, distribution and transmission of electricity", and access to electricity by domestic households are particularly highlighted. Given the inadequate access to basic services in rural areas, Outcome 7 has specifically identified the improvement of rural services to support sustainable livelihoods in output 3. The need to improve access to basic services in also highlighted in output 2 of Outcome 8. Outcome 10 primarily focuses on reducing the impact of energy demand on the environment and the document advocates for the increased implementation of renewable energy resources.

The Department of Energy is responsible to development and monitor compliance with regards to the provision of electricity services.

A number of key partners across all spheres of government have been identified to share the responsibility to implement Outcome 9. The responsibilities of national departments (Presidency, 2010i:7), which include the Department of Energy, are to:

- Coordinate infrastructure funding to unlock the delivery of services;
- Coordinate human settlement planning and service delivery planning;
- Evaluate and coordinate capacity building initiative to ensure greater impact;
- Rationalise municipal reporting requirements;
- Liaise within their sector and better organise intergovernmental support to municipalities;
- Work with their provincial sector departments to support and monitor the interventions agreed upon.

Provinces must find ways to improve their support to municipalities towards increasing household access to electricity and free basic electricity, particularly in provinces with underperforming municipalities.

Municipalities are the key service providers. Local government consists of district municipalities and local municipalities. District municipalities are primarily concerned with development facilitation and

service delivery, including electricity. The application of these responsibilities, however, varies and C2 districts have considerable service provision responsibility while C1 district are primarily responsible for facilitating development. According to the Constitution, local municipalities are responsible for specified services referred to as municipal services, including electricity, water supply and sanitation, refuse removal. In cases where municipalities cannot reticulate electricity, the Constitution (chapter 7), however, specified that "…national government…has the legislative and executive authority to see to the effective performance by municipalities in their functions".

2.4 Millennium Development Goals and the international context

Although eight Millennium Development Goals (MDGs) that were adopted in 2000 were designed to eradicate extreme poverty by 2015, the MDGs do not contain a goal specifically related to energy.
The Organisation for Economic Cooperation and Development (OECD) and the International Energy Agency (IEA) stated in a 2010 report that the UN Millennium Development Goal of eradicating extreme poverty by 2015 will not be achieved unless substantial progress is made on improving energy access. The report (OECD and IEA, 2010: 8) points out that the lack of access to modern energy[1] services is a serious hindrance to social and economic development as access to modern forms of energy is essential for the provision of clean water, sanitation and healthcare. The UN Advisory Group on Energy and Climate Change (OECD/IEA, 2010: 15) has therefore called for the goal of universal access to modern energy services by 2030.

The importance of modern energy in achieving the MDGs is outlined below (Adopted from OEC/IEA, 2010; and Modi, McDade, and Saghir, 2006).

> **Goal 1: Eradicate extreme poverty and hunger.** Access to modern energy facilitates economic development by providing more convenient, efficient, healthier, and often cheaper, means to perform household tasks such as cooking, heating and lighting. Improved productivity can also improve alternative options for household income generation.
>
> **Goal 2: Achieve universal primary education.** Access to modern energy services is positively correlated to better educational achievements. Improved access to modern energy reduces pressure on children to collect wood and water, and to cook. This, in turn, leads to improved school attendance and outcomes. In addition, electricity can facilitate education by addressing basic issues such as lighting, while also improving communication and access to information technology. Nelson Mandela, launching the results of Census 96, said that access to electricity will make it possible for children to study. He argued that the environment between the school and the home in White households was seamless thus facilitating better education outcomes. This differed dramatically with the situation amongst Black households.
>
> **Goal 3: Promote gender equality and empower women.** Improved access to electricity and modern fuels reduces the physical and time burden placed upon individuals, usually women, to fetch wood. This not only relieves particularly females from the potential health and security hazards involved, but also provides them with the opportunity to pursue education and work/income generating opportunities.
>
> **Goal 4,5, and 6: Reduce child mortality; Improve maternal health; and Combat HIV/AIDS, malaria and other diseases.** The use of solid biomass fuels for cooking and heating in indoor environments, can increase the disease burden through increases in the risk of respiratory infections, chronic

[1] The OECD/IEA report defines access to modern energy services as access to electricity and clean cooking facilities such as clean cooking fuels and stoves, advanced biomass stoves and biogas systems.

obstructive lung disease and even lung cancer. Women who perform a disproportionate amount of cooking are more at risk. Access to modern energy can reduce the risk of accidents (that often cause serious burns), and can lead to the reduction of waterborne diseases by allowing households to boil water. Electricity and modern energy services furthermore support the functioning of hospitals and clinics.

Goal 7: Ensure environmental sustainability. The use of modern fuels, more efficient appliances and renewable energy sources can relieve the pressure on the environment that is often caused by the unsustainable use of biomass which, in turn, could lead to deforestation, soil degradation and erosion. Using cleaner energy could also decrease local air pollution and reduce greenhouse—gas emissions and global warming and improve health outcomes of citizens.

Goal 8: Develop a global partnership for development. Energy is necessary to maintain international communication.

2.5 The South African electrification programme

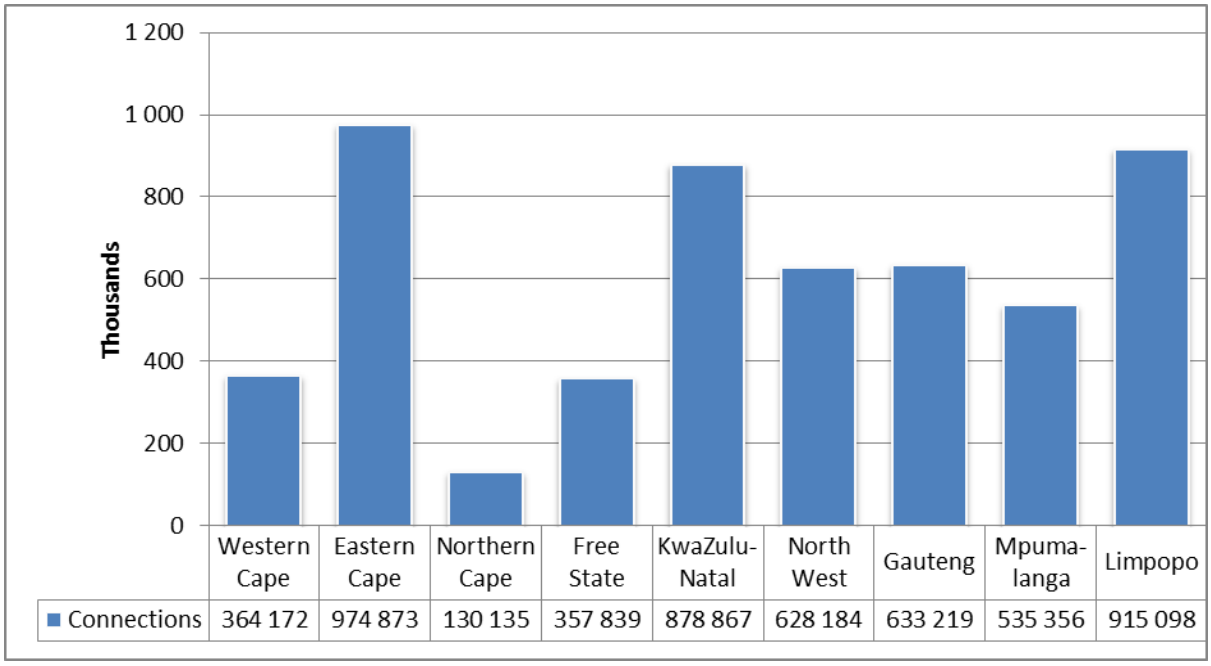
South Africa has made remarkable progress in improving household access to electricity. In 1992, access to grid electricity was limited to approximately 3 million households, equating to about 36% of the population (50% of the urban population and 12% of the rural population). In 1994 the then newly elected democratic government launched the Reconstruction and Development Programme (RDP) the objective of which was to meet basic needs by, inter alia, ensuring access to appropriate and affordable energy to the entire population (Presidency, 1994). The National Electrification Programme (NEP) was set up with the objective to electrify low—income households in urban and rural areas that were deprived of access to electricity during the apartheid period. The NEP adopted the targets set in the RDP to connect 450 000 households per year (Eskom 300 000 and municipalities 150 000 per year) during the first phase (1994—1999) of the project. This target was exceeded and more than 2,5 million households were electrified during this time, taking the percentage of households with electricity from approximately 36% to 66% nationally in 1999 (46% in rural areas and 80% in urban areas) (DPME, 2001:1; Winkler, 2006) and 85% by 2013 (DOE, 2012).

In 2001 the NEP was redefined as the Integrated National Electrification Plan (INEP) in line with the White Paper on Energy (1998). While there were a large number of rural connections in the mid-1990s, the programme was dominated by urban connections until at least 2002 when a more rural focus was adopted. Following the RDP programme in which electrification projects occurred without reference to other local projects, all implementers, including ESKOM, were forced to situate projects within applicable Integrated Development Programmes (IDPs). Although potentially slower and less efficient, this made implementation more sustainable (Marquard, Bekker, Eberhard and Gaunt, 2007).

Between 1994 and 2011, more than 5,4 million new households were connected via grid, and 46 000 more via non-grid technologies (DOE, 2012). Despite the success of the electrification programme, the Department of Energy (2013) reports that approximately 3,4 million households continue to be without access to electricity, with the largest backlogs noted in KwaZulu-Natal, Gauteng and Eastern Cape.

In line with the timelines in the National Development Plan, Government has stated the objective to achieve universal access to modern energy using a combination of grid and non-grid technology by 2025 (DOE, 2013).

Figure 1: Achieved connections between 1994 and 2001 by province.



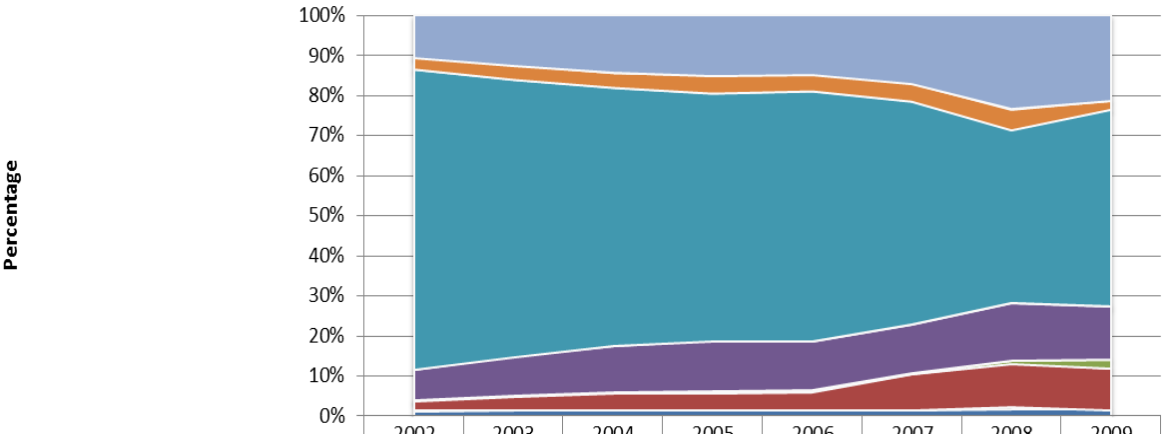
Source: Department of Energy, 2012a.

According to Winkler (2006: 59) the largest challenges for the policy of electrification lies in the fact that areas where electrification is cheaper —urban areas and denser settlements —have already been electrified, and that the mainly rural areas and more widely dispersed households that are left requires longer distribution lines which are generally not viable in financial terms. In addition, he argued (in 2006) that the prospects for off-grid concessions were also not good. Electrification of households in informal settlements is equally elusive. These settlements are often unplanned and the occupied areas are often unsuitable for habitation due to instability, danger of flooding, legal challenges, or other health and environmental concerns (Gaunt, Salida, Macfarlane, Maboda, Reddy and Borchers, 2012). As long as poor households in informal areas remain without electricity they will continue to miss out on Free Basic Electricity and Free Basic alternative energy.

2.6 Energy use patterns in the household sector and energy poverty

In its report, *Energy accounts for South Africa 2002–2009*, Stats SA (2012) divides the South African economy into three main section for the purposes of energy use, namely: industrial (including the agricultural and commercial sectors), residential and transport. The report shows that the domestic / residential sector used approximately 13,3% of all electricity in 2009, up from 7,7% in 2002. This is presented in Figure 2. The report, however, rightly notes that the figure does not reflect the full story because the use of electricity is more prevalent amongst households in urban areas while households in rural areas are more likely to use solid fuels as a source of energy.

Figure 2: Percentage distribution of energy to the main users in South Africa, 2002–2009



	2002	2003	2004	2005	2006	2007	2008	2009
Transport, storage and communication	10,6	12,6	14,4	15,2	14,9	17,1	23,4	21,4
Mining and quarrying	3,1	3,5	3,9	4,4	4,1	4,4	5,3	2,1
Manufacturing	74,7	69,1	64,2	61,7	62,3	55,7	43,1	49,1
Domestic	7,7	9,8	11,4	12,7	12,3	12,1	14,4	13,3
Construction	0,3	0,3	0,4	0,4	0,3	0,4	0,6	2,3
Commercial sector	2,4	3,3	4,0	4,2	4,6	8,9	11,4	10,2
Agriculture and fishing	1,2	1,4	1,6	1,5	1,4	1,5	1,7	1,6

Source: Stats SA. 2012. National accounts: energy accounts for South Africa 2002-2009

Providing energy security in an environmentally sustainable and sensitive manner is one of the overriding challenges faced by the energy sector. Despite the temptation to view the impact on the environment, and particularly climate change, as a long-term concern that should be traded off against short-term priorities, the Department of Energy's Integrated Resource Plan for 2010-2030 (DOE, 2011)prioritises the challenge that this twin challenge will pose for future energy consumption and the energy mix.

2.6.1 Negative consequences of using non-modern sources of energy

Energy poverty refers to a situation in which households are negatively affected by inadequate consumption of energy sources. The International Energy Agency (IEA, 2010) defines energy poverty as a lack of access to modern sources of energy, and a reliance on biomass for cooking and heating. The organisation defines access to modern energy services as access to electricity and clean cooking facilities such as clean cooking fuels and stoves, advanced biomass stoves and biogas systems. For the purposes of this report, access to electricity is used as an indicator.

It is estimated that as many as 70% of households in developing countries use traditional fuels such as wood, dung and crop residue for cooking (IARC, 2010) due to their seemingly free availability from nature. The use of these fuels can, however, be hazardous, and countries have been challenged to introduce measure that would improve access to modern forms of energy, including electricity (from the grid, and off-grid) and other clean cooking fuels and stoves, advanced biomass stoves and biogas systems. The use of traditional forms of energy often has adverse consequences for the health and socio-economic development of households, as well as the environments in which they live. Without access to modern forms of energy households are forced to spend a significant portion of their time and energy looking for biomass, usually wood. Since women and children are often

responsible for this chore, this places a disproportionate physical and time burden upon them, often to the detriment of their health, security and educational progress or income earning economic opportunities (Modi et al. 2006; OECD;IEA. 2010).

The 2010 Time Use Survey conducted by Stats SA (2013: 42) shows that women were generally more likely than men to collect fuel for household consumption and that the likelihood to do so increased with the distance household members had to travel to fetch wood. Household members spent an average of 135 minutes per day to collect fuel when they had to walk more than 1 kilometre, compared to about 92 minutes for those that were less than 100 metres away from the fuel source. The results show that, in the age groups 15–45 years and 46 years and older, males only spent 42,6% and 44,3% respectively of the time women spent on housework, including fetching fuel, while men were slightly more likely to fetch wood/dung from an off-site source in urban formal areas, mostly females performed this activity in urban informal areas (56%), tribal areas (79%), rural formal areas (48%) and South Africa (72%). Women and men shared the responsibility equally in 17% of rural formal, 8% of tribal, 11% of urban informal, and 13% of urban formal households (Stats SA, 2013: A23–A24).

Burning traditional biomass over open fires or in inefficient stoves contributes to health-threatening indoor air pollution. According to the World Health Organisation (OECD/IEA, 2010: 13) the number of premature deaths from household air pollution is greater than the number of premature deaths from malaria or tuberculosis. As with fetching fuel, women and children bear a disproportionate burden of the associated health risks associated to indoor pollution. According to the IARC (2010: 109), poverty, income and education are likely to aggravate further exposure potentials for vulnerable groups.

Other health-related impacts relate to energy-related injuries, such as burns and paraffin ingestions which could cause devastating emotional, financial and physical damage to many communities, particularly in low-income areas. Injury surveillance data reported by the Paraffin Safety Association of South Africa (PASASA) shows that 24% of surveyed households have experienced energy-related harm, most frequently associated with fire, burns and ingestion. According to the study, electricity and paraffin were responsible to approximately 73% of burn injuries, mostly through scalds or liquid burns, ingestion and blame burns (Swart and Brendenkamp, 2012).

Deforestation and land degradation is also more likely in densely populated areas where households predominantly rely on wood for cooking and heating.

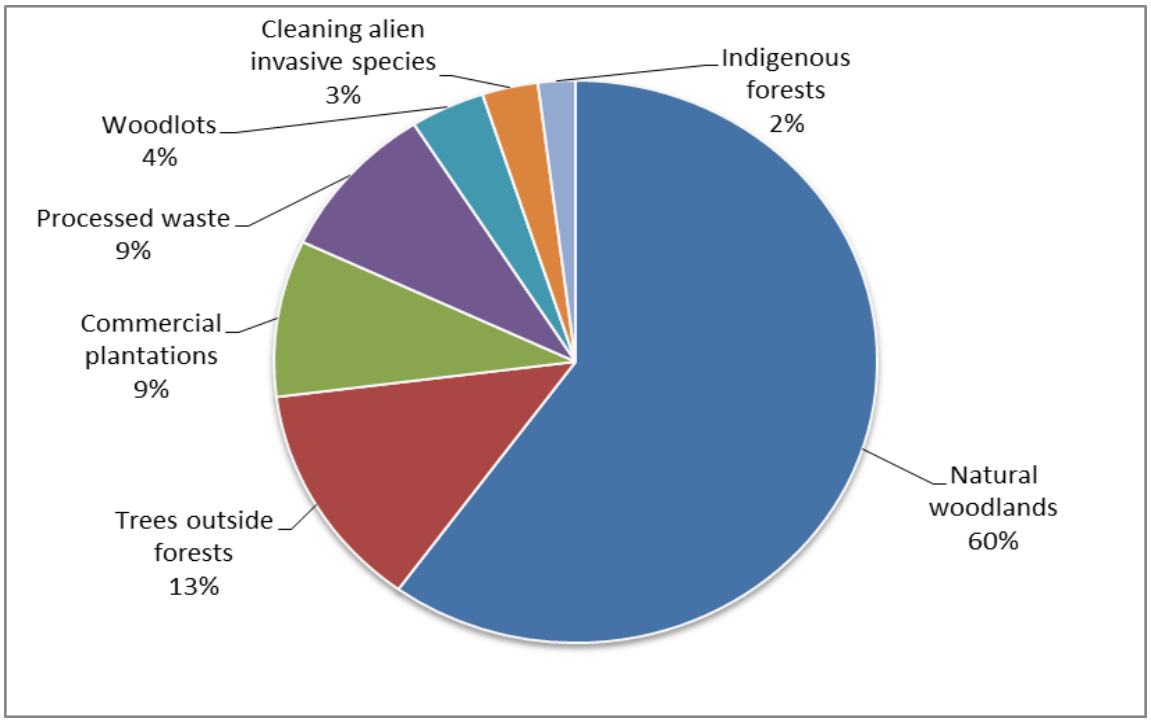
2.6.2 Biomass

Damm and Triebel (2008:8) estimate that the supply of fuelwood is adequate on a national level, but they argue that the situation on a local level is more varied. While some households have access to adequate supplies within walking distance, others have no access to local supplies, forcing them to either buy wood, or to use substitutes such as paraffin. Demand often exceeds supply, undermining the faith the White Paper on Renewable Energy (Department of Minerals and Energy, 2003) has in biomass, including wood, as renewable resource.

Poor rural households are particularly likely to rely on low-cost biomass fuels for everyday cooking and heating activities. The demand for biomass fuels are influenced by the distribution of the population and households in the country. The use of fuelwood is concentrated in the poorer provinces with large rural populations, i.e. Limpopo, KwaZulu-Natal, Eastern Cape and North West. Approximately one quarter of the woodland biome, source of 60% of the wood, is zoned as communal land, and 70% of the former homelands fall in the woodland biome (Damm and Triebel, 2008).

Assuming that about 80% of households use fuelwood as their primary source of energy, Shackleton, Grundy and Williams (2004, in Damm and Triebel, 2008:4) estimated that households used approximately 11,2 tonnes of wood annually comprising approximately 40% of the energy consumption in South African households. In 2002, Williams and Shackleton (2002) estimated that fuelwood had a value of approximately R3 billion annually, or about R2000 per household per year. The sources of wood is summarized in Figure 3, below.

Figure 3: Estimated fuelwood supply in South Africa, 2008



Source: Damm&Triebel, 2008: 8

2.6.3 Changing energy mix

An analysis of the energy use over time shows that the energy usage patterns of households are changing. These changes are primarily driven by urbanisation, electrification, particularly in rural areas, as well as the increasing purchasing power of households. Although progress with regards to electrification has contributed significantly towards achieving improved access to safer, cleaner and more affordable energy services for households across the socio-economic spectrum, energy use in poor households continues to be characterised by the use of multiple sources of energy. This reaffirms the observation by Winkler (2006: 47) that households will often continue to use other sources of energy, such as paraffin, wood and Liquid, Petroleum and Gas (LPG) long after they are connected to electricity.

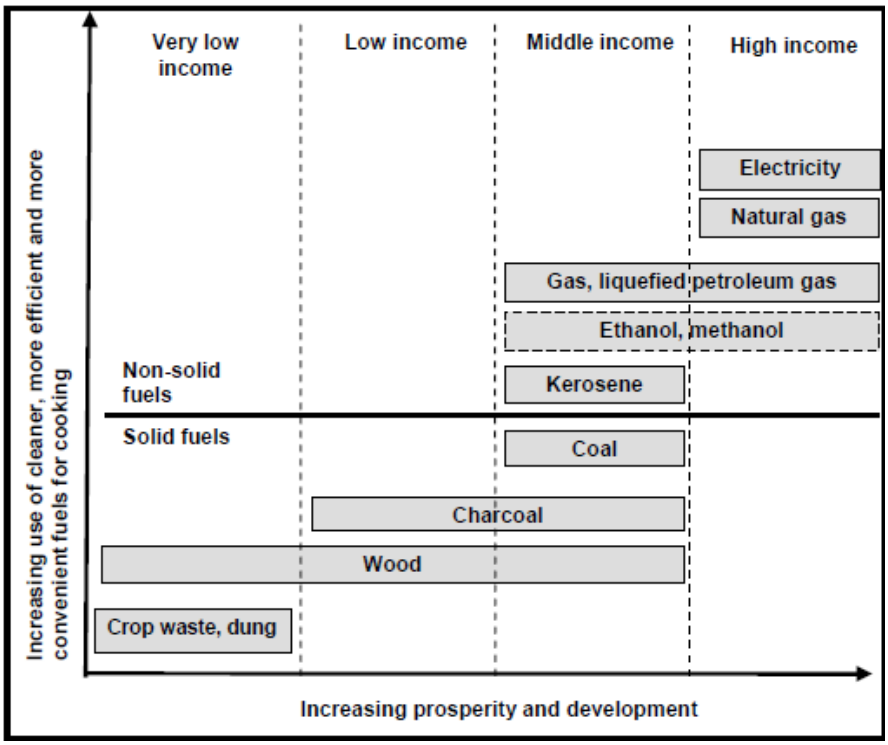
Stats SA (2012) classifies residential energy into three categories:

- Traditional fuels, consisting of solid fuels such as wood and animal dung;
- Transitional fuels, consisting of coal, paraffin and LPG; and
- Modern fuels, consisting of electricity.

The report argues that the residential energy use will change from traditional fuels, through transitional fuels, to modern sources of energy. It also expects the demand for residential electricity to grow at the same rate as the population (Stats SA, 2012).

According to the IARC (2010: 51) the transition from biomass (or traditional fuels) to modern fuelshas been associated with improvements in development and economic improvements. The poorest households tend to depend on biomass fuels for cooking and heating. As the prosperity of households increases they tend to start using non-solid fuels such as kerosene, and LPG(Figure 4).Whereas a large percentage of middle- and high-income households uses electricity, the use of electricity in poor households is often more limited. In addition to often being the last households to be electrified (Energy Research Centre, 2004) issues of affordability often limit the use of electricity to lighting and entertainment. The lack of access to electricity is therefore a primary defining characteristic of poor households in relation to energy.

Figure 4: Transition from the use of biomass fuels to modern fuels



Source: WHO (2006) in International Agency for Research on Cancer (2010: 52).

Studies have found that only a few factors generally determine the choice of fuel (IARC, 2010, Winkler, 2006; Qase and Annecke, 1999). These factors are: Access to electricity and alternative

sources of fuel, as well as household appliances; household income and affordability; and the reliability of fuel supplies.

Access

Households are, naturally, more likely to embrace electricity when it is available, but both urban and rural households often transition into modern fuels in collaboration with a variety of other fuels. Although diminishing access to traditional fuels could accelerate the acceptance of modern fuels, it could also move households down the energy ladder to lower and more polluting fuels (IARC, 2010: 53).

Affordability

Electricity is convenient, versatile and very desirable and movement up the energy ladder to using electricity is almost inevitable if the service is affordable. Studies, however, show that many households that get connected to the grid are not necessarily able to afford the use of electricity for thermal applications such as cooking and heating and that these households will continue to use other sources of fuel such as paraffin or wood for these activities (Qase and Annecke, 1999). A study conducted in 2003 showed that 56% of South African households that were connected to electricity in ESKOM-licensed areas consumed less than 50 kWh of electricity per month (Prasad and Ranninger, 2003 in Winkler, 2006). The affordability of solid fuels contributes greatly to its prevalence in particularly rural areas.

Although poor households will generally use biomass, a study (using income figures given in 1980 US dollars) showed that households will start switching to electricity at relatively low household incomes (US $10-30 per person per month). However, where wood is available and affordable, households might continue to use wood up to US $ 100 per person per month. The study found that the use of modern fuels intensified as household income increased but that there are no definitive inflexion points, rather broad areas, at which households will start to switch (IARC, 2010: 55).

Although poor households spend less on energy, they often spend a larger percentage of their household income on household energy needs. In a study conducted by Swart and Bredenkamp (2012: 3) households that earned up to R1500 per month on average spent 26% of their income on energy compared to 4% for households that earned more than R5500 per month. The threshold in absolute amounts vary from R220 for higher income households compared to R330 for lower income households. This may also be linked to average household size with poorer households having larger households compared to more well off households. Other studies show that the urban poor spend between 10% and 20% of their income on energy, compared to less that 5% by wealthier households (IARC, 2010:55). Households are estimated to spend around 80% of their energy expenditure on fuel for cooking, and 20% or more of their monthly income to obtain wood and charcoal (Flavin and Aeck, 2005: 19). These fuels are not only less efficient than electricity, but buying them in small amounts inflates the prices further (IARC, 2010: 55).

Illegal connections

There is general consensus that illegal connections are very common in South Africa for a number of reasons. Amongst this is a perceived culture of non-payment, and that recent increases in the price of electricity will increase the number of illegal connections. The OECD (2013) points to a report by Eskom that states that only 20% of billed electricity is paid for in Soweto and that illegal connections

are a significant problems in many municipalities. A recent study conducted for the Department of Energy (DOE, 2013) found that only 1% (or 144 501 of all households) used illegal connections to access electricity. The report adds that most of the illegal connections were found in informal settlements.

3. Objectives of this volume

The General Household Survey (GHS) is an official source of official statistics that contributes, amongst other things, towards the monitoring of selected indicators in relation to the performance of various government departments. The GHS has been conducted since 2002 by Statistics South Africa (Stats SA) and was specifically designed to measure the multiple facets of the living conditions of South African households and it covers six broad areas, namely: education, health and social development, housing, household access to services and facilities, food security and agriculture.

The report provides insight on the energy-related consumption patterns of South African households using cross-sectional household survey data collected between 2002 and 2012. The study will also report on the findings of a more elaborated battery of energy questions that was asked in 2012. These questions were developed in collaboration with the Department of Energy and focussed on household perceptions and experiences.

The report will attempt to:

- Determine access to electricity;
- Outline the sources of energy used by households for cooking, heating and lighting since 2002;
- Investigate the levels of energy poverty;
- Explore satisfaction with electricity provisions, perceptions about the quality of electricity and pricing of electricity
- Explore views on electricity-saving strategies

4. Methodology and data

This study used the GHS 2002–2012 data series as indicated in the objectives. From 2008 an enhanced design was made and consists of a multi-stage stratified sample with probability proportional to size selection of primary sampling units (PSUs) at the first stage and sampling of dwelling units (DUs) with systematic sampling at the second stage. In this regard, a design allocates proportionatelyto the provinces however taking into account that there are large variations in size, a disproportionate or over sampling is implemented for the Northern Cape and the Free State in the design for instance. The sample was further stratified by geography (primary stratification), and by population attributes using the Census 2001 data (secondary stratification).

Survey officers employed and trained by Stats SA visited all the sampled dwelling units in each of the nine provinces. During the first phase of the survey, sampled dwelling units were visited and informed about the survey as part of the publicity campaign. The actual interviews took place soon after the publicity visits. A total of approximately 30 000 households were interviewed during consecutive years using face-to-face interviews. Between 2002 and 2008, data collection took place over a period of two weeks in July of each year. Since GHS 2009, data collection is spread over three

months during the period July to September of each year. As a result of the sample size and stratification design, data can only be aggregated down to provincial level. Data for the whole series as presented in this release were therefore comparable and the analysis is made on this basis.

More details related to the sampling and fieldwork methodology can be found in the GHS reports and metadata (2002-2012).

Stats SA revised the population model to produce mid-year population estimates during 2013 in the light of the findings of the 2011 census. The new data have been used to adjust the benchmarking for all previous datasets. Weighting and benchmarking were also adjusted for the provincial boundaries that came into effect in December 2010. The data for the GHS 2002 to GHS 2012 as presented in this release are therefore comparable.

Household estimates that were developed using the UN headship ratio methodology were used to weight household files. Data from the Census 1996, 2001 and 2011 as well as the 2007 community survey were used to analyse trends and develop models to interpolate the number of households for each year. The weighting system was based on tables for the expected distribution of household heads for specific age categories, per population group and province. Missing values and unknown values were excluded from totals used as denominators for the calculation of percentages, unless otherwise specified. Frequency values have been rounded off to the nearest thousand. Population totals in all tables reflect the population and sub-populations as calculated with SAS and rounded off. This will not always correspond exactly with the sum of the preceding rows because all numbers are rounded off to the nearest thousand.

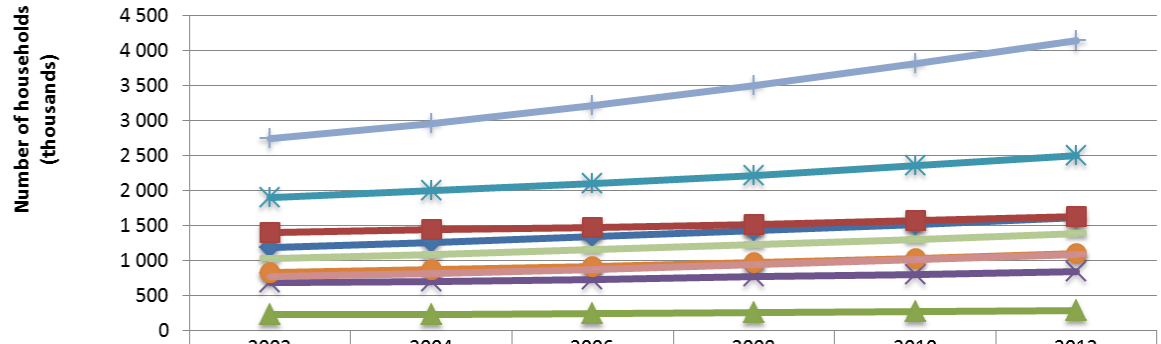
As a result of new statistical programs used for weighting, which discards records with unspecified values for the benchmarking variables, namely age, sex and population group, it became necessary to impute missing values for these variables. A combination of logical and hot-deck imputation methods was used to impute the demographic variables of the whole series from 2002–2012.

SAS 9.0 and SAS Enterprise Guide was used for the data analysis. In addition to the use of descriptive statistics, modelling using logistic regression analysis and chi square tests were also used for selected indicators. Unspecified values (item non-response) were excluded from the totals that were used to calculate percentages.

5. Findings

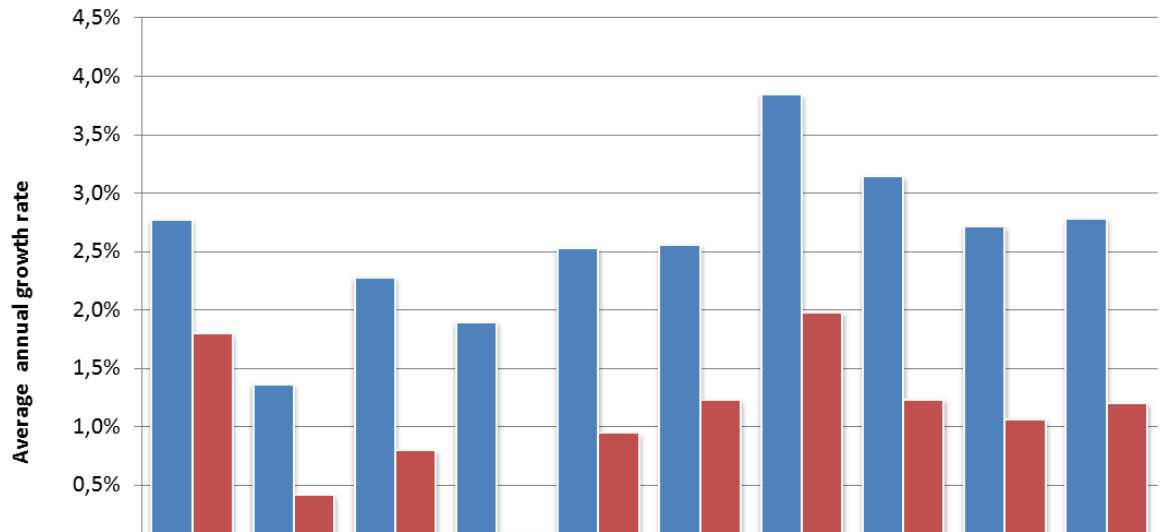
Households are the most appropriate units of analysis to measure progress with regards to the delivery of basic services to the South African population. The number of households increased by 2,8% a year to 14,6 million in 2012. Figure 5, below, shows that Gauteng contains the largest number of households (4,2million), followed by KwaZulu-Natal with 2,5 million. Northern Cape contains only approximately 296 000 households. The figures also shows that the number of households in Gauteng have experienced the most rapid increase, followed by households in KwaZulu-Natal.

Figure 5: Number of households per province 2002-2012



	2002	2004	2006	2008	2010	2012
Western Cape	1 198	1 269	1 348	1 432	1 524	1 619
Eastern Cape	1 405	1 445	1 482	1 525	1 573	1 631
Northern Cape	231	242	254	268	282	296
Free State	686	710	738	773	806	843
KwaZulu-Natal	1 902	1 999	2 101	2 224	2 358	2 504
North West	837	878	926	980	1 040	1 105
Gauteng	2 743	2 960	3 217	3 504	3 823	4 153
Mpumalanga	774	825	882	947	1 015	1 088
Limpopo	1 037	1 096	1 159	1 232	1 309	1 392

Figure 6: Comparison of provincial average annual growth rates for population and households, 2002-2012



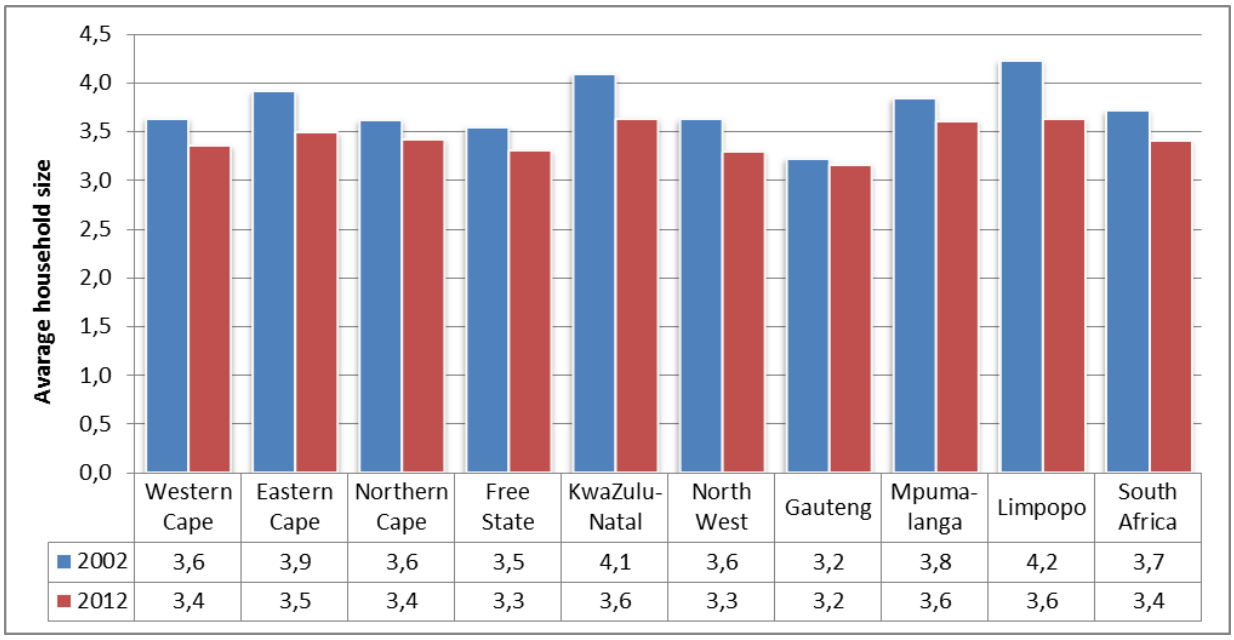
	Western Cape	Eastern Cape	Northern Cape	Free State	KwaZulu-Natal	North West	Gauteng	Mpuma-langa	Limpopo	South Africa
Households	2,8%	1,4%	2,3%	1,9%	2,5%	2,6%	3,8%	3,1%	2,7%	2,8%
Population	1,8%	0,4%	0,8%	0,1%	0,9%	1,2%	2,0%	1,2%	1,1%	1,2%

It is clear from Figure 6 that the growth rate in households has outstripped the growth rate in population since 2002. Whereas the population of South Africa has increased by 1,2% per year between 2002 and 2012, households grew by more than twice the growth rate, 2,8%, during the same time. In Gauteng, population increased by an average of 2% per year compared to average household growth of 3,8% during this time. Households grew by an average of 3,1% per year in Mpumalanga during the same time. The lowest average annual household growth was measured in

Eastern Cape (1,4%) and Free State (1,9%). Both provinces also experienced relatively low population growth during the period in question.

The rapid increase in the number of households has, naturally, affected the average household sizes. Figure 7 shows that, between 2002 and 2012, the average household size in South Africa declined from 3,7 to 3,4. The largest average households sizes (3,6) were observed in the predominantly rural provinces of KwaZulu-Natal, Limpopo and Mpumalanga. Gauteng had the smallest average households size (3,2). An analyses of households by geographic location shows that households in rural areas had the largest average household size (4,1 persons per household), followed by households in urban formal areas (3,2 persons per household) and urban informal households (3,1 persons per household). Households in farm areas, on average, contained only 2,6 persons.

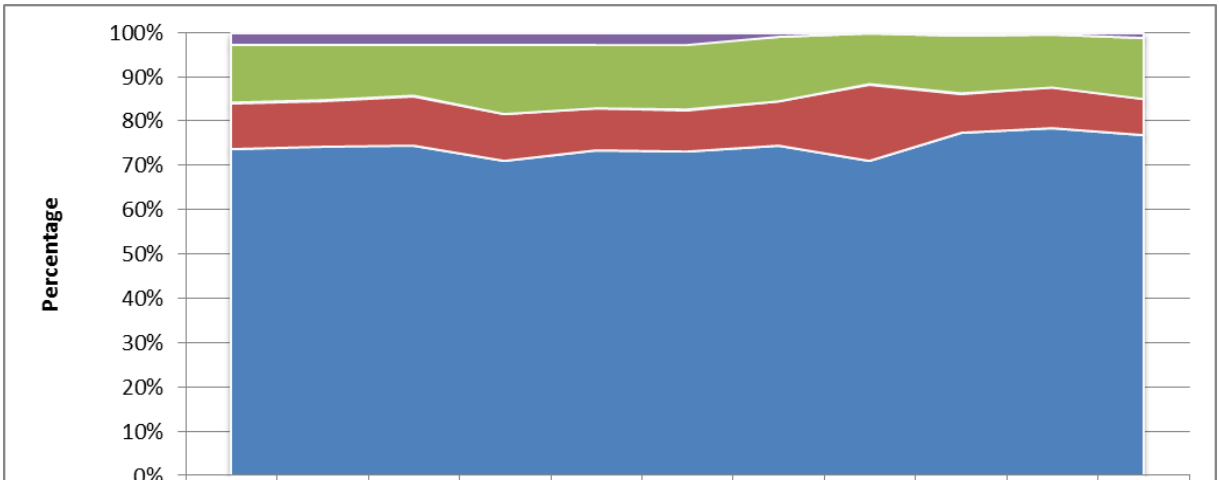
Figure 7: Changes in the average household size, 2002–2012



	Western Cape	Eastern Cape	Northern Cape	Free State	KwaZulu-Natal	North West	Gauteng	Mpuma-langa	Limpopo	South Africa
2002	3,6	3,9	3,6	3,5	4,1	3,6	3,2	3,8	4,2	3,7
2012	3,4	3,5	3,4	3,3	3,6	3,3	3,2	3,6	3,6	3,4

More than three-quarters of households lived in formal dwellings (76,9%) in 2012 compared to 73,7% in 2002. The percentage of household that lived in informal dwellings also increased slightly from 13,2% to 14,1% during this period. By contrast, the percentage of households that resided in traditional dwellings declined by 2,2% to 8,1% in 2012.

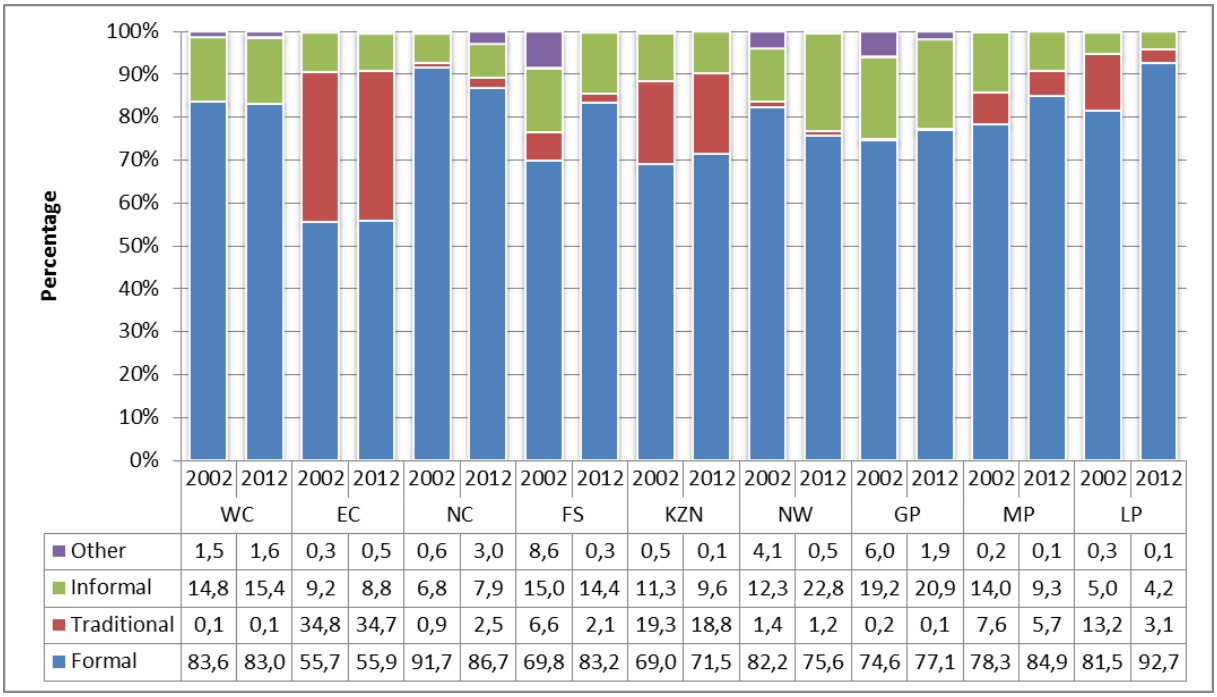
Figure 8: Percentage distribution of households by dwelling type, 2002–2012



	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012
Other	2,7	2,3	2,2	2,5	2,1	2,0	0,9	-	0,6	0,3	0,9
Informal	13,2	13,1	12,1	16,0	15,0	15,5	14,6	11,7	13,2	12,0	14,1
Traditional	10,3	10,3	11,2	10,6	9,4	9,2	9,9	17,2	8,9	9,2	8,1
Formal	73,7	74,4	74,5	71,0	73,5	73,3	74,6	71,1	77,4	78,5	76,9

Figure 9 shows that, in 2012, the percentage of households that lived in formal dwellings was the smallest in Eastern Cape (55,9%) and the largest in Limpopo (92,7%). The percentage of households in Limpopo that lived in formal dwellings increased by 11,2% between 2002 and 2012. The percentage of households that lived in informal dwellings was the largest in North West (22,9%) and Gauteng (20,9%). More than a third of households in Eastern Cape (34,7%) and about one-fifth (18,8%) of households in KwaZulu-Natal lived in traditional dwellings

Figure 9: Percentage distribution of dwelling types by province, 2002 and 2012



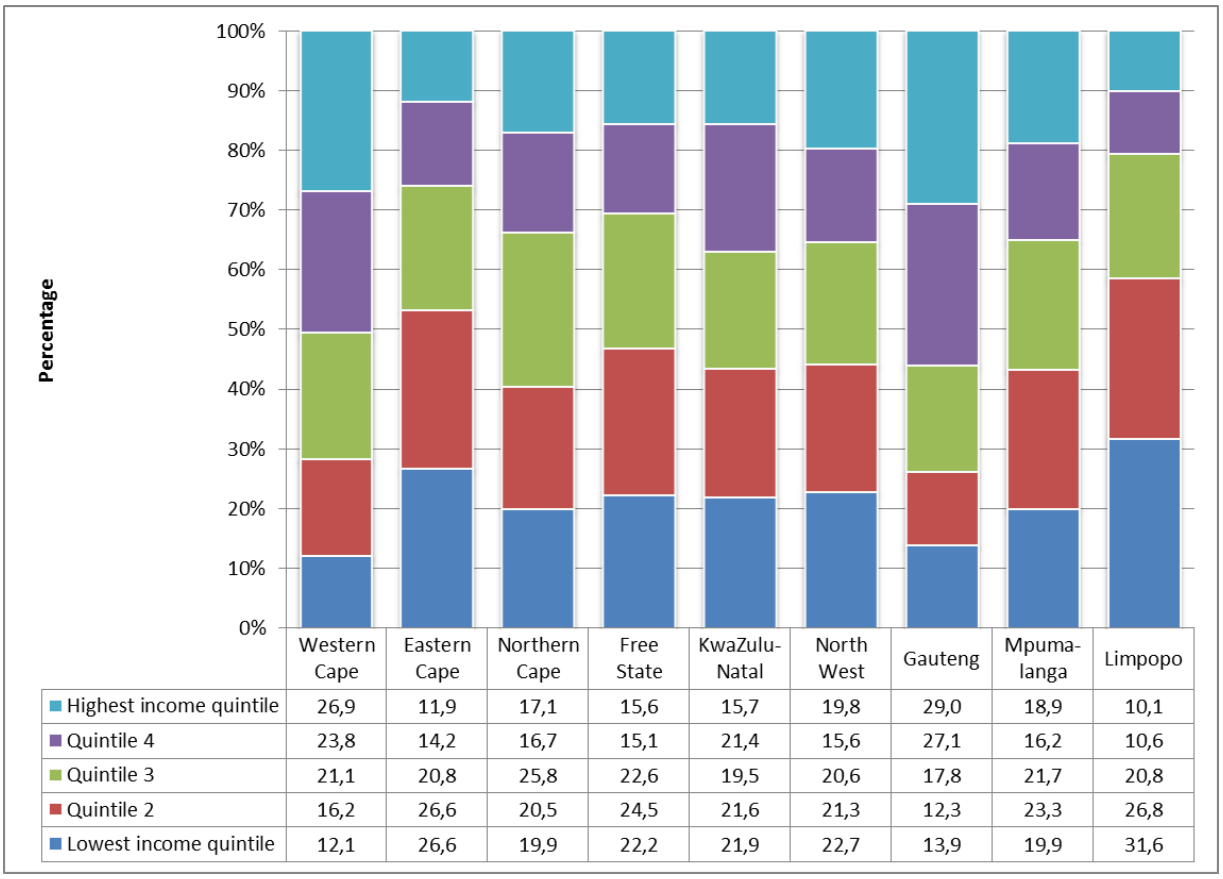
	2002	2012	2002	2012	2002	2012	2002	2012	2002	2012	2002	2012	2002	2012	2002	2012	2002	2012
	WC		EC		NC		FS		KZN		NW		GP		MP		LP	
Other	1,5	1,6	0,3	0,5	0,6	3,0	8,6	0,3	0,5	0,1	4,1	0,5	6,0	1,9	0,2	0,1	0,3	0,1
Informal	14,8	15,4	9,2	8,8	6,8	7,9	15,0	14,4	11,3	9,6	12,3	22,8	19,2	20,9	14,0	9,3	5,0	4,2
Traditional	0,1	0,1	34,8	34,7	0,9	2,5	6,6	2,1	19,3	18,8	1,4	1,2	0,2	0,1	7,6	5,7	13,2	3,1
Formal	83,6	83,0	55,7	55,9	91,7	86,7	69,8	83,2	69,0	71,5	82,2	75,6	74,6	77,1	78,3	84,9	81,5	92,7

5.1 Household living standards

Figure 10 shows that poor households (household in the bottom two income quintiles) were predominantly located in Limpopo (58,4%) and Eastern Cape (53,2%). By comparison, only 26,2% of the population in Gauteng and 28,3% of the population in Western Cape could be considered poor by these standards. In fact, 29% of households in Gauteng and 26,9% of households in Western Cape fell into the richest income quintile.

A comparison of income quintile bands in urban and rural areas show that 29,8% of urban households fell into the lowest two quintiles compared to 60,2% of rural households. Conversely, 26,3% of urban households were quintile 5 households, compared to only 7,5% of rural households.

Figure 10: Distribution of income quintiles by province, 2012



	Western Cape	Eastern Cape	Northern Cape	Free State	KwaZulu-Natal	North West	Gauteng	Mpuma-langa	Limpopo
Highest income quintile	26,9	11,9	17,1	15,6	15,7	19,8	29,0	18,9	10,1
Quintile 4	23,8	14,2	16,7	15,1	21,4	15,6	27,1	16,2	10,6
Quintile 3	21,1	20,8	25,8	22,6	19,5	20,6	17,8	21,7	20,8
Quintile 2	16,2	26,6	20,5	24,5	21,6	21,3	12,3	23,3	26,8
Lowest income quintile	12,1	26,6	19,9	22,2	21,9	22,7	13,9	19,9	31,6

Household's ownership of electrical appliances is presented in Table 1. The figure shows that 78,8% of households owned an electrical stove and that 70% owned a refrigerator. By comparison, less than a third (31,5%) owned a washing machine and only 9,2% had a tumble drier. As could be expected, ownership of electrical appliances are closely associated with households wealth and households in the wealthier provinces (Western Cape and Gauteng) were more likely to own any of the electrical appliances.

Table 1: Household ownership of electrical appliances by province, 2012

	WC	EC	NC	FS	KZN	NW	GP	MP	LP	SA
TV	90,3	70,3	79,8	83,3	72,5	76,5	84,9	80,0	74,3	**79,5**
Electric stove	87,7	74,1	83,8	85,7	72,9	74,1	82,8	81,0	69,3	**78,8**
Refrigerator	84,6	55,2	71,4	76,0	66,6	67,1	75,8	69,7	61,1	**70,3**
DVD/Blue ray	69,4	44,2	52,1	60,5	47,3	47,9	62,4	53,1	57,6	**56,0**
Microwave	75,0	38,8	53,0	58,3	43,0	42,6	64,8	45,0	28,0	**52,1**
Built in kitchen sink	69,7	24,9	31,1	32,9	28,6	20,6	49,5	27,0	11,8	**36,6**
Washing machine	60,1	18,8	44,6	25,3	16,3	30,3	42,5	28,7	12,2	**31,5**
DStv / Pay television	35,8	16,9	28,5	27,7	24,9	23,0	37,7	27,0	25,9	**29,2**
Home theatre	16,5	10,6	12,4	19,3	16,9	25,8	30,3	22,9	11,8	**20,6**
Deep freezer	32,3	13,5	30,9	16,0	19,5	17,5	18,2	25,1	24,1	**20,6**
Computer	34,1	9,7	16,1	16,5	12,6	14,7	28,0	15,2	11,1	**19,5**
Vacuum cleaner	30,2	7,0	12,9	10,2	6,7	8,6	19,7	8,5	4,0	**13,4**
Home security	18,7	5,9	5,7	6,1	9,4	4,9	20,5	8,3	2,5	**11,8**
Tumble drier	18,0	4,3	8,6	5,2	5,8	7,9	13,1	8,7	3,3	**9,2**
Dish washer	14,5	2,7	4,8	6,3	5,4	4,5	11,0	6,1	2,8	**7,4**
Air conditioner	7,8	1,6	5,1	5,9	8,8	4,0	7,0	4,9	4,6	**6,1**
Swimming pool	8,9	2,4	2,4	2,8	4,0	1,7	7,8	2,9	1,6	**4,9**

Urban households were consistently more likely to own electrical appliances than rural households (Table 2). Urban households were specifically much more likely to have possessed appliances such as a microwave oven (64,4% to 25,7%) and washing machine (41,4% to 10,4%). Very similar percentages of urban and rural households owned a deep freezer.

Table 2: Household ownership of electrical appliances by geographical location, 2012

	Rural	Urban	South Africa
TV	66,6	85,6	**79,5**
Electric stove	66,1	84,7	**78,8**
Refrigerator	54,7	77,7	**70,3**
DVD/Blue ray	41,2	62,9	**56,0**
Microwave	25,7	64,4	**52,1**
Washing machine	10,4	41,4	**31,5**
Dstv / pay television	14,2	36,2	**29,2**
Deep freezer	17,0	22,3	**20,6**
Home theatre	12,6	24,4	**20,6**
Computer	6,1	25,8	**19,5**
Vacuum cleaner	2,2	18,6	**13,4**
Home security	1,4	16,7	**11,8**
Tumble dryer	2,5	12,4	**9,2**
Dish washer	1,6	10,2	**7,4**
Air conditioner	2,0	8,0	**6,1**
Swimming pool	1,0	6,7	**4,9**

An analysis by income quintile (Table 3) shows that wealthier households were generally more likely to possess electrical appliances than households in lower income quintile bands. The differences between ownership of various appliances between households in quintile 1 and quintile 5 are particularly pronounced for microwave ovens (54,3%), Pay television (50,4%), computers (48,9%) and washing machines (47,9%). The smallest differences were observed for ownership of swimming pools (13,9%), air conditioners (18,1%) and dish washers (19,8%).

The distribution of households per province according to their respective Living Standard Measures (LSM) classifications is presented in Table 4. LSM 1–4 is combined to form the first category, 'low', while LSM 5–7 is combined to form 'intermediate'. 'High' consists of households in LSM 8–10. The table shows that almost half of all households in Eastern Cape (48,9%) and Limpopo (46,4%) had a low standard of living compared to only 8,8% of households in Western Cape and 15,8% of households in Gauteng. Inversely, only 5,7% of households in Limpopo and 9,2% of households in Eastern Cape enjoyed a high standard of living compared to 34,3% of households in Western Cape and 28,3% of households in Gauteng. About one-fifth of households in South Africa were classified as having had a high standard of living.

Table 3: Household ownership of electrical appliances by income quintile, 2012

Electrical appliance	Poorest households	Quintile 2	Quintile 3	Quintile 4	Wealthiest households
Television	69,3	75,0	74,9	83,4	92,4
Swimming pool	0,8	1,0	1,0	3,5	14,7
DVD/Blue ray	40,9	46,7	47,5	61,3	77,5
Dstv/pay television	11,8	12,7	16,4	32,5	62,2
Air conditioner	0,6	0,9	1,4	5,0	18,7
Computer	4,1	5,0	7,3	18,5	53,0
Vacuum cleaner	1,3	1,7	3,9	12,0	38,3
Dish washer	1,5	1,8	2,4	5,3	21,3
Washing machine	13,2	16,5	22,4	34,6	61,1
Tumble dryer	1,6	2,1	3,5	7,1	26,0
Deep freezer	11,9	15,0	15,6	21,2	34,9
Refrigerator	55,5	63,0	65,0	73,8	90,2
Electric stove	67,3	74,7	76,4	83,2	90,0
Microwave	28,9	36,0	43,5	60,0	83,2
Home security	1,1	1,3	2,4	8,9	36,8
Home theatre	9,0	10,7	13,1	23,5	42,8

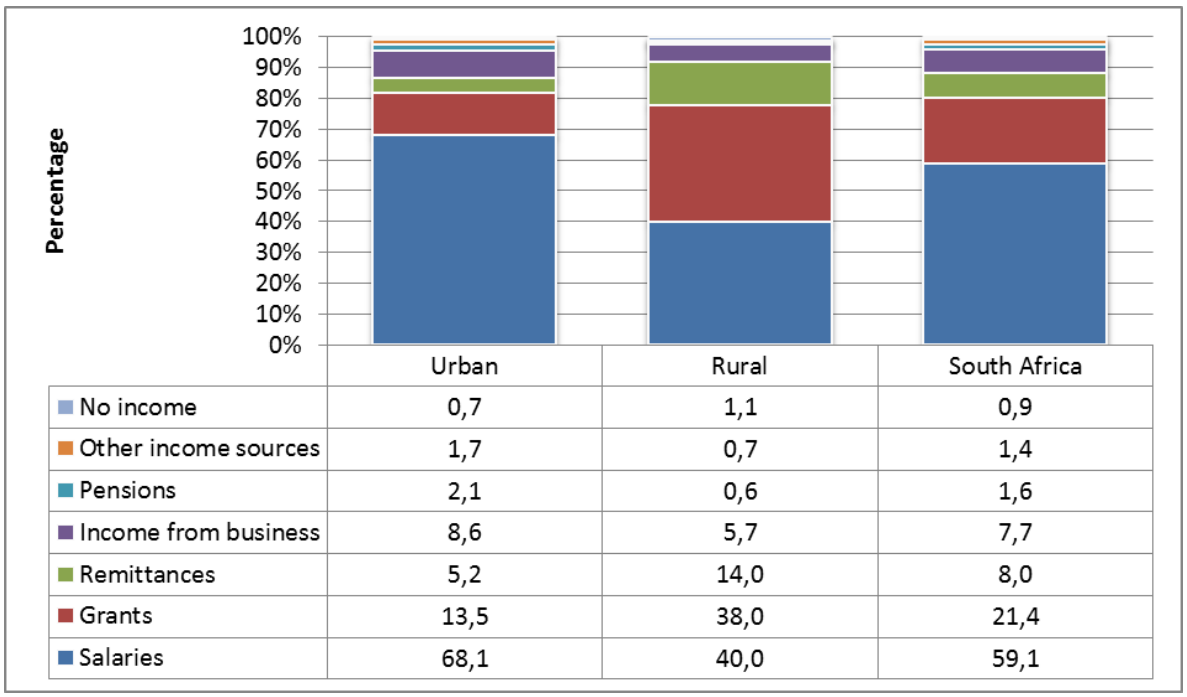
Table 4 also shows that households in rural areas were much more likely to have experienced a low standard of living than households in urban areas (57,5% compared to 16%). By contrast, 26% of household in urban areas experienced a high quality of life compared to only 2,6% of households in rural areas.

Table 4: Distribution of Living Standard Measures by province and geographic location, 2012

	Low	Intermediate	High	Per cent	Total
Province					
Western Cape	8,8	56,9	34,3	100,0	1 619 223
Eastern Cape	48,9	41,9	9,2	100,0	1 630 829
Northern Cape	26,6	59,6	14,0	100,0	296 493
Free State	22,6	64,6	12,9	100,0	842 535
KwaZulu-Natal	40,2	45,9	14,0	100,0	2 504 220
North West	37,0	52,1	11,1	100,0	1 104 665
Gauteng	15,8	56,0	28,3	100,0	4 153 150
Mpumalanga	32,6	54,7	12,8	100,0	1 088 284
Limpopo	46,4	47,8	5,7	100,0	1 391 697
Geographical location					
Urban	16,0	58,0	26,0	100,0	9 967 716
Rural	57,5	40,0	2,6	100,1	4 663 379
South Africa	**29,2**	**52,2**	**18,6**	**100,0**	**14 631 096**

The relative poverty of rural households is confirmed in Figure 11 which shows that rural households are much less likely to rely on salaries as the main source of income than urban households, and that a much larger percentage of rural households rely on social grants and remittances. The awarding of social grants is based on a means test and households that receive social grants can often register as indigent households to so be exempted from paying for basic services such as electricity.

Figure 11: Main sources of household income by geographical location, 2012

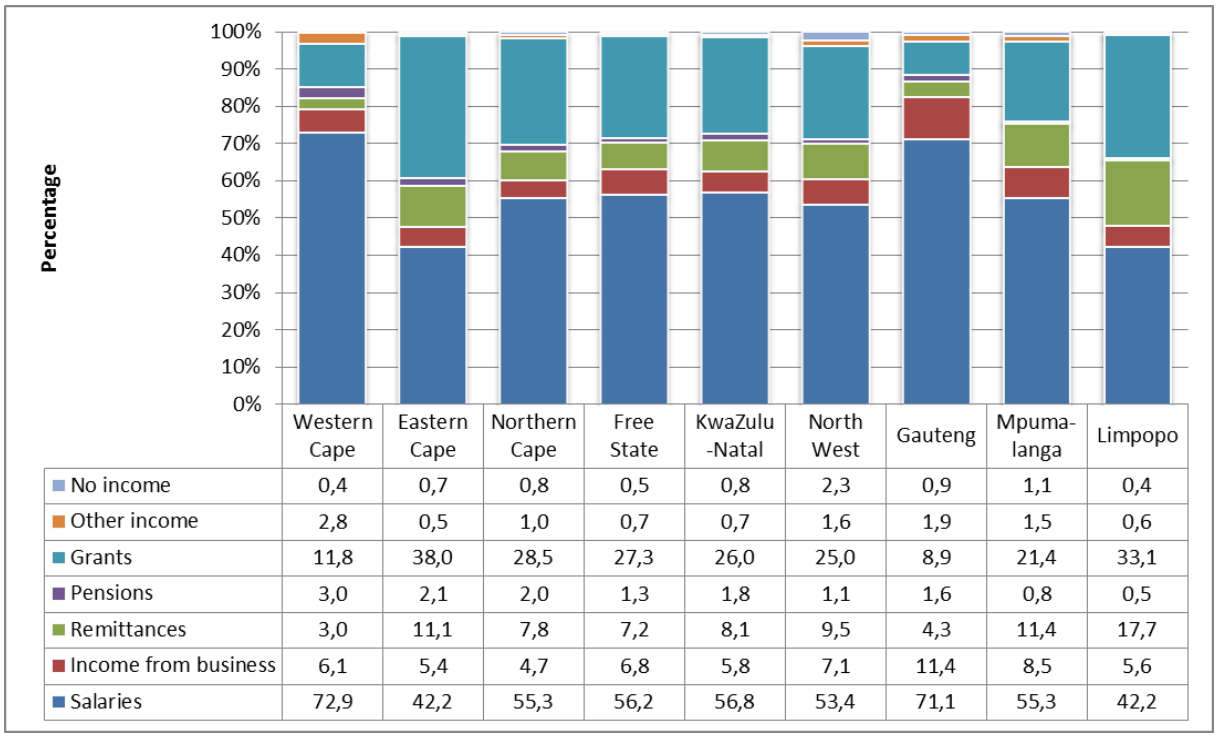


	Urban	Rural	South Africa
No income	0,7	1,1	0,9
Other income sources	1,7	0,7	1,4
Pensions	2,1	0,6	1,6
Income from business	8,6	5,7	7,7
Remittances	5,2	14,0	8,0
Grants	13,5	38,0	21,4
Salaries	68,1	40,0	59,1

Figure 12 shows that more than one-quarter of households reported social grants as their main source of income in six of the nine provinces. Of these, 33% of households in Limpopo, and 38% of

households in Eastern Cape reported social grants as their main source of income. In Mpumalanga, 21,4% of households reported social grants as their mains source of income.

Figure 12: Main sources of household income by province, 2012



	Western Cape	Eastern Cape	Northern Cape	Free State	KwaZulu -Natal	North West	Gauteng	Mpuma-langa	Limpopo
No income	0,4	0,7	0,8	0,5	0,8	2,3	0,9	1,1	0,4
Other income	2,8	0,5	1,0	0,7	0,7	1,6	1,9	1,5	0,6
Grants	11,8	38,0	28,5	27,3	26,0	25,0	8,9	21,4	33,1
Pensions	3,0	2,1	2,0	1,3	1,8	1,1	1,6	0,8	0,5
Remittances	3,0	11,1	7,8	7,2	8,1	9,5	4,3	11,4	17,7
Income from business	6,1	5,4	4,7	6,8	5,8	7,1	11,4	8,5	5,6
Salaries	72,9	42,2	55,3	56,2	56,8	53,4	71,1	55,3	42,2

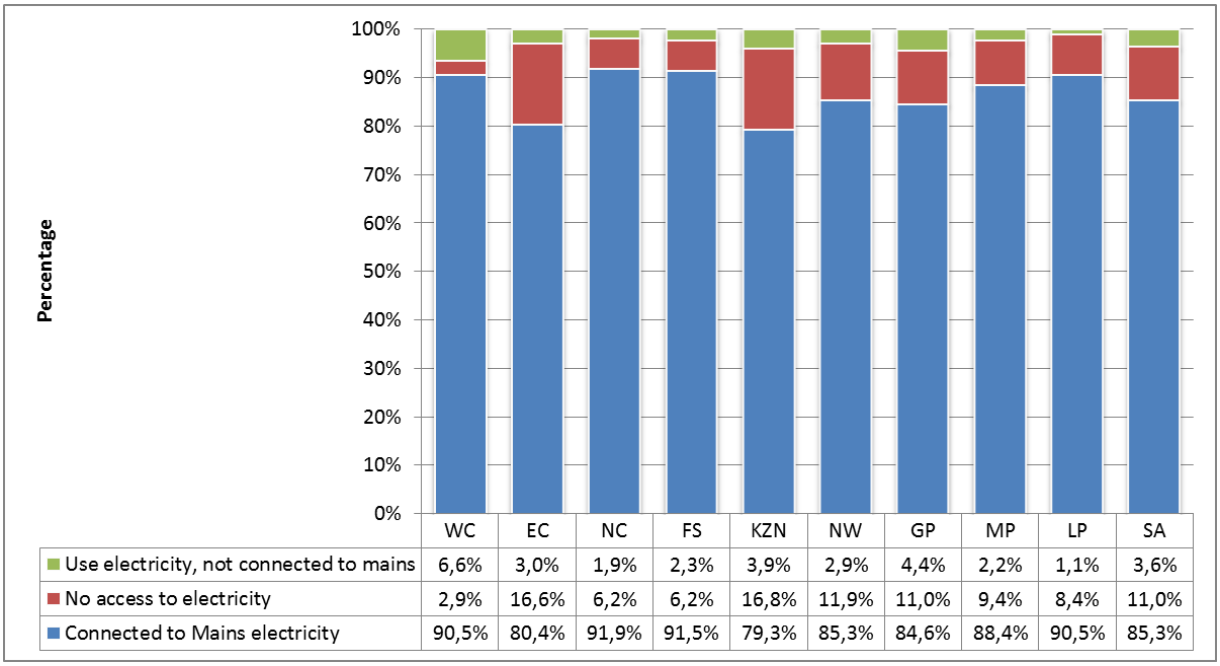
5.2 Household access to electricity

Inadequate access to modern energy services is a serious hindrance to social and economic development. Figure 13 shows that in 2012, 85,3% of South African households reported that they were connected to mains electricity. A further 3,6% of households reported that they used electricity, but that they were not connected to the mains. About 11% of households did not have access to electricity.

The highest percentage of households connected to the mains were reported in Northern Cape (91,9%) and Free State (91,5%). Households in KwaZulu-Natal (80,4%) and Eastern Cape (80,4%) were least likely to have been connected to the mains. KwaZulu-Natal (16,8%) and Eastern Cape (16,6%) also contained the highest percentage of households without any access to electricity. Only 2,9% of households in Western Cape did not have any access to electricity.

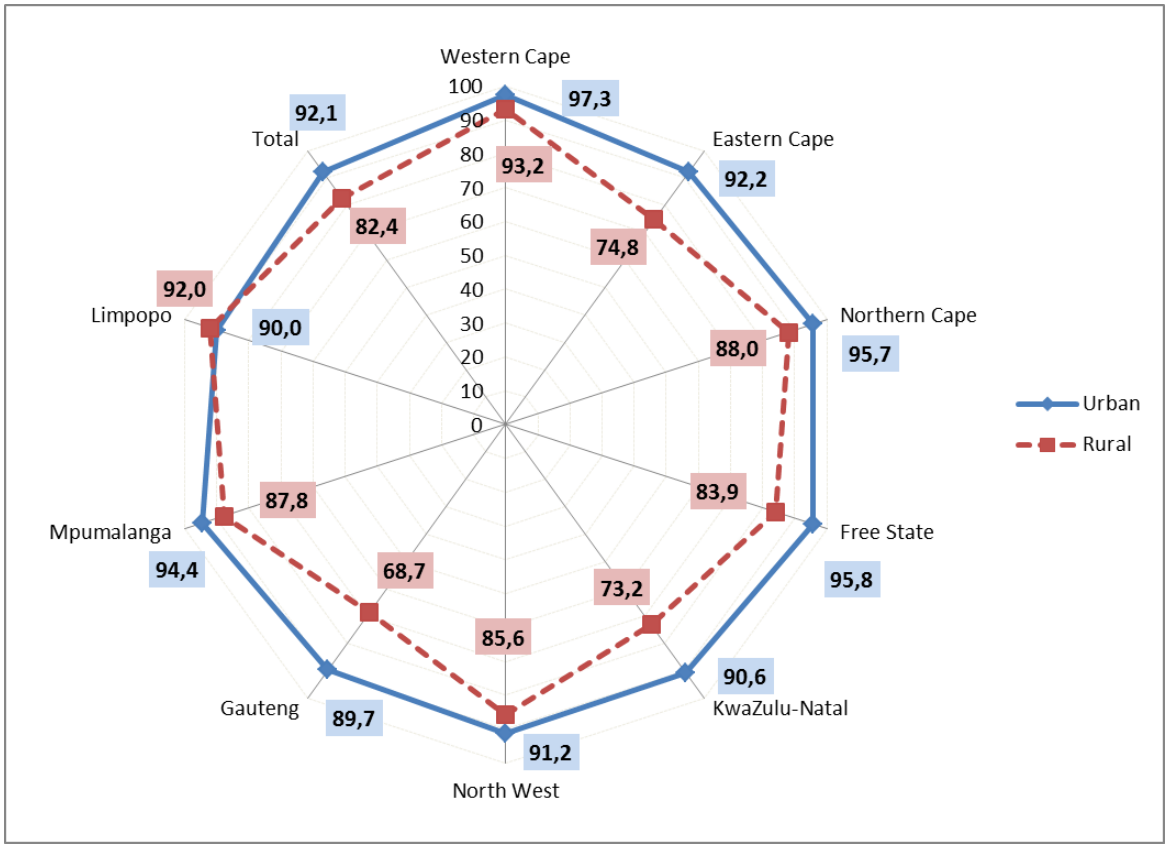
Figure 14 shows that households in urban areas were generally, with the exception of Limpopo, more likely to have access to, or use electricity that households in rural areas. The largest differences between urban and rural areas were noted in Gauteng (89,7% vs 68,7%), Eastern Cape (92,2% vs74,8%) and KwaZulu-Natal (90,6% vs 73,2%).

Figure 13: Household access to and use of electricity and other sources s of energy by province, 2012



	WC	EC	NC	FS	KZN	NW	GP	MP	LP	SA
Use electricity, not connected to mains	6,6%	3,0%	1,9%	2,3%	3,9%	2,9%	4,4%	2,2%	1,1%	3,6%
No access to electricity	2,9%	16,6%	6,2%	6,2%	16,8%	11,9%	11,0%	9,4%	8,4%	11,0%
Connected to Mains electricity	90,5%	80,4%	91,9%	91,5%	79,3%	85,3%	84,6%	88,4%	90,5%	85,3%

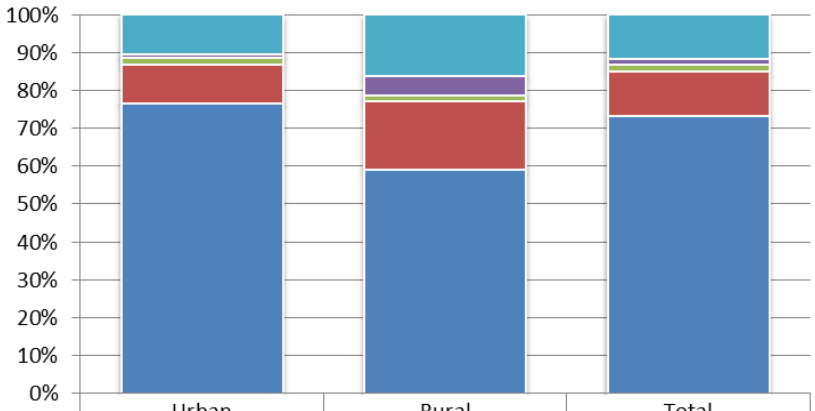
Figure 14: Household use of electricity by geographical location, 2012



As seen in Figure 13, approximately 3,6% (578 005) of all households used electricity without being connected to the mains themselves. Of this total, 460 856 were in urban areas and 117 149 in rural areas. If the electricity that households use were not from the mains supply, they were requested to

indicate which sources of electricity they used (Figure 15). Almost three-quarters of households (76,7% in urban areas and 59,2% in rural areas) indicated that they tapped electricity from other sources (such as their neighbours or landlords), but that they paid or reimbursed them for the electricity. A much smaller percentage (11,7%) admitted that they extracted electricity from other sources but that they did not pay for it. The percentage was much larger in rural areas (18,1%) than in urban areas (10,1%). A very small percentage of households utilized home solar systems or generators.

Figure 15: Household sources of electricity if not connected to the Mains, 2012



	Urban	Rural	Total
Other	10,7	16,2	11,8
Home solar system	0,7	5,1	1,6
Generator	1,9	1,5	1,8
Connected to other source for which the household is not paying for, e.g. connected to the neighbour but do not pay them.	10,1	18,1	11,7
Connected to other source which household pay for,e.g. connected to neighbours and pay them	76,7	59,2	73,1

5.3 Household access to Mains electricity

Whereas the previous section focussed on households' use of electricity regardless of the sources thereof, this section will specifically focus on households access to mains electricity[2].

Table 5 shows that the number of households with access to Mains electricity increased by 48,8% (at an average rate of 3,7% per year) to 12,4 million households in 2012. During this period, the total number of households increased by approximately 35% to 14,6 million households at an average rate of 2,8% per year. Despite the rapid rate of electrification, the number of households without access to electricity declined by less than 10% to 2,3 million households in 2012. This figure is considerably lower than the national backlog of 3,4 million households reported by the Department of Energy (DOE, 2013: 7). The share of households without electricity of all households declined from 22,9% in 2002 to 14,7% in 2012.

[2]Mains electricity is defined here as the general-purpose alternating-current (AC) electric power that is supplied to households.

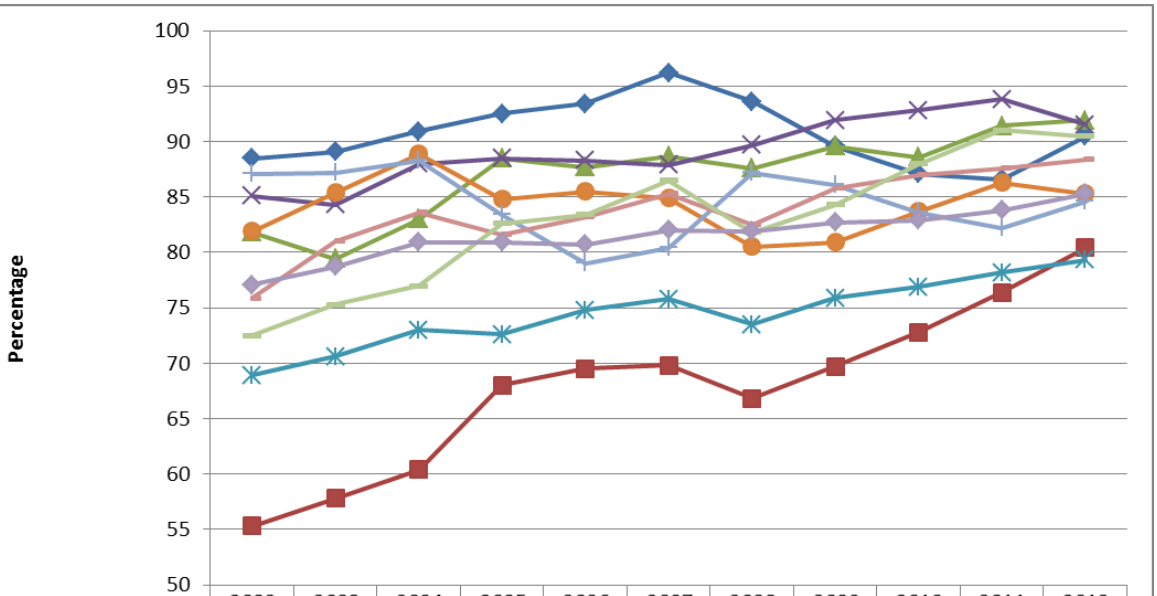
Table 5: Total number of households and households with and without electricity (thousands), 2002-2012

Year	Total number of Households	Households with access to electricity	Household without access to electricity	Households without access to electricity as percentage of all households[3]
2002	10 814	8 320	2 494	22,9%
2003	11 113	8 721	2 392	21,3%
2004	11 425	9 226	2 199	19,1%
2005	11 754	9 497	2 257	19,1%
2006	12 107	9 742	2 365	19,3%
2007	12 485	10 205	2 280	18,0%
2008	12 886	10 507	2 379	18,1%
2009	13 303	10 990	2 313	17,3%
2010	13 731	11 386	2 345	17,1%
2011	14 173	11 863	2 310	16,2%
2012	14 631	12 383	2 248	14,7%

The progress made in achieving universal access to electricity is clear from Figure 16. Between 2002 and 2012, the percentage of households with access to mains electricity increased from 77,1% to 85,3%. The largest increases were noted in Eastern Cape (55,3% to 80,4%) and Limpopo (72,5% to 90,5%).According to this figure, the rapid improvement in Eastern Cape moved the province off the bottom of the list, marginally above KwaZulu-Natal. Households in Northern Cape (91,9%) and Free State (91,5%) were most likely to have access to mains electricity.

[3]Please note that unspecified/missing values are excluded from the denominator (total number of households) for purposes of the calculation.

Figure 16: Household access to mains electricity, 2002-2012



	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012
Western Cape	88,5	89,1	90,9	92,5	93,4	96,2	93,6	89,6	87,1	86,6	90,5
Eastern Cape	55,3	57,8	60,4	68,0	69,5	69,8	66,8	69,7	72,8	76,4	80,4
Northern Cape	81,8	79,4	83,0	88,5	87,7	88,7	87,6	89,6	88,6	91,4	91,9
Free State	85,1	84,3	88,0	88,5	88,3	87,9	89,7	91,9	92,8	93,8	91,5
KwaZulu-Natal	68,9	70,6	73,0	72,6	74,8	75,8	73,5	75,9	76,9	78,2	79,3
North West	81,9	85,4	88,9	84,8	85,5	84,9	80,5	80,9	83,7	86,3	85,3
Gauteng	87,1	87,2	88,3	83,4	79,0	80,4	87,2	86,1	83,6	82,2	84,6
Mpumalanga	75,9	81,0	83,6	81,6	83,2	85,3	82,5	85,8	87,0	87,6	88,4
Limpopo	72,5	75,3	77,0	82,6	83,4	86,5	81,8	84,3	88,0	91,0	90,5
South Africa	77,1	78,7	80,9	80,9	80,7	82,0	81,9	82,7	82,9	83,8	85,3

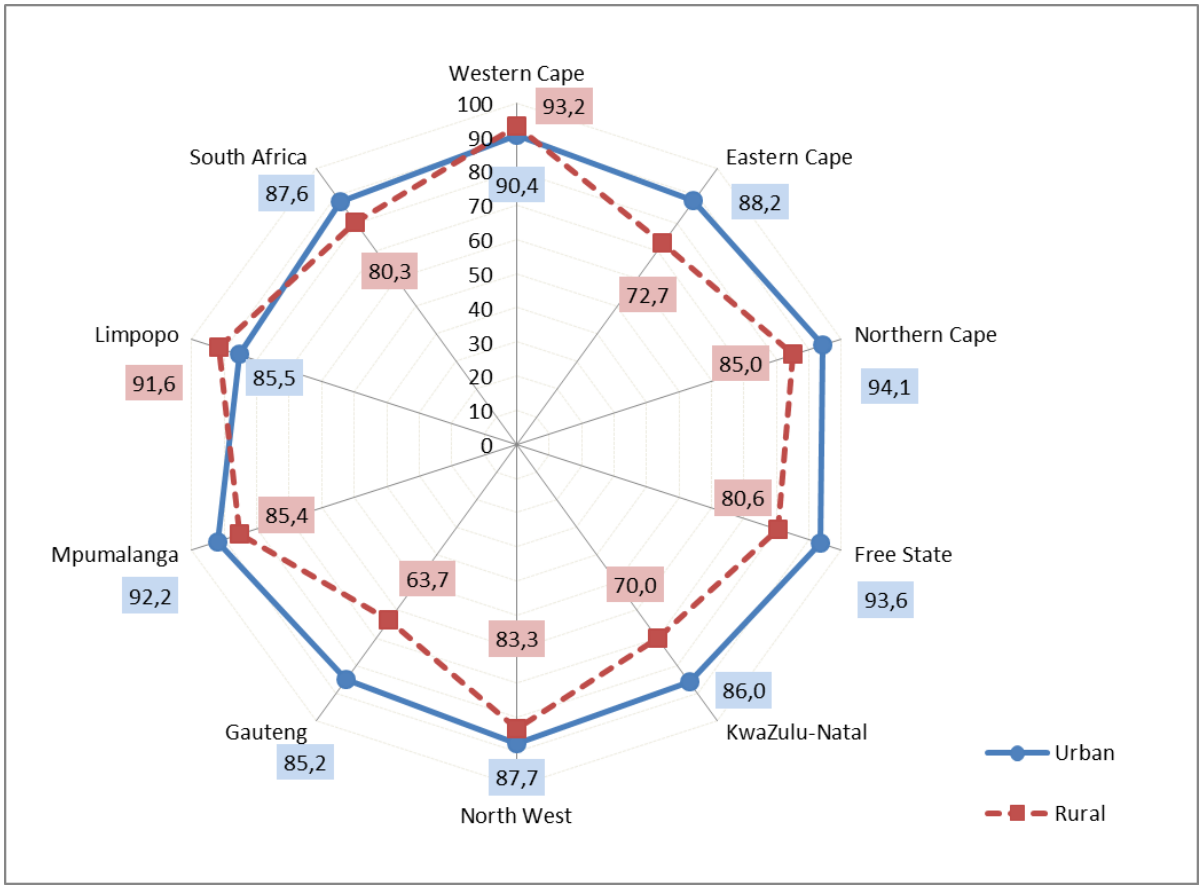
Household access to electricity is disaggregated by urban and rural areas in Figure 17. This figure is similar to Figure 14, but only refers to access to mains electricity. According to the figure, 87,6% of urban households had access to mains electricity compared to 80,3% of rural households. Urban households in Northern Cape (94,1%), Free State (93,6%) and Western Cape (93,2%) were most likely to be electrified while those in Gauteng (85,2%) and KwaZulu-Natal (86,0%) were least likely to have access to mains electricity. Rural households in Gauteng had the least access at 63,7%, followed by those in Eastern Cape (72,7%) and KwaZulu-Natal (70,0%).

The relatively low percentage of electrified households in rural Gauteng could probably be ascribed to the presence of informal settlements in areas that were previously classified as rural. Analysis show that 30,4% of households in the Gauteng rural areas are informal dwellings. Unusually, rural households in Limpopo and Western Cape were more likely to have access to mains electricity than their urban counterparts.

The two provinces have completely opposing profiles. While the only 5,6% of households in Western Cape were located in rural areas, this was the case for 82,6% of households in Limpopo. The vast majority (86%) of the relatively small rural population in Western Cape lived in relatively well serviced formal dwellings. Approximately 16% of households in the much larger urban areas lived in informal dwellings that are often located in areas that are much more difficult to service.

In the largely rural Limpopo province, 79,6% of households in rural formal areas and 93,7% of households in tribal areaslived in formal dwellings. Of these households, 94,5% in tribal areas and 87% in rural formal areas had access to electricity. Only 31,1% of households in urban informal areas in Limpopo had access to electricity.

Figure 17: Household access to mains electricity by province and geographical location, 2012



It is clear from Table 6 that households headed by Black Africans are less likely to be connected to mains electricity than households headed by individuals from other population groups. The small difference in access between particularly white- an Indian/Asian-headed households is particularly noticeable. A larger percentage of female- than male-headed households were electrified. Households were more likely to be electrified with increases in the age of the head. Whereas only 74,4% of child-only households were electrified, 89,9% of households headed by persons over the age of 60 years had access to mains electricity. Similarly, poorer households were less likely to be electrified that households with a higher average per capita monthly income. While 78,8% of households in income quintile 1 were electrified, this was true for 93,8% of households in the wealthiest quintile. Only 59,3% of households classified as falling into living standard measure 1-4 (low) were electrified compared to 99,7% of households in LSM 8-10 (high). Household in formal dwellings (93,8%) were more likely to be electrified than those in traditional dwellings (63,1%) or those in informal dwellings (53,5%). As could be expected, households in urban formal areas were most likely to be electrified. It is interesting to note that a smaller percentage of households in informal areas (59,6%) had access to electricity than households in rural formal areas (66,5%).

Table 6: Household access to mains electricity by demographic and household characteristics, 2012

Characteristics	Connected to mains electricity	Not connected to mains electricity	Total	Frequency
Head population group				
Black African	82,2	17,8	100,0	11 489 635
Coloured	93,3	6,7	100,0	1 064 587
Indian/Asian	99,2	0,8	100,0	344 759
White	99,3	0,7	100,0	1 614 719
Head sex				
Male	84,9	15,1	100,0	8 542 067
Female	85,9	14,1	100,0	5 971 632
Head Age group				
<17	74,4	25,7	100,0	59 564
18-34	80,2	19,8	100,0	3 809 831
35-59	86,2	13,8	100,0	7 786 417
>60	89,9	10,1	100,0	2 857 888
Income quintile				
Poorest households	78,8	21,2	100,0	2 690 929
Quintile 2	82,5	17,5	100,0	2 676 165
Quintile 3	82,3	17,7	100,0	2 695 659
Quintile 4	85,3	14,7	100,0	2 678 482
Wealthiest households	93,8	6,2	100,0	2 696 743
Living standard measure				
Low	59,3	40,7	100,0	4 206 887
Middle	94,6	5,4	100,0	7 589 476
High	99,7	0,3	100,0	2 717 336
Type of dwelling				
Formal	93,8	6,2	100,0	9 142 590
Informal	53,5	46,5	100,0	2 009 219
Traditional	63,1	36,9	100,0	1 164 412
RDP	92,4	7,6	100,0	1 963 267
Geographical location				
Urban formal	92,4	7,6	100,0	8 471 975
Urban informal	59,6	40,5	100,0	1 429 084
Tribal area	82,7	17,3	100,0	3 929 071
Rural formal	66,5	33,5	100,0	683 570
Total	**85,3**	**14,7**	**100,0**	14 513 700

As mentioned, above, female-headed households are generally more likely to have access to mains electricity than male-headed ones. A comparison across geographic areas showsthat, with a few exceptions, this also holds true for rural and urban areas. While female-headed household generally enjoy better access than male-headed households in urban areas, access is very similar in Eastern Cape and KwaZulu-Natal, while male-headed households are notably more likely to have access in Limpopo. In rural areas, male-headed households are more likely to have access to electricity and this is so for Eastern Cape and KwaZulu-Natal. In Western Cape as well male headed households have better access.

Table 7: Percentage of households with access to mains electricity by province, geographical location and household head, 2012

	Urban		Rural		South Africa	
	Male-headed	Female-headed	Male-headed	Female-headed	Male-headed	Female-headed
Western Cape	89,2	92,1	93,3	92,9	89,5	92,1
Eastern Cape	88,3	88,2	74,0	71,7	81,9	78,8
Northern Cape	93,2	95,3	82,8	88,6	90,5	93,8
Free State	93,1	94,3	76,5	89,1	90,0	93,6
KwaZulu-Natal	86,0	86,1	72,7	68,2	81,6	76,9
North West	85,4	91,3	79,2	89,4	82,1	90,3
Gauteng	84,7	86,5	63,1	65,5	83,9	86,1
Mpumalanga	91,7	93,0	80,1	91,5	85,8	92,1
Limpopo	86,7	83,7	89,9	93,0	89,2	91,7
South Africa	**86,9**	**88,9**	**79,4**	**81,2**	**84,9**	**85,9**

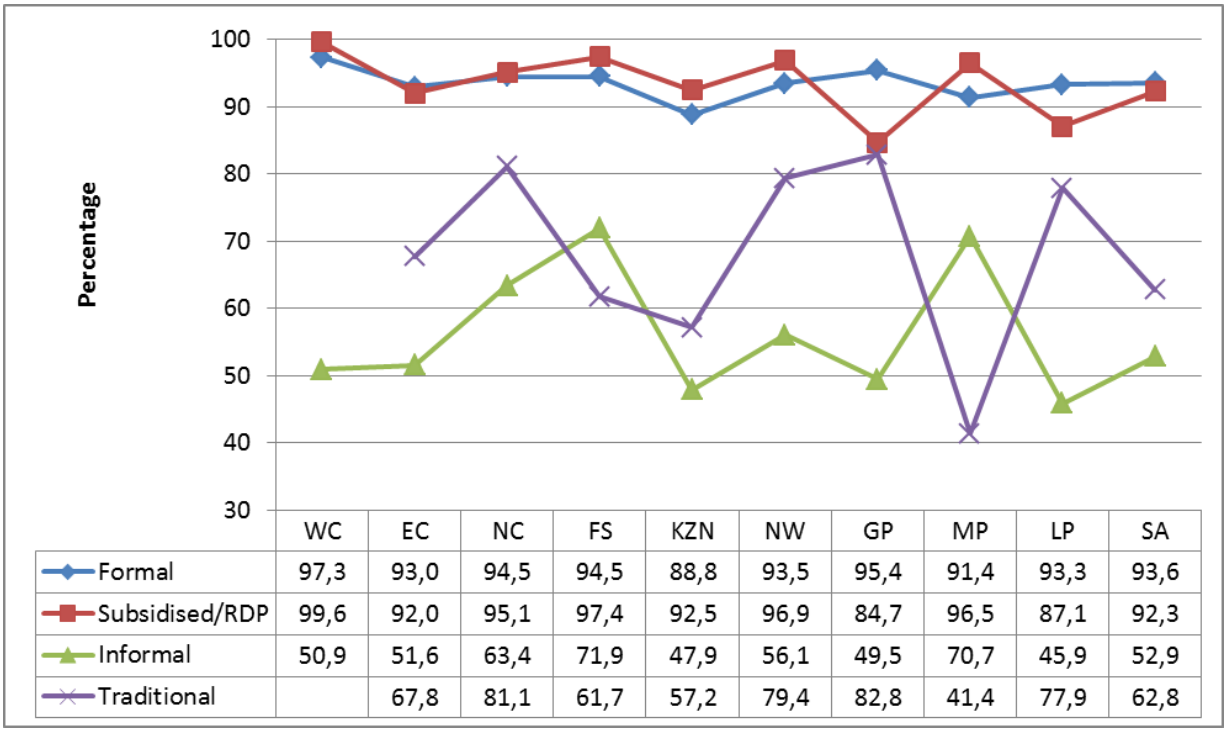
The number and percentage of individuals that lived in households without access to mains electricity, by age group, is presented in Table 8. The table shows that, nationally, 15,1% (782 381) of children in the age category 0–4 years lived in households without electricity. The bulk of these children (456 218) lived in rural areas. Although the percentage of all children (aged 0–17 years) that lived in households without electricity is very similar, the number increases to 2,6 million, of which 1,6 million lived in rural areas. Youth (15–34 years) were also more likely to live in households without electricity in rural areas (17,9%) than urban areas (10,6%). The difference is even starker where the elderly population is concerned. While 17% of older persons in rural areas lived in households without access to electricity, this was true for only 2,3% of older persons in urban areas.

Table 8: Number and percentage of individuals that lived in households without access to mains electricity by age group, sex and geographical location, 2012

	South Africa			Urban			Rural		
	Male	Female	Total	Male	Female	Total	Male	Female	Total
0–4									
Number	394 998	387 383	782 381	156 535	169 628	326 163	238 463	217 755	456 218
Per cent	15,2	15,2	15,2	10,8	11,8	11,3	20,6	19,5	20,1
0–17									
Number	1 291 470	1 287 219	2 578 690	459 360	470 208	929 567	832 111	817 012	1 649 122
Per cent	14,2	14,3	14,2	9,2	9,5	9,3	20,2	20,2	20,2
15–34									
Number	1 333 193	1 267 591	2 600 783	709 536	607 781	1 317 317	623 657	659 809	1 283 467
Per cent	13,5	13,1	13,3	11,3	9,9	10,6	17,3	18,6	17,9
65+									
Number	65 714	148 572	214 285	14 808	20 422	35 231	50 905	128 149	179 055
Per cent	7,1	8,9	8,3	2,5	2,1	2,3	15,1	17,9	17,0
Total									
Number	3 310 431	3 232 214	6 542 645	1 577 595	1 369 975	2 947 569	1 732 837	1 862 239	3 595 076
Per cent	13,2	12,3	12,8	9,9	8,4	9,2	19,1	18,7	18,9

Figure 18 illustrates that households in formal dwellings were most likely to have access to electricity, nationally (93,6%), and across all provinces. Households residing in traditional dwellings were more likely than those in informal dwellings to have access to electricity across all provinces except Western Cape (where not traditional dwellings were enumerated), Free State and Mpumalanga.

Figure 18: Household access to electricity by province and dwelling type, 2012



	WC	EC	NC	FS	KZN	NW	GP	MP	LP	SA
Formal	97,3	93,0	94,5	94,5	88,8	93,5	95,4	91,4	93,3	93,6
Subsidised/RDP	99,6	92,0	95,1	97,4	92,5	96,9	84,7	96,5	87,1	92,3
Informal	50,9	51,6	63,4	71,9	47,9	56,1	49,5	70,7	45,9	52,9
Traditional		67,8	81,1	61,7	57,2	79,4	82,8	41,4	77,9	62,8

Table 9: Household access to electricity by income quintile, 2012

	Quintile 1 (poorest households)	Quintile 2	Quintile 3	Quintile 4	Quintile 5 (wealthiest households)
Western Cape	87,7	83,7	88,5	88,6	97,6
Eastern Cape	71,6	78,5	79,2	88,6	93,5
Northern Cape	85,2	92,4	90,8	93,6	98,8
Free State	92,4	88,1	87,8	93,5	98,2
KwaZulu-Natal	67,2	71,6	76,6	84,5	96,4
North West	86,1	84,9	87,2	87,1	81,4
Gauteng	73,1	83,7	75,7	81,7	94,3
Mpumalanga	85,0	88,5	88,2	86,3	89,4
Limpopo	89,3	90,3	89,0	87,2	93,3
South Africa	**78,8**	**82,5**	**82,3**	**85,3**	**93,8**

Table 9 shows that access to electricity is largely associated with a households' per capita monthly income. Households in income quintile 5 would therefore be more likely to have access to electricity than those in preceding income quintiles. Households in income quintile five enjoyed the largest access to electricity in all provinces except North West. This is an anomalous finding that defies easy

explanation. The observation might be linked to the well-established trend in North West in which many mine-workers prefer to be paid a live-out allowance rather than to stay in mine hostels or other mine accommodation. To save money (which they often send back as remittances to the areas of origin) the miners then move into dilapidated informal settlements where they are often left without access to basic services, such as electricity. Another anomaly can be found in Limpopo and Mpumalanga where households in quintile 4 are less likely to have access electricity than those in lower quintiles two and three. In Gauteng households in quintile 4 were less likely to access electricity than those in quintile 2. At least some of these inconsistencies could possibly be explained in the context of the government's integrated national electrification plan and its focus on the poorest, most marginalised households.

As with income quintiles, there seems to be a positive correlation between standard of living and the likelihood of being connected to the mains electricity. LSMs are highly correlated with electricity use as the index is essentially based on household's ownership of a series of 29 commodities, many of which are electrical appliances. Nationally, 99,7% of households with the highest standard of living had access to electricity, compared to 94,6% of households in the 'intermediate' category, and only 59,3% in the lowest category. In terms of access to electricity, households in the two upper categories (high and intermediate) are very similar, while households in the lowest category are lagging behind considerably across all provinces. It is interesting to note that only 47,6% of low LSM households in Western Cape and 34,0% of low LSM household in Gauteng had access to electricity. By comparison, 81,3% of low LSM households in Limpopo had access to electricity.

Table 10: Household access to electricity by province and LSM, 2012

Province	Living standard measure		
	Low	Intermediate	High
Western Cape	47,6	91,6	99,6
Eastern Cape	63,3	96,0	98,9
Northern Cape	74,2	97,8	100,0
Free State	67,2	98,2	100,0
KwaZulu-Natal	53,0	95,8	100,0
North West	63,5	97,4	100,0
Gauteng	34,0	91,0	99,7
Mpumalanga	67,3	98,0	100,0
Limpopo	81,3	98,2	99,5
South Africa	59,3	94,6	99,7

Based upon the foregoing tables, households were classified into eight categories, namely:

- Urban rich electrified
- Urban rich not electrified
- Urban poor electrified
- Urban poor not electrified
- Rural rich electrified
- Rural rich not electrified
- Rural poor electrified
- Rural poor not electrified

Households that fell into the bottom two income quintiles were classified as poor, while those in the three upper bands were grouped together as 'rich' households. Although the per capita household income might differ significantly amongst households in the 'rich' category, these households probably use and have access to very similar fuels and appliances. The number and percentage of these households as a proportion of all households with access to electricity is presented in Table 11.

More than four-tenths (43,6%) of households lived in urban areas, fell into the top three income quintiles, and had access to electricity. Comparable percentages were poor (fell into the bottom two income quintiles) and had access to electricity, but respectively lived in urban areas (17,4%) and rural areas (16,2%). About one-eight (11,5%) were 'rich' rural dwellers with access to electricity. It is noticeable that the percentage of households without access to electricity was much smaller, regardless of whether households lived in urban or rural areas, or whether they were 'poor' or 'rich'.

Table 11: Number and percentage share of households by geographical location, economic status and access to electricity of all households, 2012

Household types by economic status, geographical location and access to electricity	Percentage of household share	Number of household (thousands)
Urban rich and have access to electricity	43,6	5 858
Urban rich and not having access to electricity	3,1	414
Urban poor and have access to electricity	17,4	2 337
Urban poor and not having access to electricity	2,4	325
Rural rich and have access to electricity	11,5	1 541
Rural rich and not having access to electricity	1,9	258
Rural poor and have access to electricity	16,2	2 176
Rural poor and not having access to electricity	3,9	529
Total	**100,0**	**13 438**

5.4 Household electricity providers

The supply of electricity involves three phases: generation, transmission and distribution. The generation and transmission of electricity is facilitated by national Government through the state-owned electricity company, Eskom. Eskom is responsible for the generation of 95% of all electricity, and also transmits all electricity in the country. Although schedule 4 of the Constitution makes electricity reticulation a municipal responsibility, the responsibility to distribute electricity to end-users is currently shared between municipalities and Eskom. According to the Non-financial Census of Municipalities for 2009, 56, largely rural, municipalities relied solely on Eskom to distribute electricity. According to the National Electricity Regulator of South Africa (NERSA) domestic users comprised 94% of all electricity customers in 2006, together accounting for approximately 20% of all electricity consumption. Although Eskom serviced roughly the same number of customers as municipalities, customers were generally poorer and buying less electricity, and Eskom hence sold only one-third as many GWh (NERSA, 2006). National Treasury (2011) argues that municipalities in these areas have been slow to extend electricity supply to poor household due a lack of funds and technical expertise to expand their distribution systems, as well as the inability to generate revenue from poor areas.

Table 12 shows that Eskom (47,1%) and municipalities (50%) distributed electricity to to similar percentages of households in the country. In Urban areas municipalities provided electricity to approximately two-thirds (65,9%) of all households. In rural areas Eskom, however, serviced 84,1% of all households. The percentage of rural households serviced by Eskom were particularly high in provinces such as Eastern Cape (98,3%), North West (95,9%) and Limpopo (94%). Nationally, less than 3% of households indicated that they received electricity from sources other than Eskom or their local municipalities. Since Eskom predominantly provide electricity to domestic households in rural areas, the extent to which households in different types of dwellings receive electricity from Eskom or municipalities is largely a function of their location in rural and urban areas.

Table 12: Household sources of electricity by province and geographical location, 2012

	Urban			Rural			Total		
	Municipality	Eskom	Other	Municipality	Eskom	Other	Municipality	Eskom	Other
Western Cape	75,0	24,4	0,5	20,5	47,2	32,3	71,8	25,8	2,4
Eastern Cape	75,9	24,0	0,1	1,7	98,3	0,0	41,7	58,3	0,1
Northern Cape	73,0	25,5	1,5	11,3	85,5	3,2	60,8	37,4	1,9
Free State	58,9	37,8	3,3	74,9	13,6	11,6	61,1	34,5	4,4
KwaZulu-Natal	77,1	22,6	0,4	34,7	64,5	0,8	61,6	37,9	0,5
North West	53,9	43,3	2,8	3,8	95,9	0,3	27,8	70,7	1,5
Gauteng	56,5	36,5	6,9	31,7	53,1	15,3	56,1	36,9	7,1
Mpumalanga	82,1	17,9	0,0	12,9	86,9	0,2	44,2	55,7	0,1
Limpopo	50,7	41,5	7,8	5,1	94,0	0,9	12,1	85,9	2,0
South Africa	**65,9**	**30,8**	**3,4**	**14,1**	**84,1**	**1,9**	**50,0**	**47,1**	**2,9**

Table 13 shows that households in formal dwellings are slightly more likely to receive electricity from a municipality than from Eskom (53,5% compared to 43,7%), while households in informal dwellings (55,9% compared to 41,5%) and households living in traditional dwellings (82,2% compared to 17,7%) are more likely to receive electricity from Eskom. Households living in all types of dwellings in North West and Limpopo are more likely to receive electricity from Eskom.

Table 13: Household sources of electricity by province and type of dwelling, 2012

	Formal			Informal			Traditional		
	Municipality	Eskom	Other	Municipality	Eskom	Other	Municipality	Eskom	Other
Western Cape	75,2	23,6	1,2	43,7	50,9	5,3	43,8	56,2	0,0
Eastern Cape	58,2	41,8	0,1	44,5	55,5	0,0	5,1	94,9	0,0
Northern Cape	62,7	35,9	1,4	47,9	48,6	3,5	22,0	78,0	0,0
Free State	62,9	32,5	4,6	46,4	49,8	3,9	77,1	22,9	0,0
KwaZulu-Natal	65,3	34,1	0,6	81,8	18,2	0,0	35,0	64,7	0,4
North West	31,0	67,5	1,5	7,9	90,6	1,6	20,6	79,4	0,0
Gauteng	59,1	34,1	6,8	35,4	60,7	4,0	66,8	33,2	0,0
Mpumalanga	42,5	57,3	0,1	73,4	26,6	0,0	12,2	87,9	0,0
Limpopo	12,4	85,6	2,0	15,3	84,7	0,0	3,3	96,7	0,0
South Africa	**53,5**	**43,7**	**2,8**	**41,5**	**55,9**	**2,6**	**17,7**	**82,2**	**0,1**

As with electricity supply by type of dwelling, a definite bias towards urban households in higher LSM households has influenced the identified supplier of electricity. Since households with medium, and particularly high living standard measures are most likely to be in urban areas, where services are provided by municipalities, it stands to reason that electricity would predominantly be supplied by these municipalities. Conversely, low LSM household are more likely to live in rural areas where services are largely provided by Eskom. It is noticeable from Table 14 that Eskom provided electricity to a larger percentage of low LSM households in all provinces except Free State, and that the majority of households in medium LSM areas received their electricity from municipalities across all provinces but North West and Limpopo. The majority of high LSM households received their electricity from municipalities.

Table 14: Household sources of electricity by province and standard of living, 2012

		WC	EC	NC	FS	KZN	NW	GP	MP	LP	SA
Low standard	**Municipality**	32,9	10,5	37,6	52,5	46,4	11,9	22,6	22,7	6,7	**22,5**
	Eskom	43,0	89,5	59,0	41,6	52,9	86,5	56,0	77,1	92,4	**74,6**
	Other	24,1	0,0	3,5	5,9	0,8	1,6	21,4	0,2	0,9	**2,9**
Medium standard	**Municipality**	67,7	54,7	63,4	60,4	60,8	25,6	49,8	43,6	10,6	**49,1**
	Eskom	30,2	45,2	35,4	36,3	38,9	72,7	45,1	56,3	87,6	**48,6**
	Other	2,1	0,1	1,2	3,3	0,3	1,8	5,1	0,1	1,8	**2,3**
High standard	**Municipality**	82,0	88,5	78,7	73,4	85,1	66,5	69,7	79,4	58,9	**75,5**
	Eskom	17,5	11,5	18,9	18,2	14,0	33,5	22,0	20,6	31,1	**20,0**
	Other	0,5	0,0	2,3	8,4	1,0	0,0	8,4	0,0	10,0	**4,5**

5.5 Methods of payment for electricity

Figure 19 shows that more than three-quarters (76,2%) of South African households used prepaid electricity. Pre-paid electricity was most prevalent in Eastern Cape (93,8%), Mpumalanga (90,3%) and Limpopo (88,5%). The high prevalence of pre-paid meters can be ascribed to the fact that they were introduced as far back as the 1980's and that they were actively promoted as part of the 'Electricity for all' campaigns (DOE, 2013). Slightly more than one-fifth (20,9%) of households receive a bill nationally. In Gauteng, more than one-third (36,9%) of households received bills.

Table 15 compares the use of conventional and pre-paid meters in rural and urban areas. It is evident from the table that a much higher percentage of households in rural areas (92%) utilized pre-paid electricity than households in urban areas (69,3%). Conversely, households in urban areas were more likely to have conventional meters that allow them to pay for their electricity post-hoc. Conventional meters are particularly prevalent in older, more established suburbs and urban areas that were electrified before 1990.

Figure 19: Household methods of payment for electricity by province, 2012

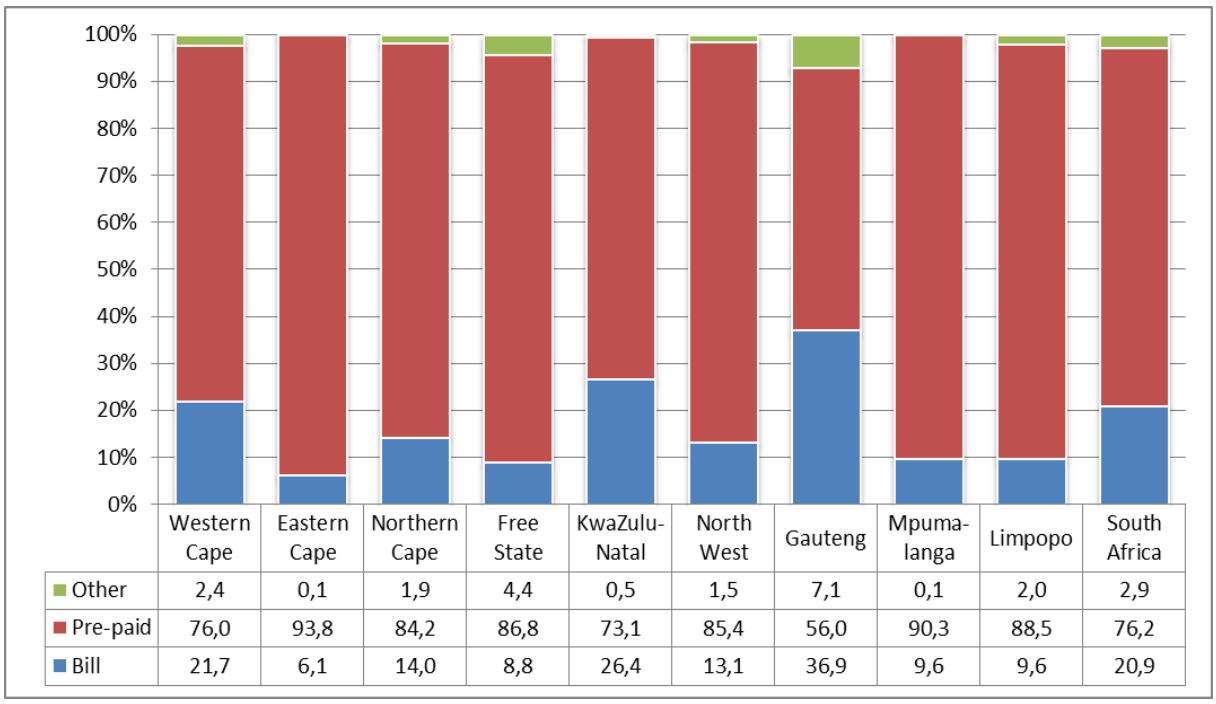
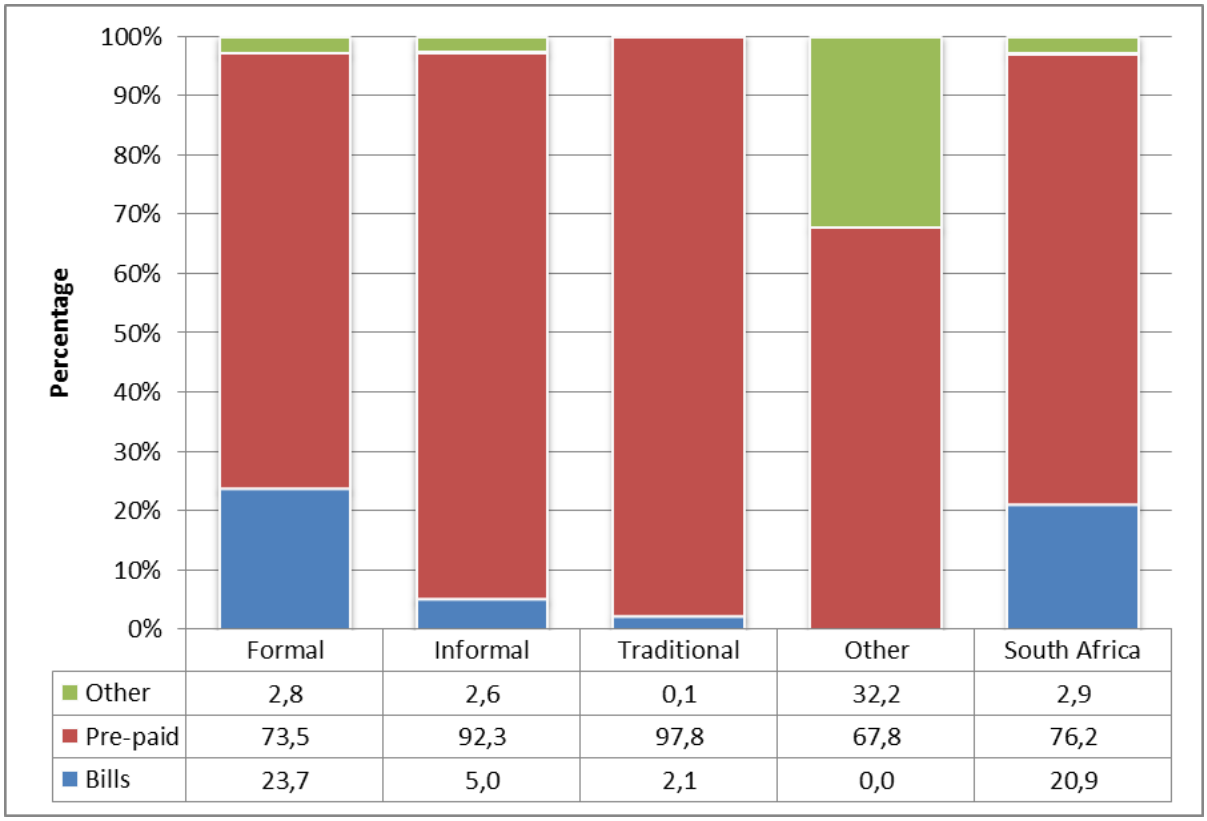


Table 15: Household methods of payment for electricity by province and geographical location, 2012

	Urban			Rural		
	Bills	**Pre-Paid**	**Other**	**Bills**	**Pre-Paid**	**Other**
Western Cape	20,7	78,7	0,5	36,4	31,3	32,3
Eastern Cape	8,9	91,0	0,1	2,9	97,1	0,0
Northern Cape	13,7	84,8	1,5	15	81,9	3,2
Free State	9,0	87,7	3,3	7,8	80,6	11,6
KwaZulu-Natal	39,4	60,3	0,4	3,9	95,4	0,8
North West	22,1	75,1	2,8	4,8	94,9	0,3
Gauteng	37,2	55,9	6,9	21,6	63,2	15,3
Mpumalanga	16,3	83,7	0,0	4,2	95,6	0,2
Limpopo	23,6	68,6	7,8	7,0	92,1	0,9
South Africa	**27,4**	**69,3**	**3,4**	**6,1**	**92,0**	**1,9**

Figure 20 confirms the higher prevalence of pre-paid meters in areas that were, for the most part, only electrified more recently. Pre-paid meters are almost universal for households that lived in informal dwellings (92,3%), and even more common (97,8%) in households that lived in traditional dwellings (and which were predominantly located in rural areas).

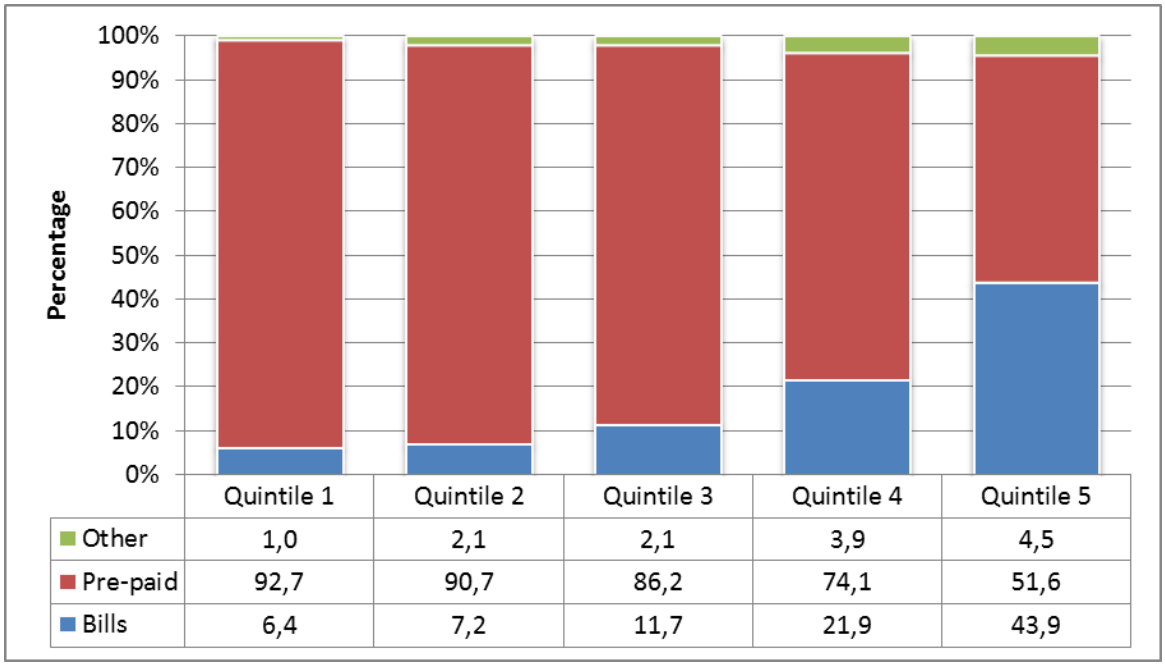
Figure 20: Household methods of paying for electricity by type of dwelling, 2012



	Formal	Informal	Traditional	Other	South Africa
Other	2,8	2,6	0,1	32,2	2,9
Pre-paid	73,5	92,3	97,8	67,8	76,2
Bills	23,7	5,0	2,1	0,0	20,9

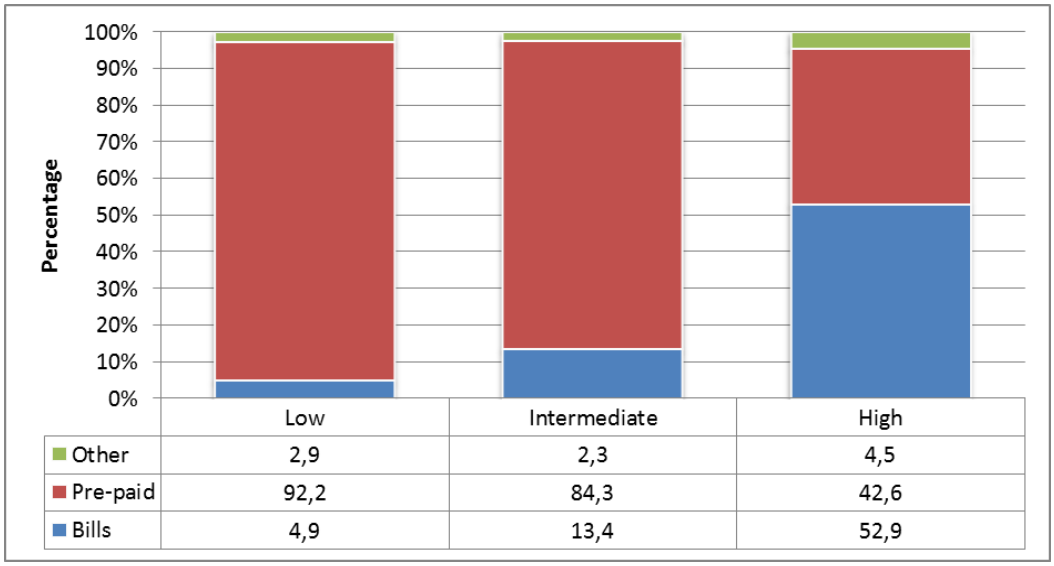
As could be expected, households' use of conventional meters increase with income. This is presented in Figure 21. While only 6,4% of households in income quintile 1 have conventional meters, this percentage increases to 43,9% for households in quintile 5. Conversely, the use of pre-paid meters decreases with increased household's income.

Figure 21: Household methods of paying for electricity by income quintile, 2012



	Quintile 1	Quintile 2	Quintile 3	Quintile 4	Quintile 5
Other	1,0	2,1	2,1	3,9	4,5
Pre-paid	92,7	90,7	86,2	74,1	51,6
Bills	6,4	7,2	11,7	21,9	43,9

Figure 22: Household methods of paying for electricity by standard of living, 2012



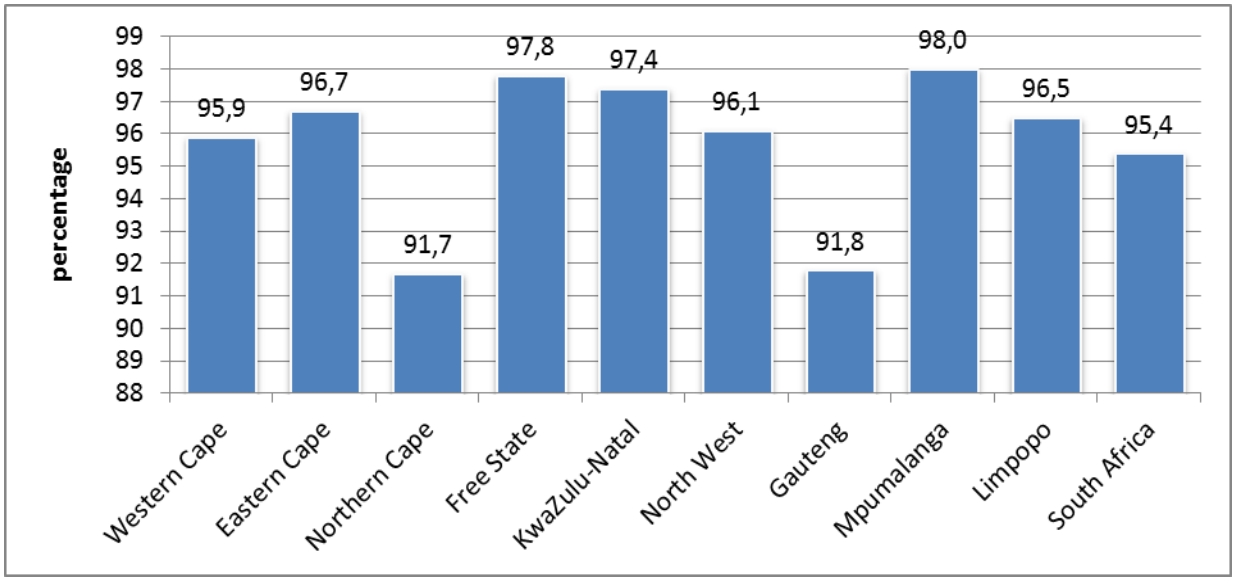
	Low	Intermediate	High
Other	2,9	2,3	4,5
Pre-paid	92,2	84,3	42,6
Bills	4,9	13,4	52,9

Figure 22 shows that households with a high standard of living (LSM 8-10) are much more likely to use conventional meters than households in the lower categories (52,9% compared to 13,4% and 4,9%). By comparison, households with the lowest standard of living have the highest likelihood of using pre-paid meters.

5.6 Payment for electrical services

Figure 23 shows that only 4,6% of electrified households in South Africa that did not pay for electricity. The highest percentage of non-paying households wasreported in Northern Cape (8,3%) and Gauteng (8,2%). Ninety-eight per cent of households in Mpumalanga and 97,8% of households in Free State reportedly paid for electricity.

Figure 23: Percentage of households that paid for electricity by province, 2012



The percentage of households that paid for electricity by income quintile and province is presented in Table 16. Although households in income quintile 5 were generally most likely to pay for electricity, no clear patterns can be discerned.

Table 16: Percentage of households that paid for electricity by province and income quintile, 2012

	Quintile 1	Quintile 2	Quintile 3	Quintile 4	Quintile 5
Western Cape	94,6	93,0	95,9	93,3	98,8
Eastern Cape	97,0	96,7	94,8	98,2	96,9
Northern Cape	95,6	94,8	83,1	91,3	94,6
Free State	96,5	97,1	97,8	97,9	100,0
KwaZulu-Natal	98,1	98,1	98,2	95,5	98,3
North West	98,1	96,7	95,5	95,1	96,1
Gauteng	90,9	93,0	89,7	87,5	95,4
Mpumalanga	98,5	99,0	98,7	97,5	96,3
Limpopo	98,8	98,6	93,4	92,6	93,9
South Africa	**96,5**	**96,6**	**94,6**	**92,9**	**96,7**

A household's dependence on electricity is associated very strongly with its particular standard of living since LSMs are influenced by households' ownership and use of a number of electrical and electronic appliances. Figure 24 reveals that households with high standard of living (98,2%) were more likely to pay for electricity than households with intermediate (95,7%) and low (91%) standards of living. Households with a low standard of living were least likely to pay for electricity in Gauteng (47,6%) and Western Cape (64%).

Figure 24: Percentage of households that paid for electricity by province by standard of living, 2012

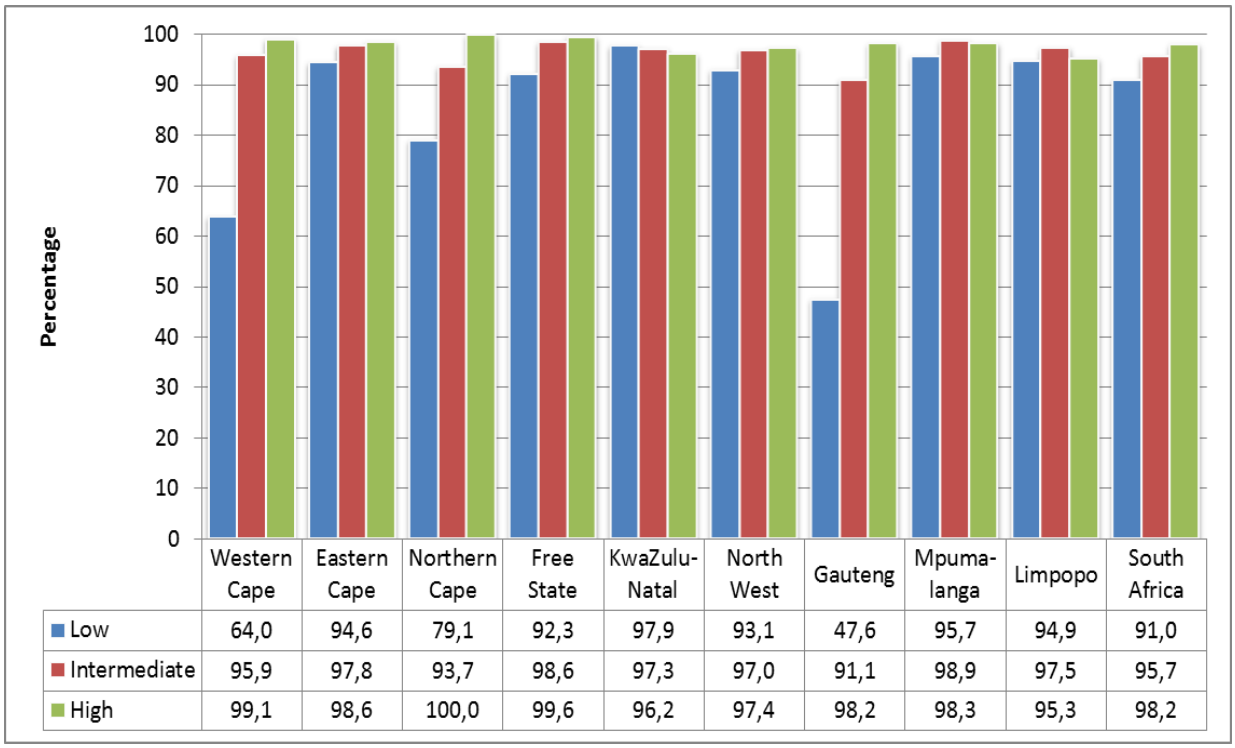
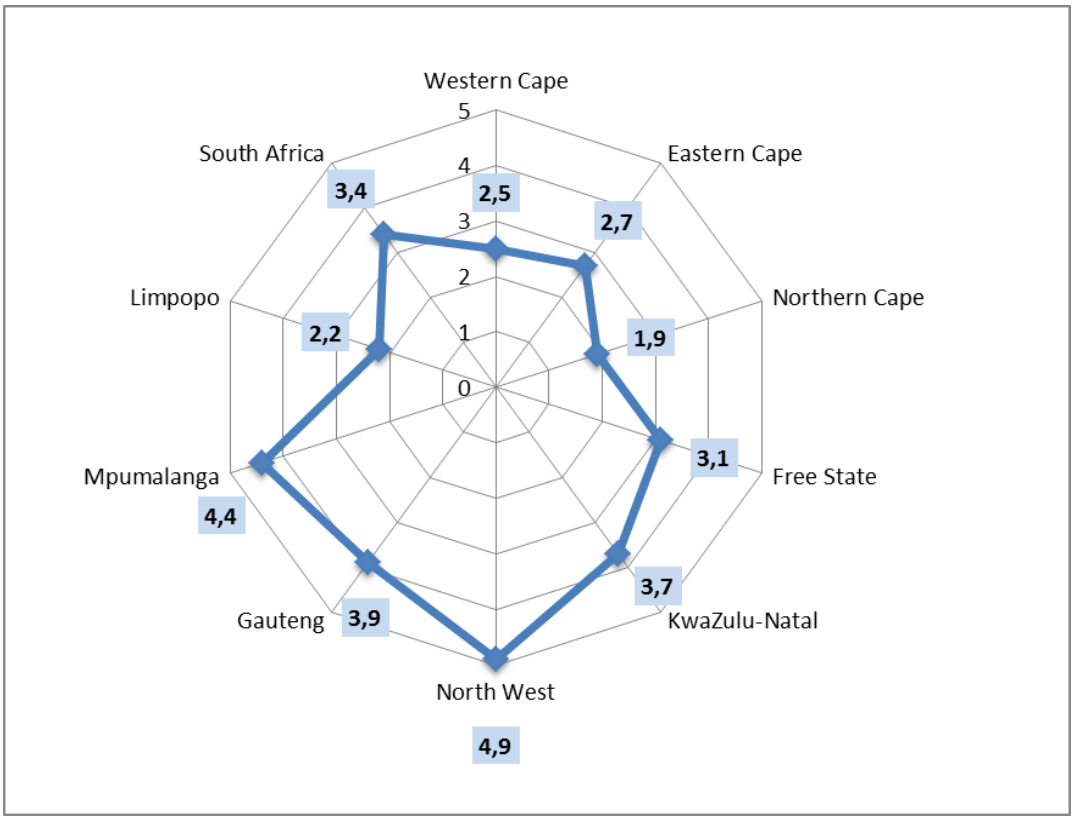


Figure 25indicate that households in North West (4,9%), Mpumalanga (4,4%) and Gauteng (3,9%) were most likely to have experienced electricity cut-offs due to non-payment. On average 3,4% of

households in South Africa reported that their electricity was cut off during the 30 days before the survey.

Figure 25: Percentage of households that reported that electricity was cut off for non-payment by province, 2012



Three logistic regression models were developed to predict payment for electricity services in rural and urban areas, as well as nationally. This is presented in Table 17. The model shows that female headed households, relative to male-headed households increased the log odds of paying for electricity by 0,60 nationally, and by 1,1 in rural areas. . Looking at the age of the household head, the model shows that, relative to households heads aged 20–39 years, household heads in the age groups 60 years and older, as well as in the age group 40–59 increased the log odds of paying for electricity. The model also shows that households with the highest per capita monthly household incomes, particularly in rural areas, were much more likely than the poorest households to have paid for electricity.

It is noticeable that households that lived in traditional dwelling were more likely to have paid for electricity than those in formal households, nationally and in rural areas. Relative to urban households, households in rural areas decreased the log odds of paying for electricity by 1,07.

The model, however, also shows that households that received pensions and grants as main sources of income were also more likely to increase the log odds of paying in comparison to households that received a salary as main source of income. This is almost definitely linked to the fact that salaried households are much more likely to have conventional meters and to receive bills, while the other households have to pay for electricity using pre-paid cards.

Table 17: Predictors of payment for mains electricity in rural and urban areas and South Africa, using logistic regression, 2012

	Urban areas	Rural areas	South Africa
Model Indicators			
Likelihood ratio chi-square	91	134	240
Hosmer and Lemeshow goodness of fit test (P-value)	0,9976	0,0476	0,7648
N	3 375	789	4 164
Intercept	1,8331	0,152*	1,6159
Maximum likelihood estimates			
Age of household head			
20-39 (Reference category)			
40-59	0,9156	n/a	0,6786
60+	1,3302	n/a	1,1382
Main source of income of household			
Salaries (Reference category)			
Remittances	-0,0664*	1,9002	0,5749*
Pensions	0,6172*	14,5869*	0,8653*
Grants	0,2585*	1,3104	0,7194
No income	0,9185	2,7789	1,2886
Other	-1,8883	14,8169*	-0,4299*
Income quintile			
Income quintile 1			
Income quintile 2	0,1145*	0,0269*	0,017*
Income quintile 3	-0,1955*	0,2123*	-0,1157*
Income quintile 4	0,1312*	0,8669	0,3701*
Income quintile 5	0,8297	1,682	1,0652
Interruptions			
No interruptions (Reference category)			
Experienced interruptions	n/a	1,0099	0,604
Type of Main dwelling			
Formal (Reference category)			
Informal	n/a	-0,00839*	-0,2395*
Traditional	n/a	1,9429	1,8413
Gender of household head			
Male (Reference category)			
Female	n/a	1,0552	0,604
Geographic location			
Urban (Reference category)			
Rural	n/a	n/a	-1,0693

*: Values that are not significant at 95% or 99% levels of significance 3

5.7 Household expenditure on electricity

The 2010/2011 income and expenditure survey found that households spent almost a third (32%) of all household consumption expenditure on housing, water, electricity, gas and other fuels. Households in the bottom expenditure decile spent 6,4% of their consumption expenditure on electricity, gas and other fuels compared to 1,7% for households in the upper decile (Stats SA, 2012b: 60). The study also found that households in the bottom expenditure decile spent 4,5% of their consumption expenditure on electricity, and 1,4% on liquid fuels, compared to 1,7% for electricity and less than 0,1% on liquid fuels for households in the upper decile. In term of income per capita deciles, households in the bottom decile spent 3,6% and households in the top decile 1,8% of their total household consumption on electricity (Stats SA, 2012b: 100). Despite spending a larger percentage of their household income, the average consumption expenditure was lower for poorer households. The study (Stats SA, 2012b: 166) show that households in the bottom income per capita decile on average spent R1 248 per year on electricity, gas and other fuels, compared to an average spending of R 6 178 for household in the top decile, and R2 494 on average. Spending on electricity averaged R948 for households in the bottom decile, R5 871 for those in the top decile, and R2 222 on average. Households in the bottom income per capital decile on average spent more on solid fuels (R105) than those in the top decile (R64) or than the average expenditure (R80).

The percentage of household income that is spent on electricity by province according to the finding of GHS 2012 is presented in Table 18. The table shows that, nationally, about 50% of households spent less than 5% of their income on electricity, and that about three-quarters (74,9%) spend less than 10%. Nationally, 8,8% of households spent 20% or more of their income on electricity. The percentage of households that spent more than 19% on electricity varies by province, but the lowest is observed in Eastern Cape (5,9%), and the highest percentage in Gauteng (11,4%).

These figures are much higher than the figures from the 2010/2011 income and expenditure survey quoted earlier. This could be expected as the GHS does not utilize the same specialized methodology than the Income and Expenditure Surveys. The figures are, however, useful in terms of the relative magnitudes they show.

Table 18: Percentage of household income spent on electricity by province, 2012

	0-5%	5-9%	10-14%	15-19%	>19%
Western Cape	50,3	23,4	12,1	4,7	9,5
Eastern Cape	53,3	25,1	11,1	4,7	5,9
Northern Cape	51,0	20,2	14,4	5,8	8,6
Free State	46,1	27,3	13,1	5,9	7,7
KwaZulu-Natal	47,1	26,8	11,8	5,5	8,8
North West	48,1	23,5	13,2	5,7	9,4
Gauteng	50,4	21,4	12,7	4,0	11,4
Mpumalanga	56,6	22,5	11,1	4,4	5,4
Limpopo	53,3	25,1	8,9	5,3	7,5
South Africa	**50,5**	**24,0**	**11,9**	**4,9**	**8,8**

Table 19 shows that female-headed households are slightly more likely than male-headed households to spend more than 20% of the household income on electricity. Households in subsidised dwellings are most less likely to spend less than 5% of their income, and slightly more

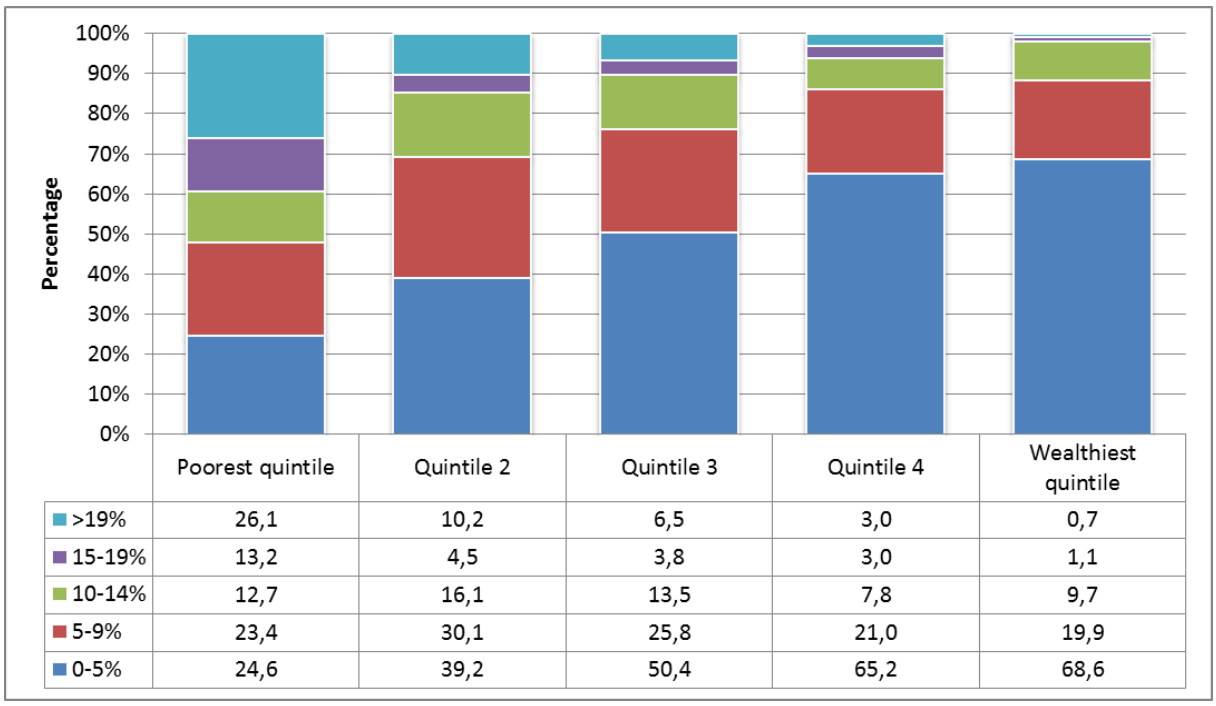
likely to spend more than 20% of their income on electricity. This is probably linked to the fact that these households are predominantly in urban areas where access to alternative sources of energy such as wood is scarce, and competition for these resources is high.

Table 19: Percentage of household income spent on electricity by dwelling type and household head, 2012

Type of dwelling	0-5%	5-9%	10-14%	15-19%	>19%
Formal	50,2	23,9	12,5	4,4	9,0
Subsidised/RDP	46,1	25,0	12,1	6,2	10,5
Informal	55,3	22,9	8,0	5,7	8,0
Traditional	55,6	25,2	11,4	4,4	3,4
Household head					
Male	54,0	23,3	11,1	4,0	7,6
Female	45,8	24,8	13,0	6,0	10,4
South Africa	50,5	24,0	11,9	4,9	8,8

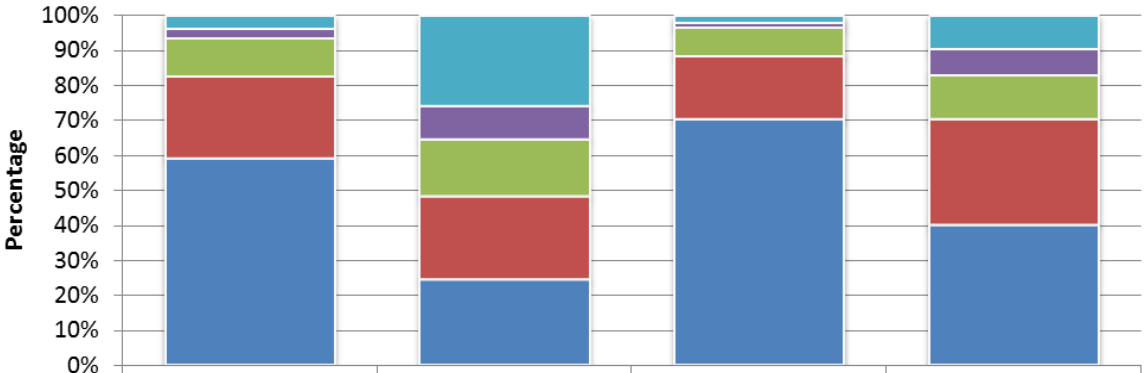
Figure 26 confirms the existence of a negative relationship between household wealth and the percentage of its total monthly household income that households pay towards electricity. Although poor households may be paying less towards electricity, this amount usually comprises a much more significant proportion of their total monthly household income. Whereas less than one-quarter of quintile 1 households spent less than 5% of their income on electricity, this was the case for 68,6% of households in the wealthiest quintile. More than one-quarter of quintile 1 households furthermore expended 20% or more of their income on electricity compared to less than 1% for households in the wealthiest income quintile.

Figure 26: Percentage of household income spent on electricity by households with access to electricity by income quintile, 2012



	Poorest quintile	Quintile 2	Quintile 3	Quintile 4	Wealthiest quintile
>19%	26,1	10,2	6,5	3,0	0,7
15-19%	13,2	4,5	3,8	3,0	1,1
10-14%	12,7	16,1	13,5	7,8	9,7
5-9%	23,4	30,1	25,8	21,0	19,9
0-5%	24,6	39,2	50,4	65,2	68,6

Figure 27: Percentage of household income spent on electricity by geographical location and socio-economic status, 2012



	Urban rich and electrified	Urban poor and electricfied	Rural rich and electrified	Rural poor and electrified
>19%	3,7	25,8	1,9	9,4
15-19%	2,9	9,6	1,6	7,6
10-14%	10,8	16,2	8,2	12,7
5-9%	23,3	23,9	17,9	30,0
0-5%	59,3	24,4	70,4	40,3

Figure 27 combines geographical location and income quintile. Poor households are defined as those that fall into income quintiles one and two. It is clear from the figure that rich households, those in quintiles 3–5, are much more likely to expend less than 5% of their monthly household income on electricity than poor households in rural and urban areas. By contrast, particularly poor households in urban areas are much more likely to spend more than 20% of their monthly household income on electricity.

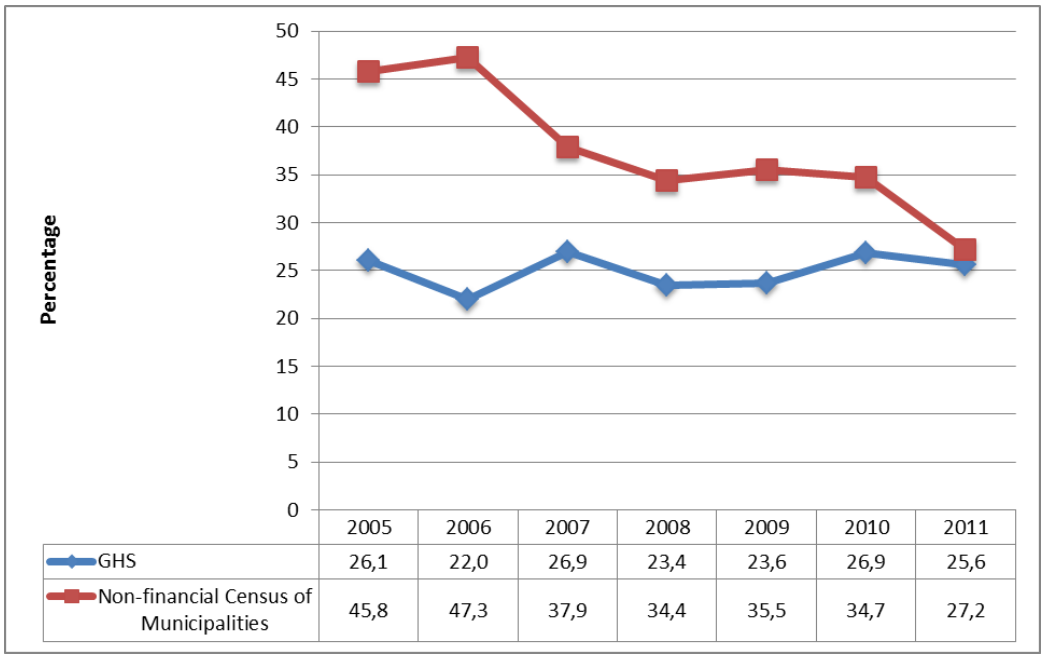
5.8 Free Basic Electricity

The provision of Free Basic Electricity (FBE) was phased in from July 2003 with the intention to provide poor households with the means to significantly enhance their well-being. The service will be provided to poor households through a self-targeting approach that takes into the account their much lower demand for electricity. The proposed levels of service (50kWh per household per month for a grid-based system) should allow households to use basic lighting, access basic media, and to heat water using a kettle. Once the basic electricity is consumed, households are expected to pay for all units of electricity consumed above the free allocation (Department of Energy, 2013b). Although the criteria differs from municipality to municipality, the indigent policies of many municipalities stipulates that the joint gross income of all occupants of dependents in a single household must not exceed the value of two state old age pensions or disability grants, approximately R1400 per month (see for instance the indigence policies for the Mbombela—, Mogale City —, Bushbuckridge —, and Mogalakwena local municipalities).

The provision has been measured annually by the GHS between 2005 and 2011, as well as through the Non-financial Census of Municipalities that has been conducted by Stats SA since 2002. Although these sources are not strictly comparable (refer to the footnote, below), a comparison is useful for contextual reasons. Figure 28 shows that the percentage of households that reportedly received free basic electricity, with some undulations, largely remained the same between 2005 and

2011 (26,1% compared to 5,6%). By contrast, the percentage of consumer or billing units that received FBE decreased from 45,8% in 2005 to 27,2% in 2011.

Figure 28: Percentage of households with access to mains electricity that received Free Basic Electricity nationally, 2005-2011[45]



	2005	2006	2007	2008	2009	2010	2011
GHS	26,1	22,0	26,9	23,4	23,6	26,9	25,6
Non-financial Census of Municipalities	45,8	47,3	37,9	34,4	35,5	34,7	27,2

Although municipalities are, by law, responsible for the provision of free basic electricity to poor households in the areas of their jurisdiction, it is noticeable in Table 20 that the lowest receipt was reported in the poorest provinces, namely Limpopo (11,2%), KwaZulu-Natal (15,1%), Eastern Cape (22,6%) and Mpumalanga (22,9%). While this might be linked to inadequate municipal service delivery, the low percentages could, perhaps, also be explained by inadequate understanding by households when answering the survey questions.

Table 21 explores the extent to which access to free electricity has influenced poor households' use of energy. Nationally, poor households that received free basic electricity were more likely to use electricity, and less likely to use solid fuels for cooking than poor households that paid for electricity. This was particularly evident in rural areas. Although a smaller percentage of poor households used electricity to heat space nationally (35,4% compared to 36,8%), poor households with access to free electricity were less likely to use solid fuels (25,2% compared to 31,1%) and more likely to use paraffin, a more expensive yet cleaner source of energy, than poor households that reported that they did not receive free electricity. A similar pattern can be observed in rural and urban areas in this

[4] Information from the GHS refers to households while the information gathered by the non-financial census of municipalities refer to consumer/billing units.

[5] The large differences between the results of the GHS and the non-financial census of municipalities could, in part, also be influenced by the fact that proxy respondents were used for the GHS. In addition to, perhaps, being less knowledgeable about household affairs in general, both the proxy respondents and other household members oftentimes lack knowledge and/or understanding as to whether the household received FBE, or not.

regard. Due to the universal use of electricity, free access to electricity seems to have had a limited impact on lighting.

Table 20: Percentage of households that received Free Basic Electricity by province, 2004-2011

	Western Cape	Eastern Cape	Northern Cape	Free State	KwaZulu-Natal	North West	Gauteng	Mpuma-langa	Limpopo	South Africa
2004	63,9	21,0	22,5	39,7	14,3	13,2	25,5	23,8	7,1	**26,2**
2005	61,0	22,6	19,3	53,7	7,2	9,5	27,9	23,0	8,1	**26,1**
2006	39,8	22,9	21,7	53,6	7,0	12,6	20,6	18,6	15,0	**22,0**
2007	48,9	28,2	22,1	56,3	9,4	16,3	28,5	23,8	13,7	**26,9**
2008	36,6	25,6	29,7	53,1	8,8	12,1	24,3	21,9	12,4	**23,4**
2009	41,6	25,7	31,3	56,9	8,5	9,6	21,7	26,3	14,3	**23,6**
2010	38,6	25,4	24,2	42,2	12,8	14,8	37,5	19,6	15,9	**26,9**
2011	42,7	22,6	29,2	41,9	15,1	11,7	31,7	22,9	11,2	**25,6**

Table 21: Energy sources used by poor households by whether they paid for electricity, type of activity and geographical location, 2012

		Electricity	Gas	Paraffin	Candles	Solid fuels	Other	None	Total
Urban									
Cooking	Only free electricity	93,0	1,1	1,2	n/a	4,2	0,2	0,2	**100,0**
	Paid for electricity	93,0	0,7	2,3	n/a	3,3	0,6	0,2	**100,0**
Space Heating	Only free electricity	38,9	0,6	18,8	n/a	14,6	0,2	26,9	**100,0**
	Paid for electricity	50,2	0,9	13,2	n/a	8,9	0,7	26,1	**100,0**
Lighting	Only free electricity	99,0	n/a	0,0	0,2	0,1	0,2	0,3	**100,0**
	Paid for electricity	98,4	n/a	0,1	0,9	0,1	0,5	0,0	**100,0**
Rural									
Cooking	Only free electricity	62,6	0,8	2,3	n/a	34,1	0,2	0,1	**100,0**
	Paid for electricity	56,9	0,6	3,5	n/a	38,7	0,1	0,2	**100,0**
Space Heating	Only free electricity	28,5	0,2	8,3	n/a	45,8	0,0	17,2	**100,0**
	Paid for electricity	25,8	0,1	5,3	n/a	49,9	0,1	18,8	**100,0**
Lighting	Only free electricity	99,4	n/a	0,0	0,6	0,0	0,0	n/a	**100,0**
	Paid for electricity	99,1	n/a	0,1	0,6	0,1	0,0	n/a	**100,0**

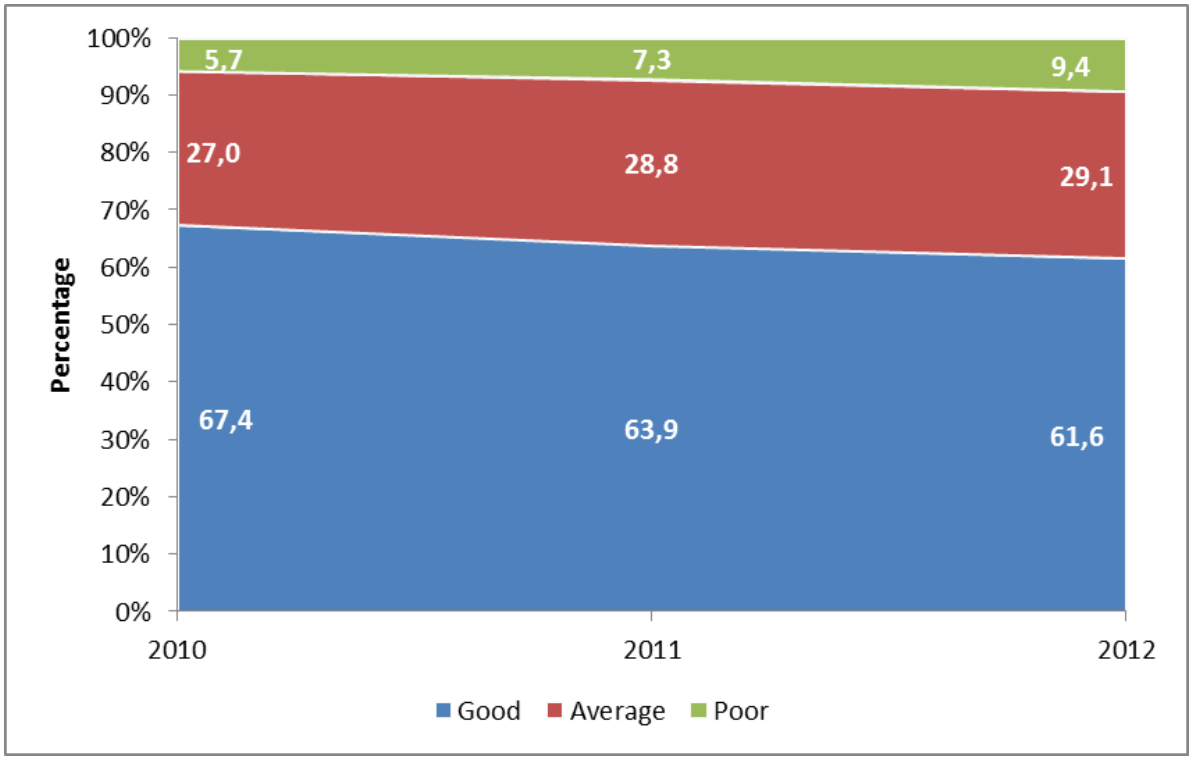
Table 21: Energy sources used by poor households by whether they paid for electricity, type of activity and geographical location, 2012 (Concluded)

		Electricity	Gas	Paraffin	Candles	Solid fuels	Other	None	Total
South Africa									
Cooking	Only free electricity	82,7	1,0	1,6	n/a	14,3	0,2	0,2	**100,0**
	Paid for electricity	73,3	0,6	2,9	n/a	22,7	0,3	0,2	**100,0**
Space Heating	Only free electricity	35,4	0,5	15,2	n/a	25,2	0,2	23,6	**100,0**
	Paid for electricity	36,8	0,5	8,9	n/a	31,3	0,4	22,1	**100,0**
Lighting	Only free electricity	99,2	n/a	0,0	0,4	0,1	0,2	0,2	**100,0**
	Paid for electricity	98,8	n/a	0,1	0,8	0,1	0,2	0,0	**100,0**

5.9 Perceived quality of the electricity supply

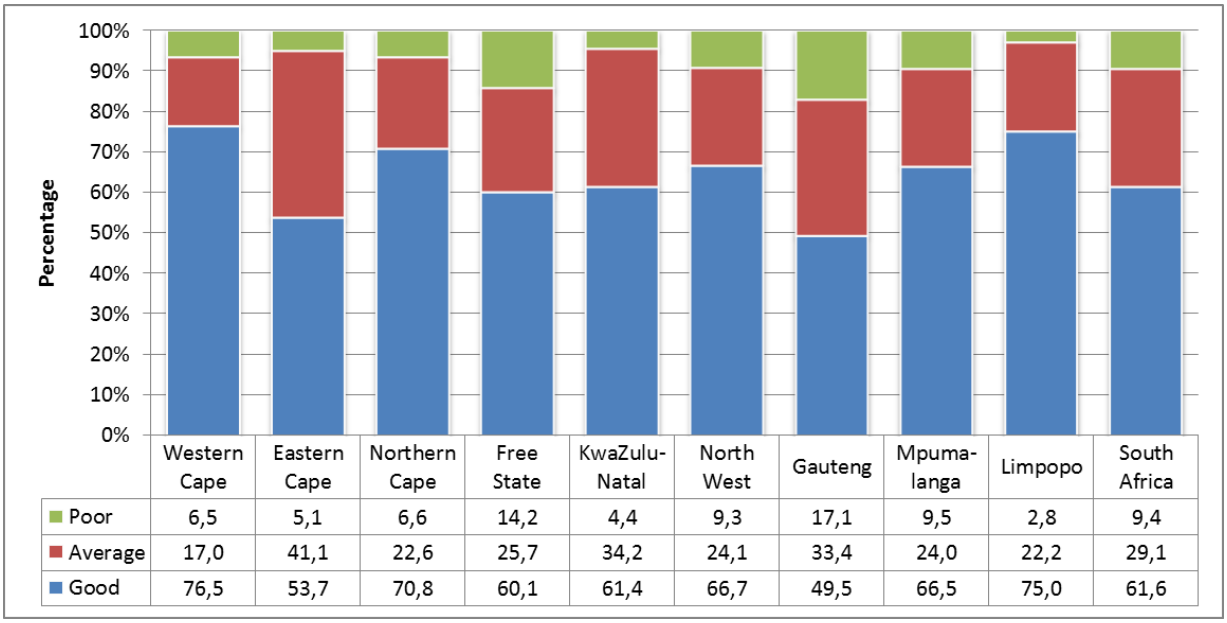
In 2012, households were asked how they rated the quality of electricity supply services they received in terms of factors such as maintenance, meter reading, billing, complaint handling, and connection installation. Figure 29 shows that 61,6% of households rated the service they received as 'good', compared to slightly more than two-thirds (67,4%) in 2010. The percentage of households that rated perceived quality as 'poor' increased from 5,7% in 2010 to 9,4% in 2012. Households were not specifically asked to explain their ratings.

Figure 29: Household perceptions of the quality of electricity supply services, 2010-2012



According to Figure 30, households in Gauteng (17,1%) and Free State (14,2%) were most likely to rate the electricity supply serves are 'poor', while households in Western Cape (76,5%), Limpopo (75%) and Northern Cape (70,8%) were most likely to rate the services as 'good'. Less than half (49,5%) of households in Gauteng, and only 53,7% of household in Eastern Cape rated the services as 'good'.

Figure 30: Household perceptions of the quality of electricity supply services by province, 2012



	Western Cape	Eastern Cape	Northern Cape	Free State	KwaZulu-Natal	North West	Gauteng	Mpuma-langa	Limpopo	South Africa
Poor	6,5	5,1	6,6	14,2	4,4	9,3	17,1	9,5	2,8	9,4
Average	17,0	41,1	22,6	25,7	34,2	24,1	33,4	24,0	22,2	29,1
Good	76,5	53,7	70,8	60,1	61,4	66,7	49,5	66,5	75,0	61,6

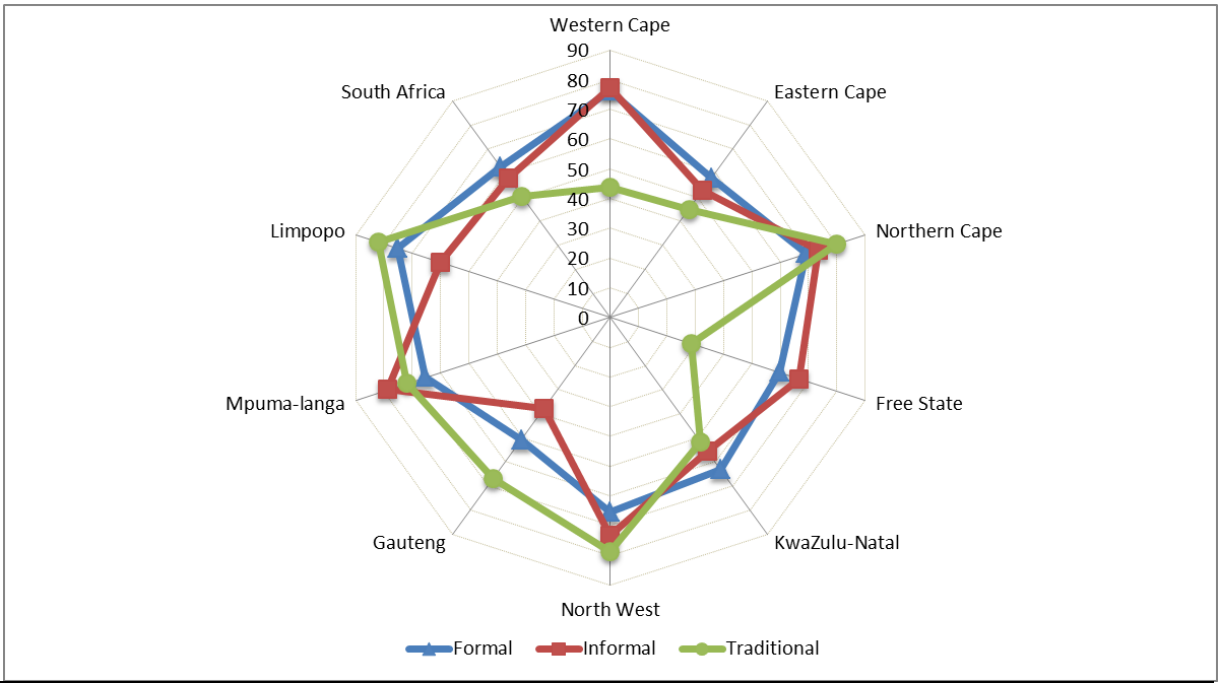
Table 22 shows that households in urban areas are slightly more likely than households in rural areas to rate the electrical services they receive as 'good' (62,8% compared to 61%). Urban households in Free State, Eastern Cape and KwaZulu-Natal were notably less likely than their rural peers to rate services are 'good'. Nationally, rural households were more likely to rate services as 'poor' than urban ones (11,1% compared to 5,4%). Although 43,1% of urban households in Free State reported poor services, the sentiment was shared by only 9,5% of households in rural areas. In Mpumalanga, rural households (15,6%) were more negative about the electricity services they received than urban households (4,3%).

Table 22: Household rating of electricity supply services by province and geographical location, 2012

		Good	Average	Poor	Per cent	Total
Western Cape	Rural	76,2	17,2	6,6	100,0	1 528
	Urban	82,3	13,8	3,9	100,0	91
	Total	**76,5**	**17,0**	**6,5**	**100,0**	**1 619**
Eastern Cape	Rural	59,8	34,1	6,1	100,0	802
	Urban	46,6	49,4	4,0	100,0	829
	Total	**53,7**	**41,1**	**5,1**	**100,0**	**1 631**
Northern Cape	Rural	68,0	23,9	8,1	100,0	224
	Urban	80,0	18,4	1,6	100,0	73
	Total	**70,8**	**22,6**	**6,6**	**100,0**	**296**
Free State	Rural	64,6	25,9	9,5	100,0	707
	Urban	32,5	24,5	43,1	100,0	136
	Total	**60,1**	**25,7**	**14,2**	**100,0**	**843**
KwaZulu-Natal	Rural	65,3	30,3	4,4	100,0	1 452
	Urban	54,7	40,9	4,3	100,0	1 052
	Total	**61,4**	**34,2**	**4,4**	**100,0**	**2 504**
North West	Rural	68,7	20,6	10,7	100,0	504
	Urban	64,8	27,3	7,9	100,0	601
	Total	**66,7**	**24,1**	**9,3**	**100,0**	**1 105**
Gauteng	Rural	49,4	33,5	17,1	100,0	4 024
	Urban	50,3	32,8	16,9	100,0	129
	Total	**49,5**	**33,4**	**17,1**	**100,0**	**4 153**
Mpumalanga	Rural	62,6	21,8	15,6	100,0	483
	Urban	69,7	25,9	4,3	100,0	605
	Total	**66,5**	**24,0**	**9,5**	**100,0**	**1 088**
Limpopo	Rural	76,2	18,0	5,8	100,0	243
	Urban	74,8	23,0	2,3	100,0	1 148
	Total	**75,0**	**22,2**	**2,8**	**100,0**	**1 392**
South Africa	**Rural**	**61,0**	**27,9**	**11,1**	**100,0**	**9 968**
	Urban	**62,8**	**31,7**	**5,4**	**100,0**	**4 663**
	Total	**61,6**	**29,1**	**9,4**	**100,0**	**14 631**

Figure 31 shows that 62,7% of households that lived in formal dwellings rated the electricity supply services as 'good', while this was only the case for 58,1% of households in informal, and 50,5% of households in traditional dwellings. Patterns are quite erratic and it is not possible to conclude whether households in any one of the three main dwelling types are generally more likely to provide a better rating of electricity supply services. In Free State, households that lived in traditional dwellings were noticeably less likely to rate services as good. Figures that relate to traditional dwellings in Gauteng and Western Cape should be disregarded due to the small number of un-weighted cases involved.

Figure 31: Percentage of households that described electricity supply services as good by province and type of dwelling, 2012



	WC	EC	NC	FS	KZN	NW	GP	MP	LP	SA
Formal	76,1	57,9	69,3	59,9	63,3	65,5	50,9	65,3	75,1	62,7
Informal	77,3	52,9	73,5	66,6	55,5	73,3	37,7	78,6	59,9	58,1
Traditional	43,8	44,8	79,9	28,4	51,7	78,7	66,8	71,8	81,8	50,5

Tables 23 shows that, nationally, households in the wealthiest income quintile were most likely to rate electricity supply services as 'good'. The pattern, however, differs between provinces.While higher income households were clearly more likely to rate the service as 'good' in Eastern Cape and Gauteng, the poorest households (quintile 1) were most likely to rate electricity services as 'good' in Mpumalanga and Limpopo.

Table 23: Percentage of households that rated the quality of electricity supply services as 'good'by province and income quintile, 2012

Province	Quintile 1 (lowest)	Quintile 2	Quintile 3	Quintile 4	Quintile 5 (Highest)
Western Cape	73,8	76,1	80,3	75,7	77,3
Eastern Cape	48,1	46,6	61,3	59,3	63,7
Northern Cape	65,5	66,6	73,8	74,3	74,1
Free State	54,8	56,6	57,7	64,0	73,0
KwaZulu-Natal	56,4	56,8	55,0	64,0	70,4
North West	62,9	67,3	66,7	65,4	68,4
Gauteng	42,1	43,7	47,2	49,0	54,4
Mpumalanga	69,6	66,5	73,9	66,5	57,7
Limpopo	75,8	73,9	76,2	73,2	75,1
South Africa	**59,5**	**59,5**	**63,3**	**61,4**	**64,4**

The pattern is less clear in terms of giving a 'poor' rating, Table 24. While, nationally, 9,2% of households in quintile 5rated the quality of electrical services as 'poor', about 9,3% of households in quintile 1 did the same. It is probably accurate to conclude that no clear correlations emerge between income quintile and rating of electricity services as 'poor'.

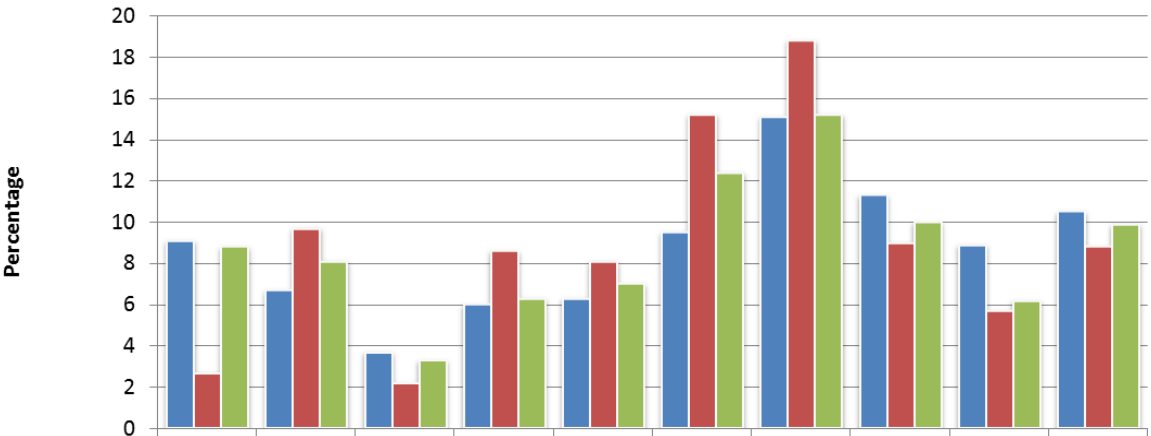
Table 24: Percentage of households that rated the quality of electricity supply services as 'poor' by province and income quintile, 2012

Province	Quintile 1 (lowest)	Quintile 2	Quintile 3	Quintile 4	Quintile 5 (Highest)
Western Cape	10,8	6,4	5,8	5,2	6,2
Eastern Cape	5,5	4,5	4,4	5,0	5,8
Northern Cape	8,2	10,8	5,6	4,9	2,0
Free State	20,5	14,3	13,0	10,9	8,8
KwaZulu-Natal	4,3	2,3	4,4	5,5	5,8
North West	9,0	6,9	9,7	10,4	10,3
Gauteng	22,7	19,5	18,9	18,9	12,1
Mpumalanga	5,2	9,4	6,0	11,2	14,2
Limpopo	1,8	2,8	2,3	2,5	5,4
South Africa	**9,3**	**8,0**	**8,5**	**10,5**	**9,2**

5.10 Household use of and perception of electricity-supply-related call centres

Households that had access to mains electricity were asked whether they contacted a call centre with a complaint related to electricity during the year before they were surveyed. According to Figure 32, only 10% of households contacted a call centre, nationally, and urban households (10,5%) were slightly more likely to have contacted a call centre than rural households (8,8%). A larger percentage of rural than urban households contacted call centres in five provinces, namely Eastern Cape, Free State, Gauteng, Northern Cape and KwaZulu-Natal. Despite this, no clear pattern emerges about the relative likelihood of households in urban and rural areas to have contacted call centres.

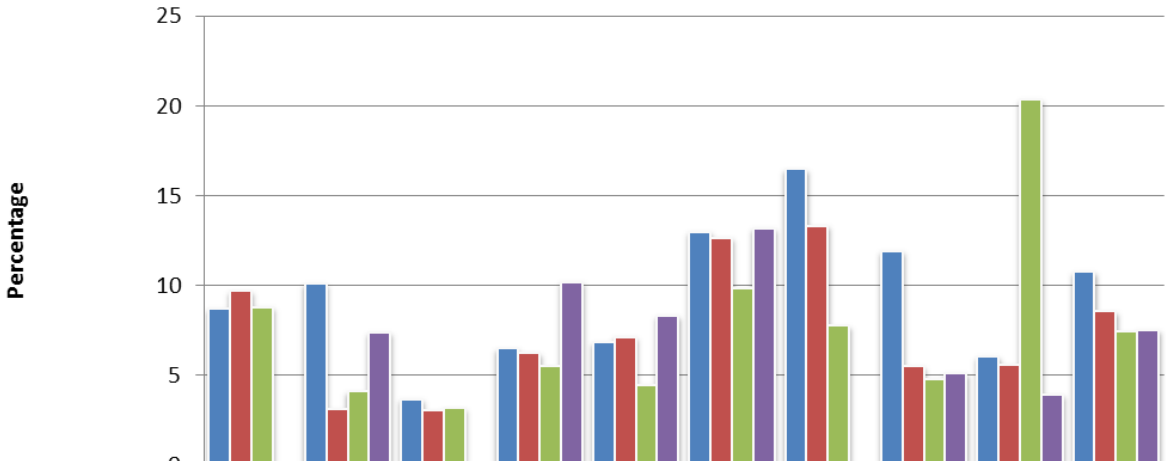
Figure 32: Percentage of households that contacted a call centre regarding their electricity supply by province and geographical location, 2012



	Western Cape	Eastern Cape	Northern Cape	Free State	KwaZulu -Natal	North West	Gauteng	Mpuma-langa	Limpopo	South Africa
Urban	9,1	6,7	3,7	6,0	6,3	9,5	15,1	11,3	8,9	10,5
Rural	2,7	9,7	2,2	8,6	8,1	15,2	18,8	9,0	5,7	8,8
South Africa	8,8	8,1	3,3	6,3	7,0	12,4	15,2	10,0	6,2	9,9

Figure 33 shows that, nationally, households in formal dwelllings (10,7%) were more likely to have contacted a call centre than those in subsidised or RDP houses (8,5%), informal (7,4%), traditional dwellings (7,5%). Limpopo households with informal dwelllings (20,3%) were most likely to have contacted a call centre, followed by housholds with formal dwellings in Gauteng (16,5%). The number of sampled households with traditional dwelllings in Western Cape, Gauteng and Northern Cape were too small for analysis.

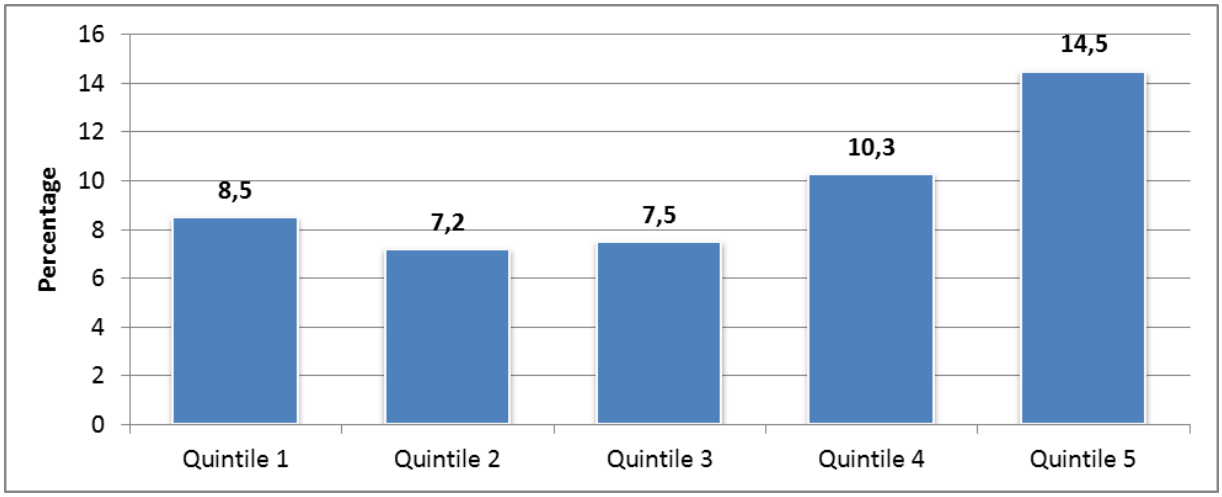
Figure 33: Percentage of households that contacted a call centre regarding their electricity supply by province and dwelling type, 2012



	WC	EC	NC	FS	KZN	NW	GP	MP	LP	SA
Formal	8,7	10,1	3,7	6,5	6,8	13,0	16,5	11,9	6,0	10,7
Subsidised/RDP	9,7	3,1	3,0	6,2	7,1	12,7	13,3	5,5	5,6	8,5
Informal	8,8	4,1	3,2	5,5	4,4	9,8	7,7	4,8	20,3	7,4
Traditional	0,0	7,4	0,0	10,2	8,3	13,2	0,0	5,1	3,9	7,5

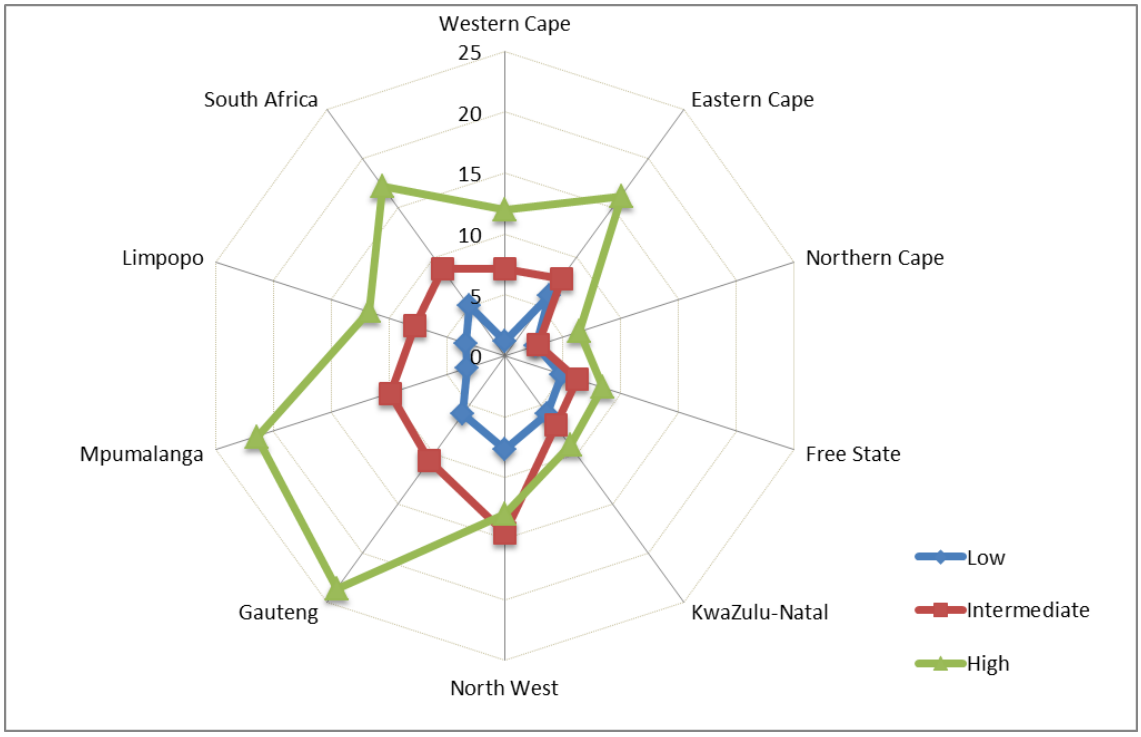
Figure 34 shows a positive relationship between per capita household income, as expressed by per capita income quintiles, and the likelihood that they have contacted call centres regarding their electricity supply. The percentage of households that contacted a call centre increases steadily from quintile 3 (7,5%) to quintile 5 (14,5%). Similar percentages of households in the bottom three quintiles contacted a call centre regarding their electrical supply.

Figure 34: Percentage of households that contacted a call centre regarding their electricity supply during the year before the survey by income quintile, 2012



As with income quintiles (Figure 34), Figure 35 shows that households with a high standard of living were, with the exception of North West, more likely to have contacted a call centre than households in the lower living standard bands. Nationally, 17,2% of households with a high standard of living contacted a call centre, compared to 8,9% of those with an intermediate standard of living, and 5,1% of those with a low standard of living. High LSM households in Gauteng (23,6%) and Mpumalanga (21,5%) were most likely to have contacted a call centre, while low LSM households in Western Cape (1,2%) and Northern Cape (2,6%) were least likely to have done so.

Figure 35: Percentage of households that contacted a call centre regarding their electricity supply during the year before the survey by province and standard of living, 2012



Households that contacted a call centre were next asked whether the call centre was available after the first call; whether they received a response within a reasonable time; and finally, whether the problem they reported was resolved in a single call. The responses are presented in Table 25, below, by province and the method of payment (pre-paid meter, or conventional meter where a customer/household receives a bill). Nationally, a larger percentage of households with pre-paid meters than those with conventional meters (and who are billed) gave positive responses to these questions. While 61,8% of households with pre-paid meters reported that the call centre was available after the first call, this was reported by only 46% of households with conventional meters. Although less than half (48,1%) of households with pre-paid meters felt that the response time was reasonable, the comparable figure for households with conventional meters was just over one-third (35,5%). Finally, only 28,4% of households with conventional meters reported that their problems were solved with one call, compared to 47,6% of households with pre-paid meters. Although a larger percentage of households with pre-paid rather than conventional meters gave positive answers across most provinces for all three questions, the situation in Limpopo, Northern Cape and Western Cape was more varied.

Table 25: Quality of service received from call centre by method of payment, 2012

	Method of payment	Available first time	Response reasonable time	Problem resolved one call
Western Cape	Bill	59,4	64,6	48,9
	Pre-paid	70,0	57,2	57,3
Eastern Cape	Bill	57,6	62,3	75,0
	Pre-paid	69,3	63,0	65,9
Northern Cape	Bill	66,2	33,9	13,4
	Pre-paid	52,5	39,1	31,8
Free State	Bill	41,3	35,7	28,1
	Pre-paid	59,4	42,1	30,6
KwaZulu-Natal	Bill	54,9	38,5	24,6
	Pre-paid	66,6	54,8	52,0
North West	Bill	34,0	39,8	28,7
	Pre-paid	72,3	52,5	49,9
Gauteng	Bill	40,8	28,2	21,2
	Pre-paid	47,4	35,4	34,1
Mpumalanga	Bill	47,4	30,1	24,0
	Pre-paid	58,8	36,1	49,7
Limpopo	Bill	66,9	61,0	62,8
	Pre-paid	66,8	57,4	47,7
South Africa	**Bill**	**46,0**	**35,5**	**28,4**
	Pre-paid	**61,8**	**48,1**	**47,6**

Table 26: Quality of service received from call centre by service provider, 2012

	Source of electricity	Available first time	Response reasonable time	Problem resolved one call
Western Cape	Municipality	65,0	61,4	50,3
	Eskom	72,7	53,8	65,7
Eastern Cape	Municipality	58,3	53,6	52,3
	Eskom	73,0	67,9	74,4
Northern Cape	Municipality	58,3	45,4	33,2
	Eskom	50,0	22,9	14,6
Free State	Municipality	51,0	34,7	25,9
	Eskom	74,8	59,3	41,9
KwaZulu-Natal	Municipality	54,9	38,9	28,3
	Eskom	70,7	60,8	58,0
North West	Municipality	48,2	34,8	28,1
	Eskom	74,0	55,8	53,3
Gauteng	Municipality	35,8	25,5	24,6
	Eskom	57,7	42,0	31,8
Mpumalanga	Municipality	40,6	35,3	31,4
	Eskom	72,6	34,6	58,4
Limpopo	Municipality	33,8	32,7	18,6
	Eskom	76,6	65,8	61,2
South Africa	**Municipality**	**45,6**	**36,1**	**31,3**
	Eskom	**68,7**	**52,7**	**52,0**

The perceived quality of service received from a call centre by households according to province and the electricity distributor, municipality or Eskom, is presented in Table 26. Although the provision of electricity is a municipal responsibility, Eskom discharges this responsibility on the behalf of a number of municipalities that are unable to do so themselves. The customer support lines are operated separately by the individual municipalities and Eskom. Nationally, households that received their electricity from Eskom were generally more satisfied with the call centres than those who had to deal with municipalities. In contrast to the other provinces where this pattern is repeated, a larger percentage of households in Northern Cape reported better services from their respective municipalities than from Eskom in terms of all three categories, namely: whether operators were available immediately, whether they responded within a reasonable time, and whether the problem was resolved in one call.

Table 27 constructs three logistic regression models (for urban, rural and South Africa) that attempt to identify the best combination of variables to predict the rating of electricity services as good/not good in rural and urban areas as well as the country as a whole. The logistic regression coefficients are used to give the change in the log odds of the outcome for a one unit increase in the predictor variable. To interpret these coefficients as odds-ratios they need to be exponentiated.

For urban areas, the table shows that for each unit change in interruptions, the log odds of rating electricity services as good, as opposed to not good, decreases by 0,61. Similarly, the log odds of rating electricity as good decreased by 1,1 if household lived in informal dwellings as opposed to formal dwellings. In terms of the source of electricity in urban areas, households that received their electricity from municipalities as opposed to Eskom decreases the log odds of giving a 'good' rating 0,54.

For rural areas, the Table 27 shows that, in relation to low LSM households, intermediate LSM households decreased the log odds of a good rating by 0,38. Households in informal dwellings were less likely to give a positive rating than those in formal dwellings, while those in traditional dwellings were more likely to do so.

Nationally, households that lived in informal dwellings were less likely to give a positive rating than households in formal dwellings, while those in traditional dwellings were more likely to do so. Households that experienced interruptions, as opposed to no interruptions, not surprisingly, decreased the log odds of a good rating by 0,60.

Table 27: Predictors of rating electricity services as good in rural and urban areas and South Africa, using logistic regression, 2012

Description of variable	Urban areas	Rural areas	South Africa
Model indicators			
Likelihood ratio chi Square	128	48	160
Hosmer and Lemeshow goodness of fit test (P-value)	0,1226	0,7377	0,2552
N	3338	7431	4106
Intercept	2,3478	2,7506	2,8847
Maximum likelihood estimates			
Living Standard Measure (LSM)			
Low(Reference category)			
Middle	n/a	-0,3797	n/a
High	n/a	0,2244*	n/a
Dwelling type			
Formal dwelling(Reference category)			
Informal dwelling	-1,0915	-0,6425	-1,6584
Traditional	0,9996*	0,4211	2,1665
Source of electricity (ie. Eskom, municipality, other)			
Eskom(Reference category)			
Municipality	-0,5445	n/a	n/a
Other	0,8911	n/a	n/a
Reported interruptions			
No interruptions Bill (Reference category)			
Interruptions	-0,6089	n/a	-0,6021
Geographical location			
Urban (Reference category)			
Rural	n/a	n/a	0,306

*not significant at 95% or 99% confidence interval

Table 28 constructs a logistic regression model that identifies the best combination of variables to predict the rating of electricity services as poor/not poor in rural and urban areas as well as the country as a whole. The models show, that in urban areas, and nationally, households that experienced interruptions were more likely to rate electricity services as poor. Similarly, those that received electricity from municipalities, as opposed from Eskom, were also more likely to give a negative rating in urban areas. The log odds of giving a 'poor' rating increased by 0,36 in urban areas, and 0,30 nationally for households that received electricity from municipalities instead of Eskom.

Nationally, the wealthiest households (quintile 4 and 5) were less likely than households in the poorest income quintile to give a poor rating. Households in rural areas, as compared to those in urban areas, decreased the log odds of rating services as poor by 0,17.

Table 28: Predictors of rating electricity services as poor in rural and urban areas and South Africa, using logistic regression, 2012

Description of variable	Urban areas	Rural areas	South Africa
Model indicators			
Likelihood ratio chi Square	143	133	260
Hosmer and Lemeshow goodness of fit test (P-value)	0,3958	0,9982	0,4346
N	3338	768	4106
Intercept	-0,0668*	-0.4600	-0,0414*
Maximum likelihood estimates			
Income quintile			
Poorest households(Reference category)			
Quintile 2	n/a	n/a	0,1304*
Quintile 3	n/a	n/a	0,000673*
Quintile 4	n/a	n/a	-0,1326
Wealthiest households	n/a	n/a	-0,1603
Living Standard Measure (LSM)			
Low(Reference category)			
Middle	n/a	0.1996	n/a
High	n/a	-0.2572	n/a
Dwelling type			
Formal dwelling(Reference category)			
Informal dwelling	0,3281*	-0.1121*	0,1585*
Traditional	-0,00846*	0.4301	0,2115*
Source of electricity (i.e. Eskom, municipality, other)			
Eskom(Reference category)			
Municipality	0,3629	n/a	0,3006
Other	-0,3709	n/a	-0,2527
Reported interruptions			
No interruptions Bill (Reference category)			
Interruptions	0,4415	n/a	0,4849
Geographical location			
Urban **(Reference category)**			
Rural	n/a	n/a	-0,1695

*not significant at 95% or 99% confidence interval

5.11 Main sources of energy

Although South Africa has, quite remarkably, increased the proportion of households that have access to electricity from about 36% of the population in 1993 to 85% of the population by 2013, more than 3,4 million households remain without electricity (DOE, 2013). Inadequate access to electricity deprive households of safer, cleaner, more versatile, convenient and affordable sources of energy that could significantly improve household's quality of life. As households without access to electricity are forced to use alternative sources of energy, poor households who cannot afford enough electricity to service all their needs (see Winkler, 2006:47) often revert to secondary sources of energy such as paraffin, wood and LPG. Poor households are particularly likely to rely on wood, coal and animal dung (solid fuels) for domestic activities. While solid fuels are often cheaper, its use exposes household members, particularly women and children, to significant hazards in relation to their health, personal security and socio-economic development and advancement.

Table 29 explores the substantial differences that exist between households with and without access to electricity. The table follows Table 11 in which a number of household categories were developed based on geographical locations, economic status and access to electricity. It is clear from the table that, regardless of geographical location and level of income, households without access to electricity are much more likely than households with access to electricity to use solid fuels for cooking, space heating and water heating. The differentials, however, seem to be larger for rural households. In urban areas, 0,8% of rich households with access to electricity and 6,5% of rich households without access to electricity used solid fuels for cooking. By comparison, 3% of poor households in urban areas who had access to electricity used solid fuels compared to 14,3% of poor, urban households without electricity. In rural areas, 14,5% of electrified rich rural households used solid fuels compared to 52,1% of rich rural households without access to electricity. While 39,3% of electrified poor rural households used solid fuels for cooking, more than three-quarters (77,6%) of poor rural households without access to electricity had to use it. Similar observations can be made with regards to space heating and water heating. These findings support the notion that the use of solid fuels is as much a function of the availability of alternatives such as electricity, as the abundant and cheap availability of solid fuels to use.

Table 29: Percentage of household that are using solid fuels for cooking and heating, 2012

	Cooking	Heating Space	Heating water
Urban rich with access to electricity	0,8	3,6	1,2
Urban rich without access to electricity	6,5	20,6	11,8
Urban poor with access to electricity	3,0	9,1	4,4
Urban poor without access to electricity	14,3	26,6	18,2
Rural rich with access to electricity	14,5	23,5	14,4
Rural rich without access to electricity	52,1	57,0	53,8
Rural poor with access to electricity	39,3	46,2	35,7
Rural poor without access to electricity	77,6	77,3	75,2

Table 30 outlines the percentage of households that had access to electricity, but who indicated that they used alternative sources for cooking, lighting, space heating and heating water. It is clear that rural households were more likely than urban households, and that poor households were more likely than rich households to have used alternative sources of energy even though their dwellings were electrified. Households are often forced to revert to alternative sources of energy when they cannot afford to acquire more electricity to service their daily requirements. As mentioned earlier, easier availability of alternatives, as one could potentially find in rural areas, would make it easier to adopt such a strategy.

Table 30: Percentage of household that have access to electricity but who are not using it for cooking, lighting and heating, 2012

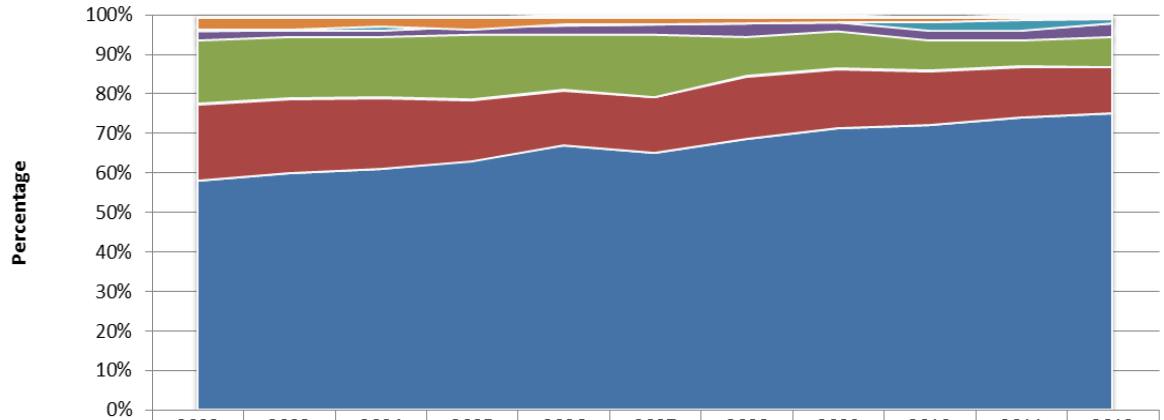
	Cooking	Lighting	Heating space	Heating water
Urban, rich with access to electricity	7,2	1,8	42,2	6,4
Urban poor with access to electricity	9,6	2,6	57,1	10,7
Rural rich with access to electricity	20,6	1,4	59,1	19,7
Rural poor with access to electricity	44,6	2,1	80,7	41,0

The following sections will direct attention to the main sources of energy used to perform the various domestic activities, namely: cooking, heating water, heating space, and lighting.

5.11.1 Main source of energy for cooking

Energy for cooking is a basic necessity without which household cannot function. Figure 36 shows that the percentage of households that mainly used electricity for cooking increased relatively consistently from 58% in 2002 to 75,2% in 2012. Simultaneously, the percentage of households that used solid fuels (wood, coal and animal dung) decreased from 22,6% to 12,6%.

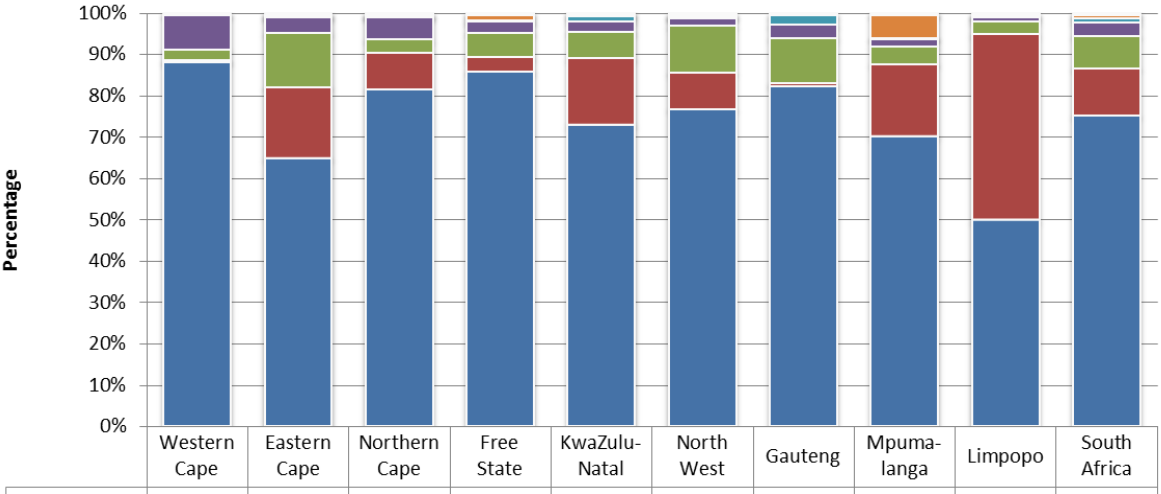
Figure 36: Main sources of energy for cooking, 2002–2012



	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012
None	0,4	0,4	0,4	0,5	0,2	0,1	0,1	0,1	0,5	0,2	0,2
Animal dung	0,3	0,4	0,3	0,3	0,2	0,3	0,2	0,3	0,3	0,2	0,2
Coal	3,0	2,7	2,4	2,4	2,2	2,1	1,9	1,4	1,2	0,9	0,8
Other	0,5	0,4	0,8	0,0	0,1	0,1	0,2	0,2	1,6	2,7	1,0
Gas	2,2	1,6	1,7	1,8	2,3	2,3	3,0	2,2	2,2	2,1	3,3
Paraffin	16,2	15,9	15,5	16,6	14,2	16,0	10,3	9,5	8,4	7,1	7,8
Wood	19,3	18,7	17,9	15,3	13,8	14,0	15,7	15,1	13,7	12,7	11,6
Electricity	58,0	60,0	61,0	63,1	67,1	65,1	68,6	71,4	72,1	74,2	75,2

The provincial pattern of energy use in 2012 is presented in Figure 37. More than eight-tenths of households used electricity for cooking in Western Cape (88,1%), Free State (85,9%), Gauteng (82,2%) and Northern Cape (81,7%). Conversely, less than half of households in Limpopo (49,8%) and less than two-thirds of household in Eastern Cape (64,9%) used electricity for cooking. This contrasts sharply to the findings of Figure 12 which reported that 90,5% of households in Limpopo and 80,4% of households in Eastern Cape were electrified. While the use of solid fuels is extremely limited in Western Cape (0,6%) and Gauteng (1,4%), its use is much more common in Limpopo (45,4%), Mpumalanga (23,5%), Eastern Cape (17,8%) and KwaZulu-Natal (17,6%).

Figure 37: Main sources of energy for cooking by province, 2012

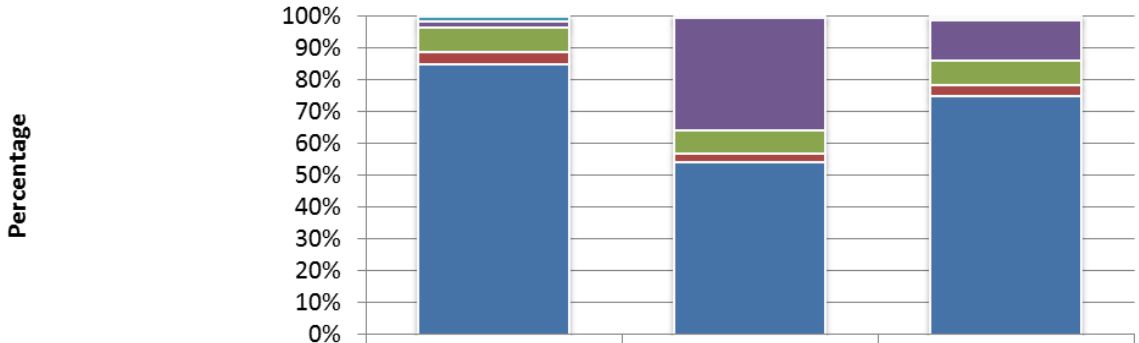


	Western Cape	Eastern Cape	Northern Cape	Free State	KwaZulu-Natal	North West	Gauteng	Mpuma-langa	Limpopo	South Africa
None	0,2	0,2	0,5	0,3	0,1	0,5	0,0	0,2	0,5	0,2
Animal dung	0,0	0,6	0,1	0,2	0,3	0,2	0,0	0,2	0,0	0,2
Coal	0,0	0,0	0,1	1,3	0,4	0,3	0,5	5,7	0,3	0,8
Other	0,3	0,2	0,4	0,3	1,1	0,2	2,4	0,1	0,2	1,0
Gas	8,4	3,8	5,3	2,6	2,7	1,9	3,1	1,8	1,1	3,3
Paraffin	2,4	13,1	3,3	6,0	6,4	11,3	10,9	4,3	3,0	7,8
Wood	0,6	17,3	8,7	3,5	16,0	8,8	0,9	17,6	45,1	11,6
Electricity	88,1	64,9	81,7	85,9	73,1	76,8	82,2	70,1	49,8	75,2

A comparison of the energy used for cooking by geographical location is presented in Figure 38. The figure shows that the use of electricity was much more common in urban households (84,9%) than in rural households (54,4%). While similar percentages of households used paraffin, a much larger percentage of rural than urban households (35,4% compared to 1,9%) used solid fuels. Urban households were furthermore more likely to use gas.

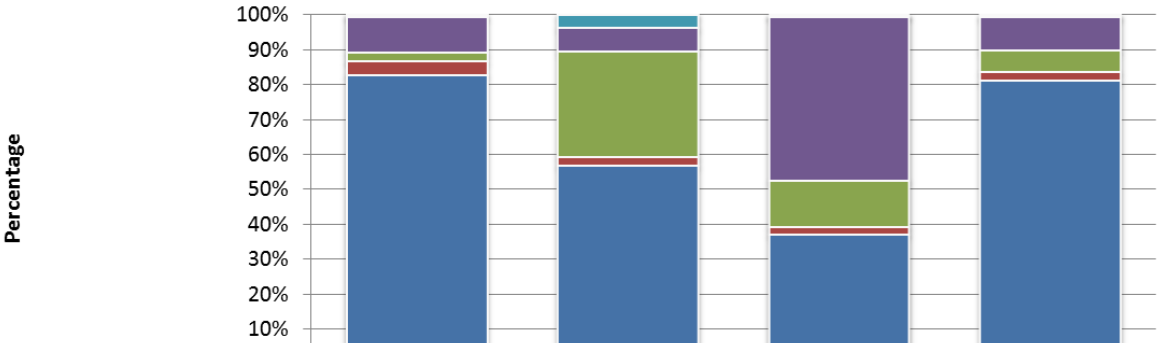
Figure 39 shows that households in formal dwellings are generally most likely to use electricity, and that households in traditional dwellings are most likely to use solid fuels. Households in subsidised dwellings, colloquially known as RDP houses, have a very similar pattern of energy consumption than households in other formal dwellings. This is, perhaps, surprising if one recalls that dwellings are subsidised based upon economic need.

Figure 38: Main sources of energy for cooking by geographical location, 2012



	Urban	Rural	South Africa
None	0,1	0,3	0,2
Other	1,3	0,2	1,0
Solid fuels (wood, coal, dung)	1,9	35,4	12,6
Paraffin	8,0	7,3	7,8
Gas	3,7	2,5	3,3
Electricity	84,9	54,4	75,2

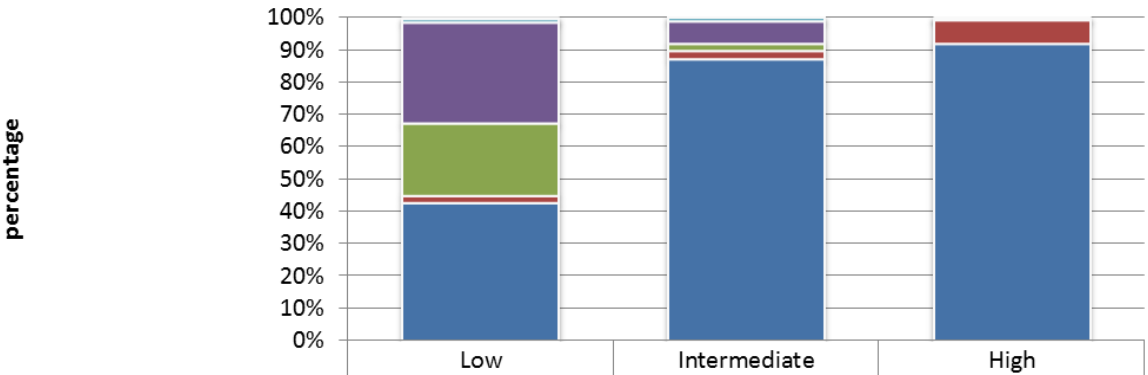
Figure 39: Main sources of energy for cooking by type of dwelling, 2012



	Formal	Informal	Traditional	Subsidised
None	0,1	0,1	0,4	0,2
Other	0,6	3,7	0,0	0,5
Solid fuel (wood, coal, dung)	10,2	6,7	46,9	9,6
Paraffin	2,4	30,3	13,4	6,0
Gas	3,9	2,3	2,1	2,5
Electricity	82,8	56,9	37,2	81,1

Figure 40 explores the impact of socio-economic status on the use of energy for cooking. Households with the lowest standard of living were least likely to use electricity for cooking (42,9%) while those with the highest standard of living were most likely to do so (91,9%). While 31% and 22,3% of households with a low standard of living respectively used wood and paraffin, barely any of the high LSM households did so. Almost all the high LSM households that did not primarily use electricity for cooking used LP gas to do so.

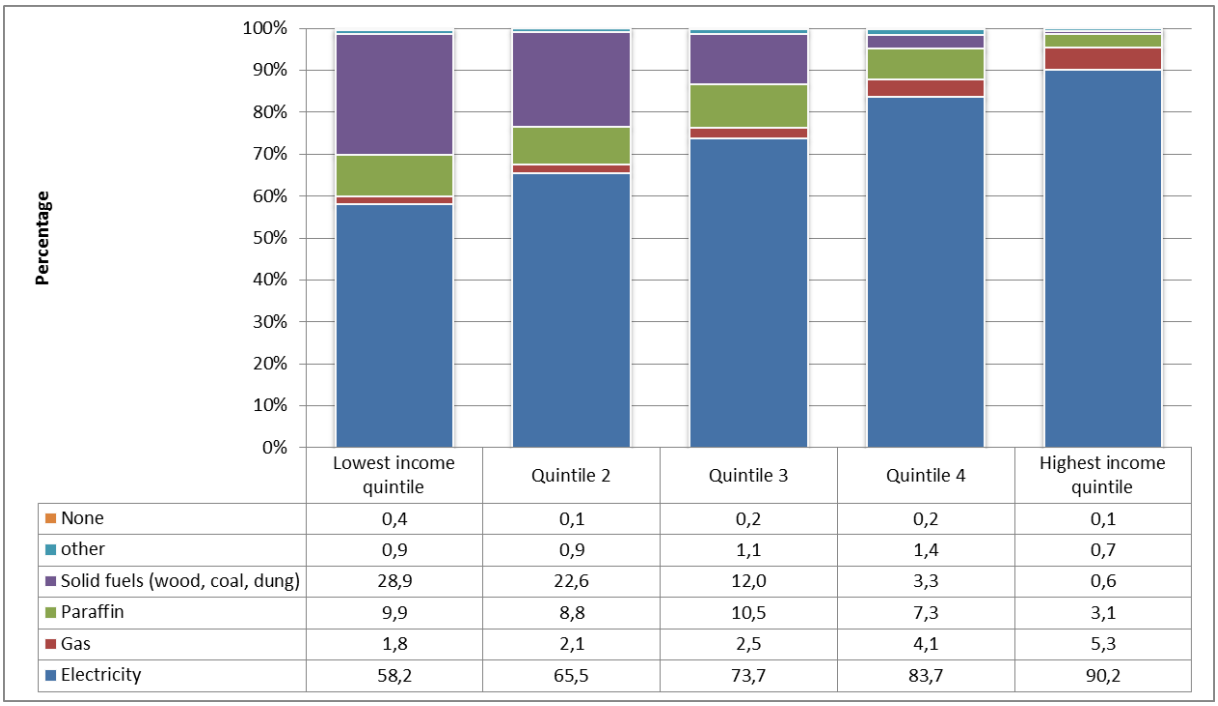
Figure 40: Main sources of energy for cooking by living standard, 2012



	Low	Intermediate	High
None	0,5	0,1	0,0
Other	1,1	1,1	0,5
Solid fuels (wood, coal, dung)	31,0	6,7	0,1
Paraffin	22,3	2,4	0,0
Gas	2,3	2,4	7,5
Electricity	42,9	87,2	91,9

Figure 41 shows very clearly how the use of electricity as primary source of energy for cooking increases with household wealth, as measured through income quintiles based on per capita monthly household income, while the use of solid fuels for cooking is negatively associated with households' wealth. The percentage of households that used solid fuels as primary source of energy for cooking therefore decreases in each successive income quintile until only 0,6% of households in the highest bracket used solid fuel for cooking.

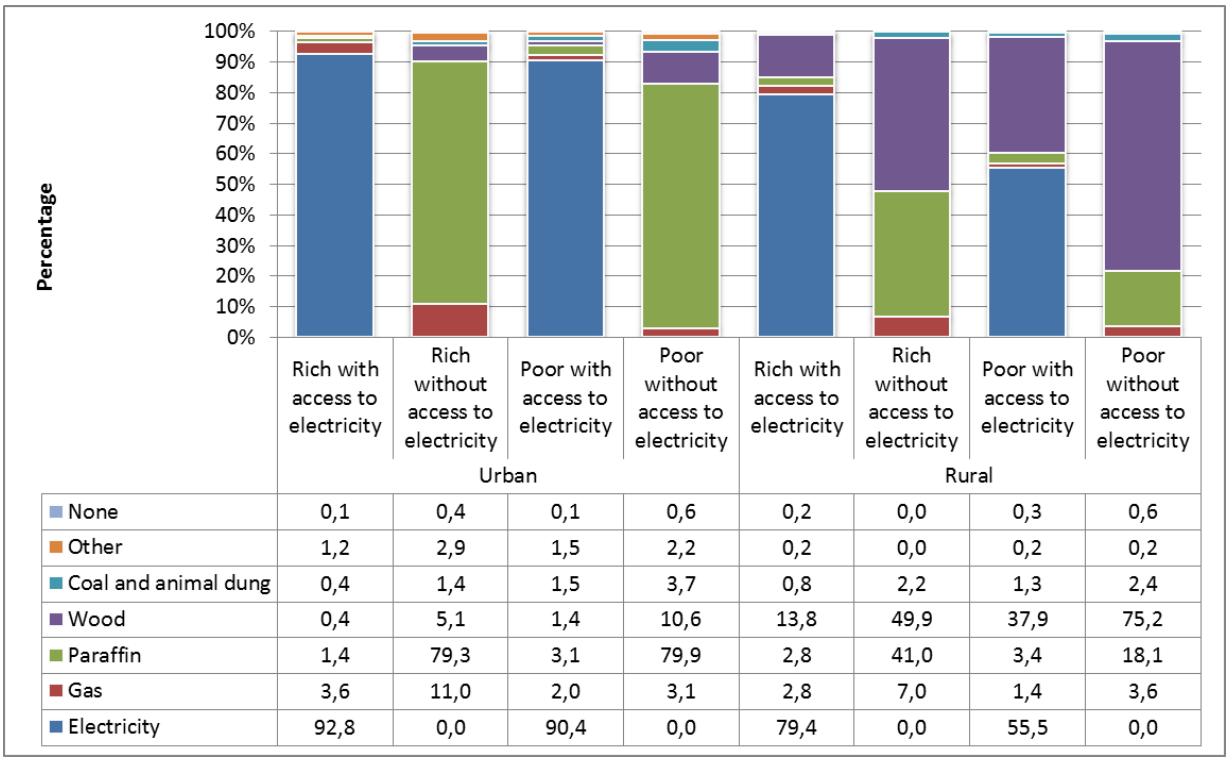
Figure 41: Main sources of energy for cooking by income quintile, 2012



	Lowest income quintile	Quintile 2	Quintile 3	Quintile 4	Highest income quintile
None	0,4	0,1	0,2	0,2	0,1
other	0,9	0,9	1,1	1,4	0,7
Solid fuels (wood, coal, dung)	28,9	22,6	12,0	3,3	0,6
Paraffin	9,9	8,8	10,5	7,3	3,1
Gas	1,8	2,1	2,5	4,1	5,3
Electricity	58,2	65,5	73,7	83,7	90,2

Figure 42 shows that electrified households are very likely to use electricity for cooking, regardless of socio-economic status and geographical location. Rich households (those in income quintiles 3-5) are more likely to use electricity than poor households in both urban, but particularly in rural areas. The findings also associate the use of gas with income as rich households without access to electricity were more likely to use gas for cooking than poor households. The largest difference, however, relates to the use of paraffin. In urban areas, almost eight-tenths of households without access to electricity used paraffin for cooking, regardless of their socio-economic status. However, for households without access to electricity, in rural areas only 41% of rich used paraffin while less than one-fifth (18,1%) of poor households used paraffin. The use of solid fuels, particularly wood, was much more common in rural areas.

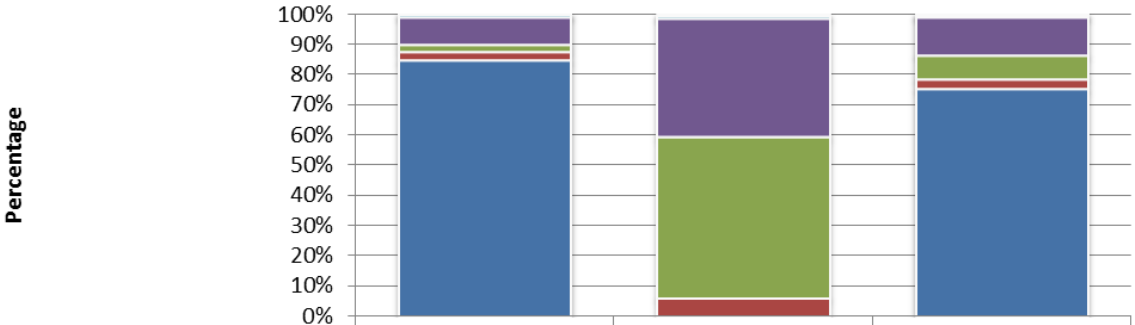
Figure 42: Type of energy used for cooking by socio-economic status, geographic location, and access to electricity, 2012



	Urban				Rural			
	Rich with access to electricity	Rich without access to electricity	Poor with access to electricity	Poor without access to electricity	Rich with access to electricity	Rich without access to electricity	Poor with access to electricity	Poor without access to electricity
None	0,1	0,4	0,1	0,6	0,2	0,0	0,3	0,6
Other	1,2	2,9	1,5	2,2	0,2	0,0	0,2	0,2
Coal and animal dung	0,4	1,4	1,5	3,7	0,8	2,2	1,3	2,4
Wood	0,4	5,1	1,4	10,6	13,8	49,9	37,9	75,2
Paraffin	1,4	79,3	3,1	79,9	2,8	41,0	3,4	18,1
Gas	3,6	11,0	2,0	3,1	2,8	7,0	1,4	3,6
Electricity	92,8	0,0	90,4	0,0	79,4	0,0	55,5	0,0

Figure 43 explores the extent to which access to electricity influenced households' primary use of energy for cooking. The majority of electrified households used electricity (84,5%) for cooking, followed by solid fuels (9,3%). By contrast, households without access to electricity primarily relied on paraffin (53,2%) and solid fuels (39,1%), followed by gas (6,0%). Only 1,3% of households without access to electricity relied on 'other' sources of energy which includes solar power.

Figure 43: Main sources of energy for cooking by access to electricity, 2012



	Access to electricity	No access to electricity	South Africa
None	0,1	0,4	0,2
Other	1,0	1,3	1,0
Solid fuels (wood, coal, dung)	9,3	39,1	12,6
Paraffin	2,1	53,2	7,8
Gas	3,0	6,0	3,3
Electricity	84,5	0,0	75,2

Table 31 explores the sources of energy used for cooking by households that specifically had access to mains electricity. Electrified households in Gauteng (94,8%), Free State (91,8%) and Western Cape (91,1%) were most likely to use electricity for cooking while households in rural areas like Limpopo (43,3%) and Mpumalanga (19,9%) and Eastern Cape (25,%) were more like to use solid fuels. While 93,4% of households with access to mains electricity used electricity for cooking in urban areas, this was only the case for less than two-thirds (66,1%) of households in rural areas. Although households in subsidised dwellings are generally poorer households, their pattern of energy used coincided with that of other formal households, perhaps pointing to a lack of accessible and more affordable alternative sources of energy. The likelihood of using electricity for cooking increases consistently with income and living standard and households in the quintile 5 and with a high standard of living were most likely to use electricity.

Table 31: Main sources of energy for cooking for households with access to mains electricity, 2012

	Electricity	Gas	Paraffin	Solid fuels	Other	None
Western Cape	91,1	8,0	0,4	0,2	0,2	0,1
Eastern Cape	78,2	3,0	5,8	12,5	0,2	0,2
Northern Cape	88,0	4,7	1,6	5,5	0,3	0,1
Free State	91,8	2,4	2,5	2,9	0,3	0,1
KwaZulu-Natal	88,2	2,2	1,1	7,9	0,6	0,1
North West	87,4	1,4	3,0	7,7	0,2	0,3
Gauteng	94,8	2,7	1,0	0,3	1,3	0,0
Mpumalanga	76,9	2,0	1,2	19,9	0,0	0,0
Limpopo	54,3	1,0	0,9	43,3	0,2	0,4
South Africa	**85,2**	**3,0**	**1,7**	**9,4**	**0,6**	**0,1**
Type of dwelling						
Formal	86,6	3,7	0,9	8,3	0,4	0,1
Informal	88,7	0,7	3,7	4,2	2,7	0,0
Traditional	56,2	1,8	7,3	34,3	0,1	0,3
Subsidised /RDP	87,1	1,5	2,1	8,6	0,6	0,1
Income quintile						
Income quintile 1	71,3	1,4	2,6	23,8	0,7	0,2
Income quintile 2	77,0	1,8	2,9	17,7	0,5	0,1
Income quintile 3	85,5	2,0	2,7	9,0	0,6	0,2
Income quintile 4	92,7	3,1	1,0	2,2	0,8	0,2
Income quintile 5	93,9	5,1	0,3	0,3	0,3	0,1
Living standard						
Low	66,0	1,0	5,2	27,1	0,3	0,4
Intermediate	89,4	1,9	1,1	6,8	0,7	0,1
High	91,9	7,5	0,0	0,1	0,4	0,0
Geographical location						
Urban	93,4	3,4	1,2	1,2	0,7	0,1
Rural	66,1	1,9	3,0	28,6	0,2	0,2

Table 32 constructs a logistic regression model that identifies the best combination of variables to predict the use of solid fuels by households for cooking in rural and urban areas as well as the country as a whole.

The model shows that, wealthier households in income quintiles four and five were generally less likely to use solid fuels for cooking than poorer households in the reference category, income quintile one. Interestingly, households in income quintiles two and three were more likely to use solid fuels that the poorest households. Similarly, households with the highest standards of living were much less likely to use solid fuels than households with a low standard of living. Households with an intermediate standard of living were more likely to use solid fuels for space heating.

As compared to household that lived in formal dwellings, households in informal dwelling generally decreased the log odds of using solid fuels for cooking, while those in traditional dwellings generally increased the log odds of doing so, particularly in rural areas.

Rural households were much more likely to use solid fuels for cooking as compared to their urban counterparts. Nationally, rural households, as compared to urban households, increased the log odds of using solid fuels for cooking by 1,24.

Table 32: Predictors of households that are connected to mains electricity using solid fuels for cooking in rural and urban areas as well as nationally, using logistic regression, 2012

Description of variable	Rural areas	Urban areas	South Africa
Model Indicators			
Likelihood ratio chi Square	247	1 107	5 124
Hosmer and Lemeshow goodness of fit test (P-value)	0,9815	0,87	0,021
N	12 476	7 174	19 650
Intercept	-3,7269	-2,7811	-3,5448
Maximum Likelihood Indicator			
Income quintile			
Poorest households (Reference category)			
Quintile 2	0,5147	0,8471	0,758
Quintile 3	0,3663	0,2635	0,2339
Quintile 4	-0,4731	-0,293	-0,3459
Wealthiest households	-1,17	-1,9836	-1,7045
Living Standard measures			
Low (Reference category)			
Medium	0,2535*	0,4126	0,298
High	-1,2554	-1,4944	-1,2752
dwelling type			
Formal (Reference category)			
Informal	-0,2521*	-0,743	-0,3909
Traditional	0,8968	0,2671	0,1365
Main source of income			
Salaries (Reference category)			
Remittances	-0,596	0,0102*	-0,0907*
Pensions	1,081	-0,00759*	0,2996*
Grants	0,2328*	0,603	0,4857
Other income	-0,7163	0,1955*	0,0161*
No income	0,1634*	-0,7491	-0,5912
Geographic location			
Urban (Reference category)			
Rural	n/a	n/a	1,2364

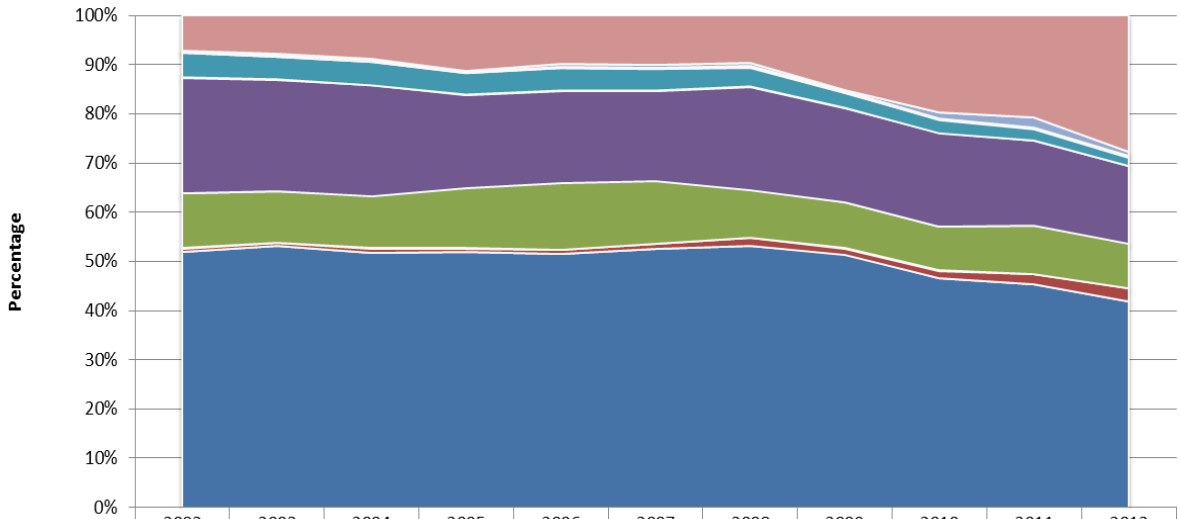
*: Values that are not significant at 95% or 99% levels of significance

5.11.2 Main source of energy for space heating

Due to large temperature variations between seasons, the energy used for space heating tends to vary more by season that the energy used for any of the other activities, e.g. cooking, lighting and heating water. Data on the use of energy in winter and in summer conditions gathered during 2012 show that a larger percentage of households used electricity and solid fuels during the winter months for space heating than during the warmer summer months, but that the percentage of households that did not heat their homes increased substantially during the summer months.

Figure 44 shows that the percentage of households that used any fuel for heating decreased by 20,5% between 2002 and 2012, from 92,8% to 72,3%. Although the number of households that had access to electricity increased substantially during this time, the percentage of households that used electricity for heating decreased by 10,1% to 41,8% in 2012. This is indicative of the massive electrification of poor households that are very unlikely to use electricity to use their available electricity for such energy intensive activities. The percentage of households that used wood similarly declined by 7,7%, from 23,5% to 15,8% between to 2002 and 2012. The use of solid fuels (wood, coal and animal dung) decreased from 28,8% in 2002 to 17,9% in 2012.

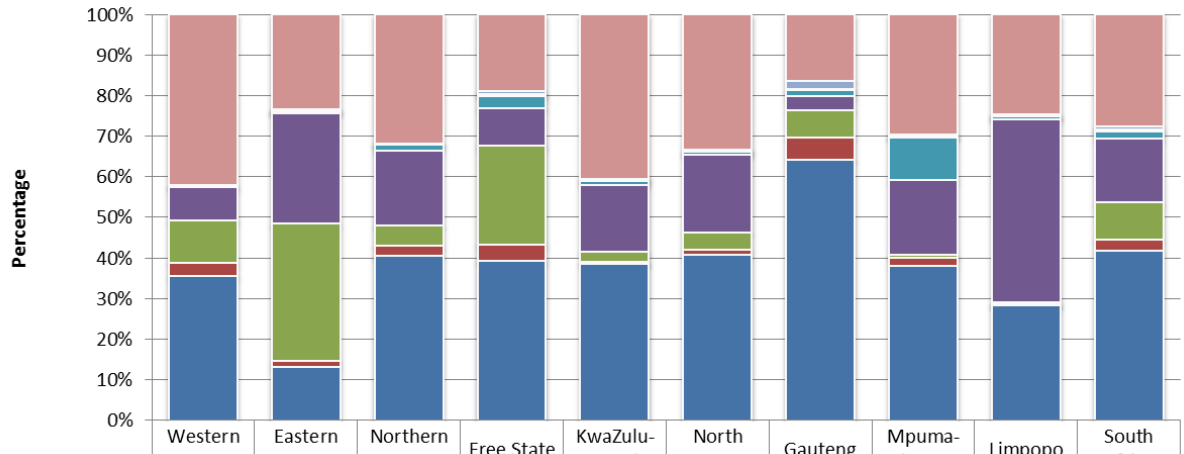
Figure 44: Main sources of energy for heating, 2002–2012



	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012
None	7,2	7,9	8,9	11,3	9,8	10,1	9,7	15,2	19,7	20,7	27,7
Other	0,2	0,2	0,2	0,2	0,6	0,6	0,6	0,3	1,2	2,2	0,8
Animal dung	0,3	0,4	0,4	0,3	0,4	0,3	0,3	0,3	0,3	0,2	0,3
Coal	5,0	4,6	4,7	4,4	4,6	4,3	3,9	3,1	2,7	2,3	1,8
Wood	23,5	22,7	22,5	18,9	18,7	18,3	21,0	19,1	19,1	17,4	15,8
Paraffin	11,2	10,5	10,7	12,3	13,6	12,9	9,7	9,4	8,9	9,9	9,2
Gas	0,7	0,6	0,9	0,7	0,9	1,1	1,7	1,2	1,5	2,0	2,7
Electricity	51,9	53,1	51,7	51,9	51,5	52,5	53,1	51,4	46,6	45,3	41,8

The main sources of energy used by households for heating space are presented in Figure 45. One-third of households in North West (33,3%), KwaZulu-Natal (40,5%) and Western Cape (42,0%) indicated that they did not use any fuels for heating. The use of electricity was most common in Gauteng (64,2%), North West (40,7%) and Northern Cape (40,6%) and least common in Eastern Cape (13,2%) and Western Cape (35,4%). Households were most likely to have used wood in Mpumalanga (45,1%) and Eastern Cape (27,3%) and least likely to do so in Gauteng (3,4%) and Western Cape (8,3%). The use of paraffin was most prevalent in Eastern Cape (33,7%) and Free State (24,3%) and least common in Limpopo (0,5%) and Mpumalanga (0,7%). More than one-tenth (10,5%) of households in Mpumalanga used coal.

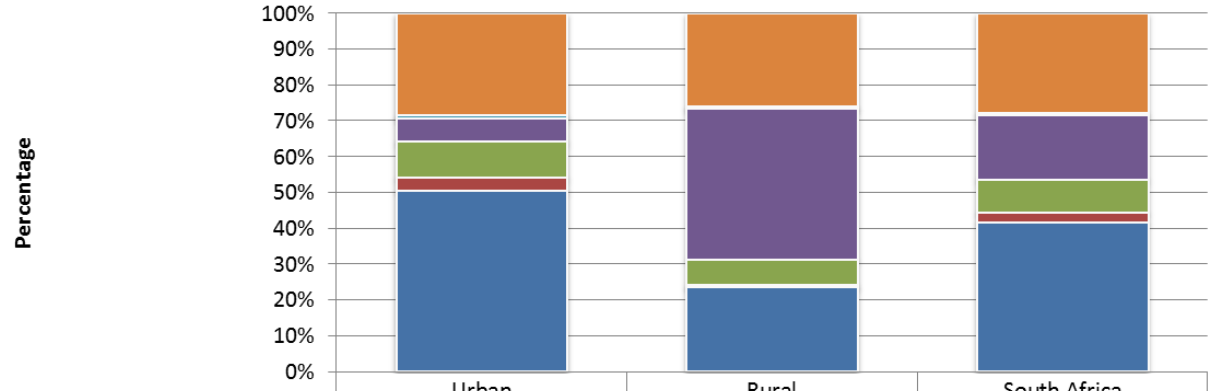
Figure 45: Main sources of energy for space heating by province, 2012



	Western Cape	Eastern Cape	Northern Cape	Free State	KwaZulu-Natal	North West	Gauteng	Mpuma-langa	Limpopo	South Africa
None	42,0	23,5	31,9	18,9	40,5	33,3	16,4	29,7	24,6	27,7
Other	0,5	0,1	0,1	0,8	0,2	0,3	2,0	0,5	0,5	0,8
Animal dung	0,0	0,5	0,2	0,4	0,5	0,3	0,2	0,2	0,1	0,3
Coal	0,0	0,2	1,3	3,0	0,9	0,8	1,7	10,5	0,6	1,8
Wood	8,3	27,3	18,6	9,3	16,5	19,0	3,4	18,5	45,1	15,8
Paraffin	10,4	33,7	5,0	24,3	2,5	4,2	6,7	0,7	0,5	9,2
Gas	3,3	1,4	2,3	4,1	0,4	1,4	5,5	1,9	0,3	2,7
Electricity	35,4	13,2	40,6	39,2	38,6	40,7	64,2	38,1	28,2	41,8

Large differences are observed in the energy use patterns of urban and rural areas, Figure 46. More than half (50,4%) of households in urban areas used electricity to heat space, compared to less than one-quarter (23,6%) in rural areas. However, households in rural areas were much more likely to use solid fuels (42,1%) than those in urban areas (6,4%). Both the use of paraffin and gas was more common in urban areas. It is noticeable that very similar percentages of households in urban and rural areas (28,4% and 26,1%) indicated that they did not heat their homes at all.

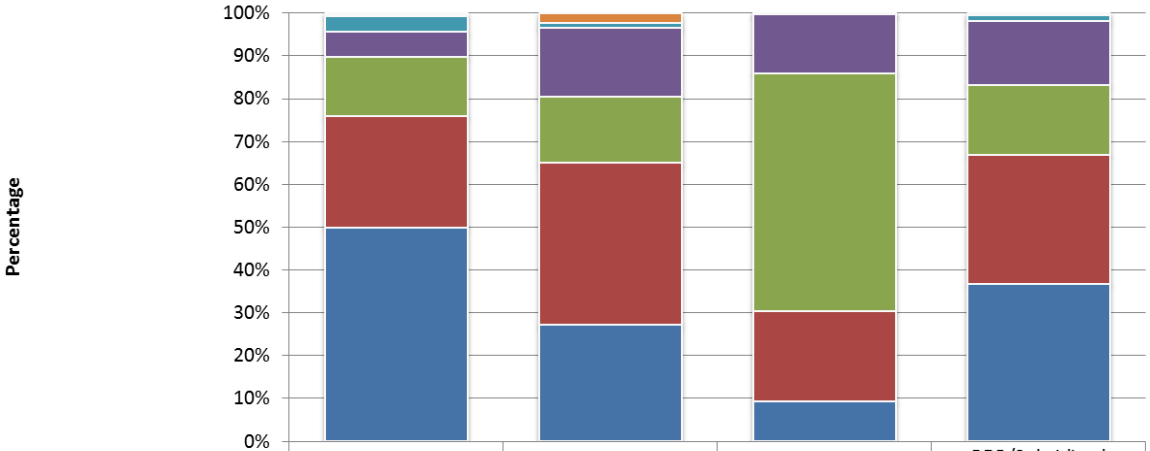
Figure 46: Main sources of energy for space heating by geographic location, 2012



	Urban	Rural	South Africa
None	28,4	26,1	27,7
Other	1,0	0,4	0,8
Solid fuels (wood, coal, dung)	6,4	42,1	17,8
Paraffin	10,0	7,3	9,2
Gas	3,7	0,5	2,7
Electricity	50,4	23,6	41,8

Figure 47 shows that households in formal dwellings (50%) were most likely to use electricity for space heating, followed by those in subsidised households (36,8%), informal dwellings (27,2%) and, finally, those in traditional dwellings (9,3%). Households in traditional dwellings were most likely to use solid fuels for heating, while the percentages for other households were very similar. Households in formal dwellings were less likely to use paraffin, and more likely to use LPG than households in other dwelling types. Households in informal dwellings were most likely to not use any source of space heating.

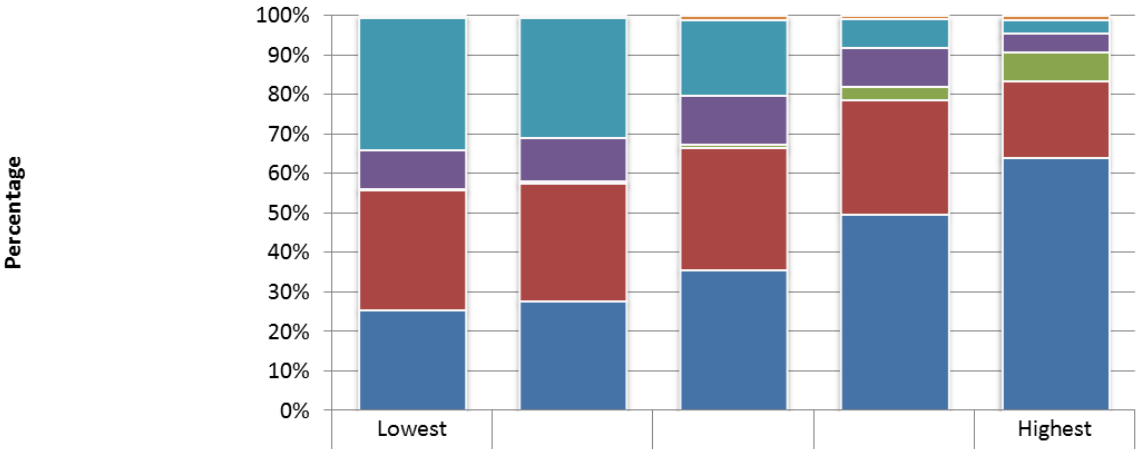
Figure 47: Main sources of energy for space heating by type of dwelling, 2012



	Formal	Informal	Traditional	RDP/Subsidised houses
Other	0,6	2,3	0,1	0,5
Gas	3,8	1,0	0,2	1,4
Paraffin	5,9	16,1	13,8	14,9
Solid fuels (wood, coal, dung)	13,8	15,6	55,6	16,3
None	25,9	37,8	21,0	30,1
Electricity	50,0	27,2	9,3	36,8

Figure 48 shows very clearly how the use of electricity as primary source of energy for heating space increases with household wealth, as measured through income quintiles based on per capita monthly household income. The percentage of households that use electricity for space heating increase from 25,5% in quintile 1 to 64% in quintile 5. By contrast, the use of solid fuels for cooking is negatively associated with households' wealth. The percentage of households that used solid fuels as primary source of energy for heating space therefore decrease in each successive income quintile until only 3,3% of households in the highest bracket used solid fuel for space heating.

Figure 48: Main sources of energy for space heating by income quintile, 2012

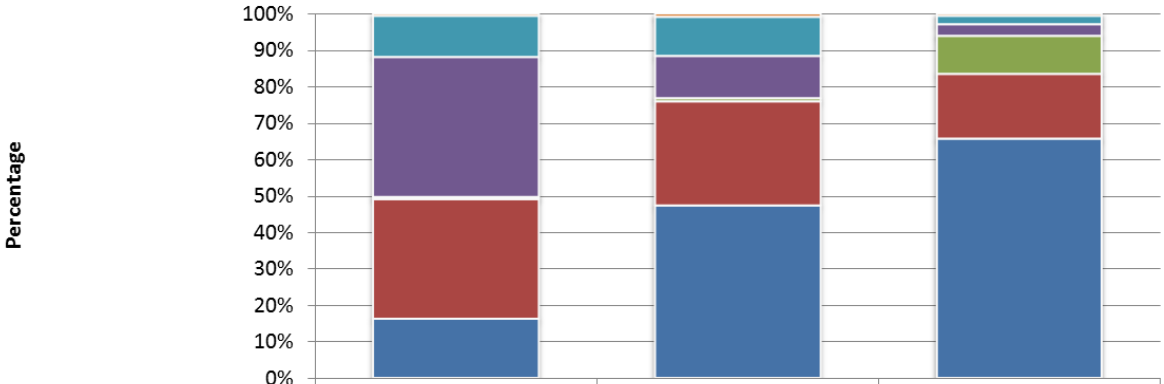


	Lowest income quintile	Quintile 2	Quintile 3	Quintile 4	Highest income quintile
Other	0,5	0,7	1,1	0,9	1,1
Solid fules (wood, coal, dung)	33,6	30,2	19,3	7,2	3,3
Paraffin	9,7	11,1	12,3	10,0	4,8
Gas	0,5	0,6	0,9	3,2	7,4
None	30,2	29,8	30,8	28,9	19,5
Electricity	25,5	27,6	35,7	49,7	64,0

A graphic representation of energy use for space heating by household living standard, Figure 49, shows that households with a high standard of living were much more likely that those with an 'intermediate' or 'low' standard of living to have used some source of energy for heating their homes. High LSM households were most likely to use electricity and LP gas for heating, while low LSM households were most likely to have used solid fuels and paraffin. A similar percentage of households used 'other' sources of energy across all three categories. The percentage of households that did not heat their homes decreased from 38,3% for low LSM households to 17,8% for the households with the highest standards of living.

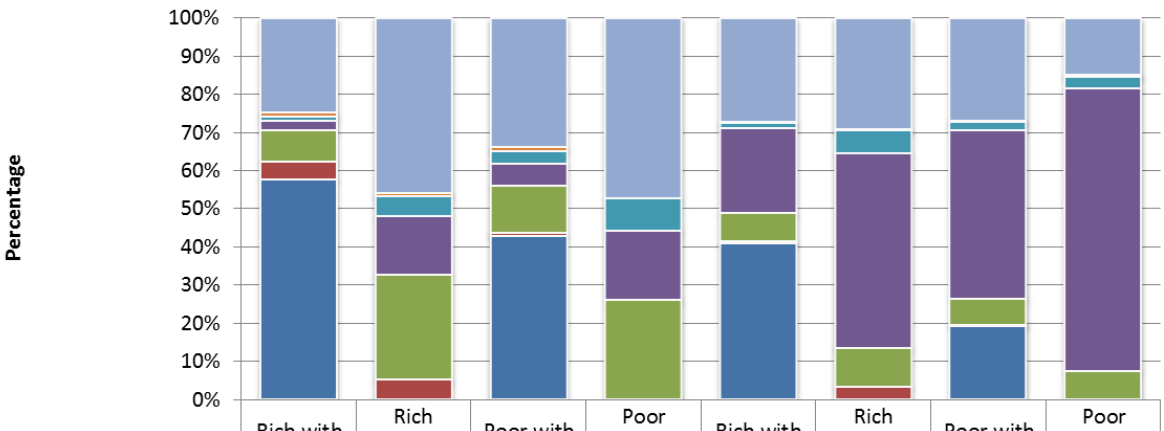
Figure 50 confirms that mere access to electricity does not mean that households will necessarily use electricity for domestic activities. In urban areas, only 57,8% of rich households with access to electricity (those in income quintile 3–5) actually used electricity, while only 42,9% of electrified poor households used electricity. The percentage of electrified households that use electricity is even lower in rural areas, possibly because households are generally poorer, but also because more alternative sources of fuel, like wood, might be available. Only 40,9% of electrified rich households in rural areas used electricity, compared to 19,3% of electrified poor households. The figure also shows that urban households were much more likely to use paraffin than households in rural areas, but that, conversely, rural households were much more likely to use wood. Urban-based households, regardless of socio-economic status or access to electricity, were less likely to actually heat their homes than households in rural areas.

Figure 49: Main sources of energy for space heating by standard of living, 2012



	Low	Intermediate	High
Other	0,7	1,0	0,7
Paraffin	11,1	10,6	2,1
Solid fuels (wood, coal, dung)	38,3	11,5	3,3
Gas	0,6	1,1	10,5
None	33,0	28,3	17,8
Electricity	16,3	47,5	65,7

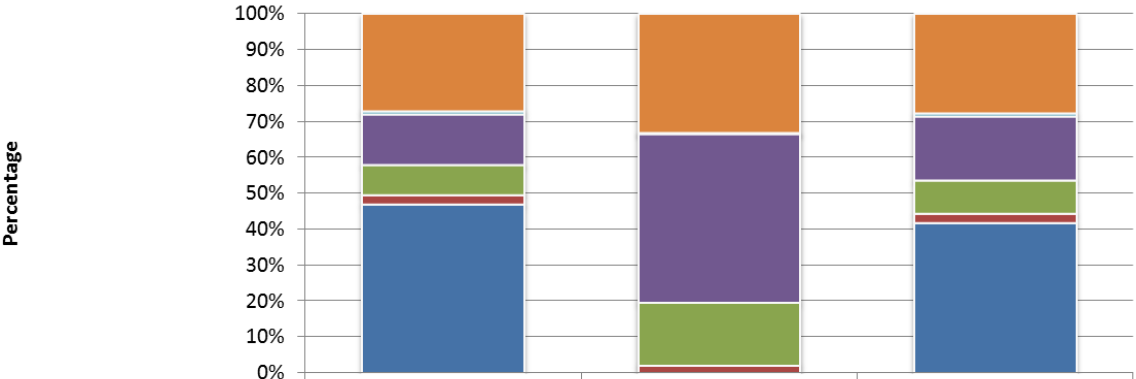
Figure 50: Type of energy used for heating water by socio-economic status, geographic location, and access to electricity, 2012



	Urban				Rural			
	Rich with access to electricity	Rich without access to electricity	Poor with access to electricity	Poor without access to electricity	Rich with access to electricity	Rich without access to electricity	Poor with access to electricity	Poor without access to electricity
None	24,7	45,9	33,9	47,2	27,1	29,1	26,9	15,0
Other	1,2	0,7	0,9	0,0	0,5	0,4	0,4	0,4
Coal and animal dung	1,1	5,2	3,3	8,6	1,3	6,0	2,1	3,0
Wood	2,5	15,3	5,8	18,0	22,2	51,0	44,1	74,2
Paraffin	8,1	27,6	12,3	25,6	7,5	10,2	6,9	7,2
Gas	4,6	5,2	0,9	0,6	0,5	3,3	0,3	0,2
Electricity	57,8	0,0	42,9	0,0	40,9	0,0	19,3	0,0

It is clear from Figure 51 that less than one-halve (47%) of electrified households used electricity for space heating. Another 14,2% used solid fuels, while about one-quarter (27%) did not heat their homes at all. For households without access to electricity, the largest percentage used solid fuels (46,8%), followed by paraffin (17,5%). Almost one-third (33,1%) did not use any energy.

Figure 51: Main sources of energy for space heating by access to electricity, 2012



	Access to electricity	No access to electricity	South Africa
None	27,0	33,1	27,7
Other	0,9	0,4	0,8
Solid fuels (wood, coal, dung)	14,2	46,8	17,8
Paraffin	8,1	17,5	9,2
Gas	2,8	2,2	2,7
Electricity	47,0	0,0	41,8

Table 33 profiles the sources of energy used for space heating (referred to as heating) by households that are already electrified. Nationally, less than one-halve (49%) of use electricity for heating. Electrified households in Eastern Cape (16,5%) and Limpopo (31,3%) were least likely to use electricity, while households in Gauteng (75,7%) were most likely to use electricity. Limpopo households (44,0%) were most likely to use solid fuels and those in Gauteng (2,3%) least likely. Nationally, a quarter of households did not heat their homes, with the highest percentage in Western Cape (39,5%) and the lowest in Gauteng (12,2%). Households in formal dwellings were most likely to use electricity for heating, and those in traditional dwellings least likely. Households in subsidised dwellings were less likely than those in formal dwellings to use electricity for heating, and more likely to use solid fuels, or to remain without heating. A positive relationship can be discerned between household income and standard of living on the one hand, and pattern of energy use for heating on the other. Households in sequential income quintiles are increasingly more likely to use electricity for heating, and conversely, less likely to use solid fuels. Similarly, high LSM households are most likely to use electricity, and least likely to use solid fuels. While 57,4% of electrified urban households used electricity compared to 29,3% of rural household. By contrast, electrified rural households (36,3%) were more likely to use solid fuels for heating than their urban counterparts (4,9%). While more than two-thirds (66,8%) of households with conventional meters used electricity, this was only the case for 40,8% of households with pre-paid meters. The latter group of households were more likely to use solid fuels or to not heat their homes at all.

Table 33: Main sources of energy for space heating for households with access to mains electricity, 2012

	Electricity	Gas	Paraffin	Solid fuels	Other	None
Western Cape	39,1	3,7	9,3	8,1	0,3	39,5
Eastern Cape	16,5	1,7	36,2	21,6	0,1	23,9
Northern Cape	44,0	2,1	4,9	17,9	0,1	31,0
Free State	42,9	4,5	22,8	10,6	0,7	18,5
KwaZulu-Natal	48,7	0,3	2,3	11,1	0,2	37,3
North West	47,6	1,1	3,0	17,6	0,4	30,3
Gauteng	75,7	5,8	2,8	2,3	1,3	12,2
Mpumalanga	43,3	2,0	0,3	24,3	0,5	29,6
Limpopo	31,3	0,3	0,3	44,0	0,5	23,6
South Africa	**49,0**	**2,9**	**7,9**	**14,3**	**0,6**	**25,3**
Type of dwelling						
Formal	53,3	3,9	5,7	11,9	0,4	24,7
Informal	49,7	0,6	10,8	10,1	2,3	26,5
Traditional	14,8	0,1	15,9	46,2	0,1	23,0
RDP	40,4	0,8	13,7	15,5	0,5	29,2
Income quintile						
Income quintile 1	32,3	0,5	8,2	29,0	0,5	29,6
Income quintile 2	33,4	0,7	10,8	25,6	0,5	29,0
Income quintile 3	43,1	0,8	11,4	16,4	0,7	27,6
Income quintile 4	58,0	3,0	8,2	5,1	0,7	25,1
Income quintile 5	67,8	7,5	3,9	2,4	0,8	17,6
Living standard						
Low	27,2	0,2	7,9	34,5	0,5	29,8
Intermediate	50,2	1,0	10,1	11,5	0,6	26,6
High	65,9	10,4	2,1	3,3	0,7	17,7
Geographical location						
Urban	57,4	4,0	8,2	4,9	0,7	24,8
Rural	29,3	0,4	7,1	36,3	0,4	26,4
Electricity payment						
Conventional meter	66,8	7,6	1,2	4,4	0,4	19,6
Pre-paid meter	40,8	1,8	10,4	18,3	0,6	28,1
Private	67,7	2,6	1,7	6,8	2,7	18,6

The log odds of using solid fuels for space heating, as opposed to using some other form of energy, is modelled as a linear combination of predictor values in Table 34. As with cooking, wealthier households with access to electricity were generally less likely to use solid fuels for space heating that households with electricity in the lowest income quintile. Compared to the poorest households, households in the wealthiest income quintile decreased the log odds of using solid fuels by 1,39; 0,72; and 0,99 in respectively urban and rural areas, and South Africa. The model also shows that the log odds of using solid fuels generally decreased for households in intermediate and high LSM households in relation to those in low LSM households. The only exception is in the case of intermediate LSM rural households where the log odds actually increased by 0,09. The latter finding is, however, not significant. In comparison to households in formal dwellings, the log odds of using solid fuels for space heating increase for households in traditional dwellings, but decrease for those in informal dwellings in rural and urban areas, and the country as a whole. The model also show, that for the country as a whole, living in rural areas as compared to urban areas increased the log odds of using solid fuels for space heating by 0,8. Whereas households that received grants were

more likely to have used solid fuels for space heating than households that mainly received salaries, households with other sources of income were, in comparison, less likely to do so.

Table 34: Predictors of households with access to electricity using solid fuels for space heating in rural and urban areas and South Africa, using logistic regression, 2012

Description of variable	Rural areas	Urban areas	South Africa
Model Indicators			
Likelihood ratio chi Squire	476	895	4 361
Hosmer and Lemeshow goodness of fit test (P-value)	0,1129	0,9931	0,0002
N	12 463	7 165	19 628
Intercept	-2,4469	-1,4492	-1,9284
Maximum Likelihood Indicator			
Income quintile			
Poorest households (Reference category)			
Quintile 2	0.4638	0,6966	0,5835
Quintile 3	0.2411	0,274	0,2171
Quintile 4	-0.5407	-0,3338	-0,4606
Wealthiest households	-0.7164	-1,3916	-0,9887
Living Standard measures			
Low (Reference category)			
Intermediate	-0.2584	0,0883*	-0,1283
High	-0.2911	-0,6233	-0,2727
Dwelling type			
Formal (Reference category)			
Informal	-0.2340	-0,321	-0,1719
Traditional	0.5193	0,2654	0,2111
Main source of income			
Salaries (Reference category)			
Remittances	-0.0789*	-0,1274*	-0,1002*
Pensions	-0.0224*	-0,0275*	-0,00623*
Grants	0.6460	0,5606	0,5756
Other income	-0.4347	0,02*	-0,1396*
No income	-0.1329*	-0,3858*	-0,305*
Geographical location			
Urban (Reference category)			
Rural	n/a	n/a	0,8038

*: Values that are not significant at 95% or 99% levels of significance

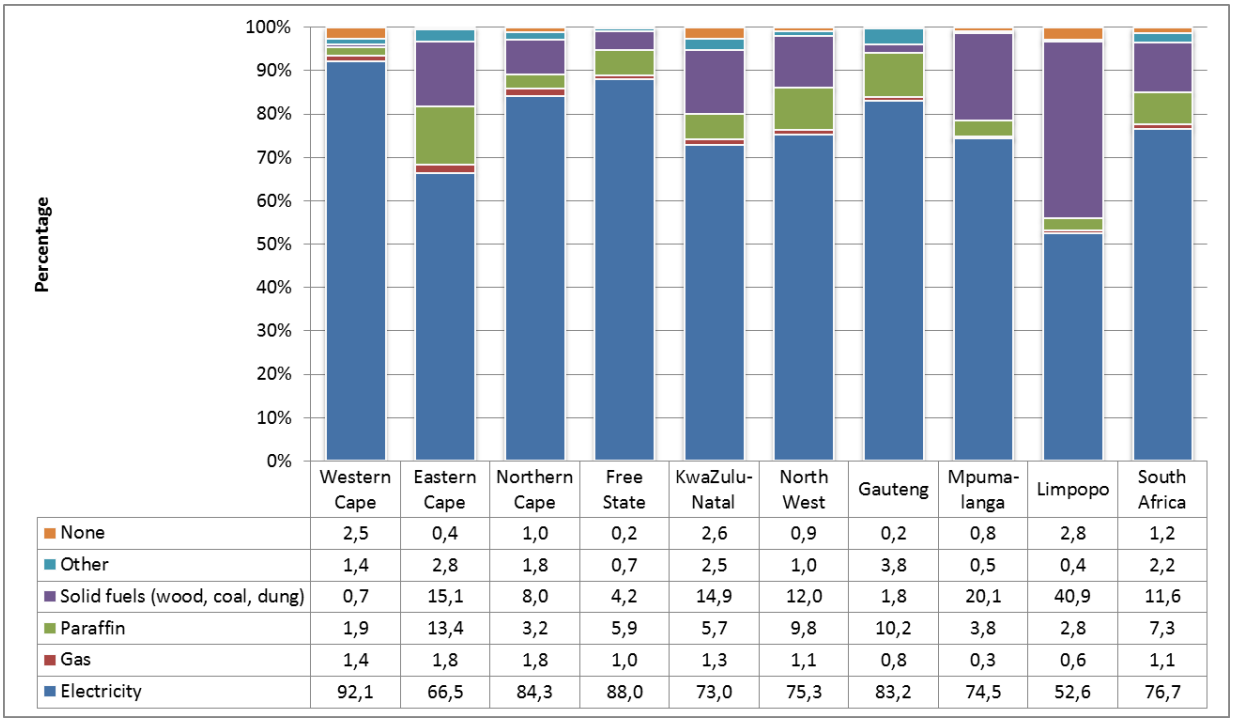
5.11.3 Main source of energy for heating water

This section refers to the activity of heating water for primarily sanitary purposes, e.g. bathing, washing clothes and doing the dishes. The amount and type of energy used to perform these tasks are primarily determined by a household's standard of living and income. Wealthy households with a high standard of living are more likely to have electric geysers, washing machines and dish washers while poor households might have to cook water using a kettle or stove that works with electricity or

some other form of energy. Although this study does not focus on the amount of energy used, it is probably fair to assume that wealthier household will also use more energy to perform these activities. In 2009, the minister of Energy stated in her budget vote speech (DOE, 2013c) that the department will facilitate the installation of one million water solar heaters in households and commercial building by 2014. Almost 360 000 units have been installed by September 2013 under the Department of Energy's fiscus funded programme and the Eskom rebate programme, 90% of which in four provinces, namely: Gauteng, Western Cape, KwaZulu-Natal and Eastern Cape. These are also the provinces where the use of other sources of energy, including solar water heaters, is most common.

Figure 52shows that more than three-quarters (76,7%) of households used electricity and 11,6% used solid fuels to heat water. Nationally, 7,3% used paraffin to heat water. The use of solid fuels was most common in Limpopo (40,9%), Mpumalanga (20,1%), Eastern Cape (15%) and KwaZulu-Natal (14,9%) and least common in Western Cape (0,7%) and Gauteng (1,8%). More than nine-tenths (92,1%) of households in Western Cape used electricity compared to only 52,6% in Limpopo and about one-third (66,5%) in Eastern Cape. The use of paraffin was most prevalent in Eastern Cape (13,4%) and Gauteng (10,2%).

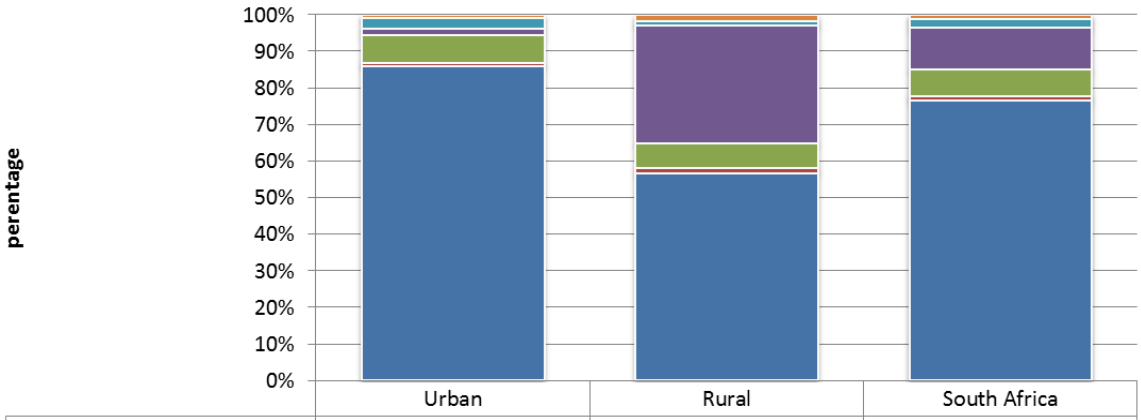
Figure 52: Main sources of energy for heating water by province, 2012



	Western Cape	Eastern Cape	Northern Cape	Free State	KwaZulu-Natal	North West	Gauteng	Mpuma-langa	Limpopo	South Africa
None	2,5	0,4	1,0	0,2	2,6	0,9	0,2	0,8	2,8	1,2
Other	1,4	2,8	1,8	0,7	2,5	1,0	3,8	0,5	0,4	2,2
Solid fuels (wood, coal, dung)	0,7	15,1	8,0	4,2	14,9	12,0	1,8	20,1	40,9	11,6
Paraffin	1,9	13,4	3,2	5,9	5,7	9,8	10,2	3,8	2,8	7,3
Gas	1,4	1,8	1,8	1,0	1,3	1,1	0,8	0,3	0,6	1,1
Electricity	92,1	66,5	84,3	88,0	73,0	75,3	83,2	74,5	52,6	76,7

The main source of energy used for heating water is also influenced by whether households live in urban or rural areas. This is presented in Figure 53. While households in urban areas were much more likely to use electricity than those in rural areas (86,0% compared to 56,7%), the use of solid fuels was much more common in rural areas (32,1%) than in urban areas (1,9%).

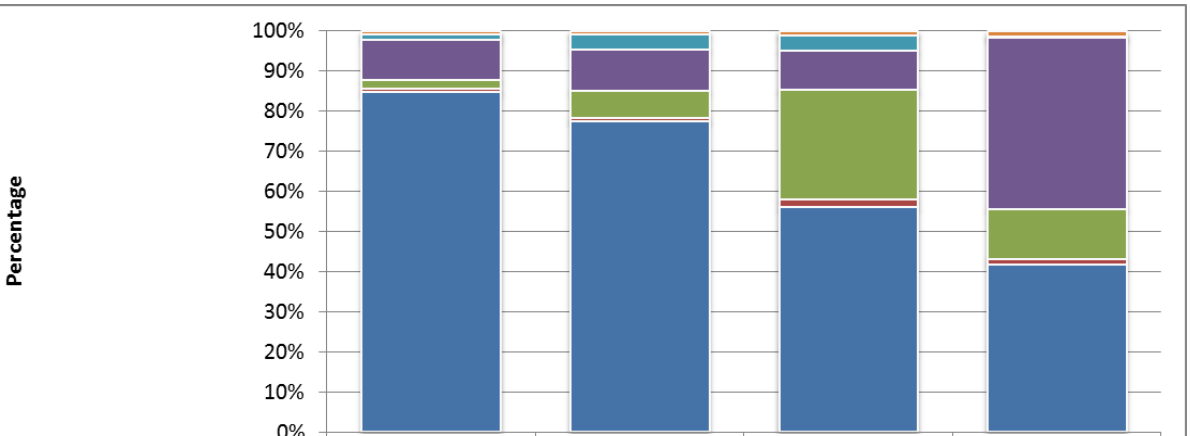
Figure 53: Main sources of energy for heating water by geographical location, 2012



	Urban	Rural	South Africa
None	0,9	1,9	1,2
Other	2,8	1,0	2,2
Solid fuels (wood, coal, dung)	1,9	32,1	11,5
Paraffin	7,5	6,8	7,3
Gas	0,9	1,4	1,1
Electricity	86,0	56,7	76,7

Figure 54 shows that households that lived in formal dwellings (84,7%) were most likely to use electricity to heat water, followed by those in subsidised dwellings (77,5%). Households in traditional dwellings were more likely to use solid fuels (42,5%) than electricity (41,9%). The use of paraffin as a source of energy for heating water is very low for formal households (2,2%), and increases to more than one-quarter (27,4%) of all households in informal dwellings.

Figure 54: Main sources of energy for heating water by type of dwelling, 2012

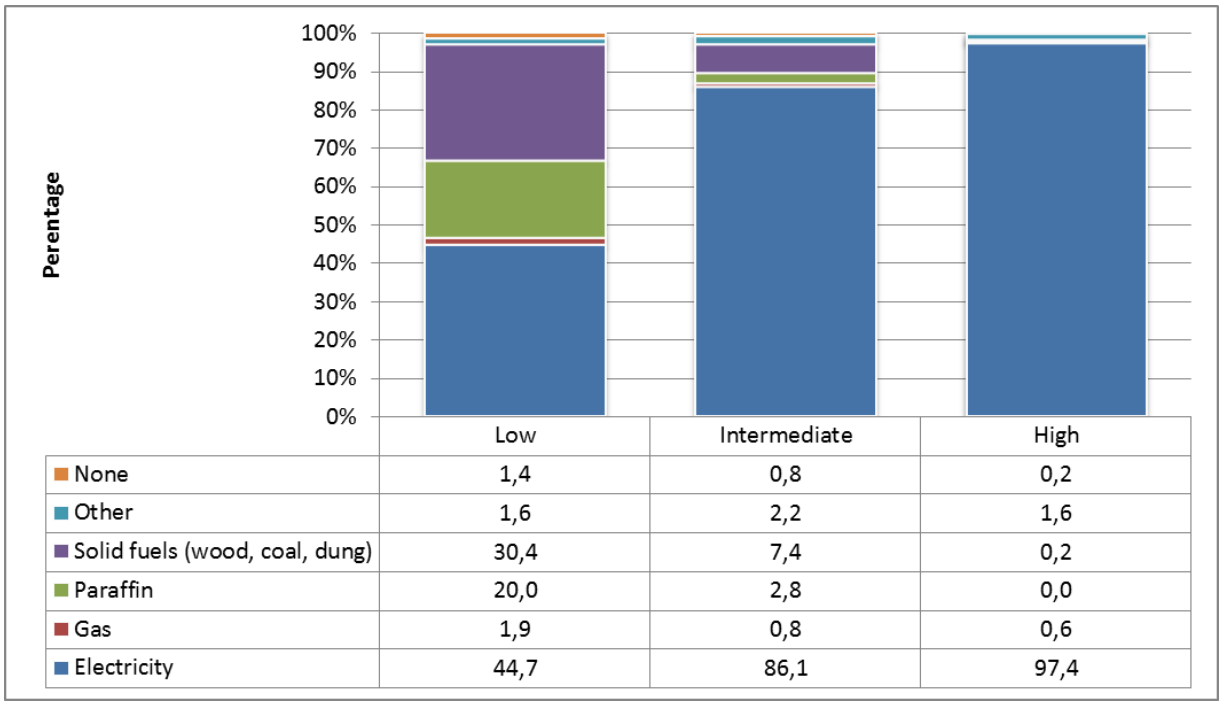


	Formal	RDP/Subsidised	Informal	Traditional
Other	0,8	0,9	1,0	1,3
None	1,3	3,6	3,8	0,4
Solid fuels (wood, coal, dung)	10,1	10,3	9,9	42,5
Paraffin	2,2	6,8	27,4	12,5
Gas	0,9	0,9	1,9	1,3
Electricity	84,7	77,5	56,1	41,9

The use of electricity to heat water was almost universal amongst households with a high standard of living (Figure 55). Although 86,1% households with an intermediate standard of living also used electricity, about 7,4% used solid fuels. Low LSM households relied on electricity (44,7%), solid fuels

(30,4%) and paraffin (20%). A higher percentage of low LSM households than intermediate or high LSM households furthermore did not heat water (1,4% compared to 0,8% and 0,2% respectively).

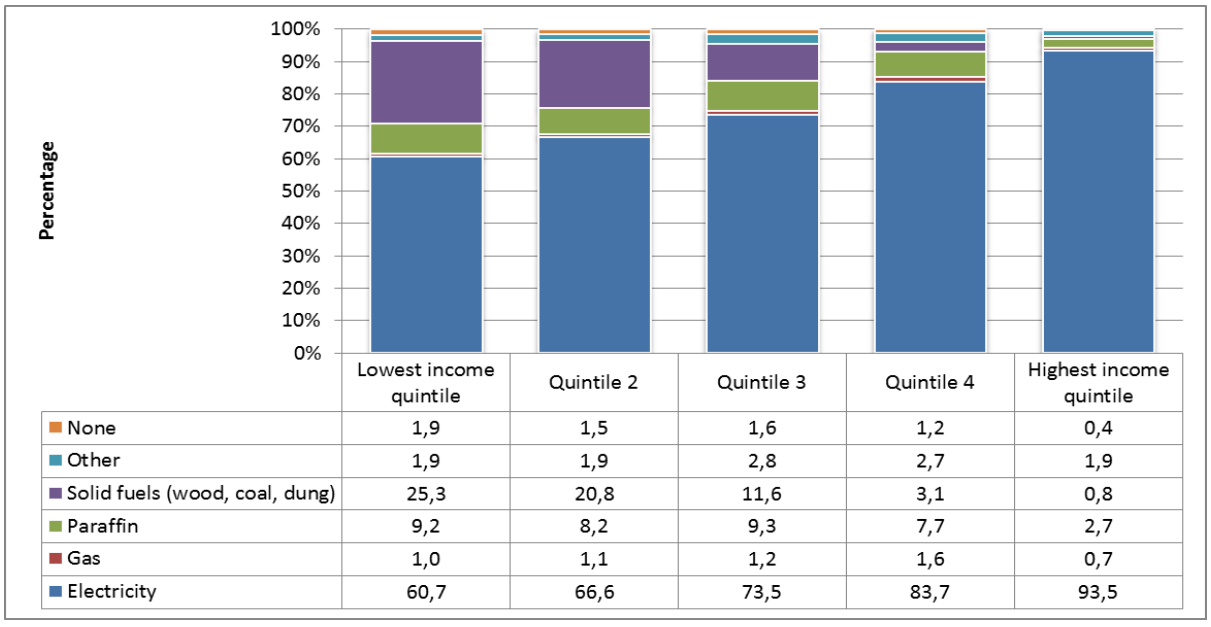
Figure 55: Main sources of energy for heating water by living standards measures, 2012



	Low	Intermediate	High
None	1,4	0,8	0,2
Other	1,6	2,2	1,6
Solid fuels (wood, coal, dung)	30,4	7,4	0,2
Paraffin	20,0	2,8	0,0
Gas	1,9	0,8	0,6
Electricity	44,7	86,1	97,4

While the use of electricity for heating water is positively associated with increased per capita household income, there seems to be an inverse relationship between the use of solid fuels and per capita households' income. This is presented in Figure 56.The use of electricity is most common in quintile 5 (93,5%) and least common for quintile 1 (60,7%), while the use of solid fuels is most common in quintile 1 (25,3%) and least common for quintile 5 households (0,8%).

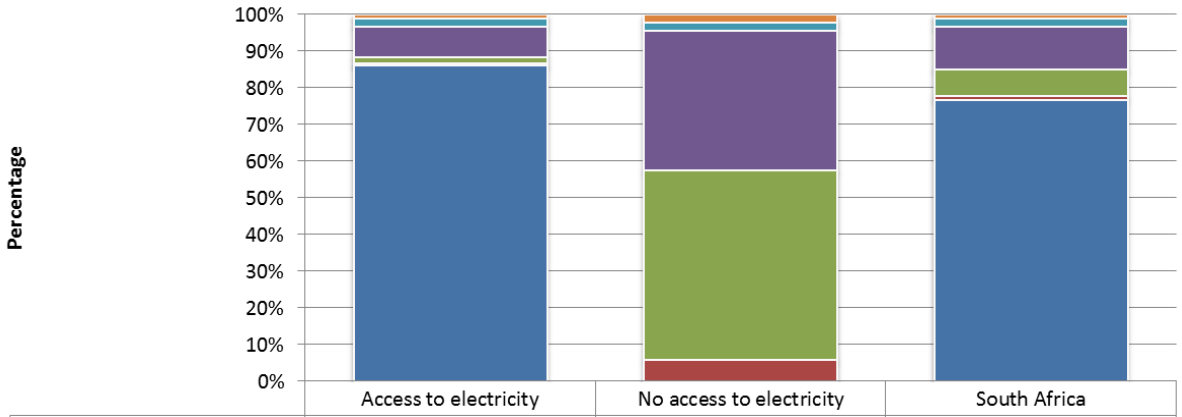
Figure 56: Main sources of energy for heating water by income quintile, 2012



	Lowest income quintile	Quintile 2	Quintile 3	Quintile 4	Highest income quintile
None	1,9	1,5	1,6	1,2	0,4
Other	1,9	1,9	2,8	2,7	1,9
Solid fuels (wood, coal, dung)	25,3	20,8	11,6	3,1	0,8
Paraffin	9,2	8,2	9,3	7,7	2,7
Gas	1,0	1,1	1,2	1,6	0,7
Electricity	60,7	66,6	73,5	83,7	93,5

Figure 57 shows that the majority of households that had access to electricity (86,1%) mainly used electricity to heat water, while 8,3% used solid fuels. Households without access to electricity, by comparison, use, paraffin (51,6%) and solid fuels (38,2%). LP gas was notably more common amongst households which did not have access to electricity.

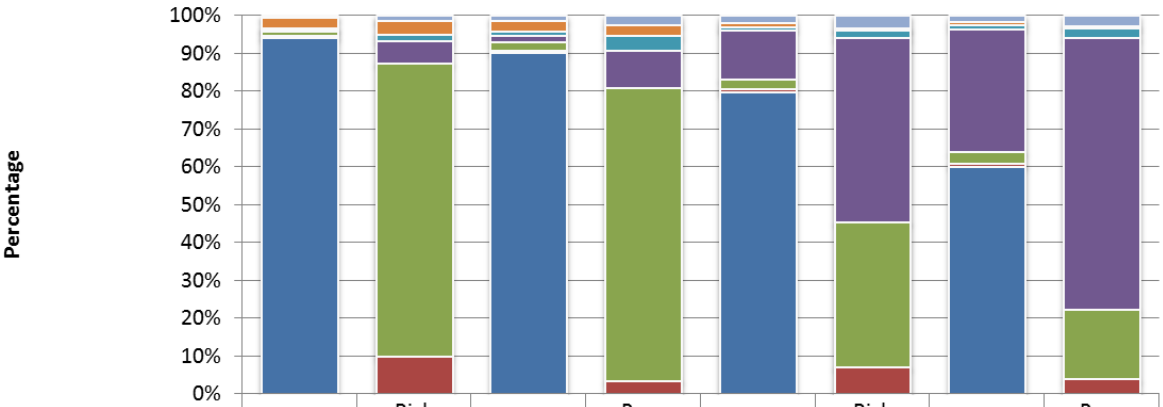
Figure 57: Main sources of energy for heating water by access to electricity, 2012



	Access to electricity	No access to electricity	South Africa
None	1,1	2,3	1,2
Other	2,2	2,1	2,2
Solid fuels (wood, coal, dung)	8,3	38,2	11,5
Paraffin	1,8	51,6	7,3
Gas	0,5	5,5	1,1
Electricity	86,1	0,3	76,7

Figure 58 shows that more than 90% of households with access to electricity in urban areas used electricity to heat water, regardless of household income, compared only 79,8% of 'rich' households in rural areas, and 60% of 'poor' households in rural areas. Urban households who did not have access to electricity predominantly used paraffin, while the use of wood was much more common amongst rural households without access to electricity. In rural areas, 38,4% of 'rich' households (those in the upper 3 income quintiles) who were not electrified used paraffin, while paraffin was used by only 18,4% of poor households without access to electricity. The majority (72%) of the latter households used solid fuels, possibly pointing to better access and affordability of particularly wood in rural areas.

Figure 58: Type of energy used for heating water by socio-economic status, geographic location, and access to electricity, 2012



	Urban				Rural			
	Rich with access to electricity	Rich without access to electricity	Poor with access to electricity	Poor without access to electricity	Rich with access to electricity	Rich without access to electricity	Poor with access to electricity	Poor without access to electricity
None	0,7	1,4	1,5	2,5	2,0	3,4	1,6	2,8
Other	2,8	3,7	2,8	3,0	1,2	0,6	0,9	0,8
Coal and animal dung	0,3	1,6	1,0	3,9	0,7	2,0	1,2	2,4
Wood	0,5	6,0	1,7	9,8	13,2	48,8	32,5	72,0
Paraffin	1,3	77,5	2,3	77,4	2,4	38,4	3,0	18,4
Gas	0,4	9,6	0,4	3,4	0,8	6,4	0,8	3,4
Electricity	94,1	0,3	90,3	0,0	79,8	0,5	60,1	0,4

5.11.4 Main source of energy for lighting

Households require adequate lighting to assist household members with reading and studying, to provide security, and to facilitate socialization and income generating activities. Studies have linked the use of fuel for lighting to an increased risk of household fires and related burn injuries; an increased exposure to pollutants; unintentional ingestion of liquids such as paraffin, primarily by children; and the potential for vision-related problems and irritation linked to poor quality illumination of fuel-based lanterns and candles. Access to electricity can therefore contribute significantly to improving household standards of living. The main sources of energy used for lighting between 2002 and 2012 are presented in Figure 59.

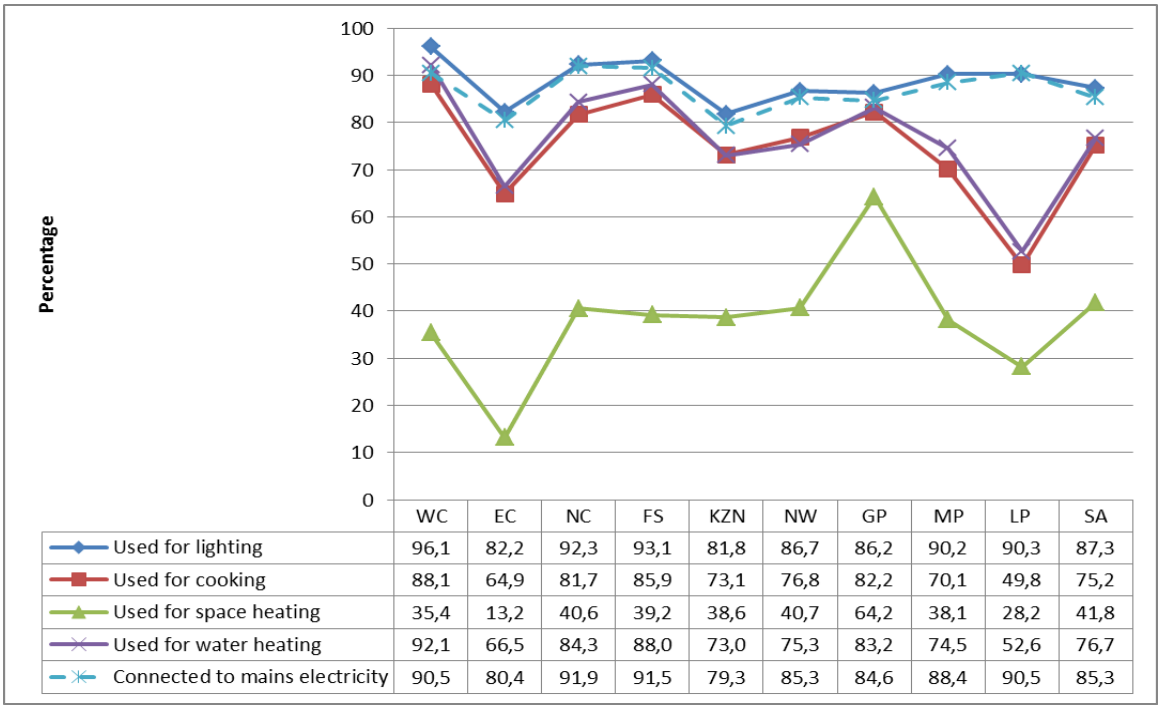
Although more than three-quarters (76,7%) of households already used electricity as main source of lighting in 2002, this figure increased by another 10,6% to 87,3% by 2012. The increased use of electricity coincided with a decreased use of paraffin (5,6% to 2,4%) and candles (17,3% to 9,0%), and more recently, an increase in the use of 'other' sources of energy.

Figure 59: Main sources of energy for lighting, 2002–2012

	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012
Other	0,4	0,3	0,4	0,3	0,4	0,4	0,4	0,5	2,3	3,0	1,3
Candles	17,3	16,1	14,4	14,9	14,2	13,6	14,0	13,1	11,1	9,8	9,0
Paraffin	5,6	4,6	4,4	3,7	3,5	3,1	3,2	3,1	2,5	2,5	2,4
Electricity	76,7	78,9	80,8	81,2	81,9	82,9	82,4	83,3	84,1	84,8	87,3

The use of electricity for lighting is much more closely correlated to household access to electricity than for any of the other domestic activities such as cooking, and heating across all provinces. Figure 60 illustrates a particularly poor association between access to mains electricity and using electricity for space heating. The use of electricity for cooking and heating water was particularly poorly correlated with access to electricity in Eastern Cape and Limpopo.

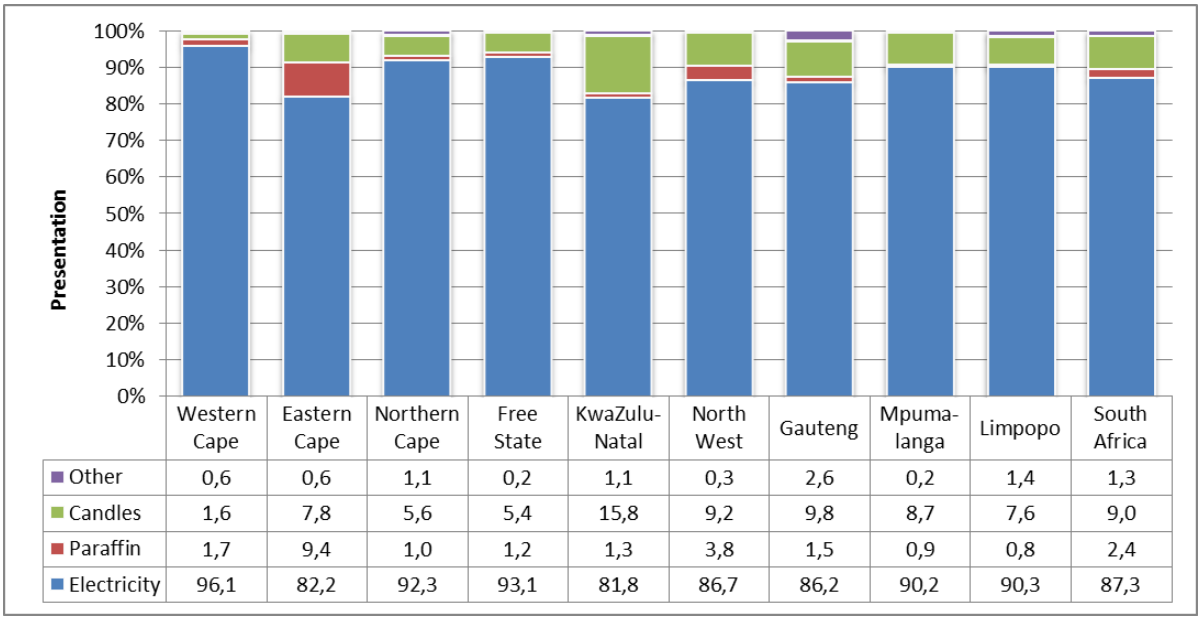
Figure 60: Percentage of households with access to mains electricity compared to percentage of households that used electricity for cooking, lighting, heating water and heating space by province, 2012



	WC	EC	NC	FS	KZN	NW	GP	MP	LP	SA
Used for lighting	96,1	82,2	92,3	93,1	81,8	86,7	86,2	90,2	90,3	87,3
Used for cooking	88,1	64,9	81,7	85,9	73,1	76,8	82,2	70,1	49,8	75,2
Used for space heating	35,4	13,2	40,6	39,2	38,6	40,7	64,2	38,1	28,2	41,8
Used for water heating	92,1	66,5	84,3	88,0	73,0	75,3	83,2	74,5	52,6	76,7
Connected to mains electricity	90,5	80,4	91,9	91,5	79,3	85,3	84,6	88,4	90,5	85,3

Figure 61 shows that almost nine-tenths (87,3%) of households in South Africa used electricity for lighting in 2012. The highest percentage was observed in Western Cape (96,1%) while only 81,8% of households in KwaZulu-Natal used electricity. The use of paraffin for lighting was most common in Eastern Cape (9,4%) and least common in Limpopo (0,8%). The use of candles as primary source of illumination was most prevalent in KwaZulu-Natal (15,8%) and lowest in Western Cape (1,6%).

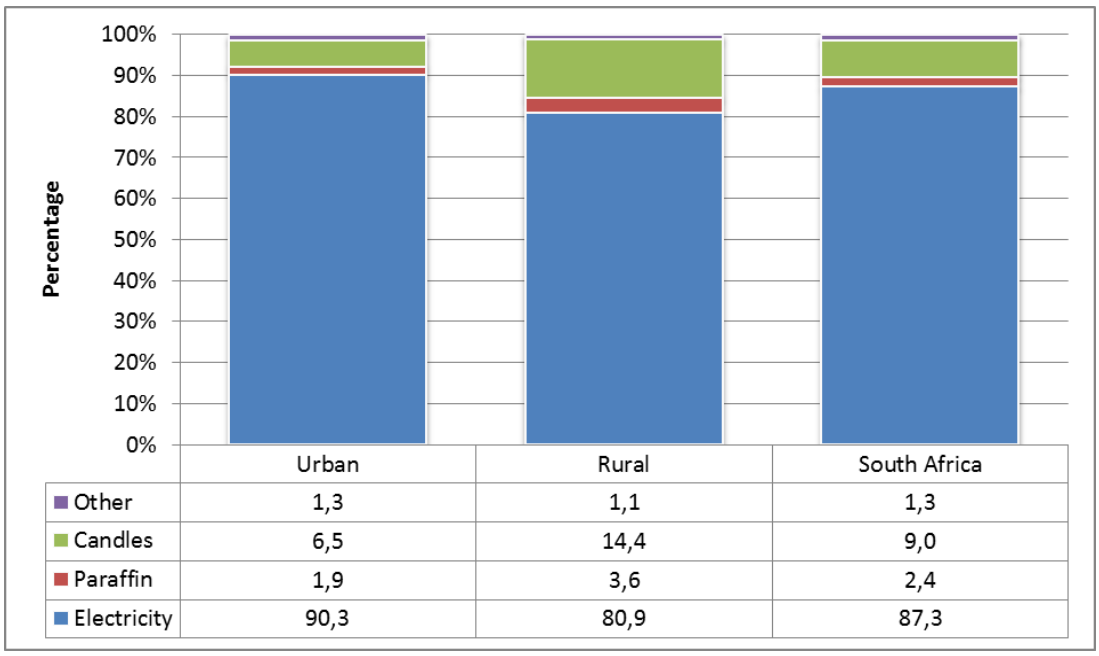
Figure 61: Main sources of energy for lighting by province, 2012



	Western Cape	Eastern Cape	Northern Cape	Free State	KwaZulu-Natal	North West	Gauteng	Mpuma-langa	Limpopo	South Africa
Other	0,6	0,6	1,1	0,2	1,1	0,3	2,6	0,2	1,4	1,3
Candles	1,6	7,8	5,6	5,4	15,8	9,2	9,8	8,7	7,6	9,0
Paraffin	1,7	9,4	1,0	1,2	1,3	3,8	1,5	0,9	0,8	2,4
Electricity	96,1	82,2	92,3	93,1	81,8	86,7	86,2	90,2	90,3	87,3

While households in urban areas are more likely to use electricity for lighting than those in rural areas (90,3% compared to 80,9%), the use of candles is much more common in rural than urban households (14,4% compared to 6,5%). A larger percentage of rural households furthermore use paraffin. This is presented in Figure 62.

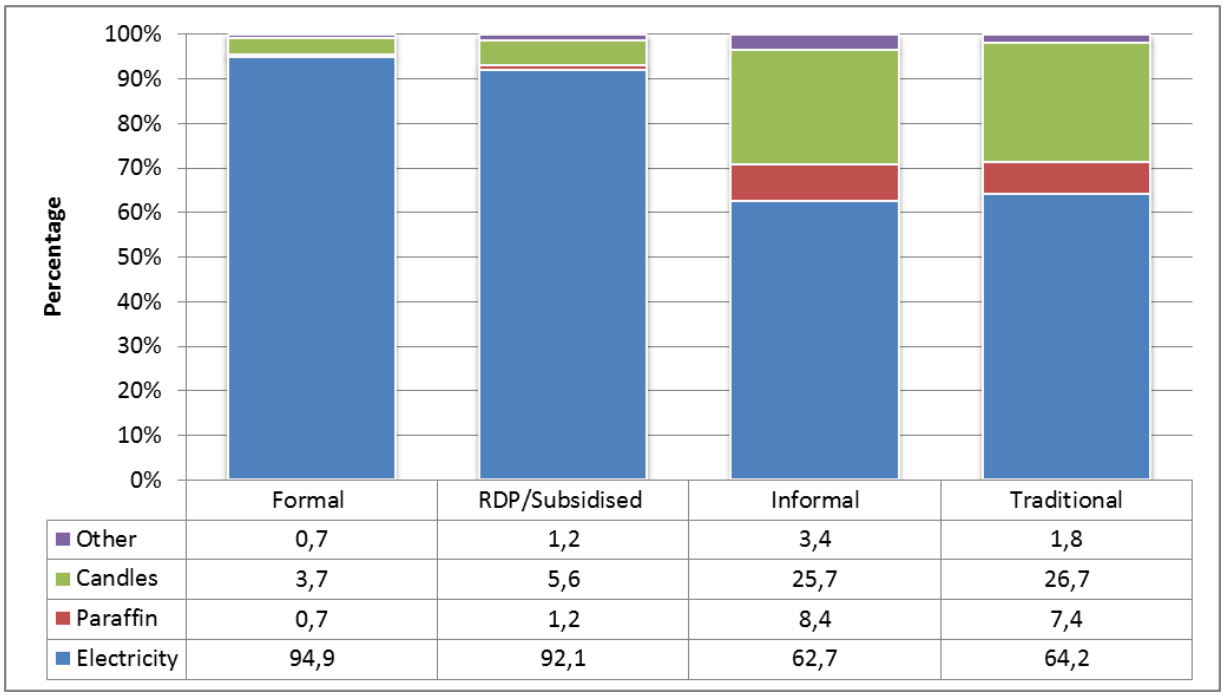
Figure 62: Main sources of energy for lighting by geographical location, 2012



	Urban	Rural	South Africa
Other	1,3	1,1	1,3
Candles	6,5	14,4	9,0
Paraffin	1,9	3,6	2,4
Electricity	90,3	80,9	87,3

The main sources of energy used for lighting by type of dwelling are presented in Figure 63. The figure shows that the use of electricity for lighting was almost universal (94,9%) amongst households in formal dwellings. Almost more than nine-tenths (92,1%) of households in subsidised dwellings used electricity, about 5,6% used candles. More than one-quarter of households in informal dwellings, and 26,7% of households in traditional dwellings still used candles for lighting. Less than two-thirds (62,7% and 64,2% respectively) of households in informal and traditional dwellings used electricity for lighting.

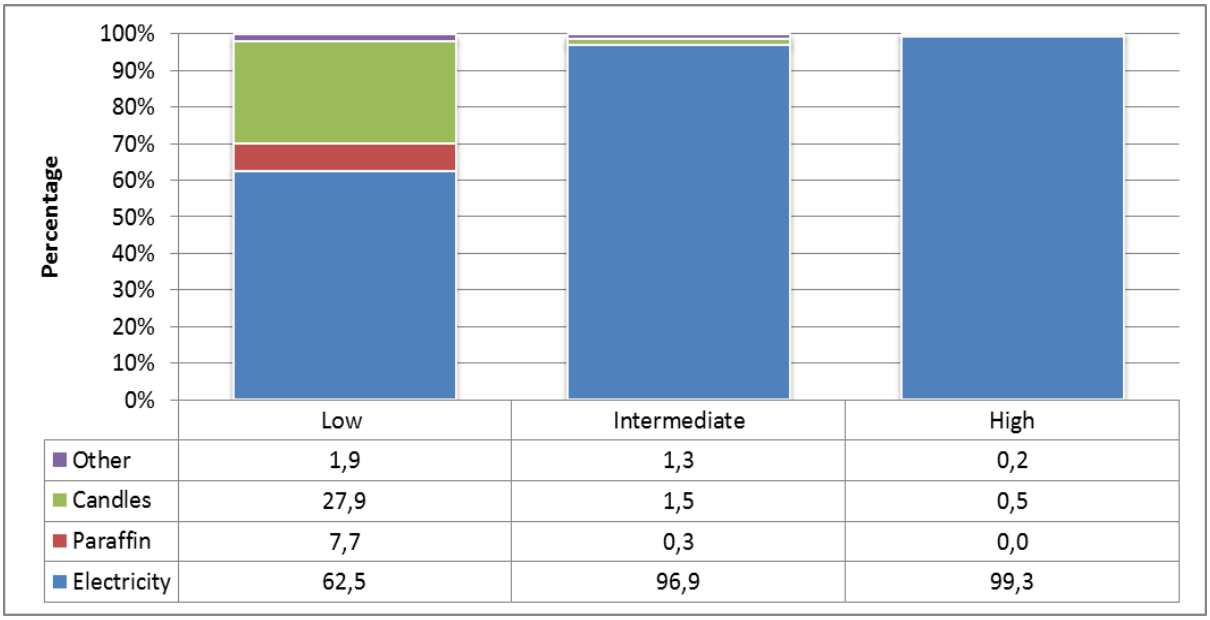
Figure 63: Main sources of energy for lighting by dwelling type, 2012



	Formal	RDP/Subsidised	Informal	Traditional
Other	0,7	1,2	3,4	1,8
Candles	3,7	5,6	25,7	26,7
Paraffin	0,7	1,2	8,4	7,4
Electricity	94,9	92,1	62,7	64,2

The use of electricity for lighting is positively associated with a households' standard of living (Figure 64). While 99,3% of households in the 'high' living standard category used electricity, this declines to 96,9% for households in the 'intermediate' category, and 62,5% of households in the 'low' category. The use of candles and paraffin were mostly limited to the low LSM households.

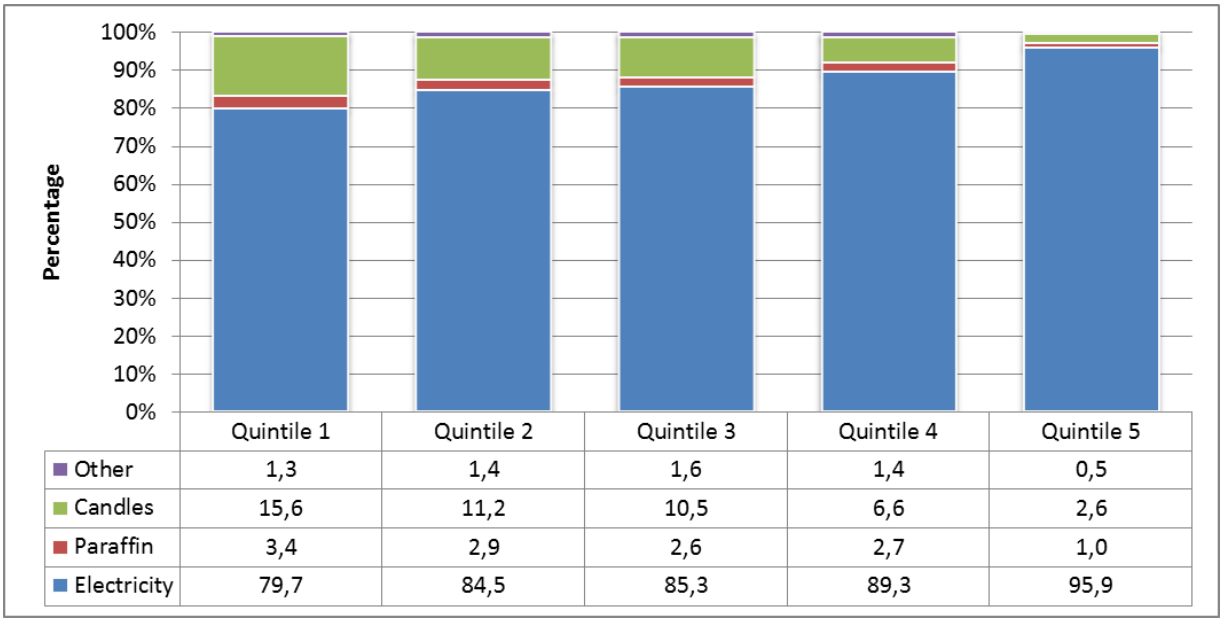
Figure 64: Main sources of energy for lighting by living standard, 2012



	Low	Intermediate	High
Other	1,9	1,3	0,2
Candles	27,9	1,5	0,5
Paraffin	7,7	0,3	0,0
Electricity	62,5	96,9	99,3

The relationship between households' income and the use of electricity for lighting is confirmed in Figure 65. The figure shows that the percentage of households that used electricity for lighting increased consistently in each successive income quintile (from 79,7% in quintile 1 to 95,9% in quintile 5). At the same time the percentage of households that used candles and paraffin decreased consistently from 3,4% and 1% respectively for households in quintile 5.

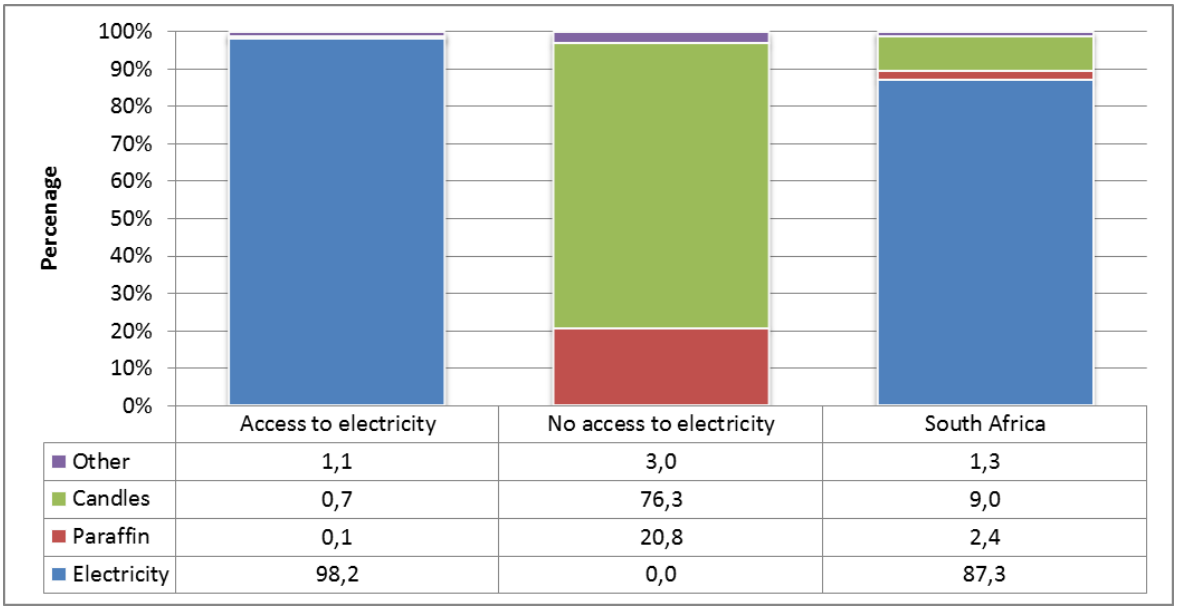
Figure 65: Main sources of energy for lighting by income quintile, 2012



	Quintile 1	Quintile 2	Quintile 3	Quintile 4	Quintile 5
Other	1,3	1,4	1,6	1,4	0,5
Candles	15,6	11,2	10,5	6,6	2,6
Paraffin	3,4	2,9	2,6	2,7	1,0
Electricity	79,7	84,5	85,3	89,3	95,9

Figure 66 shows that the use of electricity is almost universal (98,2%) amongst electrified households. By contrast, more than two-thirds (76,3%) of households without access to electricity used candles for lighting, while 20,8% used paraffin. Households without access to electricity were also more likely to use 'other' sources of light.

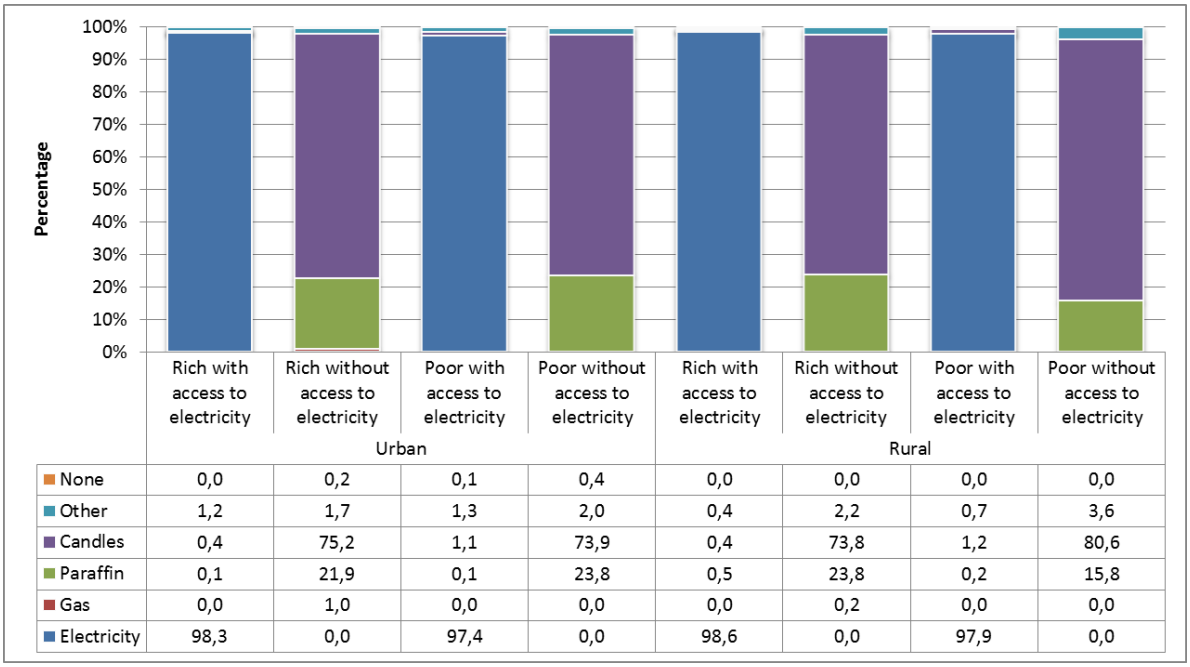
Figure 66: Main sources of energy for lighting by access to electricity, 2012



	Access to electricity	No access to electricity	South Africa
Other	1,1	3,0	1,3
Candles	0,7	76,3	9,0
Paraffin	0,1	20,8	2,4
Electricity	98,2	0,0	87,3

An interesting pattern emerges from Figure 67 where the type of energy used for lighting is analyses on the hand of socio-economic status, geographic location and access to electricity. The figure shows that almost all households with access to electricity used electricity for lighting, regardless of geographic location, and regardless of socio-economic status. By comparison, more than three-quarters of households without access to electricity used candles while the rest used paraffin. Poor rural households without access to electricity were more likely to use candles, and less likely to use paraffin than other households without electricity.

Figure 67: Type of energy used for lighting by socio-economic status, geographic location, and access to electricity, 2012



	Urban				Rural			
	Rich with access to electricity	Rich without access to electricity	Poor with access to electricity	Poor without access to electricity	Rich with access to electricity	Rich without access to electricity	Poor with access to electricity	Poor without access to electricity
None	0,0	0,2	0,1	0,4	0,0	0,0	0,0	0,0
Other	1,2	1,7	1,3	2,0	0,4	2,2	0,7	3,6
Candles	0,4	75,2	1,1	73,9	0,4	73,8	1,2	80,6
Paraffin	0,1	21,9	0,1	23,8	0,5	23,8	0,2	15,8
Gas	0,0	1,0	0,0	0,0	0,0	0,2	0,0	0,0
Electricity	98,3	0,0	97,4	0,0	98,6	0,0	97,9	0,0

A logistical regression model, Table 35, was developed to predict household use of paraffin and candles for lighting. It shows that, nationally, households in urban areas were less likely to use paraffin and candles for lighting, while households that lived in informal and traditional dwellings

were more likely that those that lived in formal dwellings to have used paraffin and candles for lighting across rural and urban areas, and nationally. Compared to households in quintile 1, the log odds of using paraffin and candles for lighting decreased for each subsequent income group. The wealthiest households had the lowest likelihood of using electricity. Households that did not predominantly receive salaries or wages were generally less likely to use paraffin or candles than those that received salaries as main source of income.

Table 35: Predictors of households using paraffin and candles for lighting in urban and rural areas, and South Africa, using logistic regression, 2012

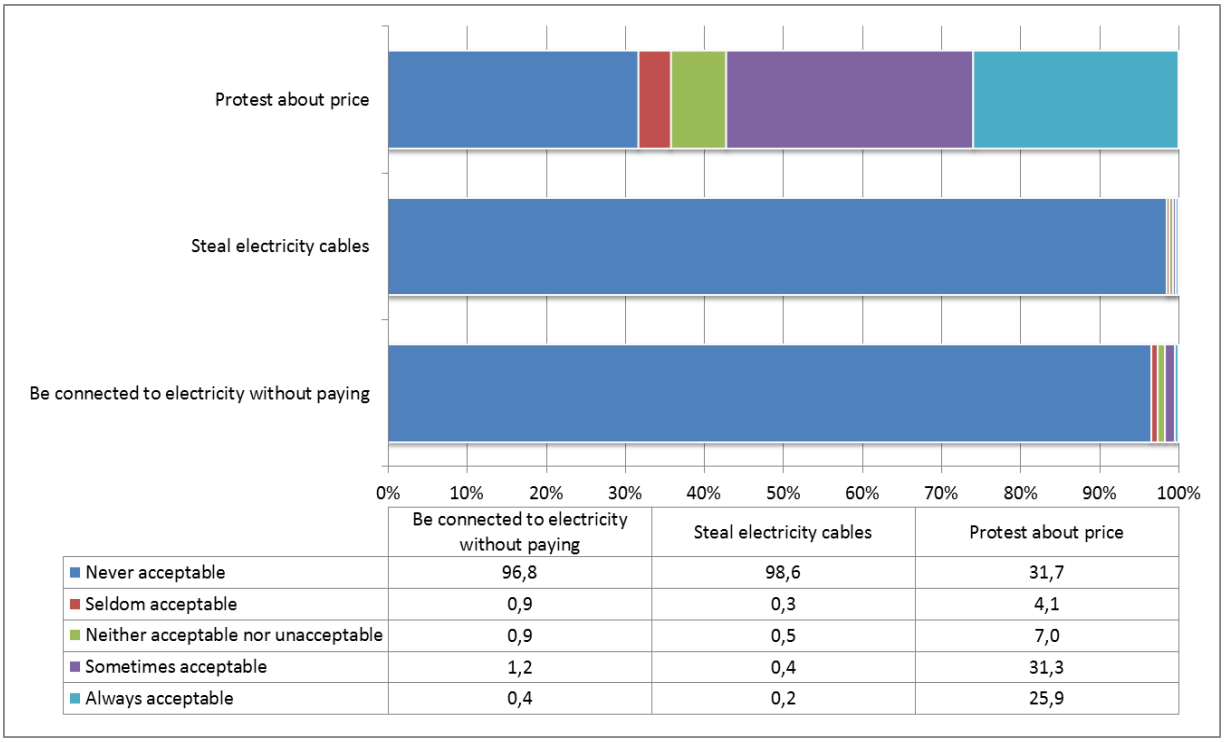
Description of variable	Urban areas	Rural areas	South Africa
Model indicators			
Likelihood ratio chi Square	1 207	733	2 765
Hosmer and Lemeshow goodness of fit test (P-value)	0,0070	0,0632	<,0001
N	13 817	8 707	22 524
Intercept	-3,3390	-1,9928	-2,1822
Maximum likelihood estimates			
Geographical location			
Rural area(Reference category)			
Urban area	n/a	n/a	-0,8972
Type of Main Dwelling			
Formal dwelling (Reference category)			
Informal dwelling	2,8379	1,3422	2,3296
Traditional dwelling	2,1809	1,5716	1,7372
Income quintile			
Poorest households(Reference category)			
Quintile 2	-0,3460	-0,1553	-0,1800
Quintile 3	-0,2202	-0,2936	-0,2359
Quintile 4	-0,5906	-0,6062	-0,5536
Wealthiest households	-1,3500	-0,3966	-1,0143
Main source of income			
Salaries (Reference category)			
Remittances	n/a	-0,2360	-0,1656*
Pensions	n/a	-2,0583	-1,1338
Grants	n/a	-0,0571*	-0,0212*
Other income	n/a	0,6166	0,6647
No income	n/a	-0,2618*	-0,0840*

*: Values that are not significant at 95% or 99% levels of significance

5.12 Household perceptions regarding electricity services

Households' perceptions of electricity related activities are presented in Figure 68. Households were asked to give their opinions about illegal connections, theft of electricity cables; and protests about the price. Household held very similar views about non-payment for electricity and the stealing of electricity cables. Households almost universally felt that it was never acceptable to be connected to mains electricity without paying for the service (96,8%), while 98,6% of households felt that stealing electricity cables was wrong. The question about whether protest about electricity prices were allowable, however, elicited a more varied response. While about one-third (35,8%) felt that protest could seldom or never be justified, 57,2% felt that it could be condoned sometimes or always (25,9%).

Figure 68: Household perceptions on electricity-related activities, 2012



	Be connected to electricity without paying	Steal electricity cables	Protest about price
Never acceptable	96,8	98,6	31,7
Seldom acceptable	0,9	0,3	4,1
Neither acceptable nor unacceptable	0,9	0,5	7,0
Sometimes acceptable	1,2	0,4	31,3
Always acceptable	0,4	0,2	25,9

Since the question about electricity protests has elicited such mixed responses, the data is explored further in Figure 69, below. Although the figure shows that many households in Limpopo (41,9%), KwaZulu-Natal (41,3%), Mpumalanga (38,2%) and North West (37,5%) felt that protest actions could seldom or never be condoned, protest action also elicited strong support across all provinces. More than 60% of households in Eastern Cape (64,3%), Gauteng (62,0%) and Western Cape (60,1%) felt that protest action could always or on occasion be permissible. The least support for protest actions was noted in Limpopo and North West, both 48,9%.

Figure 69: Household perceptions on the right to protest about the price of electricity by province, 2012

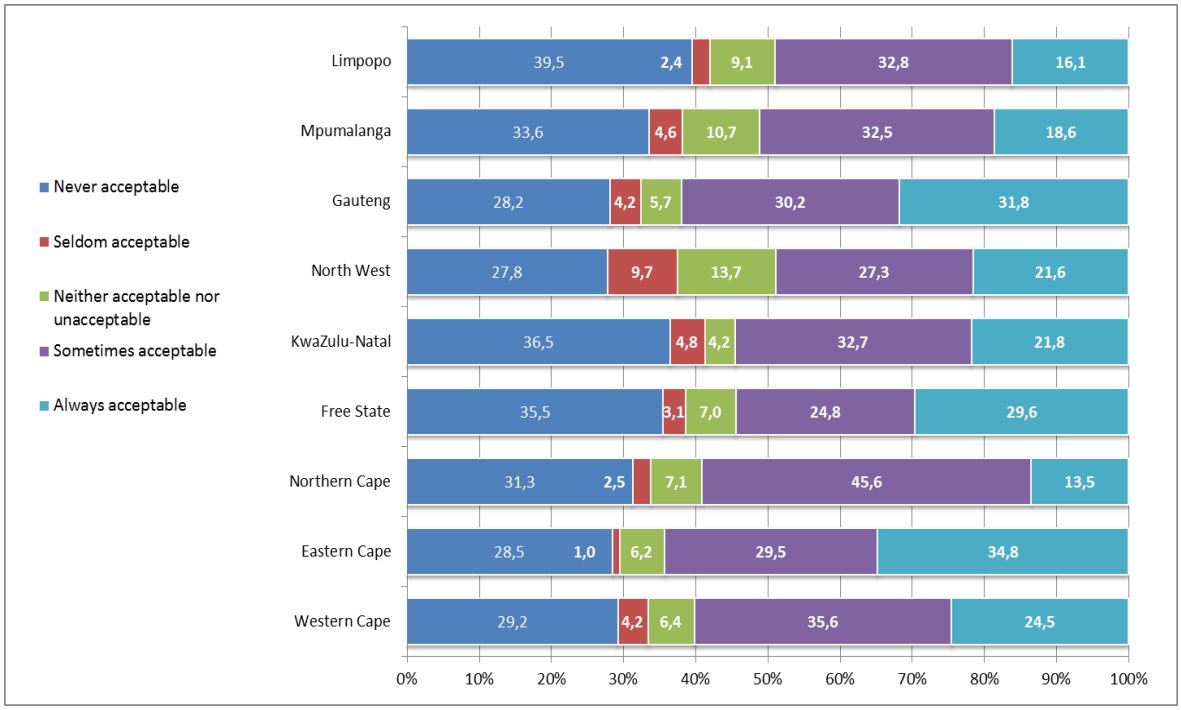


Figure 70 shows that the wealthiest households (income quintiles four and five) were the most likely to approve protest action. The support for protest action was, however, not much lower for poorer households in lower income quintiles.

Figure 70: Household perceptions on the right to protest about the price of electricity by income quintile, 2012

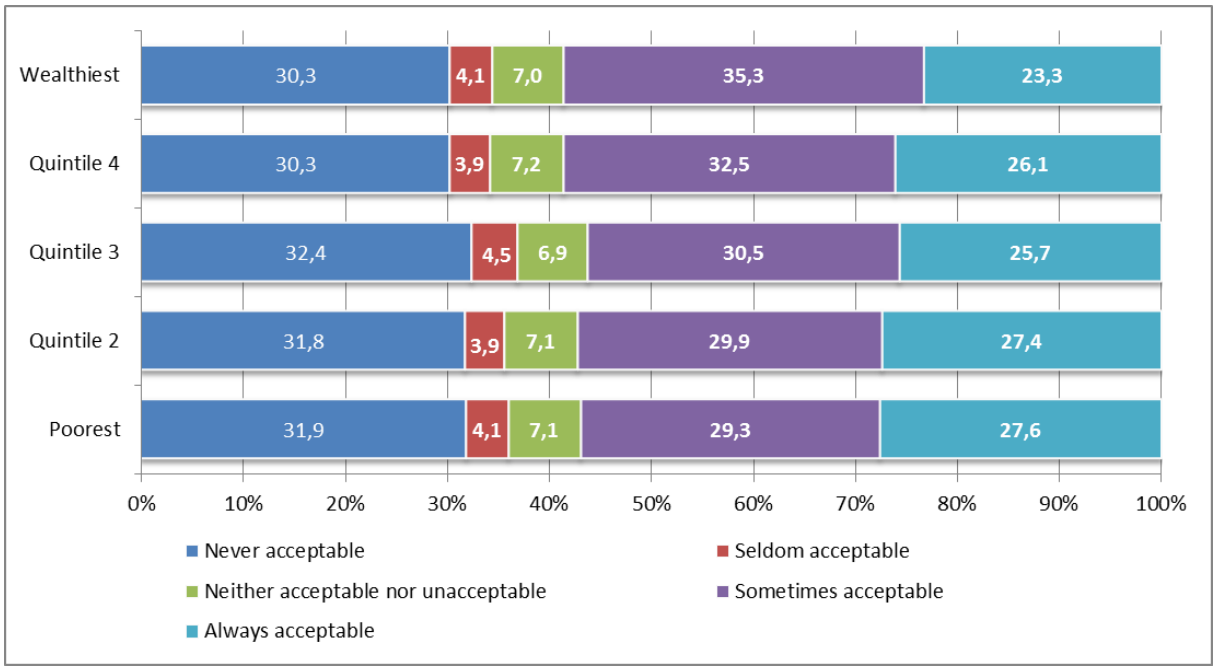
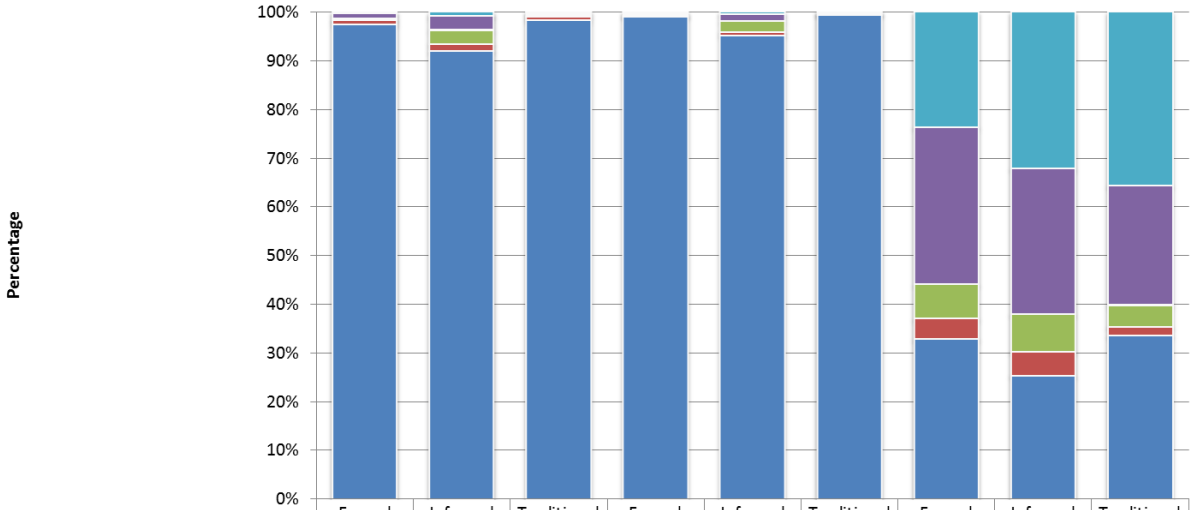


Figure 71 shows that households that lived in informal dwellings were slightly more likely to approve of withholding payment for electricity services rendered as well as stealing electricity cables than

households in formal or traditional dwellings. In addition, households that lived in informal dwellings (62%) and traditional (60,2%) dwellings were more likely than those in formal dwellings (55,9%) to approve of protests against electricity prices.

Figure 71: Household perceptions on electricity-related activities by dwelling type, 2012



	Connection to electricity without paying			Steal electricity cables			Protest about price		
	Formal	Informal	Traditional	Formal	Informal	Traditional	Formal	Informal	Traditional
Always acceptable	0,3	0,8	0,1	0,2	0,4	0,0	23,7	32,1	35,7
Sometimes acceptable	1,0	2,9	0,4	0,3	1,4	0,1	32,2	29,9	24,5
Neither acceptable nor unacceptable	0,3	2,8	0,4	0,2	2,2	0,1	7,0	7,8	4,4
Seldom acceptable	0,8	1,4	0,7	0,2	0,7	0,3	4,2	4,8	1,8
Never acceptable	97,6	92,1	98,4	99,2	95,3	99,5	32,9	25,4	33,6

5.13 Household perceptions of handling increases in electricity prices

Stating a hypothetical increase in the electricity price, households were asked to indicate whether they would agree with a set of five statements. This is indicated in Table 36.The 2010/2011 income and expenditure survey found that the increase in housings expenditure surpassed all other increases, growing by 47,9% between 2005/6 and 2010/11. This increase was largely driven by the fact that electricity tariffs increased by three times that of general inflation (111,4% for electricity compared to 37,3% in general) during this time.

The table shows that only about one-third (36,4%) of households said that they would continue to use the same amount of electricity and that they were willing to pay extra. Households in Northern Cape (39,1%) and Gauteng (39,4%) were most likely to take the laissez faire approach, while households in North West and Free State were much more likely to disagree with the statement. Households living in wealthier quintile 5 households (41,8%) with a high standard of living (40,8%), those living in rural areas (38,3%) were most likely to agree with the statement. The latter is, perhaps, due to the fact that rural household have few options available to them.

Households were also asked whether they would consider reducing the electricity they used. Nationally, 82,2% of households said that they would reduce their electricity consumption, with the highest agreement in North West (90,%) and the lowest agreement in Western Cape(72,3%). Households that lived in formal dwellings were slightly more likely that those in informal or traditional dwellings to agree with the statement. On the whole it would seem as if wealthier

households (quintile 5, high LSM, urban area) were slightly less willing to reduce their energy consumption than poorer households with low standards of living and those that lived in rural areas. This can possibly be attributed to the fact that energy expenditure comprises a much smaller proportion of the total household expenditure for wealthier households than for their poorer counterparts.

Table 36: Household reactions to rise in electricity prices, 2012

	Continue to use the same amount of electricity, and pay extra.	Reduce the amount of electricity used by the household	Use alternative sources of energy	Stop paying for electricity
Western Cape	38,7	72,3	43,5	3,5
Eastern Cape	36,1	78,3	80,5	8,4
Northern Cape	39,1	89,6	76,7	4,3
Free State	21,3	86,9	80,3	7,9
KwaZulu-Natal	38,2	84,9	64,7	8,7
North West	31,8	90,0	65,8	4,1
Gauteng	39,4	80,1	50,6	5,0
Mpumalanga	33,8	84,7	75,9	4,9
Limpopo	37,7	87,8	79,2	4,9
South Africa	**36,4**	**82,2**	**63,8**	**5,9**
Type of dwelling				
Formal	37,9	81,4	60,2	5,4
Informal	27,4	84,1	72,1	7,6
Traditional	39,9	80,3	82,7	7,3
Subsidised (RDP)	33,1	85,5	69,5	6,6
Income quintile				
Income quintile 1	32,2	85,9	77,3	6,7
Income quintile 2	34,6	84,9	75,1	5,9
Income quintile 3	35,8	84,1	69,8	5,9
Income quintile 4	37,3	82,2	58,2	5,7
Income quintile 5	41,8	77,3	48,6	5,7
Living standard				
Low	35,1	84,6	79,9	7,0
Intermediate	35,1	83,8	64,3	5,8
High	40,8	76,4	49,0	5,1
Geographical location				
Urban	35,6	80,7	55,8	5,6
Rural	38,3	85,8	81,9	6,4

Only 63,8% of households said that they would consider using alternative sources of energy. Households in Eastern Cape Cape (80,6%) were most likely to support the option while households in Western Cape (43,5%) and Gauteng (50,6%) were least likely to be interested. Wealthier households with a high standard of living and households that lived in formal dwellings and in urban areas were less likely than their peers to be looking at alternative sources of energy. These observation supports the notion that poorer households, and particularly those in rural areas, already use multiple sources

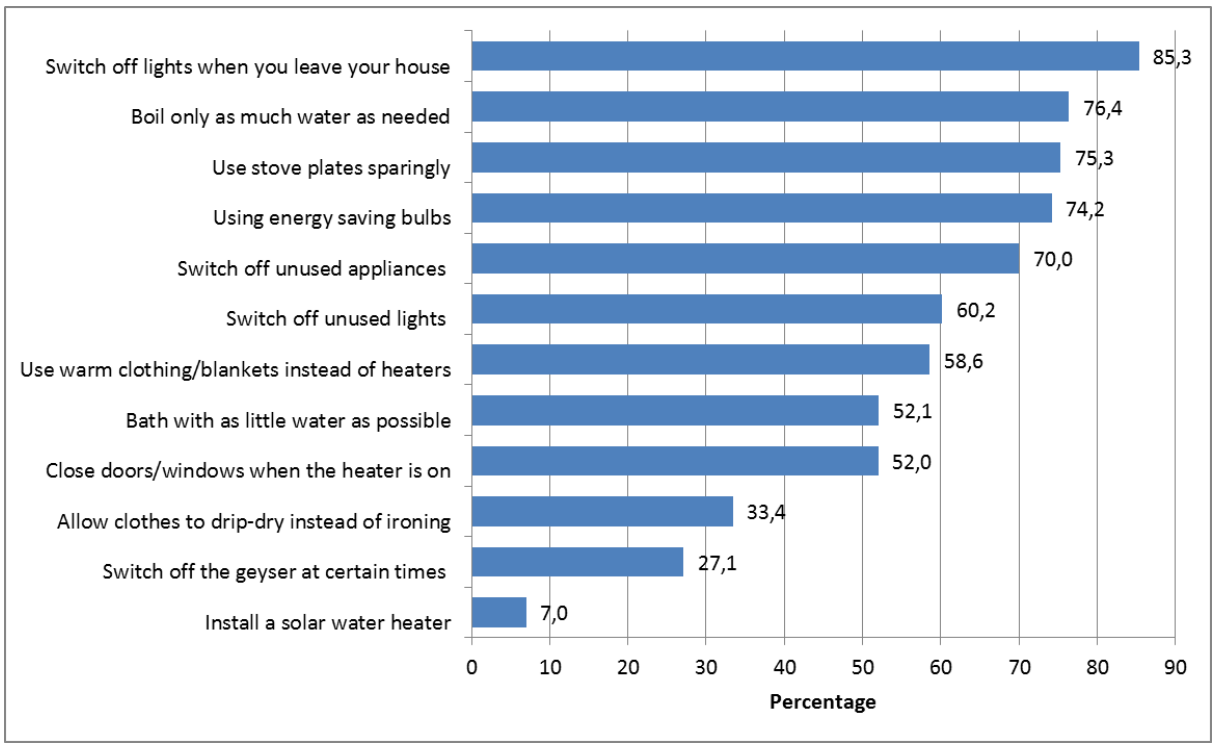
of fuel for domestic chores, and that alternative fuels, such as wood, is more readily available in those areas.

Although 98,7% earlier that it would be unacceptable to draw electricity without paying for it, 6,9% of households indicated that they would stop paying for electricity if the price increased suddenly. Low income household with a low standard of living, and those that lived in informal dwellings were most likely to support a discontinuation of payment for electricity services. Urban households were more likely to support the statement than rural households, possibly because a much larger percentage of rural households have pre-paid meters which gives them little scope to discontinue payment as it would mean a discontinuation of services as well.

5.14 Household support for measures to save electricity

The GHS 2012 questionnaire also requested households to indicate if they supported a set of everyday activity that could commonly be followed to save some electricity. National household support for the different measures is presented in Figure 72. Nationally, households were least likely to support the installation of a solar water heater (7,0%), switching off the geyser during times it is not used (27,1%), and not using an electric iron (33,4%). Households were most likely to support a call to switch off lights when you leave your house (85,3%), to use stove plates sparingly (75,3%) and to use energy saving light bulbs (74,2%).

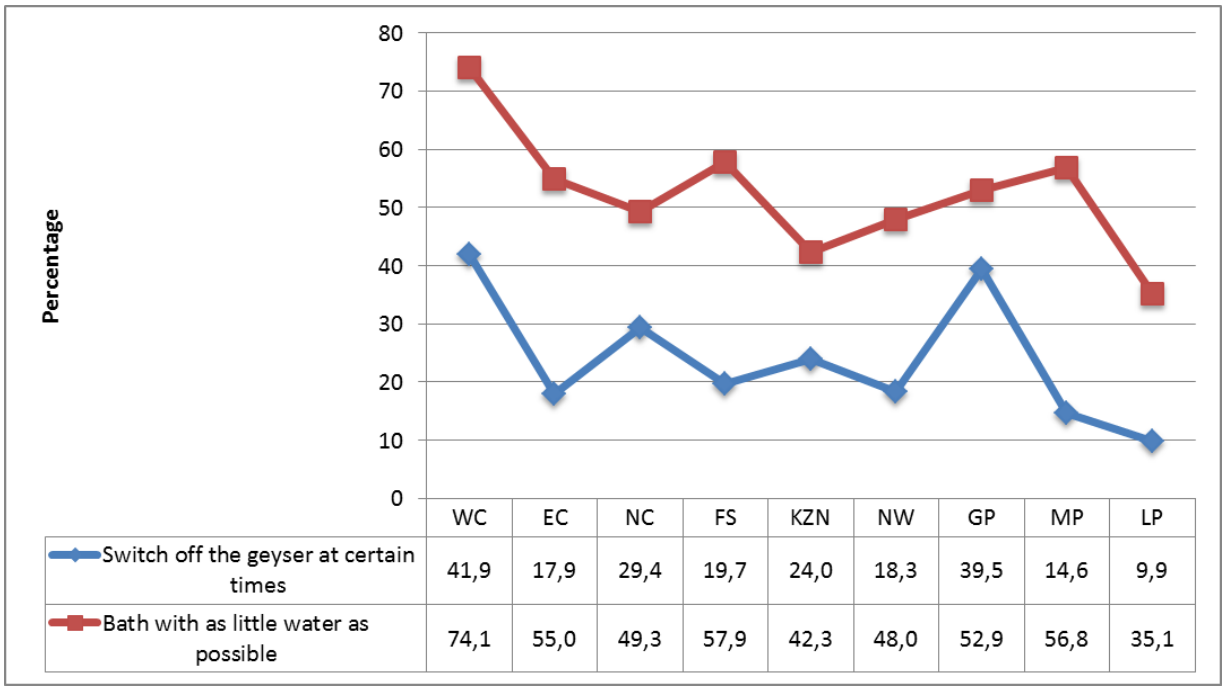
Figure 72: Percentage of electrified household that supported measures to save electricity, 2012



Although the support for the various measures did not generally differ much by province, noticeable differences were noted between provinces with respect to 'bathing in as little water as possible' and 'switching off the geyser at certain times'. This is presented in Figure 73. Households in Western Cape (74,1%) were noticeably more likely to support this measure. About one-third (35,1%) of households in Limpopo supported the measure. The question about switching off the geyser at certain times yielded a bi-modal distribution in which households in Western Cape (41,9%) and

Gauteng (39,5%) were much more likely than households in the other provinces to consider the measure.

Figure 73: Percentage of electrified household that support selected measures to save electricity by province, 2012



	WC	EC	NC	FS	KZN	NW	GP	MP	LP
Switch off the geyser at certain times	41,9	17,9	29,4	19,7	24,0	18,3	39,5	14,6	9,9
Bath with as little water as possible	74,1	55,0	49,3	57,9	42,3	48,0	52,9	56,8	35,1

It is interesting to note that support for the proposed measures amongst households with access to electricity was also influenced by the type of dwelling households inhabited (Table 37). Support was generally larger amongst households in formal dwellings, and smallest amongst households that lived in traditional dwellings. Households in informal and traditional dwellings were particularly uninterested in the proposal to switch off the geyser at some times of the day or night, most probably because they did not own a geyser. Households were generally not interested in installing a solar water heater.

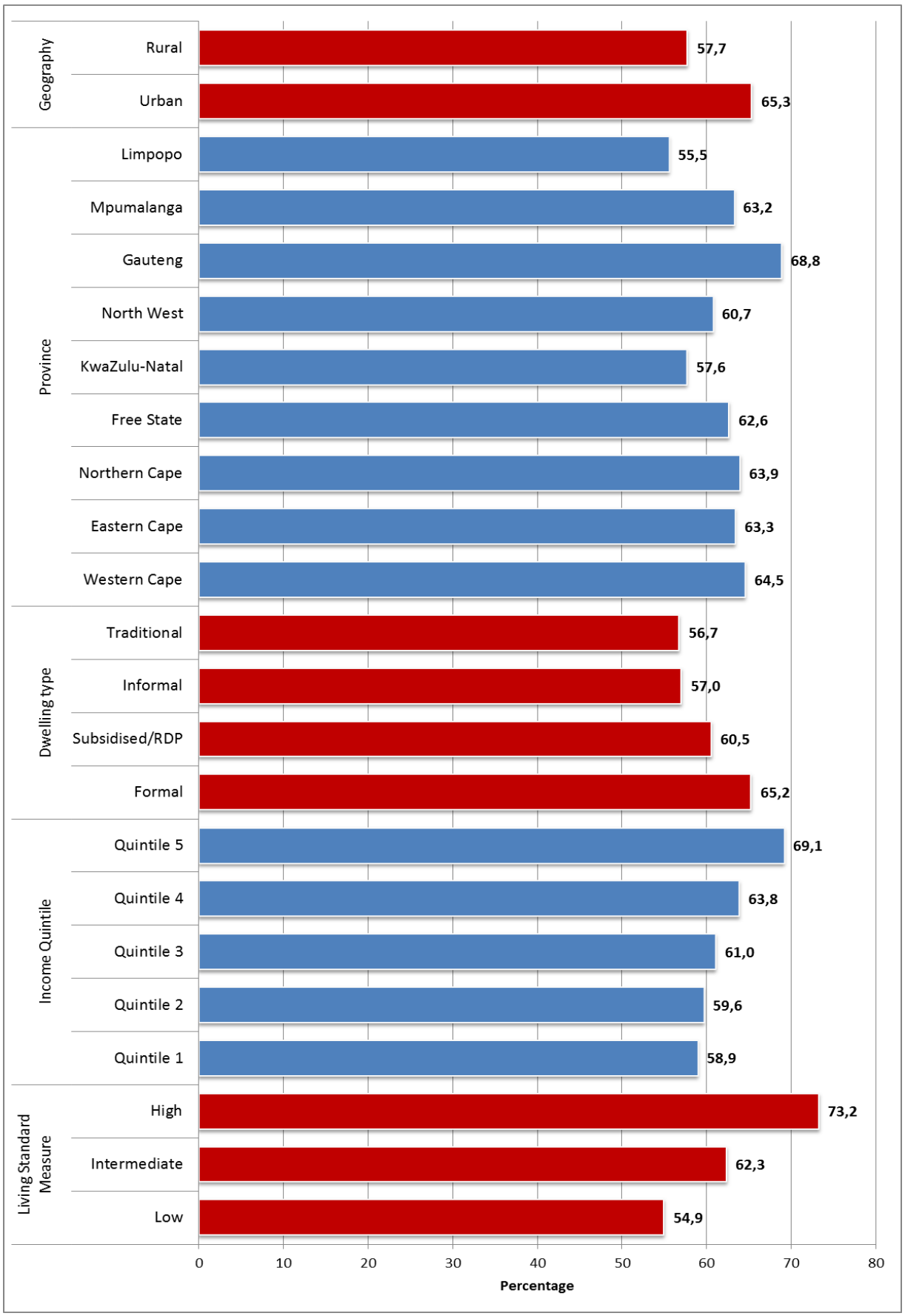
Table 37: Household support for measures to save electricity by living standard, 2012

	Formal	Informal	Traditional
Switch off lights when you leave your house	92,4	65,9	63,9
Using energy saving bulbs	82,6	52,9	46,8
Switch off unused lights	66,1	36,8	40,1
Switch off unused appliances	76,3	51,3	47,2
Switch off the geyser at certain times	30,2	3,8	3,3
Boil only as much water as needed	83,5	60,5	52,8
Use stove plates sparingly	82,0	59,0	51,2
Bath with as little water as possible	57,3	34,8	35,0
Use warm clothing/blankets instead of heaters	64,1	46,9	44,7
Close doors/windows when the heater is on	53,9	34,4	29,3
Allow clothes to drip-dry instead of ironing	34,8	24,4	30,9
Install a solar water heater,	7,4	2,5	3,2

The battery of questions was used to create an index with a maximum score of 12 points for households that supported (answered yes) each one of the measures outlined, above. The score was converted to percentages to create a 100 point scale. The mean scores are shown in Figure 72.

Figure 74 show that urban households are more likely to be aware of the energy-saving measures than those in rural households. Households in Gauteng are more likely to be aware of energy-saving measures than those in Limpopo and KwaZulu-Natal, both provinces with large rural populations. Households that reside in formal dwellings were most likely to be conscious of the need to save electricity, followed by households in subsidised or RDP dwellings. Households in traditional dwellings were least concerned. There seem to be a positive relationship between socio-economic status and living standards, and awareness of energy-saving measures. Households in each successive income quintile or LSM group are namely more likely than households in the preceding group to be knowledgeable of energy-saving measures. In fact, about three-quarters (73,2%) of High LSM households showed some awareness.

Figure 74: Awareness of measures to save energy, 2012



6. Summary and conclusions

The National Development Plan (2011: 140) envisions greater "social equity through expanded access to energy services with affordable tariffs and well-targeted and sustainable subsidies for needy households". Access to affordable modern sources of energy is essential to achieve social and economic development in pursuit of poverty reduction and ensuring an improved quality of life for all households. The National Energy Act (No. 34 of 2008) aims to,"...ensure that diverse energy resources are available, in sustainable quantities and at affordable prices, to the South African economy in support of economic growth and poverty alleviation.." South Africa has managed to increase the percentage of household with access to electricity from about 36% in 1993 to 85% by 2013 through an almost exclusive focus on electrification programmes.

Growth of demand

Studies, however, show that the achievement of universal access by 2025 will be impeded by rapid and uneven household growth between 2002 and 2012. The household population of South Africa increased by an average of 2,8% per year during this time compared to average population growth rate of 1,2% per annum. On average, households increased most rapidly in Gauteng (3,8% per year) and most gradually in Eastern Cape (1,4%). Despite these challenges, the report shows the percentage of households without electricity, as a percentage of the total number of households, have decreased consistently since 2002, from 22,9% in 2002 to 14,7% by 2012.

The Department of Energy has committed itself to achieve universal access to (modern) energy using a combination of grid and non-grid technologies.

Electrification

Although the percentage of households with access to electricity increased from 77,1% in 2002 to 85,3% in 2012, a large number of households either remain without electricity, or cannot afford to use adequate electricity to satisfy their needs. In 2012, 11% or 1,45 million households did not have access to electricity at all, while another 3,6% or 578 005 accessed electricity informally or illegally. The percentage of households without electricity as a proportion of all households have however been declining consistently since 2002, decreasing to 14,7% in 2012.

Although rural households remained more likely than urban households to be without electricity (19,7% compared to 12,4%), this binary distribution hides the fact that up to 40,4% of household in informal urban areas did not have access to mains electricity. In rural areas, 33,5% of households in rural formal areas and 17,3% of households in tribal areas did not have access to mains electricity. This is supports the argument that future expansion of the electricity programme would be restrained in remote rural areas and in predominantly un-proclaimed informal areas.

Although 98,2% of electrified used electricity for lighting, the proportion dropped to 84,5% for cooking. This is significant as lighting is estimated to account for only about 5–10% of the energy consumed by poor households, while cooking, and space heating, is estimated to account for most of the rest (90% or more) of the total energy demand.

More than 90% of households had access to electricity in Northern Cape (91,9%), Free State (91,5%) and Western Cape and Limpopo (90,5% each). After trailing other provinces with respect to electrification since 2002, rapid growth in the number of electrified households in Eastern Cape (from 55,3% in 2002 to 80,4% by 2012) propelled the province above KwaZulu-Natal (79,3%). Despite being the wealthiest province in South Africa, only 84,6% of households in Gauteng had access to mains electricity. The relative low level of electrification is due to the fact that only 50,3% of informal dwellings were electrified in this high in-migration province. Although the report shows that only 53,5% of households that lived in informal dwellings were electrified, more than one-fifth (20,9%) of households lived in informal dwellings in Gauteng, compared to 14,1% nationally.

The report finds a positive association between households' income and access to electricity. While 78,8% of the poorest households (in income quintile 1) had access to electricity, 93,8% of wealthy households in quintile 5 were electrified. Similarly, access to electricity was universal amongst high LSM households (99,7%) while only 59,3% of low LSM households were electrified. The living standards measures are, however, skewed towards households with access to electricity. Household headed by black Africans were least likely to be electrified (82,2%), as were child-only / child-headed households (74,4%) and households headed by youth aged 18–34 years (80,2%).

Illegal or informal connections

The findings of the survey show that, for the 3,6% of the households that used electricity but who were not connected to the mains, the majority (73,1%) were connected to a source that the households paid for (informal connection). About 11,7% reported that they were connected to a source for the which the household was not paying for, thus an illegal connection.

Electricity distribution

Nationally, half of households indicated that they received electricity from their local municipalities, while 47,1% received electricity directly from Eskom. Less than 2,9% claimed to receive electricity independently from these two providers. Municipalities provided electricity to almost two-thirds (65,9%) of households in urban areas, but only 14,1% of household in rural areas. Conversely, 84,1% of households in rural areas said they received electricity from Eskom as compared to 30,8% in urban areas. The percentage of rural households served by Eskom was particularly high in provinces such as Eastern Cape (98,3%), North West (95,9%) and Limpopo (94%) and is related to the inability, or unwillingness of municipalities to deliver services to relative poor and scattered households.

The study found that, compared to the service provided by Eskom in urban areas, households that received electricity from their municipalities were less likely to rate the electricity services they received as ‘good’, and were, inversely, more likely to rate the service they received as ‘poor’.

Electricity metering

More than three-quarters (76,2%) of households used pre-paid meters compared to just over one-fifth (20,9%) of households that used conventional meters. This figure differs from a figure of 60% provided by DOE (2013:23) since their calculation was not limited to households with access to electricity. While 43,9% of the wealthiest households use a conventional meter, and 51,6% used a pre-paid meter, 92,7% of households in income quintile 1 used a pre-paid meter. Pre-paid meters are clearly not confined to poor households as is often suggested.

Free basic electricity

Government attempts to address energy poverty has generally revolved around an aggressive programme to electrify homes and to ensure that poor households had access to electricity. One way of doing this was through the Free Basic Electricity (FBE) programme which was phased in from 2003 with the objective of providing 50 kWh of electricity to poor households to cater for their basic electricity needs. The percentage of electrified households that received FBE has, according to the GHS, undulated around the 25% mark since 2005. It is noticeable that only about one-tenth of households in Limpopo (the poorest province) reported receiving FBE compared to 42,7% of households in Western Cape. Although this can be caused partially by how respondents understood the provision of FBE, the relatively higher requirements set by local municipalities to qualify for FBE in rural areas could also be an important factor. The survey shows that, particularly for cooking and space heating, poor households that received free basic electricity was more likely to use electricity, and less likely to use potentially harmful solid fuels than poor households that did not receive free basic electricity.

Alternative sources of energy

As seen earlier, 11% of households, nationally, did not have access to electricity at all. Households without adequate access to appropriate sources of energy often utilize multiple sources of energy such as wood and paraffin. These sources of energy increases the exposure of household members to health risks potentially caused by indoor pollution or injury as a result of carrying heavy loads, as well as accidental burning or ingestions of fluids such as paraffin.

The flip-side of not having access to electricity is having access to it but not being able to afford using it for all the household activities. The report found that the use of alternative sources of energy by electrified households could be associated with geographical location (more likely in rural areas), socio-economic status (more likely for poor households), and domestic activities (more likely for energy-intensive activities such as space heating and cooking).

The report finds that households without access to electricity were generally more likely to use solid fuels (particularly wood, but also coal and animal dung) for cooking, heating and lighting than electrified households. The use of solid fuels was particularly prevalent in rural areas. In rural areas, more than three-quarters of households without access to electricity used solid fuels for cooking, heating and lighting compared to about 50% of rural rich (in quintiles 3-5) households without access to electricity. The use of solid fuels was much more limited in urban areas, regardless of socio-economic status as access to wood was more limited, and the use of paraffin was more common.

Energy profile for cooking

The percentage of households that used electricity for cooking increased from 58% in 2002 to 75,2% in 2012. Concurrently, the percentage of households that used solid fuels decreased by 10%, from 22,6% in 2002 to 12,6% in 2012. Despite these improvements, 45,1% of households in Limpopo still used wood, while 5,8 of households in Mpumalanga used coal, in addition to 17,6% that still used wood. Whereas 9,3% of electrified households preferred solid fuels for cooking, more than half (53,2%) of un-electrified households relied on paraffin, while another 39,1% used solid fuels. The use

of LP gas for cooking is still relatively small and largely limited to high income, predominantly urban households.

Energy profile for space heating

Space heating is a relatively energy-intensive, yet more seasonal, activity for households. Unlike cooking which is an essential activity for households, many households choose not to heat their homes. The percentage of these households increased consistently from 7,2% in 2002 to 27,7% in 2012. By comparison, the percentage of households that used other sources of energy, particularly electricity and wood, declined notably. Since the study was conducted during the cold winter months between July and September 2012, it is, perhaps, understandable that households in Gauteng and Free State were most likely to have used some kind of fuel for heating. More than 40% of households in Western Cape and KwaZulu-Natal, however, indicated that they did not heat their homes. Although electricity was used for heating by less than half the electrified households, presumably due to monetary reasons, 46,8% of un-electrified households relied on solid fuels while another 17,5% relied on paraffin. Low LSM households, and those in rural areas, particularly those in traditional dwellings, were most likely to use solid fuels for heating space.

Energy profile for heating water

The energy use pattern for cooking and heating water was shown to largely coincide. The report found that 76,7% of households used electricity (predominantly through geysers) and only 11,6% used solid fuels to heat water. The use of solid fuels were most common in Limpopo (40,9%) and Mpumalanga (20,1%) and least common in Western Cape (0,7%) and Gauteng (1,8%). Urban households were much more likely than those in rural areas to use electricity (86,0% compared to 56,7%) while the use of solid fuels was more common in rural areas. Only 56,1% of households in informal dwellings used electricity to heat water, while 27,4% and 9,9% respectively relied on paraffin and solid fuels.

Energy profile for lighting

Use of electricity is very closely correlated with household access to electricity. The percentage of households that used electricity has increased from 76,7% in 2002 to 87,3% in 2012. The latter figure is higher than the percentage of households that were connected to mains electricity and includes households with informal or illegal connections. The use of electricity for lighting was more common in urban areas (90,3%) than rural areas (80,9%). While 94,9% of households in formal dwellings, and 92,1% of households in subsidised dwelling used electricity, less than two-thirds of households in informal and traditional dwellings used electricity. More than one-quarter of these households used candles. Nationally, more than three-quarters (76,3%) of un-electrified households used candles for lighting, while 20,8% used paraffin. Although these percentages were very similar across rural and urban areas for households without access to electricity, a slightly higher percentage of un-electrified poor households in rural areas (80,6%) used candles.

Household expenditure on electricity

The report find that, nationally, about 50% of households spent less than 5% of their income on electricity, and that about three-quarters (74,5%) spent less than 10%. In total, 8,8% spent more than 20% of their income on electricity. The highest percentage of households that spent more than 20% of their income on electricity was observed in Gauteng (11,4%), Western Cape (9,5%) and North

West (9,4%). Households that lived in subsidised or RDP dwellings were most likely to spent more than 20% of their household income on electricity, while only 3,4% of households in traditional did so. The report support earlier findings which stated that low-income households were likely to spend a larger percentage of their household income than wealthier households, despite them using less energy. Figure 26 in the report shows that less than one-quarter (24,6%) of quintile 1 households spent less than 5% of their household income on electricity compared to more than two-thirds (68,6%) of quintile 5 households. Inversely, more than one-quarter of quintile 1 households spent more than 20% of their household income on electricity, compared to only 0,7% of quintile 5 households. Poor households in rural areas were less likely to spend as much of their income as those in urban areas, largely due to the availability of affordable alternatives such as wood.

Electricity cut-offs and household perceptions regarding payment electricity services

Only 4,6% of households that were connected to the mains electricity reportedly did not pay for electricity. Although high income households were, perhaps, slightly more likely to pay for electricity, the association is tenuous at best and variable across provinces. In fact, in Limpopo poor households in quintile 1 were more likely to pay for electricity than those in quintile 5. Low-income households were almost more likely to pay than households in higher LSM groups across all provinces. However, low LSM households in Gauteng (47,6%), Western Cape (64,0%) and Northern Cape (79,1%) were much less likely to pay than households with a low standard of living in other provinces.

A relatively low percentage of household reported that electricity was cut off during the previous month due to non-payment. The highest prevalence was noted in North West (4,9%), Mpumalanga (4,4%) and Gauteng (3,9%).

Household perceptions regarding electrical services and measures to save electricity

Households were generally completely opposed to stealing electricity (97,7%) or using electricity without paying for it (98,9%). Households were, however, not averse to protesting about the price of electricity. Nationally, 57,2% of households said that it was sometimes or always acceptable to protest about the price of electricity. More than 60% of households in Eastern Cape (64,3%), Gauteng (62,0%) and Western Cape (60,1%) felt than protest action could be condoned. Households in informal dwellings (62,0%) were slightly more likely than those in formal dwellings (55,9%) to approve of protests against electricity prices.

Household perceptions of measures to save electricity

Households were asked to indicate how they would, hypothetically, deal with sudden increases in the price of electricity. One-third (36,4%) indicated that they would continue using the same amount of electricity but that they would merely pay more for it. Nationally, 82,2% agreed with a statement that they would reduce the amount of electricity used by the household, while about two-thirds (63,8%) agreed with a statement that they would look for an alternative source of energy to use. Only 5,9% of households agreed with a statement that they would stop paying for the service altogether.

Households were asked a set of 12 questions to test their awareness of measures to save electricity. An index was created indicating the average score that it is essential to lower the cost of living for

poor households. Almost 85,3% of households were aware of actions such as switching off the lights, but only 7% agreed with installing a solar water heater, while 27,1% agreed with switching off the geyser at some times.

7. Policy recommendations

Although significant progress has been made by the national electrification programme to provide electricity to all households, future progress will be hampered by the cost ineffectiveness of providing mains electricity to remote rural households and the difficulty of providing electricity to predominantly informal dwellings in largely unplanned and unstructured informal areas. Although electricity will remain the gold standard in terms of convenience, affordability and safety, alternative sources of energy should be investigated. Emphasis should be placed on off-grid renewable-energy solutions to improve energy access to remote and difficult to service poor households.

The electrification of informal areas is increasingly becoming more important.

An in-depth investigation is needed to establish why the use of solar energy is not as wide spread as could be expected in South Africa.

Despite having access to electricity, it should be acknowledged that poor households will continue to use multiple sources of energy and technologies to meet their needs into the foreseeable future. To this end the report also recommends the introduction of effective and efficient technologies (such as efficient wood burning stoves and solar cookers) to reduce the hazards of using solid fuels, and to decrease the demand for fuel wood in poor households.

In addition, the use of transitional fuels such as paraffin and LPG should be promoted in the absence of modern alternatives as these sources of energy could bring many benefits to the poor in terms of the time and energy spent searching for wood, as well as the immediate impact on the environment.

As a transitional measure, the supply of fuel wood from woodlots and community tree planting activities should also be addressed as this would improve access to energy, as well as serve to protect the environment.

Although Government has attempted to address the affordability of electricity by low-income households through the provision of free basic electricity, it could be argued that the supply of clean, safe fuels for energy-intensive activities such as cooking is still insufficient. Many households still turn to potentially hazardous solid fuels to perform these activities as they cannot afford to buy sufficient quantities.

The definition of energy poverty need to be settled together with ways to measure it in order to accurately classify households as energy-poor for the purposes of assisting households to access modern sources of energy.

8. Limitations of the data

The study is based on secondary data that have been collected as part of the GHS between 2002 and 2012. Since data was sourced from a general survey, none of the content areas were measured in great detail. Although more specific questions on energy were asked in 2012, the number of questions was limited. Data available for 2012 was also not asked in previous years, which means that time series data is only available for a few question, namely the use of various energy sources for cooking, heating and lighting. Certain aspects, for example household income, were estimated for only the third time in 2011, although there were certain provisions and conditions attached to it. Throughout the report, these limitations are highlighted and the process of data interrogation has inevitably identified areas where the GHS questionnaire can be improved for future use.

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10. Variable categorisation

Table 38, below, summarises the way in which variables were analysed for purposes of the logistic regression models.

Table 38: Categorisation of variables used in logistic regression models

Description	Variable	Variable values
Province	1	Western Cape
	2	Eastern Cape
	3	Northern Cape
	4	Free State
	5	KwaZulu-Natal
	6	North West
	7	Gauteng
	8	Mpumalanga
	9	Limpopo
Households Income quintile	1	Poorest quintile
	2	Quintile 2
	3	Quintile 3
	4	Quintile 4
	5	Wealthiest quintile
Living standard measure	1	Low
	2	Intermediate
	3	High
Households dwelling type	01,03,04,05,06,07,10	Formal dwelling
	08,09	Informal dwelling
	02	Traditional dwelling
Households main source of income	01	Salaries
	03	Remittances
	04	Pensions
	05	Grants
	02,06,07	Other income
	08	No income
Supplier of electricity to households	01,02	Municipality
	03,04	Eskom
	05	Other
Method of payment for electricity		
	01,03	Pre-paid

	02.,04	Bill
	05	Other
Reported electricity interruptions by households	00	No interruptions reported
	01+	Reported interruptions
Geographical location	01,02	Urban
	04,05	Rural