ENERGY SMART

LOCAL GOVERNANCE REPORT

FAST-TRACKING OUR TRANSITION TO A HEALTHY, MODERN, AFFORDABLE ELECTRICITY SUPPLY FOR ALL

THIS PROJECT WAS MADE POSSIBLE WITH FUNDING FROM THE EUROPEAN UNION

PROJECT 90 BY 2030

ENERGY SMART CITIZENS IN ACTION

ABBREVIATIONS

CBO..... Community Based Organisation
CCG..... Community Care-Givers
CoGTA..... Cooperative Governance and Traditional Affairs
CSIR..... Council for Scientific and Industrial Research
CWP..... Community Works Project
DEA..... Department of Environmental Affairs
DoE ..... Department of Energy
EEO ..... Ekurhuleni Environmental Organisation
EPWP ..... Expanded Public Works Programme
EU..... European Union
FBE ..... Free basic electricity
FBAE ..... Free Basic Alternative Energy
HSRC..... Human Sciences Research Council
IBT..... Inclining Block Tariff
IDP ..... Integrated Development Plan
IEP..... Integrated Energy Plan
INEP ..... Integrated National Electrification Programme
IPP..... Independent Power Producers
IRP..... Integrated Resources Plan
ISMO..... Independent System Market Operator
LGCCS ..... Local Government Climate Change Support
LOLP..... Loss of Load Probability
LPG..... Liquefied Petroleum Gas
LSM ..... Living Standard Measures
MAP..... Municipal Adaptation Plans
MFMA ..... Municipal Finance Management Act
MYPD ..... Multi-Year Price Determination
NCCRPWP..... National Climate Change Response Policy White Paper
NDP ..... National Development Plan
NERSA..... National Energy Regulator South Africa
REIPPPP ..... Renewable Energy Independent Power Producer Procurement Programme
RDP..... Reconstruction and Development Programme
SALGA ..... South African Local Government Association
SANCO..... South African National Civic Organisation
SHS..... Solar Homes Systems
SSEG ..... Small Scale Embedded Generation
TIPS..... Trade and Industrial Policy Strategies
WEF ..... World Economic Forum
WWF..... World Wide Fund for Nature

KEY CONTRIBUTORS: GRAY MAGUIRE, THANDO LUKUKO, DR YVETTE ABRAHAMS (ADVISOR)
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ENERGY SMART CITIZENS IN ACTION

CHAPTER 1: INTRODUCTION AND BACKGROUND TO THIS REPORT

"If you want to go fast, go alone. If you want to go far, go together." African Proverb

South Africa faces a number of challenges in the transition towards a more secure, environmentally friendly and equitable energy system. Setting goals for this transition that are not only achievable but also ambitious, and at the same time promote the value of contributions that people can make through energy conservation and energy efficiency is important for the process.

Energy services should be affordable, reliable, pose no threat to human health and safety, and be environmentally sustainable. In the transition to such a system, different supply options and combinations have to be assessed on their ability to meet the demand for energy in the country, as well as for their social and environmental impacts to be considered. Over and above considerations for the different types of energy carriers and energy efficient appliances, building an understanding of local energy usage dynamics and energy distribution processes to ensure the buy-in and cooperation of residents is crucial and can contribute to achieving the objective.

South Africa grapples with specific challenges such as inequality, poverty, unemployment and energy poverty. The challenges marginalised communities face are pervasive and have a significant impact on South Africa's economy and energy situation. The daily energy struggles faced by communities reveal the need for energy planning to reflect the perspective of low-income households in South Africa as well as their living conditions.

In May 2015 Project 90 by 2030 (Project 90) with the support of the European Union embarked on the two and a half year-long Energy SMART Citizens in Action project which sought to address the inherent gaps in energy planning and implementation in South Africa. The SMART project set out to equip communities and local civil society organisations with the knowledge and capacity to improve energy efficiency practically at a household level, and to empower them to engage with local authorities on energy access-related issues.

One output of the project is this SMART Local Governance Report, which is shaped around the findings from a series of participatory workshops on energy issues, which were held in eight communities in four provinces of South Africa. The bulk of the information reflected in this report was gathered as part of the workshop series.

The necessity of the project arose out of three separate processes. The first was the Multi-Year Price Determination (MYPD 3) process that took place in January 2013. Project 90 recognised the need for the participation of all South Africans, and mobilised township activists to present on their lived reality at the hearings organised by the National Energy Regulator South Africa (NERSA). The second process was a series of workshops with communities in the Western Cape where community leaders were shown steps to improve home energy use. The final process was the development of the SMART Energy Planning Report[1] which was intended to guide towards more transparent energy planning to fast-track South Africa's transition to a healthy, modern, affordable electricity/energy supply for all.

This SMART Local Governance Report tries to combine all these three processes and aims to guide municipalities as well as their citizens on their path to joint and inclusive energy planning that makes an effort to include marginalised communities in the process and addresses their needs and concerns.

Over the course of the project it became clear that there is a link between effective knowledge and effective governance. Where people do not possess the knowledge, their ability to effectively participate in energy governance is low, and therefore they cannot act in favour or against any form of energy planning. The link between knowledge and governance highlights how important it is to work on governance issues in general in order to introduce effective alternative energy scenarios. But it is not only knowledge that hampers effective governance but also a lack of communication from the perspective of the local government. Those community representatives that tried to contact local government regarding issues such as housing, sanitation and electricity were rarely successful in getting a response to their communication.

The report was written with input from representatives from eight communities in four provinces with a strong emphasis being placed on ensuring a mix of urban, peri-urban and rural settings to secure broader experiences to reflect upon. The project explored different approaches on how to get the energy challenges faced by low-income communities reflected in municipal governance processes to deliver much needed services. The project partnered with the following communities: Hankey and Pellsrus in the Kouga Municipality in the Eastern Cape, Tsakane and KwaThema in the Ekurhuleni Metropolitan Municipality in Gauteng, Nyanga and Hillview 2 in the City of Cape Town in the Western Cape and Maphephetheni in the eThekwini Municipality and Nokobongo/Shakashead in KwaDukuza Municipality in KZN.

CHAPTER 2: ENERGY SITUATION IN SOUTH AFRICA

South Africa is facing a number of challenges in the energy sector. One critical challenge is the perpetual electricity price increases by the state owned utility, Eskom. These have been in excess of 300% over the period 2007 to 2015, which is more than six times the inflation rate for the same period[2]. Furthermore, in 2012 the Department of Energy (DoE) estimated that 47% of South Africans are energy poor as they spend more than 10% of their income on energy needs[3]. Energy-poor households often struggle to access sufficient energy services to meet their basic needs, and furthermore their ability to choose safe and reliable energy alternatives that are not damaging to human health and the environment is limited[4].

Between 1994 and 2016, over 6.7 million households were connected to the grid, and over 123 000 additional households were supplied with non-grid technology via solar home systems[5]. This means that a significant number of South African homes are experiencing electrical energy services for the first time, often resulting in unsafe or inefficient use, as well as a lack of awareness around reticulation guidelines and municipal electricity systems.

Link between Municipalities and electricity

Municipal sales of electricity continue to be a major income earner for municipalities, with the 2014/2015 national average being 28.3% derived from electricity sales, second only to grants and subsidies at 30.9%[6]. This means that electricity sales subsidise a number of other services, but electricity demand is decreasing as the price continues to increase[7]. Should this trend continue into the future without being well managed, it could mean less money available for municipalities to not only meet their income requirements for continued energy services, but also for other services, resulting in an increasing poverty trap.

Energy planners must also face the reality that escalating price trends of grid-based electricity in South Africa are likely to continue, as work by the Council for Scientific Research (CSIR) has shown[8], and this will have two major implications. The first is that municipalities are going to find it more difficult to source income from electricity sales as the social pressure pushing back against increasing prices forces municipalities to reduce margins. The second implication is that as middle class and wealthy households implement more energy saving actions and technologies into their homes, poor households who lack access to capital required to undertake similar actions will be squeezed further by the price increases. Furthermore, higher income households effectively cross-subsidise poorer customers, so a drop in their demand could indirectly mean less subsidisation, which could in turn put more pressure for higher prices.

In the interests of social stability and as a matter of urgency, local governments are urged to commence work on developing an effective local government structure for energy in low-income households.

Relevant policies for local level energy planning

While Eskom still currently generates some 92% of the national electricity

supply[9] - the emergence of municipal power stations, own generation from industry and private sector generation through Independent Power Producers (IPPs) is rapidly gaining traction[10]. However, due to stagnation with policies such as the Independent System Market Operator (ISMO) bill and the Municipal Finance Management Act (MFMA) – municipalities have been limited in bringing their own generation online. In theory this can be overcome by ministerial or NERSA determinations, but at this stage this has not happened. Regulations on New Generation Capacity (under the Electricity Regulation Act) enable the Minister of Energy, in consultation with NERSA, to make determinations on which new generation capacities will be procured, as long as they are in agreement with the Integrated Resource Plan (IRP) – South Africa's electricity infrastructure plan to 2050. These determinations can cover the whole IPP range, including renewables, coal and co-generation[11]. By 2030 it is expected that 17 800 megawatt (MW) of the electricity will be provided by RE sources under existing energy policy, with 7 000 MW in operation by 2020[12]. It is encouraging to note that two of the municipalities involved in the project (the City of Cape Town and Ekurhuleni Metro) are both looking at alternative means to provide electricity to their customers. The City of Cape Town plans to procure power directly from IPPs, although it is facing legal obstacles[13]. Ekurhuleni Metro is presently investigating how to develop their own facilities.

Free Basic Electricity (FBE) is a government programme initiated in 2003 that aims to provide 50 kWh of free electricity per household per month, as a way to increase access to electricity for low-income households. Unfortunately the design of the programme fails to take into account larger family sizes, shared meters and on-selling of electricity in informal settlements. Surveys also indicate that only about 25% of electrified households actually receive FBE[14]. In addition, a number of projects have been undertaken in terms of the 2007 Free Basic Alternative Energy (FBAE) policy to assist those not connected to the grid to gain access to alternative energy carriers. Municipalities pre-determine which of the choice of paraffin, liquefied petroleum gas (LPG), coal and bio-ethanol gel is appropriate[15], with an allowance value of at least R55 per household per month[16]. Allowance increases are indexed at the Consumer Price Index (CPI) plus 1.6% per annum. The FBAE largely focused on providing access to cleaner fuels and appliances, but this has been difficult to implement, and there has been no assessment of its overall impact.

Electrification rates and alternative energy sources for low income households

According to 2016 statistics, approximately 91% of SA households had access to electricity[17]. In 1994 this figure was about 50%, so significant improvements in electrification rates have occurred due to a national electrification project. However, this still leaves approximately 1.45 million households (or 4.75 million people) that do not have access to grid electricity. While most households using electricity are connected directly to the grid, about 3.6% accessed electricity via alternate means. This is often by a connection to another source (such as via a neighbour's residence - who is then paid for the electricity used), or an illegal connection (0.4% of households)[18] without payment[19]. A very small proportion of households produce their own electricity with solar systems. Diesel generators are used in some agricultural areas, and also as backup supply (for high-income households, industry and hospitals).

Grid connection rates now vary between 86% and 97% across the nine provinces of South Africa[17]. Larger differences are found when the race and age of the head of the household are compared, along with the relative wealth of the household. However, StatsSA indicated the largest variation in electricity access is based on dwelling type, with electrification rates in informal settlements as low as 53%.

Consumers (from individuals to large industries) purchase electricity directly from Eskom or via municipalities, depending on the distribution authority in the area, and the total split between Eskom and the municipalities is almost exactly equal[19]. Municipalities purchase electricity from Eskom and then add non-standardised charges before selling it on to the final consumer with the final electricity tariffs being subject to regulation by NERSA. Regardless of the end vendor, approximately 80% of electricity sales are made using a prepaid system.

Those who do not have access to or cannot afford electricity use solid fuels (wood, animal dung, coal), paraffin, candles and gas to fulfill basic functions in ratios as shown in Figure 1.

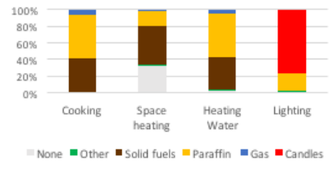

FIGURE 1 *Energy for basic needs where there is no electricity: StatsSA Household energy survey.*

Since South Africa has very few residential gas grids using natural gas[20], liquefied petroleum gas (LPG) in gas bottles is an attractive form of energy. For communities without access to affordable electricity, LPG would be a much safer and healthier form of energy than paraffin (kerosene), charcoal or wood. However many of the project participants reported that they felt it too was prohibitively priced.

Whilst the complexity of the energy contextual environment can be overwhelming, the communication of this background information to communities is of significant importance – while community members are not involved in the decision making process, they experience the impact of the decisions. High level national policy around energy generation choices for example has tremendous impacts on issues such as air quality and energy pricing, while local government choices around who accesses FBE for example, or whether to introduce an inclining block tariff structure equally impacts on the quality of life for low-income households.

The statistics listed above reflect much of what was found in the communities covered in this workshop series. Prepaid meters were the almost universal form of metering, electricity connections were widespread while affordability was low, grid dependency was the norm for electricity while diversified energy sources were ubiquitous and self-determination towards environmentally benign energy choices was low.

The following section describes the setting in the participating communities in detail.

CHAPTER 3: COMMUNITY CONTEXT

Over a two-and-a-half year period, the project worked with eight communities (both peri-urban and rural) that were based in four provinces (Eastern Cape, Western Cape, KwaZulu-Natal and Gauteng), and all with a certain level of community representation by a community based organisation (CBO). The reason for working with organisational structures was so that the project could not only work with a representative body of the community, but also to gain insights as to what the community prioritised in the past, while providing an indicator as to how well the community's constituents can work together. Another community selection criteria were their relationships with local governments. Communities and CBOs had to show a track record, or at least signal a willingness to engage with local authorities with respect to energy issues. This provided Project 90 with an avenue to assist and mediate between local government and the community so that they may continue to work together after the completion of the project cycle.

In each of the eight communities, five workshops were conducted - with a specific theme and objective designed for each – with the aim of developing an understanding of the contextual issues residents faced, what the political landscape looked like and finally the lived experiences from the implementation of policies intended to provide basic energy access. The workshops were themed as follows:

1. **Workshop 1:** The main theme of this workshop was to introduce the Energy SMART Citizens in Action Project, the objectives of the project and the potential benefits for the community. In the second part of the workshop, data was collected to determine the level of understanding of energy governance-related issues (tariff structures, reporting procedures, etc.) and challenges communities faced with accessing energy and/or electricity.
2. **Workshop 2:** On the basis of collected information from Workshop 1, the objective of the second workshop was to capacitate communities with respect to energy governance issues, and on how best to engage with local government.
3. **Workshop 3:** During the third workshop community representatives were equipped with do-it-yourself skills on low-cost energy efficiency interventions such as rocket and gasifier stoves, insulated cooking bags and products readily available on the market to improve energy access. During the workshops demonstrations on how to insulate buildings or shack dwellings were also undertaken with participants.
4. **Workshop 4:** This workshop focused on the process around the Integrated Development Plan (IDP) and municipalities' budgetary processes as one avenue for a community to engage with their local government.
5. **Workshop 5:** On the basis of the engagement with communities and the challenges raised during the workshops, Project 90 was able to develop recommendations for local governments on how

to improve the energy situation in the communities. The objective of this workshop was to discuss the observations and recommendations to get the communities feedback and agree on a way forward.

Below, background context for each of the participating communities will be presented along with an outline of the current energy situation including their level of access to basic energy services, as well as the most common issues arising. A description is also provided on the partner organisation for the project in each of the participating communities.

GAUTENG PROVINCE

Ekurhuleni Metropolitan Municipality

Tsakane Ext 10

The Tsakane community is situated in the Ekurhuleni municipality in ward 86, to the East of Johannesburg with a population of around 135 000. The specific site of engagement is in Extension 10 (Ext. 10), a community of around 6000 shacks, which receives limited basic service delivery (water and sanitation) from the local municipality but they have not been connected to the electrical grid. The municipality set up floodlights for street lighting, but these were switched off during the project implementation due to electricity theft.

The residents were moved to the site in 2000 from several locations due to mining activities in the area. At the time it was defined as a temporary resettlement plan, with further development to come. But since then, very little development has taken place. Ext. 10 faces numerous challenges ranging from high levels of unemployment, inadequate housing and health problems for the vast majority of the community, partly caused by the dependence on coal as their primary energy source for cooking and heating during winter. However, despite these challenges the community has a very strong organisational presence and has initiated self-sufficiency measures e.g. the community managed to raise funds to replace the church made of tarp with brick and mortar. Despite the hardships - poverty and unemployment - when the community works together positive results can be achieved.

Looking at the situation in Tsakane - it is an ideal site to promote renewable energy and energy efficiency since the community is unlikely to be connected to the grid any time soon. To meet their demand for energy, coal is the predominant energy source for those households who can afford to buy a bag. For those households that cannot afford to buy bags of coal, which cost around R20-25 each, residents have resorted to making their own coal briquettes from a mixture of water, mud and leftover ash for their own use or for sale.

Due to the lack of electricity connections, the focus of Project 90's engagement in the community was on the efficient use of alternative energy sources and policies and support from local government the community could expect.

Kwa-Thema

Kwa-Thema (ward 78 EMM) was established in 1951 as a result of forced removals. The densely populated community of 103 727 people was planned and organised as a typical apartheid dormitory town with transport nodes designed to get people to work and back without encouraging the building of a vibrant community. The township is surrounded by active and abandoned mines – in some locations the recorded radiation levels are so high that restrict the settlement from further expansion.

Kwa-Thema is now considered a formal settlement and is also electrified. Even though the settlement is electrified, the use of coal for heating and cooking purposes is widespread. Residents reported that electricity prices are too high for everyday use so they subsidise their energy needs with a diversity of energy sources.

Affordability of electricity is a major challenge in Kwa-Thema. Electricity sales in the community are through third parties such as major retailers and informal traders (spaza shops), however, in many cases the latter include a surcharge. The reasons for this are because when traders buy electricity in bulk for resale, they include an extra fee on electricity to cover their overheads. Buying electricity from small traders incurs a double surcharge for added overhead costs, making the units more expensive.

Awareness and understanding of governance-related issues such as tariff prices, Inclining Block Tariff (IBT), FBE and fault reporting were minimal in Kwa-Thema. This lack of understanding could be attributed to insufficient consultation and communication between local authorities and community members.

Due to the crowdedness of the settlement most houses have backyarders on their property, while sharing one electricity meter. The result of this is: households that should be eligible for FBE do not receive the benefit. By sharing the electricity meter with backyard dwellers, households create the perception that they can afford their electricity. Though this phenomenon is well understood by the municipality, it seems a strong argument is needed to encourage investment in backyarder metering by the state. An additional meter can be purchased and installed from the municipality, however affordability remains a challenge for the majority of the community. Furthermore, the process to purchase and install a meter is lengthy, such that it deters even those households who can afford the investment in a second meter.

Kwa-Thema has a strong and rich history of political activism going as far back as the early 1976[21]. One of the influential CBOs in the area is the Ekurhuleni Environmental Organisation (EEO), which is based in Kwa-Thema but is also active in Tsakane. The main focus of the CBO is to deal with the effects of mining in the community and the environment. EEO, mostly consisting of youth activists has been involved in service delivery protests on unaffordable electricity prices. Even though they are a small organisation, they have a national footprint and are affiliated with other environmental organisations that are impacted by mining activities. EEO has experience in engaging with various stakeholders in the mining value chain as well as state actors, and is well respected in the community.

WESTERN CAPE PROVINCE

City of Cape Town Municipality

Nyanga

The Nyanga area is one of the oldest black townships in Cape Town. It has a population of 57 996 with the population in the specific focus area of Ward 37 being 22 207 in 2011. Nyanga is divided into 14 areas, which vary between formal private housing, Council Rental Units (CRUs), hostels, electrified informal settlements and unelectrified informal settlements[22].

Initial engagements with community members, and with street committee representatives reflect high levels of energy poverty being experienced, with a high degree of variance in terms of required energy inputs. 50% of the population of Nyanga are backyard dwellers or have a backyarder on their property, therefore there is strong support by community representatives for backyarder metering in the area.

As was the case with Kwa-Thema, Nyanga has a strong history in the Western Cape for its protest action for better service delivery. The South African National Civic Organisation (SANCO) branch in Nyanga was Project 90's main partner for establishing links into the community. SANCO has been championing the rights of society and does so thorough their structures in many communities. SANCO has an established communication channel which Project 90 encouraged community representatives to strengthen and use to spread information about the workshop engagements to the various constituencies represented. This proved very successful in subsequent engagements, as these civic organisations have a reach that far exceeds the abilities of any external organisation looking to work in communities.

In Nyanga, Project 90 partnered with South African National Civic Organisation (SANCO), the Human Sciences Research Council (HSRC) and the City of Cape Town to facilitate the engagement between

NYANGA CASE STUDY

Nyanga township was established in the late 1940's where black migrants were forced to settle. After the political dispensation came into power, marginalised communities across the country were electrified. At the time, electricity planning provided infrastructure behind the property, referred to as the 'mid-boundary' where officials would have easy access to the infrastructure when necessary. As the population of Nyanga grew over the years, residents began to build structures in their backyards and others began erecting perimeter walls around their properties, which resulted in city officials having reduced access to the electricity infrastructure. This limited access hindered the City's ability to respond to queries timeously as often they needed to gain access to properties to conduct maintenance and repair work on the mid-boundary or overhead infrastructure.

The solution to the challenge was to upgrade the infrastructure from the mid-boundary to the street front, below the ground, so officials can have access to the infrastructure to conduct their work. As upgrades commenced, some residents in the community stated their discontent for the upgrades citing insufficient consultation, which resulted in the project being halted by disgruntled residents. Safety concerns also unfolded for City officials working on site, as tensions escalated between the City and Nyanga residents and the Electricity Department was under pressure to deliver on project deadlines and needed to seek a resolution in order for the project to continue.

the community and the City. The engagements primarily focused on governance-related issues such as the tariff structure, implications of illegal connections as well as other concerns that the community representatives had with energy access. Some of the more systematic or technical questions posed required responses from officials, which paved the way for city officials to take part in the workshops. The successfully facilitated and robust engagements enabled community members as well as city officials to address their concerns and come to a joint conclusion and plan of action.

The HSRC developed the Community Scorecard methodology to better understand and share the respective concerns of both stakeholders (community and city officials) through the development of key indicators; with plenary sessions organised to enable dialogue and site visits to witness the experiences that residents face. The engagements between stakeholders took place frequently, over the course of three to four months. Though this was a fairly lengthy process, the engagements were invaluable in trust building, as community representatives were able to ask questions and get immediate feedback on their concerns such as query resolutions. In fact, a number of community members and representatives were able to resolve their long-standing queries, and the process resulted in tangible changes, which put the Electricity Department in good standing.

This process proved to be successful in addressing some of the 'quick fixes' when it came to electricity challenges such as metering queries and electrical safety improvements - where some infrastructure was exposed and posed a threat to public safety. But communication between communities and local authorities remains a significant challenge. It is unclear if the community representatives will be able to maintain regular engagements with city officials once the support through the project ends.

Hillview 2

Hillview 2 is a very small informal settlement nestled on a piece of land in the Vrygrond area. The community was only electrified in 2016 and therefore, has a very poor understanding of the electricity system. The installation of electricity was undertaken without any training in the community and so there were lots of questions raised by the community during the workshop series about electricity governance, energy efficiency measures, meter reading and fault reporting.

The dwellings in Hillview 2 have very poor quality insulation - they are wood and zinc structures with tarpaulin and polystyrene as the main source of insulation. In the winter months in Cape Town heating costs inevitably increase - putting even more pressure on household finances. Many community members use wood fires for heating, with space heating being one of the biggest energy consumers in most households. With electricity prices in South Africa continuously on the rise, more attention however needs to be paid to energy efficiency interventions, which will provide these communities with better energy access.

The project partnered with a strong community leader who is the primary point of contact for any social issues the community faces - varying from electricity problems to matters of domestic violence. During the course of engagements with the community, the workshops had to be postponed on a regular basis due to incidents, which required her immediate attention. In addition to being the community leader, she also sits on the ward council and is the main liaison person between city officials and her community.

The City of Cape Town installed prepaid electricity meters into the community, so that all households have access to electricity. At this stage however, the main challenge faced by the community is the affordability of these energy services - unemployment in Hillview 2 is high, and all the households are grant recipients.

KWAZULU-NATAL PROVINCE
eThekwini Metropolitan Municipality
Maphephetheni

Maphephetheni is a tribal/traditional settlement, made up of eight villages and covering an area of 54.01km^2 located about 45km from Durban. It has a population of 9 700, with 67% of its population being of working age (15-64). The area has 3 000 households averaging 3.2 persons per household with just over a third (36%) of the households being female-headed. It is also the only community with an active traditional structure in form of a chieftaincy, which makes it very unique when addressing the socioeconomic challenges within a democratic society[23].

The community is part of the eThekwini Metropolitan Municipality, the largest municipality in the province, which is also the economic hub of the province with a population of 3.7 million (2016). 96% of the province uses electricity for lighting and 61% of the dwellings have access to piped water[23].

Maphephetheni is the only rural community in this project. Driving into the community, there are gravel roads, which become non-usable to public transport or small vehicles once it rains. This has a direct impact on the already minimal economic activity, which takes place in the community. Presently, the average household income is around R3 100 per month, which makes the affordability of electricity a major challenge for this community. Despite the community living on the banks of the Inanda Dam, Maphephetheni has a lack of adequate water supply, with only 10% of households having access to piped water and only 2% of households having access to flush toilets. Although 91% of households have access to electricity, which they primarily use for lighting, firewood is still the dominant source of energy for cooking and space heating[23].

The reason for the high use of firewood is due to power outages, which happen quite frequently. Because of the community's distance from urban centres, the community often goes without power for extended periods. Aside from gaining reliable access to energy, the community needs access to water and transport, which will allow them to still remain active during bad or heavy rain episodes.

As with the other communities in the project, the community representatives have very little knowledge about the IDP process. Although there is a local councillor, the community's primary means of engagement with local authorities is through the chief. A chain of command has to be followed when engaging on political issues such as energy access. The chief and the councillor share a fairly strong relationship, however that does mean that if issues are not deemed of high priority to the majority of the village then the matter is not likely to be taken up by the chief.

The provincial government has a programme to improve service delivery in the village called Sukuma Sakhe (which means stand up and

build), which organises meetings (known as war rooms) in the community on a month basis with various stakeholders to engage on issues relevant to the village. Two of the community representatives taking part in this *Energy SMART Citizens in Action* project are part of the leadership of this structure, which also sits with officials from the Departments of Agriculture, Social Development and the Police for the most part. All departments in the province should be represented in these meetings, however it is rarely the case. In fact, a community member said that the only time where all departments were present at these meetings was during the early phases.

War rooms exist in all municipalities in KZN, and various civil structures and representatives from the community and the city officials are expected to engage on the variety of challenges faced by the respective community. However, the potential of these meetings in finding solutions together is weakened by the limited understanding communities have of governmental processes and relevant policies.

The community organisation structure that the project engaged with was the Community Care Givers (CCGs). They are employed by the provincial health department to provide home-based primary healthcare to those in need. Because of the firm link between health issues and energy access, the organisation of care givers was eager to engage in the workshops to learn more about the impacts of indoor air pollution and the benefits of energy efficient cooking technologies and methods to enable low-income households to cook a hot meal every day.

KwaDukuza Municipality
Nkobongo and Shakashead

KwaDukuza Municipality (KDM) lies on the east coast of KZN, between eThekwini Metropolitan Municipality and Tugela River and forms part of the iLembe District Municipality. KwaDukuza is also home to King Shaka and also his final resting place. His settlement (Dukuza in Zulu) is situated in the area and includes a museum and a memorial site.

In KDM, Project 90 partnered with two different organisations based in two communities situated adjacent to one another - Nkobongo and Shakashead - to leverage the strengths of the respective communities.

Nkobongo has a total population of 19 528, 65% of its population is of working age and only 23% have received their matric certificate. Just over a third (36%) of the 5 800 households in the community are female headed with an average of three people per household. Although Nkobongo is categorised as an urban settlement with 95% of the dwellings being formal housing, only 2.4% have access to piped water and nearly 90% make use of pit latrine facilities. Almost all of the households use electricity for lighting[23].

The partner CBO in the community, Nkanyezi Empowerment, is a youth group that focuses on creating job opportunities for the youth in the community. Though still in its infancy, the CBO has had some experiences in engaging with their local authorities. Nkanyezi has been developing an idea to increase awareness of energy and electricity issues in the community. They are in the process of developing on a youth-focused proposal, which combines sports and recreation with education, to send to the municipality.

One of the primary reasons for the selection of this community was based on the level of activism and engagement of the youth. The community is continually raising awareness for the need of job creation, entrepreneurship and other activities to have positive impact on the socio-economic development of the community.

Shakashead is a community of 3 000 residents, 71% of which are within the working age. The community is surrounded by sugar cane plantations. Ballito and Stanger are the economic hubs closest to the community. Shakashead is a formal settlement – the dwellings on site are predominantly RDP housing units with access to basic services such as piped water (89%); flush toilets (92%) and lighting for electricity (96%) (Stats SA, 2011).

Unemployment is very high in the community and despite the high levels of access to basic services, the affordability of these services remains an issue for the residents. The statistics also indicate that 16% of households do not have access to energy sources for space heating, which is alarming considering that early RDP houses have been designed with poor thermal properties.

In this community, Project 90 partnered with a CBO called Taifa La Watu who works on education-related issues as well as employment opportunities for the youth in the area.

The biggest challenge to energy access in this community is brought on by the number of households who derive income from additional rental units on their property. There is significant pressure put on the electrical grid as a result of some homes having close to fifteen tenants renting rooms. All of these tenants draw electricity from one meter, which results in regular power outages.

Despite the lucrative rental-housing sector in the community, structures are very unsafe and there have been several reports of houses razed by fire or electrocutions that have come about as a result of the extensive network of (often illegal) connections. The municipality has recognised this safety hazard and has often attempted to intervene without much success thus far.

The KwaDukuza Municipality has been looking into developing a climate change adaptation programme where they can provide training to youth on energy and climate change-related issues. This aligned very well with the objectives of the Energy SMART Citizens in Action project, particularly in the development of a training manual intended for use by local community based organisations (CBOs). The outcomes of the project can provide the initial training for local communities for, inter alia, awareness raising and education in partnership with the municipality.

EASTERN CAPE PROVINCE

Kouga Municipality
Pellsrus

The Kouga Municipality is of strategic importance to South Africa as it is home to two wind farms, as well as being the proposed location for a new nuclear power station. This makes any engagement on energy-related issues a hot topic in the area stricken by unemployment, particularly as the proposed nuclear build is advertised by government as a job creation opportunity.

Pellsrus is located in the small holiday town of Jeffreys Bay situated around 80km from Port Elizabeth. It has a population of 3 136, and covers 1.87km^2 and 2 527 households[24]. It is also a mixed-dwelling community, with low access to basic services and a high unemployment rate.

Pellsrus is one of two townships that are in Jeffreys Bay and is characterised as a coloured township, while Tokyo Sexwale is a black township. Both fall under Ward 2 and share one councilor, but very strong political divisions along ethnic/race lines being present. And this tension also plays itself along political party affiliations. The country's main opposition party the Democratic Alliance (DA) has the majority of council seats in Kouga, with the African National Congress (ANC) a close second. The political tensions that exist in this community stem from the ruling party's (ANC) intention to build a nuclear power station in the area - with the promise of jobs and economic opportunity to surrounding communities, and a prominent group posing opposition to the nuclear build programme.

There has been an ongoing national debate on the efficacy of additional nuclear power versus the continued expansion of the flagship renewable energy programme in the country. Key issues in this discussion are the cost of building nuclear power plants, the safety issues in residing in proximity to the nuclear plant and governance-related issues such as transparency and accountability. The discussion has resulted in a factional division between groupings.

On top of this divide, the community faces several challenges with regards to energy access. Even though the community has been electrified, unemployment is high in the area and as such affordability of electricity is a challenge. The improvement of energy access in Pellsrus would require the implementation of low-cost interventions such as insulated cooking bags, maintenance and repair of defunct solar water heaters and the rollout of energy efficient lighting technologies.

Hankey

Hankey is one of many small farming communities in the Eastern Cape Province, situated between the Gamtoos Valley and the Baviaanskloof Wilderness Area. The Gamtoos Valley is known for its citrus and avocado fruit as the region's climate is well suited for the

crop and as such, economic activity in the region is bolstered by citrus exports. Hankey is also home to Sarah Baartman's gravesite, making it a national heritage site and home to the chieftaincy of the Khoisan clan.

Hankey is 21km^2 in size, with a population of 11 760, 51% of whom are coloured, Afrikaans-speaking residents. 65% of its population is of work age, with only 17% of the population having received a matric certificate. There are just over 3 100 households with close to four people per household, 42% of which are female-headed. As the Gamtoos Valley is dotted with citrus farms, the working population is employed on the surrounding farms, and in some cases, live under harsh conditions. Hankey mostly (77%) consists of Reconstruction and Development Programme (RDP) housing units, with some minor bond/council units as well as informal settlements. Only 37% of households have access to piped water and 84% use electricity for cooking.

Project 90's CBO partner in Hankey was the Khoisan Council, under the leadership of Chief Maarman who was the primary liaison for all our engagements. The council (based in Hankey) presides over the entire citrus valley and includes all the little towns dotted in the area. Many of the farm workers in the region belong to the Khoisan clan and all of the workshop engagements were organised under the auspices of the council - this was often the only way in which some farm workers would get permission to take some time off work.

Due to the very low level of income that farm workers receive, several of them do not have modern means of communication. On numerous occasions, Chief Maarman drove to each community and the farms to invite members to the workshops or to ask permission from farm owners for some of the workers to attend meetings. This often resulted in a high turnover of workshop participants, making it a great challenge to gain good traction when discussing stakeholder engagement strategies with the local authorities and farm owners.

Prior to this project, Project 90 had not worked with farm workers before, so this provided a valuable learning opportunity to develop a better understanding of the farm workers' living conditions, to determine their energy challenges and to establish the pathways to improving their access to energy.

CHAPTER 4: RESULTS AND ENERGY SMART RECOMMENDATIONS RESULTING FROM THE COMMUNITY ENGAGEMENTS

The *Energy SMART Citizens in Action* project was designed to provide a representative sample of the energy access realities of low-income households in South Africa. The highlighted issues and results of the engagements represent common trends that have emerged across community types and municipalities, and led to a set of recommendations, which were arrived through an extensive consultative process.

A common theme that emerged in many of the communities was that while the technical capacity of local government to enact policy decisions is in place, the ability to discuss and engage communities around projects is weak. In fact, in all of the communities there was very little awareness of energy governance processes. Free Basic Electricity, Free Basic Alternative Energy and Inclining Block Tariffs (IBT) were concepts not known to community members; with the regulations on tampering, fault reporting, the fines system, new service applications and various other elements of electricity governance not being well understood.

Relevant information is primarily available on local government websites, which is not accessible to community members without internet access. Similarly, community representatives had little knowledge about the Integrated Development Planning (IDP) process, which takes place every five years (with annual updates). The IDP has significant implications on community development for all areas and community members should be involved in the planning and plan-implementation processes.

Another communality was the variety of energy sources that are used at household level. The community representatives that were engaged with in the project reported that they use multiple sources of energy in addition to electricity. When asked why, the key factor reported was cost. The use of multiple sources of energy, even where communities have been fully electrified, suggests that people cannot afford to purchase more electricity than at present. In other words, access is constrained by affordability and the level of energy source diversity is a coping mechanism to deal with unaffordability.

A further issue is the almost universal prevalence of backyarders. A common practice in most of the communities is for the owner of a formal home to make provision for other residents to establish informal homes on his or her property. These additional homes most often make (legal) use of the formal home's services such as electricity via extension leads. Needless to say, when two or more households make use of a single supply point the meter for that supply point will register higher consumption than if there was only one household. Given that most municipalities make provision of FBE conditional on consumption remaining below certain thresholds, many households in this situation gain no access to FBE, despite being precisely the demographic that the policy is intended to affect.

A related problem is the widespread poor quality of electricity supply. The level of electricity supply differs in the communities. In the majority of a[hareas, access was via 40 amp feeds - with the exception of Hankey where some households had 20 amp lines and in Cape Town where all households are reported to have 60 amp feeds. While the level of supply is very often adequate for one household initially, it is common practice for electricity to be supplied to backyarders from the same 20 or 40 amp supply – resulting in the system being overloaded, necessitating rationing on a non-monetary basis. For instance, a woman in a backyard shack may have to wait her turn to cook until the cooking in the main house is completed. In such an instance, multiple sources of energy provide security of use despite the fact that the household is connected to the grid.

Other key issues that emerged during the workshop series included:

- Low levels of access to Free Basic Electricity as well as inadequacy of allocation.
- Extremely low access to Free Basic Alternative Energy.
- Poor understanding of energy efficiency and safe use.
- Lack of awareness of vendor protocols (fault logging, fines, complaints, applications, etc).
- Poor public participation in project planning and implementation of energy decisions.
- A high degree of powerlessness experienced by farm workers with regards to energy access rights.
- Inclining block tariff structures can have negative impact on the poor.

Analysis of the results from the community engagements, along with discussions with local government representatives and consultations with independent energy experts – led to the following key recommendations to be drawn, with the aim of improve energy access in marginalised communities in South Africa:

- Development of a national low-income household energy strategy with municipal implementation plans.
- Revision of the Free Basic Energy Strategy, to enable a higher number of low-income households to access FBE. The level of allocation of FBE needs to be increased.
- Factoring in predictive load-modelling & backyarder metering.
- Updating Free Basic Alternative Energy (FBAE) model and targeted diversification of fuel sources.
- Improving energy-related communication between. municipalities and communities
- Review of policy guidelines for the electrification of farm dwellers and policy guidelines for the electrification of informal settlement dwellers.

Why South Africa needs a national low-income household energy strategy with municipal implementation plans?

The post-Apartheid state has made tremendous strides in both connecting households to the grid as well as recognising that a free basic subsidy was required to improve access for low-income households. By 2006, however, it was becoming widely argued that FBE was not only missing significant numbers of people but that it was distorting energy usage towards inefficiency. In a 2006 paper on the impacts of FBE[25] Howells found that "FBE distorts the energy choices of poor households by encouraging them to cook with electricity, whereas alternatives such as liquefied petroleum gas (LPG) can deliver a similar cooking service at a much lower cost to society. An alternative energy scheme, such as providing households with clean energy credits equivalent in value to the FBE's cost, could deliver additional energy services worth at least 6% of total household welfare (and probably much more) at no additional public cost".

Despite this step, studies such as Dlamini's "Coping mechanisms of low-income urban households to escalating energy costs in South Africa[26]" from 2015, showed that the failure of energy poverty mitigation interventions due to declining affordability of electricity, unresponsiveness of FBE to large family size and the barrier to accessing FBAE while connected to the grid, resulted in deepening energy poverty and an increase in coping strategies. Dlamini argues

that in response to this status quo "households resort to switching to alternative combustible fuels like paraffin, wood, coal, and solid waste which leads to indoor and outdoor air pollution with related respiratory illnesses and under severe situations they resort to suppressing demand through options such as foregoing cooked meals, irregular bathing/ cleaning and space heating in winter".

The depth of the problem means that addressing the issue of energy poverty will be most effective in the context of a specific nationwide policy aimed at improving energy utility for low-income households by addressing the problem through multiple approaches. This kind of policy can only be drafted at national level since it must go hand in hand with revisions of policies such as FBE and FBAE policies.

The role of municipal governments is however crucial for the success of such a policy. Municipal governments need to consult with their communities and provide recommendations to national government on what policy measures would be the most adequate and effective. Local governments could also advocate for the need for national policy changes and development, based on their first-hand experience of the energy problems encountered at the municipal level.

In the absence of a national strategy, the City of Cape Town has already taken proactive strides in establishing a Low Income Energy Services Strategy to support and facilitate more sustainable utilisation of resources in their municipality – providing valuable learnings for other municipalities that are eager to follow this trajectory.

Through the project's community engagement process, the following recommendations have been developed - and should be strongly considered for inclusion or aligned with a Low Income Household Energy Strategy:

Revision of Free Basic Electricity Policy

The majority of the participants in the Energy SMART Citizens in Action project's communities have grid electricity at home. However, of those connected to the grid, most participants (around 70%) were aware of the Free Basic Electricity allocation, but were not receiving it. A number of the workshop participants at all community sites had backyarders on their property, of which a number of those backyarder dwellers were drawing electricity from the main house. This has led to a distorted view of energy consumption of these households - the meter reflects high electricity consumption, beyond the prescribed threshold established by the respective municipalities, resulting in the households becoming ineligible to receive FBE.

In addition, communities lack detailed understanding of the objectives and the benefits that FBE has as a poverty alleviation mechanism, and furthermore, every municipality has its own approach in implementing the FBE guidelines. This has resulted in communities not being able to engage with their respective government on FBE in a meaningful way.

The National Framework for Municipal Indigent Policies from the Department of Provincial and Local Government[27] opted to use a consumption-based targeting approach in the identification of indigent households qualifying for FBE, but as NERSA pointed out in its 2015/2016 review of FBE and consumption based targeting *"electricity is now more expensive and it makes it difficult for municipalities to identify low income households as indigent, which results in the intended beneficiaries of FBE not benefitting from it."* If the philosophy of the Free Basic Services is to alleviate energy poverty, then the policy needs to be made available for those who are most in need.

When the FBE policy was first developed the reasons for establishing the 50kWh standard were as follows:*"(i) 56% of households in South Africa connected to the national grid consume on average less than 50kWh of electricity per month; (ii) 50kWh per month is considered adequate electrical energy to meet the needs for lighting, media access and limited water-heating and basic ironing (or basic cooking) for a poor household; (iii) The level of 50kWh had been spoken of generally at national level and had been accepted as a norm in respect to free basic electricity. This quantity has achieved widespread political and community acceptance and expectation; and (iv) The utility of this 50kWh can be increased by using efficiency lighting interventions and other energy saving initiatives"*[28].

The state needs to investigate whether the 50kWh currently provided for FBE is sufficient to meet the basic energy needs of low-income households, especially in light of the fact that the "other energy saving initiatives" are not being rolled out from a municipal perspective. Initial research studies conducted for the FBE policy determined the average low-income household needs a minimum of between 40kWh – 60kWh worth of electricity, and the government settled on 50kWh, to be provided to households from the fiscus. This figure is highly contentious though as numerous of studies (including state reports) have stated that current levels of FBE are inadequate in terms of making a significant difference in the living standards of poor households especially those living in informal settlements[4,29,30].

One such study by Earthlife Africa in 2010[31] drew on a household energy study undertaken by Dr P Goyns of Enerkey (later to lead the IEP public consultations for DoE). His results suggested that households require more than 50kWh per household per month to meet the 'basic' needs in poor households. For example, four light bulbs of 60W used for four hours a day for a month will consume 20kWh; an electric stove that is used for one hour a day for a month uses 42kWh and boiling a kettle at least 30 minutes a day for a month uses 21kWh. Based on the findings in this report, Earthlife Africa Johannesburg proposed an amount of 200kWh per household per month the funding of this increase is far less prohibitive than many would assume.

It is perhaps NERSA itself that summarised this point best in its 2015/2016 report on national free basic electricity when it stated that *"For the free basic services that the government provides to the target market, all the custodians of that particular source including SALGA and CoGTA must put their head together to come up with the criteria that is inter-linked to all."*

There are innovative examples in South Africa, where a municipality has directed FBE funding in unconventional ways. One such example is that of the partnership between the iShack project based out of the Sustainability Institute at the University of Stellenbosch and the Stellenbosch Municipality. The iShack project has been able to access the monetary value of the FBE (50kWh/month) as a top-up to operating on a fee-for-service model for access to solar energy; with ongoing monthly payments from residents of the Enkanini informal settlement, which includes free maintenance and battery replacements. Unfortunately, not all residents were able to afford the monthly fees, so to lower the barrier to energy access, the iShack project is now offering a smaller (on-loan) "Free Basic" Solar Home System (SHS) which offers the free use (not free maintenance) of a solar home system that provides lights and cell-phone charging. The model also makes provision for the purchase of a TV designed to operate with the solar home system.

For similar projects, municipalities should consider to:

1. Provide some level of 'free service' and extend access to this free service across the whole community. This model is also more aligned with the FBE subsidy that the project receives.
2. Limit the ongoing free maintenance commitments that the project has towards all clients by:
   - Sharing risk, responsibility and ownership: taking system deposits and establishing a fee structure that relates directly to maintenance required, rather than indefinite rentals, and,
   - Linking a client's long-term fees to their own particular maintenance needs. This should encourage clients to look after their systems better, reducing the need for maintenance, with the benefit of saving money for the client and reducing the permanent capacity requirements of the project.
3. Support and incentivise the formation of Client Groups to help bolster payment compliance (unlock group support dynamics and information sharing, offer group payment discounts and give options for more convenient group payments).

In this way, the project can customise its maintenance capacity to match the level of demand and income. With such a model the baseline cost of keeping the utility going is covered by the municipal FBE subsidy. But all non-routine, client-specific services are paid for from client contributions (either drawn down from their savings or paid in by the client when required).

It is important to note that this kind of model needs customisation, so developing a locally appropriate business model is essential. Key considerations centre around the need for effective technology that address:

- Maximum battery life/protection
- Reliable switching mechanisms
- Vending platforms/options that rely less on project capacity
- Generating accurate, high-resolution data on actual energy consumption and generation in the target area.

Factoring in Predictive load-modelling & backyarder metering

South Africa, like many countries, makes use of the Herman-beta

algorithm to determine the load-modelling requirements for residential areas. The algorithm allows energy planners to compute the projected level of demand for an area - working mostly from historical data and trends in the form of a load profile model which in turn results in the sizing and design of the areas physical distribution network. According to the Electricity distribution guidelines, Part 1 [NRS 034-1:2007 - Edition 4: Planning and design of distribution networks:] the factors that influence network design fall into the following three categories:

1. fixed parameters within which the electrical designer might have to work, which include statutory requirements, existing services and layout, number of dwellings per hectare and the geography.
2. factors over which the designer has limited or no control, which include consumer loads (see 4.3) and diversity.
3. factors over which the designer should exercise control, which include the initial capital costs, new residential layouts , numbers and positioning of meters and sun stations, cable sizing and quality of supply.

Further to this, table 3 under section 4.3.4.2 (Characteristics to be considered) lists 1) Economic class of present and future residents; 2) Social characteristics, e.g. number of persons or households on each stand; 3) Community habits (shift work, etc.); 4) Load control methods ("ripple control", load limit switches or circuit-breaker tariffs); and 5) Cost of, ease of use of, availability of, and social preference for, alternative energy sources - as issues that can affect the nature of the load demand.

This same section states that "Overestimation ("safe estimate") will result in over-capitalisation, while underestimation results in a poor quality of supply which could lead to expensive reinforcement later" - so it is clear that electricity-planning officials are aware of the dangers of underestimation. Yet nowhere in engagements has the phenomenon of "backyarders" factored into the set of characteristics to be incorporated in making supply decisions. In all but one of the communities that the workshop series took place in, residents reported poor quality of supply. The distinguishing characteristic of the Hillview community where residents did not report poor quality of supply was that ALL households had their own meter and there were no backyarders present.

This leads to a few conclusions, the first being that despite the prevalence of backyarders in townships across the country, electricity service providers do not consider their effect on the load while planning, which not only leads to poor quality of supply but also prohibits the roll-out of backyarder meters due to the need to upgrade the network in the process of installing backyarder meters. An unintended consequence of this is that unmetered backyarders cannot access FBE, and in areas with inclining block tariffs, all households connected to the main meter end up paying for electricity at the higher block rates, despite their individual household consumption being very low.

Municipal energy planners are urged to factor in the inevitability of backyarders into the load profile assumptions so that "poor quality of supply which could lead to expensive reinforcement later" can be avoided.

Updating Free Basic Alternative Energy (FBAE) model

The 1998 White Paper on Energy introduced not only the need for a policy on the provision of FBE but also Free Basic Alternative Energy (FBAE). The policy was passed in 2007 and it stipulated "Municipalities have a responsibility to administer and provide FBAE to indigent households within their jurisdiction[32]". Local municipalities are expected to ensure that indigent households benefit from the implementation of this policy through a clear and transparent process. The policy document also outlines the procedures that should be followed by municipalities in identifying areas that are supposed to benefit from FBAE policy implementation such as households located far from the electricity grid or un-electrifiable households. According to the implementation guidelines, municipalities are supposed to select suitable energy carriers to be funded and 'delivered' to indigent households whilst taking care that these carriers are safe, accessible, affordable and sustainable. The primary justification for the FBAE policy was that the provision of grid electrification was not going to be universally feasible in the medium term and as such the equivalent of R55 per month of alternative fuels/ technology such as paraffin, Liquefied Petroleum Gas (LPG), photovoltaics, ethanol gel and other appropriate energy forms needed to be made available to unelectrified households to offset their lack of access to Free Basic Electricity (FBE).

While the state has made significant strides in electrifying households left outside of the system during the Apartheid years, there are still a significant number of people marginalised from the mainstream energy system. For them the application of FBAE must be regarded as a fundamental basic human right. Thus far, attempts to implement FBAE have centred on Solar Home Systems (SHS) and allocations of free basic paraffin, but there are a number of other options available to municipalities that could be used to address energy poverty in their areas.

Municipalities should investigate how non-electrical energy options can be made as safe and efficient as possible. Certain fuels are far more efficient at providing specific energy services than electricity and can be used to meet household needs. For example, gas stoves and induction cookers provide instant heat and do not have the lingering heat wastage (the heat that is wasted after cooking has finished) that electrical plate stoves have. Similarly, heating with coal or firewood is far more efficient than using an electrical heater.

There are also other technologies available that can play a major role in reducing the amount of energy required to perform tasks. Insulated cooking bags, energy efficient light bulbs, solar lighting, gel cook stoves, rocket stoves, water piping insulation, roofing insulation, natural heating and cooling, solar water heating, heat-pumps, induction cookers and water efficient shower heads can all help low-income households to save energy and reduce the money spent on energy.

One such example is the Aganang Municipality in Limpopo. The municipality established a FBAE project in 2010 that saw 500 households receive a stable, two-plate biogel cook stove, 10 litres of biogel per month for one year derived from sugar cane or other renewable agricultural sources, and two small solar-powered portable lamps. Some of the advantages of the new stoves include that water can be used on a spilt gel to put the fire out (the gel can then be scraped up and reused). The gel is non-flare, non-explosive, non-splash, non-toxic, as well as clean burning and odourless - with only very low carbon emissions and water vapour emitted. It can be used indoors and near children and pets as it does not pollute.

The advantages of the solar lamps are that they have no open flame, they emit no gases, they can operate for up to eight hours without recharging, they are powered by the sun and they are fully portable and can stand on a table or be hung from the roof.

While much can be done at the national level in revising the FBAE strategy to make it more effective, municipalities should use the system to come up with innovative ideas on how to improve the energy situation in their communities.

Improving energy-related communication between municipalities and communities

Despite the fact that all households in South Africa make use of at least one form of energy (electricity), the level of awareness of energy alternatives at the domestic level, and particularly in low-income households, is far from adequate. Knowledge of electricity tariffs, accessing FBE and FBAE, fault reporting, applying for new connections, paying fines, illegal connections (both with regards to safety as well as with regards to penalties), energy safety and energy efficiency are all far from what they should be.

The implications of energy poverty and energy efficiency, in particular, are not hard to imagine. With poor households paying more for energy services by virtue of their lack of awareness on how to reduce costs, stealing electricity through illegal connections such as connecting to a street light, meter tampering or through illegal vending of prepaid electricity is increasing at an unprecedented rate. The City of Tshwane alone reported losses of R416 million[33] in the 2013/14 financial year alone through electricity theft, meter tampering and faulty meters. This was an 83% increase over the previous year and aligned squarely with the first onset of serious price increases. In Ekurhuleni, losses from illegal connections are even higher at an estimated R800 million per year[34]. In informal settlements and low-income households, non-payment has been a tool for protest against rising electricity tariffs since the Apartheid era. But as payment enforcements improve (especially through pre-paid meters), energy poverty remains a harsh reality for many low-income urban households, and is a major driver for illegal connections and electricity theft in general.

The results from the workshops indicated that there is a lack of basic knowledge of energy issues and a high level of distrust and even animosity towards state electricity providers.

Finding effective mechanisms to communicate critical information about energy use and rights to energy to communities is essential in addressing energy poverty, tampering, non-payment, access by electricity department staff and overall energy-related service delivery.

Municipalities should aim to improve communication channels to the communities. Ekurhuleni and Kwa-Dukuza Municipalities have included the development of energy ambassadors to improve energy efficiency and electricity awareness in their IDPs, but have not implemented this initiative yet. By tapping into the Expanded Public Works Project (EPWP), or Community Works Project (CWP), municipalities can cost-effectively deliver much-needed information into the hands of communities while positioning themselves to be able to benefit from reduced tampering, improved support staff access and better-informed communities. The benefits of taking this approach are exemplified by the outcomes that were achieved in the Nyanga project site where street committee leaders played an active role in first discussing electricity service challenges with municipal officials and then later in communicating key information through street committee meetings. Changes in perception of the levels of service pre- and post-engagement were significantly positive.

Review of policy guidelines for the electrification of farm dwellers and policy guidelines for the electrification of informal settlement dwellers

This is a recommendation that specifically address Kouga Municipality and Ekurhuleni Municipality. Of all of the low-income communities that participated in this project none were quite so disempowered as the farm workers communities in Hankey and the unelectrified community in Tsakane. A review of both policy guidelines targeting the electrification of farm dwellers, as well as informal settlement dwellers is recommended.

An analysis of the policy guidelines for the electrification of farm dwellings[35] helps explain the dwellers' sense of disempowerment when the document includes extracts such as the following: "The farm owner has rights to the running of his/her farm. Furthermore, farm dwellers live on privately owned land; this means that the farm owner cannot be forced to electrify the farm dweller houses in his/her farm." The document goes on to state: "The responsibility for paying the local licensed entity for the consumption rests with the direct customer (the farmer). However, the option of making farm dwellers pay for usage or including / not including it as part of the wage package is for the farmer's discretion."

In practice this means that farm workers have virtually no power when it comes to determining what form of connection they receive, how their consumption is determined, how much they are charged or whether they can be disconnected or not.

The policy also sets out the options for electrification of farm dweller houses – indirect or direct supply to the grid and an off-grid supply. Indirect supply is the preferred method and is the most commonly found method in the project areas. This is where the dweller is not supplied by a licensed entity (ESKOM or municipality) but is rather supplied through the farmer's bulk meter, who carries all the connections and consumption costs, but who can also then pass on costs to the farm workers.

Though the policy does allow farm owners to include electricity costs as part of wage packages, community representatives reported that little-to-no consultation has taken place to establish the actual consumption by dwellers, or at what rate they are to be charged. One community representative reported: she had lived in her home for over 50 years, but now that she had become ill and could no longer work, the farm owner had unilaterally increased her electricity bill to an unaffordable level (in excess of R500 per month) and she was not in a position to contest the increase.

CHAPTER 5: CONCLUSION

With the support of the European Union, Project 90 was able to undertake the *Energy SMART Citizens in Action* project and gained valuable insights into the daily realities of eight formal and informal settlements in peri-urban and rural environments of South Africa. The project sought to: understand the local energy usage dynamics, develop an understanding of the concerns and needs of communities in South Africa and develop recommendations for engaging local government on energy issues that can lead to improved energy access.

This SMART Local Governance Report aims to give an overview to the results gathered over the two-and-a-half year engagement process, and summarises the needs and concerns of communities. By putting forward a number of recommendations for sustainable and equitable energy solutions, the report provides a guide to energy planners in particular on some of the key issues faced by low-income households with regards to energy access, while offering a set of possible solutions on how to address these challenges.

The research report argues that it is becoming harder for communities to afford access to sufficient energy. Because of the rising costs of electricity, many households have to choose between energy and other essentials such as food, clothing and housing. Energy support schemes such as Free Basic Electricity (FBE) and Free Basic Alternative Energy (FBAE) are not accessible for those that need the support the most. High density living and the sharing of electricity meters and lines result in much higher consumption patterns than the electricity grid and system is able to cater for and the support mechanisms is able to cover.

Knowledge is key to ensure effective governance in South Africa. Where people do not possess the knowledge about processes and rights, their ability to effectively participate in energy governance such as planning processes is low, and therefore they cannot act in favour or against future energy planning. Communication between local authorities and communities is not only hampered by a lack of knowledge but also by rising costs, lower revenue, policy constraints, budget cuts and frustrated constituents – all of which local governments struggle to deal with on a daily basis.

This report aimed to summarise what Project 90 had learnt from a spectrum of communities - by listening to the stories of low-income households around the country, understanding their positions and concerns and finally conveying their message to decision makers in a constructive manner.

South Africa is in need of a national Low Income Household Energy Strategy to revisit and rework the relevant policies on issues such as FBE, FBAE, farm-workers electrification and public participation, as well as to provide better support to communities who struggle the most with increasing energy and electricity costs. Research into the benefits of diverse energy sources is necessary, and instead of seeing electricity as the only solution to the country's energy crisis, South African municipalities should equally look into alternative solutions. Predictive load modelling and backyarder metering are crucial to set up a just and sustainable electricity infrastructure for low-income households. And lastly, municipalities should find effective mechanisms to communicate critical information about energy use and energy rights to communities in addressing issues such as tampering with equipment, non-payment and overall energy-related service delivery.

Local and national energy officials have a multitude of considerations to take into account when making complex decisions that not only represent the interests of its stakeholders but also the shifts that are emerging in the energy landscape on a local and national level. This Energy SMART Local Governance Report presents a series of workable solutions, developed through the project's consultative engagement process, with the aim of alleviating the energy poverty situation in South Africa, and ultimately in making a positive difference to low-income communities in South Africa.

[1] http://www.egi-sa.org.za/wp-content/uploads/2013/05/smartelectricityplanningreport-060520132.pdf.

[2] http://www.poweroptimal.com/infographic-eskom-tariff-increases-vs-inflation-since-1988-projections-2017/

[3] http://www.energy.gov.za/files/media/Pub/Survey%20of%20Energy%20related%20behaviour%20and%20perception%20in%20SA%20-%20Residential%20Sector%20-%202012.pdf

[4] http://www.cityenergy.org.za/uploads/resource_85.pdf

[5] http://www.gov.za/speeches/minister-tina-joemat-pettersson-energy-dept-budget-speech-vote-201617-11-may-2016-0000

[6] http://www.statssa.gov.za/?page_id=1856&PPN=P9114&SCH=7032

[7] http://www.statssa.gov.za/publications/P4141/P4141July2017.pdf

[8] https://90by2030.org.za/wp-content/uploads/2017/05/Energy-Scenarios-for-RSA-CSIR-Tobias-Bischof-Niemz.pdf

[9] http://www.gcis.gov.za/content/resourcecentre/sa-info/yearbook2015-16

[10] http://www.cityenergy.org.za/uploads/resource_429.pdf

[11] http://www.energy.gov.za/files/media/Pub/State-of-Renewable-Energy-in-South-Africa.pdf

[12] https://www.ipp-projects.co.za/Publications/GetPublicationFile?fileid=a5cfe14e-10b7-e611-9463-2c59e59ac9cd&fileName=20161129_IPPPP_Overview_Sep16.pdf

[13] https://www.iol.co.za/news/politics/city-of-cape-town-to-fight-for-resilient-energy-goal-in-court-8735872

[14] This varies widely by province (from 10% in Limpopo and 43% in Western Cape) and location (rural and urban)

[15] http://www.nersa.org.za/Admin/Document/Editor/file/Electricity/Legislation/Policies/Free%20Basic%20Electricity%20Policy.pdf

[16] http://www.polity.org.za/article/free-basic-alternative-energy-policy-households-energy-support-programme-notice-391-of-2007-2007-05-07

[17] http://cs2016.statssa.gov.za/

[18] This is likely to be an underestimate, as it relies on self-reporting during the large scale community survey.

[19] http://www.statssa.gov.za/publications/Report-03-18-04/Report-03-18-042012.pdf

[20] The largest is in provided by Egoli Gas, and supplies over 7 500 homes and businesses in Johannesburg.

[21] EEO. Ekurhuleni Environmental Organisation. [Online] 2012. [Cited: 09 08 2017.] http://eeokwathemamonitors.blogspot.co.za/2012/04/paso-and-cosas-riots-in-kwa-thema-paso.html

[22] Stats SA. Census2011. Nyanga , WC, South Africa : s.n., 2011.

[23] Stats SA. Census 2011. Durban , KZN, South Africa : s.n., 2011.

[24] Stats SA. Census2011. Jeffrey's Bay, EC, South Africa : s.n., 2011.

[25] https://www.researchgate.net/publication/4947506_Beyond_free_electricity_The_costs_of_electric_cooking_in_poor_households_and_a_market-friendly_alternative

[28] http://wiredspace.wits.ac.za/handle/10539/20006

[27] https://www.westerncape.gov.za/text/2012/11/national_framework_for_municipal_indigent_policies.pdf

[28] http://www.energy.gov.za/files/households/guidelines_electricity_freebasic_2003.pdf

[29] http://www.nasho.org.za/wp-content/uploads/2013/09/SALGA-draft-policy-proposal_- BACKYARDERS-for-NWG-report.pdf

[30] http://www.cityenergy.org.za/uploads/resource_83.pdf

[31] http://earthlife.org.za/www/wp-content/uploads/2010/03/Free-Basic-Electricity-Final-Low-res.pdf

[32] http://www.nersa.org.za/Admin/Document/Editor/file/Electricity/Legislation/Policies/Free%20Basic%20Electricity%20Policy.pdf

[33] https://mybroadband.co.za/news/government/117892-electricity-theft-out-of-control-in-tshwane.html

[34] http://www.iol.co.za/news/south-africa/gauteng/ekurhuleni-tackles-illegal-power-connections-2080293

[35] http://www.energy.gov.za/files/policies/electrification/updated%20farm%20dweller%20policy%202010.pdf

[36] https://nationalplanningcommission.wordpress.com/the-national-development-plan/

"Today we are faced with a challenge that calls for a shift in our thinking, so that humanity stops threatening its life-support system. We are called to assist the Earth to heal her wounds and in the process heal our own - indeed to embrace the whole of creation in all its diversity, beauty and wonder. Recognizing that sustainable development, democracy and peace are indivisible is an idea whose time has come." -Wangari Maathai

The challenges we face today are unlike those experienced in the past, and in order to adequately address these issues - a shift both in thinking and in action is required.

From the highest level of policy development to the day-to-day choices around how to boil water - there is uncertainty on all levels. This uncertainty represents the broad spectrum of options that lie before us as we chart our path towards a better life for all. For many, their choices will be governed purely by what they can afford, meaning that millions of South Africans have to choose to spend their money on electricity or other essentials such as food and transport.

This document has been developed through months of dialogue with exactly those South Africans that stand to lose or gain the most out of these energy choices, but very few of the recommendations in this document can be implemented by them. For two-and-a-half years we have been listening to the voices of low-income households around the country and have undertaken the task to convey their messages to decision makers through the agency of this document. We cannot assume to represent all of the issues faced by all low-income households in all settings around the country, but we do believe that the issues communicated to us by the communities who participated in this project represent challenges that are prevalent throughout this country.

Of all the facts and figures presented in this report perhaps the single most shocking statistic is that in 2013 the Department of Energy estimated that 43% of South Africans are energy poor, spending more than 10% of their income on energy needs - with many in the lowest LSM group spending 25% and more of their income on energy. This is an appalling state of affairs, which this report argues can only get worse if a concerted effort is not made with the utmost urgency to address both the causes and the consequences of the rapidly shifting energy landscape.

The National Planning Commission's introduction to the NDP states that the core element to be addressed in order to ensure a decent standard of living for South Africans should be housing, water, electricity and sanitation[36]. Further to this, the NDP exhorts us to address "the underlying causes of poverty and inequality by redirecting the focus of policy making from short- term symptom- based policies to longer-term policies based on sound evidence and reason."

While laudable indeed, what this appeal lacks is the element of participation. The experience of this *Energy SMART Citizens in Action* project has demonstrated how effective communication between service delivery officials and community members can result in surprisingly sophisticated solutions to widespread problems. The collaborative work by the City of Cape Town in Nyanga and Hillview, the Low-Carbon Community Development strategy of KwaDukuza and the inclusion of energy ambassadors in the Ekurhuleni Municipality's IDP are all great examples of municipalities' thinking and acting anew. We do not expect that every municipality should begin to develop their own generation capacity, or that any municipality should stumble upon a universal cure-all for the country's FBE targeting problems; but what we do ask is that they recognise the enormity of the challenge, as well as the potential for all players to become active in collaborating with communities to co-develop effective solutions.

The beginning of Chapter 4 provides a list of the most common energy challenges across the communities covered in this workshop series, as well as a list of key recommendations for addressing these issues. Arriving at the set of recommendations was rooted in a consultative process, but the hard work of implementing and re-iterating still remains.

In the reading of a set of problems and possible solutions it is easy to forget the human face of the people who's lived experiences directed this research. Indeed, we are aware that the target audience for this document must be local and national energy officials who have complex choices to make to best represent interests of many stakeholders.

Our concern however, is that in this environment of rapid change, the interests of the most vulnerable have been lacking in voice and direction. By discussing and investigating real experiences on the ground we have arrived at what we believe to be a set of workable solutions that can reduce energy poverty.

Officials responsible for all types of service delivery are challenged on all sides by increasing obstacles to the achievement of their mandates. Higher costs, lower revenue, policy constraints, budget cuts and frustrated constituents are just a few of the common issues faced in the delivery of all basic services; but it can only be through the methodical work of dialogue, problem identification, solution co-development and constant reiteration that we can arrive at the South Africa that we all deserve.

We encourage you, the reader, to critically engage the content of this report and reflect on the role that you can play in making a difference in powering the future we all want.

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