ASSESSMENT OF FREE BASIC ELECTRICITY AND USE OF PRE-PAID METERS IN SOUTH AFRICA

Tafadzwa Makonese*[1, 2], David K. Kimemia*[1,2] and Harold J. Annegarn[1,2]
[1] University of Johannesburg, Geography, Environmental Management & Energy Studies, P. O. Box 524, Auckland Park 2006, Johannesburg, South Africa
[2] SeTAR Centre, University of Johannesburg, Bunting Road Campus.
* Corresponding authors: taffywandi@gmail.com; dkimemia@gmail.com

ABSTRACT

In 2000, the African National Congress (ANC) through its election manifesto, made promises to provide free basic services to all poor South Africans. This was later quantified as 6 000 litres of water and 50 kWh of free basic electricity (FBE) monthly per household. Regarding the issuance of FBE, qualifying residents were registered and had to agree to a pre-paid meter being installed. It is argued that the quantity of free basic electricity provided to poor households is inadequate to meet basic needs and improvement of the quality of life. Conversely, there has been resistance to installation and use of pre-paid electricity meters, especially in townships around Johannesburg. Although prepayment systems have been proposed as innovative solutions to the problem of non-payment and affordability in utility services, the use of such mechanisms is still controversial. This paper reviews and assesses free basic electricity and the use of pre-paid electricity meters in South Africa. It also contributes to the on-going debate on FBE and prepayment systems. Recommendations are given on creating viable and stable institutions to curb uncertainties in the provision of electricity services, and methods for identifying changes in aggregate welfare resulting in the adoption of pre-paid electricity meters. Information from this article can be useful for policy-making purposes in other developing countries facing resistance in marketing, dissemination and installation of pre-paid meters.

***Keywords*:** Free basic electricity, FBE, prepaid electricity meters, national energy policies, households, South Africa.

1. INTRODUCTION

Access to safe, clean, convenient, and cheap energy services is important to socio-economic growth and development. The notion of electricity as a basic human right is becoming more widely accepted and adopted in countries across the globe [1]. It is arguable that lack of access to appropriate level of energy services is one cause of slow social growth and development in South Africa. This explains the wide consensus that everybody in South Africa should be given access to basic energy services for cooking, heating and lighting. The question is how to actuate this consensus. Over the years, the South African Government worked hard to extend electricity to the majority of South Africans. By 1993, only 36% of the South African population had access to grid electricity [2]. From 1994 onwards, the Government fast-tracked the electrification process through the National Electrification Programme (NEP) - a government-financed initiative targeting the poor and the disadvantaged [3]. However, the Government realised that the increase in the electrification process would not automatically result in meaningful levels of electricity consumption by poor households due to diverse socio-economic dynamics [4], and consequently devised a social tariff to cater for indigent consumers [5].

In 2000, the African National Congress (ANC) through its election manifesto, made promises to provide free basic services to all poor South Africans. This led to the introduction of the *free basic electricity* (FBE) policy to address affordability problems related to electricity [3]. According to DME [6], FBE is defined as a limited electricity supply, supplied at no charge to the user, deemed sufficient to support basic energy services of a typical poor household as determined from time to time. In 2003 the first qualifying households connected to the grid received 50 kWh per month of free basic electricity. The 50 kWh allocated was regarded as sufficient electrical energy to facilitate access to the electronic media, lighting, and limited water heating, basic ironing and cooking services [6].

Although this approach has delivered basic services to previously marginalised communities, it is clear that the system is unsustainable as service backlogs continue to pile up. Recent service related riots, sometimes catastrophic with loss of lives, and destruction of public and private owned property, have continued to occur. Perambulates in Gauteng urban penumbras indicate simmering tensions between local authorities and affected residents over service delivery issues.

This paper reviews and assesses free basic electricity and the use of pre-paid electricity meters in South Africa. It is our contention that information on planning and implementation of FBE and prepaid electricity meters is scattered and this paper aims to bring together key information and critical commentary based on a review of literature and anecdotes, and our interviews during other community based researches. The paper contributes to the on-going debate on FBE and prepayment systems and draws recommendations on creating viable and stable institutions to curb uncertainties in the provision of electricity services.

2. FBE POLICY

In 2000, the South African Government announced a statement of intent to provide free basic water and free basic energy to the indigent. In respect of energy, the Department of Minerals and Energy (DME) considered liquid fuels and electricity: "*Recognizing that the provision of free basic services is primarily a social welfare function, which is the responsibility of Government, Cabinet accepted the proposals of the DME, regarding the process to develop a national EBSST*[1] *policy*" [7]. The DME developed the *Free Basic Energy* policy as a complementary policy to the Integrated National Electrification Programme (INEP) to ensure poverty alleviation by providing for effective electrical energy utilisation [6].

In January 2001, the following preliminary recommendations were made:

- "Provision of free 50 kWh of grid electricity per month to all households with concomitant blocked or stepped tariffs for electricity consumption beyond 50 kWh to mitigate the cost implication of the free basic electricity provided.
- The provision of free non-grid electricity to all non-grid electrified households (connected through the National Electrification Programme) funded from the energy component of the *Equitable Share*[2] to the maximum of R48-00 per household. Any difference between the future actual maintenance and operation costs and the subsidy will be borne by the consumer.
- Pilot projects were to be commissioned to determine the cost implications of the EBSST and to minimise the impact on the Electricity Supply Industry (ESI).
- Based on the outcomes of the pilot studies, the DME presented an EBSST Policy Framework to Cabinet for approval in 2002/2003 that culminated in the phased implementation of the EBSST policy on a national basis" [7].

Research findings and recommendations of the DME report were useful for deriving certain policy recommendations. For example, the basic utility of free basic electricity was established, together with the associated cost. It was suggested that an allocation of 50 kWh per month would be adequate for all poor households connected to the national electricity grid [1, 3, 7]. This proposed level of basic electricity was motivated on the basis of the research carried out by the Energy Research Centre, University of Cape Town and Eskom, which reported that 56% of households in South Africa connected to the national grid consumed about 50 kWh of electricity per month. It was also argued that the 50 kWh per month is adequate electrical energy for a typical poor household to meet the needs for lighting, media access, limited water heating, basic ironing and cooking. The utility level of this subsidy was suggested to be increased by using energy efficient lighting interventions and other energy saving initiatives [7]. It was further suggested that consumers who consumed more than the allotted 50 kWh per month would imply an ability to afford full electricity services and consequently could be charged the normal tariff for excess consumption above the free basic allowance.

Before the promulgation of FBE policy, some pioneering municipalities were already providing free basic electricity to indigent households on a voluntary basis. However, the subsidy was limited to the customers of distributing municipalities and consumers serviced by Eskom were initially excluded from this exercise [7]. Starting in July 2001, funding of this allocation of electricity was introduced in a number of municipal areas, with allocations varying from 20 kWh to 100 kWh per month. Funding for these allocations was made from internal sources of municipalities, the *Equitable Share* (inter governmental transfer allocation) and cross-subsidisation from other consumer categories. The Equitable Share funds are intended to be allocated to paying for services to indigent households.

DME commenced with the implementation of non-grid electrification in remote rural areas, using Solar Home Systems (SHS). The capital for these systems was funded through the National Electrification Fund (NEF).

2.1 REGISTRATION FOR FBE

Registration for indigent households was aided by the Department of Social Development and applicants had to meet the following criteria:

- Reside in a property whose municipal value does not exceed R150 000 (typical of a township house or RDP).
- The gross monthly income of all the members of the household does not exceed two state old age pensions.
- The applicant agrees to the limited service and stays in the programme for at least six months.
- The applicant agrees to installation of a prepaid meter free of charge.
- Misinformation by the applicant to the authorities would result in all benefits received during the service being debited to the applicant and appropriate legal action taken.

Of all the above qualifying conditions, the use of prepaid electricity has been most contentious as evidenced by resistance and uproar in certain communities around Johannesburg.

[1] EBSST is an acronym which stands for Electricity Basic Service Support Tariff.

[2] Equitable Share refers to the allocation of revenue to the national, provincial and local spheres of Government as required by the Constitution. (http://www.moneywebtax.co.za/moneywebtax/view/moneywebtax/en/page1019)

2.2 ROLL OUT OF FBE

DME recommended a 'self-target' approach to the initial roll out phase of FBE, which meant a twosome approach. First, the poor households would be given an option to apply for a current-limited electricity supply and then become eligible for the free basic electricity allocation. Second, the responsible electricity service provider would identify households consuming, on average, less than a pre-determined amount of electricity per month and then automatically apply the free basic electricity allocation to these households. It was argued that this approach will more accurately target the poor and would be less costly to implement and fund [7]. DME also considered the 'broad based' approach to the implementation of FBE based on an agreed allocation of free basic electricity to all legal household connections [1].

The 'self-target' approach of implementing the FBE has the following limitations. It was hypothesised that the electricity service provider would incur higher administrative costs including the cost of altering the current capacity of service connections, particularly in the case of households served by credit (conventional) meters. Current-limiting devices would also need to be installed on the service connection where these devices do not exist [7]. The major disadvantage of the 'broad-based' is that it results in a lot of *leakage* of FBE benefit to households that were not primarily targeted for the programme. This would cost the Government and service providers more money to implement the programme than when a specific target approach was used. For example, the Government Gazette [7] noted:

> "*There were 6.8 million domestic customers connected to the national grid in 2000. If 50 kWh of free basic electricity was proposed for all grid connected households, the .estimated cost to the Electricity Supply Industry (ESI) to supply a zero rated supply of 50 kWh per household per month (calculated at an average of 40 cents kWh based on 6.8 million grid-electrified households), would be R1.64 billion per annum, for the year 2001. This amount excludes infrastructure, vending systems and upgrading costs. These costs should be capitalised and be recovered from other non-targeted customers…*"

These costs were expected to increase with the rise in the level of electrification through the National Electrification Programme, notwithstanding the increase in electricity tariffs.

3. CRITIQUE OF FBE

The first challenge with the FBE relates to the amount of free basic electricity proposed in the policy. It is argued that the amount of FBE is inadequate for meeting basic energy needs, or for meaningful development and assistance for the poor [8]. Gaunt [5] contends that the role of electricity in alleviating poverty is not clear, although a government may rationally decide to provide electricity for social benefits of poverty alleviation and political gain, meeting the costs by reallocating resources.

There have been strong calls by COSATU and various other organisations to increase the FBE from 50 kWh to 100 kWh or more per month, contending that the 50 kWh is insufficient to cover basic cooking and refrigeration [9]. The Government argued that this amount was sufficient since poor households generally have a low demand for electricity and that about 56% of households consumed not more than 50 kWh per month [6, 10]. Gaunt [5] has argued that the provision of 50 kWh FBE has the potential to increase household's average monthly electricity consumption: "*…the average consumption of the smallest consumers has increased from about 25 kWh to 51 kWh per month after the implementation of the BEST, and slightly larger consumers have increased from about 71 to 93 kWh per month*" [5]. Some have argued that FBE does not take into account large urban households with multiple energy demands [11]. Such criticisms fail to recognise that FBE is meant to provide a quantum of free basic energy services with costs for extra consumption borne by the householder.

Prasad and Ranninger [12], contends that FBE does indeed have significant social benefits as demonstrated by their study, which showed that households have more money to spend on food, use less of other fuels and have more electricity days in a month than before. Furthermore, provision of basic energy support tariff could assist with reduction of combustion fuels derived indoor air pollution (IAP) that is associated with respiratory diseases burden [13]. Benefits of IAP reduction include better human and environmental health and lower health bill.

Table 1 gives a general overview of the energy used by various appliances. The table shows that a small refrigerator alone has the capacity to use up all the free basic electricity (assumed to be operating for seven hours per day), leaving nothing for any of the other services. This indicates that the FBE advocated for is insufficient for basic living needs. Even the 100 kWh per month given in other cities e.g. Tshwane and Johannesburg, would not be sufficient to cover basic living needs, as cooking on a single hot plate for one hour per day (Table 1) would be insufficient to prepare a standard daily meal. Provision of FBE has not weaned indigent households out of reliance on alternative fuels for heat intensive thermal purposes. Many households therefore continue relying on paraffin, coal and biomass to meet their daily energy needs. Over time this fact has been recognised by government and other stakeholders, thus the impetus for the development of clean, safe, and energy efficient combustion technologies. One of the stated intentions of the FBE policy was to ensure that the health impacts and risks of fuel burning domestic appliances are no longer a concern in poor peoples' lives [1].

Table 1. Typical energy consumption and estimated hours of use of basic domestic electrical appliances

Item	Power rating (w)	Daily use (h)	Days used	Monthly energy consumption (kWh)
1x Energy saver light	11	5.0	30	1.7
1x TV (B&W)	35	6.0	30	7
1x Iron	1 000	4.0	6	24
1x Kettle	1 000	0.5	30	15
1x Hot plate	1 000	1.0	25	25
1x Regular light	100	5.0	30	15
1x Refrigerator (20 L)	250	6.5	30	49

Source (Ruiters, 2009; DME, 2003)

Most of the low-income South African households still depend on old appliances that are energy inefficient to meet their cooking, refrigeration and heating needs. For example, if one buys and use one of today's energy efficient refrigerators, it will use at least 50% less energy than a ten-year old model. It is argued that today's refrigerators consume 75% less energy than those produced in the 1980s [14].

What could further hinder the provision of FBE to the poor is that a large proportion of the poor either do not have any electricity infrastructure at all, or if they do, still have great difficulties in accessing FBE [8]. Rising tariffs, declining standards of infrastructure, power outages, increased debt and disconnections continue to affect the effective implementation of FBE.

The FBE policy stipulates that indigent households applying for free basic electricity will have to be fitted with a prepaid meter. This mechanism is regarded as a major source of inequality in access to electricity. "*Given the uncertainty of income in poor households, they are often unable to buy vouchers and as a result homes are left without electricity. In addition, the unit cost of electricity is higher for those using a pre-paid meter as compared to metered customers*" [1]. A counter argument is that the prepaid meter assists the household to manage electricity usage and thereby end up consuming less than the post-paid connections.

Ruiters [8] contends that the administrative techniques and engineering technologies employed in the provision of FBE are meant to marginalise the poor forcing them to accept sub-standard services (e.g. a 10 Amp limited supply, which trips when several appliances are used simultaneously) in exchange for a small amount of FBE. Indeed, an underpowered supply is a nuisance to the households and the ensuing power outages force people to resort to use of dangerous flame illuminators. Frequent power failures lead to damage of electrical appliances, possible fire hazards, and the annoyance of dark nights. The provision of such a service to the poor has the potential to strengthen the government's bureaucratic power over the poor and mentally oppress them, limiting their capacity for resistance [15].

4. FBE IN SELECTED CITIES

FBE allocated to the poor varies from area to area depending on the agent administering the project. In cases where the municipality acts as the agent, FBE remains pegged at the proposed 50 kWh and in Eskom mediated areas qualifying households receive up to 100 kWh of free basic electricity per month.

Initially the city of Tshwane provided FBE to all domestic sectors regardless of financial standing and electricity use. An advantage of this implementation was the ease of monitoring the programme and related processes, and the fact that all indigent households are catered for. The disadvantage is that the approach resulted in a lot of 'leakage' of the FBE benefit to groups not identified as beneficiaries within Government poverty alleviation programmes [9]. In order to provide the service to deserving households, the city used a new targeting scheme whereby people who were registered by the Department of Social Welfare as indigents received 100 kWh of FBE per 30 day period. The extra 50 kWh of free electricity meant improved socio-economic benefits of electricity access.

In Johannesburg, until 2008, all prepaid and 'lifeline' customers received 50 KWh of FBE regardless of electricity usage but there were punitive stepped up tariffs for usage above the FBE limit. Any customer using under 300 KWh per month also received 50 KWh of FBE. As from 2008, all 'lifeline' and any consumer using less than 300 kWh per month received 100 kWh of FBE per month. To better target the indigent, the municipality used the indigent list from the Department of Social Welfare to assign 100 kWh of FBE regardless of monthly consumption [9]. To cut down on costs, the removal of customers using over 300 kWh per month was automated thus stemming significant 'leakage' of the benefit of FBE to non-qualifying customers and at the same time providing high levels of the service to qualifying customers [9].

In the city of Cape Town, 50 kWh of free basic energy is supplied to households using less than 400 kWh of electricity per month.

5. PREPAID ELECTRICITY METERS

Prepaid meters have been widely adopted by utilities in different countries across the globe. The prepayment technology was initially developed in South Africa in the late 1980s with the objective of supplying energy to a large number of low-income and geographically dispersed users [16]. Eskom and municipalities responded to the high rate of non-payment and the limited development of the infrastructure required for the dispatch and reception of credit slips by installing pre-paid meters in households. By

2003, Eskom had installed 3.2 million prepaid meters in over half of South Africa's electrified households [17]. The target beneficiaries were Black communities, but these meters have since been used beyond Black townships [8].

Prepaid systems allow users to consume energy only when they have credit in an 'electricity account', as supply is discontinued when such credit is exhausted [16]. From the consumer's perspective, prepayment systems may result in a better understanding of how much energy is being consumed, inducing more control of energy use and budget management [17]. From a utilities' service point of view, prepayment reduces risk of consumption without payment and improves cash flow [18]. Furthermore, there are no account posting costs, no meter readers required, and no disconnection and reconnection fees and other administrative hurdles [8]. However, the introduction of this mechanism has been met with a lot of resistance in some segments of the society, especially in the low-income urban households.

The installation of prepaid electricity meters results in financial difficulties for some consumers as they have to pay in advance for electricity from the date of installation. In some parts of South Africa, prepayment meters were forcefully introduced to most households with the aim of eradicating the culture of non-payment [3]. Ruiters [8] argues that use of prepaid meters has been made a condition for debt renegotiations and receipt of free services. Reports from Tembisa have indicated that residents pay twice as much for units at their municipality than when buying straight from Eskom. For example, when one buys a token for R50 they get 44 units from the municipality and 85 units for the same amount from Eskom. This shows a lack of harmony and joint approach in institutions responsible for providing FBE to the marginalised.

In Soweto, residents pointed out disadvantages of using prepayment meters and these included: the inability to buy pre-paid cards, limitation in the use of electrical appliances, and that once the units were purchased they were quickly used up [19]. In areas where the meters were installed without the consent of the consumers, non-payment of electricity prevailed. Despite implementation of the so-called highly effective monitoring system, many households are still able to access electricity without paying by merely fiddling and tampering with the system. Illegal connections or connections bypassing the pre-paid meters are widespread, and "businesses" of providing illegal connections flourish in many townships. Taylor [20] contends that early prepaid meters were prone to vandalism with residents using a syringe to put sugar water into them, after which the ants would move in to consume the sugar short circuiting the meter. This resulted in these households getting free electricity. As a result most municipalities adopted 'split meters' where the only thing in the house is the pad and the display, and the actual meter is situated outside the house in a box or on a pole.

6. ELECTRICITY PREPAYMENT: CASE OF SOWETO AND TEMBISA

In Tembisa, in the late 1990s, houses were moved from a uniform flat rate system of utility services billing, to a sliding scale of rates, and then to metered consumption, implemented through a combination of remote metering and prepaid systems. This resulted in a sharp increase in the cost to households of electricity services, with households that were not on prepaid meters being billed for arrears of thousands of Rands [21]. In 1997, this triggered violent behaviour from the residents who went on a vandalising streak of meters, to which the council responded by deploying private security systems and the army to protect the meters. The council wanted to ensure a constant cash flow and 'protection of revenue' and the residents were using collective knowledge to bypass meters and make illegal connections [21].

Regardless of the activism and protests, the prepayment system was implemented, this time with more stringent measures on its security. Instead of using overhead cables, the municipality substituted these with underground cabling. High-Tec™ prepayment meters were installed and they constituted a heavy metal cover requiring a hydraulic pump to lift, and an alarm linked to the municipality in case of forced entry.

In July 2011, there were further developments in the issues around prepayments and residents again took to the streets. Apparently they were protesting that their prepaid meters charge even when people have run out of electricity. This meant that some residents end up owing the municipality hundreds of Rands, yet they are on a prepaid electricity system. Again, residents complained that since the municipality was acting as the 'middleman' in selling prepayment tokens, it was costing the residents much more than buying directly from Eskom. Residents also complained that after recharging the account, the municipality sometimes take days to restore power. Zweli Dlamini, the municipality spokesman, said the council was in the process of upgrading the system and that 'all this' would be rectified immediately.

Another 'hot-spot' where the culture of non-payment is prevalent is Soweto. On 5 July, 2011 residents of Chiawelo in Soweto protested over Eskom's installation of pre-paid electricity meters in their area. The protests became so violent that protestors set fire to the ward councillor's house and car. Four years previously, Chiawelo residents allegedly agreed to become part of a pilot scheme to implement split meters that are tamper-proof. This has seen more than 90% of residents pay for their electricity, compared to their neighbours in other parts of Soweto, which have a poor payment record. Reports from local newspapers have indicated that since the installation of the prepaid meters, electricity tariffs suddenly increased. Since then, there has been a constant battle between the residents and Eskom. As a result of the tension over 100 of the 4 000 installed meters were vandalised, with Eskom technicians

repeatedly being chased out of the area. On the other hand, protesters blamed local councillors for allowing Eskom to install the *green boxes* without their consent.

7 POSSIBLE SOLUTIONS

7.1 COST BENEFIT ANALYSIS OF PREPAYMENT SYSTEMS

There is need to examine the adoption of prepaid electricity using cost benefit analysis techniques. This method consists of comparing the performance of the electricity distribution system based on the 'factual scenario' and the 'counterfactual scenario'. The factual scenario refers to after the adoption of the prepaid meters and the counterfactual to situations where the meters are not adopted. The welfare gains or losses are evaluated from the difference between the level of welfare in the 'factual' and 'counterfactual' scenarios [16]. This is based on the premise that "*adoption of prepayment meters should be encouraged if benefits exceed those of the best available alternative, which is represented by the counterfactual, but not adopted in the opposite case*" [16].

The model requires discerning the difference between the social value of the system under the prepayment system and its social value if that innovation had not been adopted. The model should be complemented with those corresponding to the model's sensitivity to changes in some distinguishing parameters and features of policy implementation e.g. tariff discounts.

7.2 SMART GRID AND INTELLIGENT SYSTEMS

There has been considerable interest worldwide in the concept of a 'smart grid' – a more efficient and reliable infrastructure for the transmission and distribution of electricity [22]. This system has the potential to intelligently match generation with demand and help shave demand peaks. Smart meters are often part of a smart grid and provide real-time electricity consumption measurements and outage notifications, as opposed to traditional meters that measure cumulative energy use and are typically read once a month. An obvious advantage of a smart grid is the openness and reliability that is available to consumers and suppliers. These systems have the potential to intelligently match generation with demand and help consumers to conserve energy and adapt usage to supply conditions [22].

The major highlight of smart meters to energy companies is the ability to switch non-paying customers to a pre-pay tariff. This can be done using remote switches to re-programme the meter, instead of replacing it. However, there can be a conflict of interest between energy companies (which want to sell more energy) and the Government (which wants to meet supply security and carbon emission reduction targets). Users of this system have the option to generate electricity from alternative means and feed back to the grid any excess electricity. For example in Germany, they have adopted a 'feed-in tariff' which guarantees a (subsidised) price for the output of micro-generation plant and has greatly boosted investment in renewable energy [22]. It has been argued that the number of feed-in customers is likely to be so low that advocating for mass-market meters would be un-economic.

7.3 SOUND INSTITUTIONAL STRUCTURE

The lack of local government capacity is an obstacle to the successful implementation of the FBE project. In some cases there is no structure to roll out FBE and in some municipalities there seems to be confusion as to whether free basic services (FBS) reside in the Chief Financial Officer's (CFO) office or in the relevant technical department (e.g. City Power) [1]. A strategically set up and conducive institutional framework has in most cases proved to be one of the prerequisites for successful technology dissemination. Central planning and reliance on numerous layers of bureaucracy have the potential to hinder effective implementation of FBE programmes across provinces.

7.4 KNOWLEDGE DISSEMINATION

DME proposed a 'self-target' approach for the roll-out of FBE where qualifying households approach the service provider indicating the desire to be considered for free basic electricity. According to Adam [1], most people interviewed implied that approaching the service provider meant the current would be cut down and pre-paid meters installed resulting in high electricity costs. This shows lack of understanding by the communities, both in terms of the technology and benefits of adopting such mechanisms. It is clear that service providers do not provide sufficient information and education about the technologies being used. The public should be educated on available options; the need to adopt the approved technologies; mechanisms for acquisition of the technologies (funding etc.); cooperatives and small-to-medium sized enterprises (SMEs) for enterprise and socio-economic growth.

Ultimately, this approach could provide the impetus needed for a vibrant energy market, where goods and services flow through the distribution chain. However, the introduction of the Independent System and Market Operator (ISMO) bill has been applauded by some sectors of business and the society as a much needed institutional support in the provision of electricity. The mandate of ISMO will include: "*…the planning of supply of electricity by generators through the national transmission system, electricity dispatch and aggregation in respect of sale of electricity by generators, act as the buyer of electricity from generators for the Republic of South Africa and sell electricity to ISMO Customers, in a manner that will minimize the overall costs of electricity to customers and to provide for matters incidental thereto*." [23].

7.5 FBE PROPOSED PER MONTH

It has been argued and shown in field and desktop researches that 50 kWh of free basic electricity is not sufficient to improve the social welfare of the poor [5]. A recent study shows that a minimum of 200 kWh per month of free basic electricity would result in a change of aggregate welfare for the beneficiaries of FBE [1]. Earthlife Africa Johannesburg has also proposed a model that includes cross-subsidisation, levies, and taxes to meet the financial obligations of the proposed 200 kWh of free basic electricity (see [1]).

In situations where sufficient FBE cannot be rolled-out, alternative energy sources and efficient alternative energy systems should be disseminated as stated in the Free Basic Alternative Energy (FBAE) programme. A roll-out of safe alternative energy technologies may reduce the tendency towards illegal electricity connections and help mitigate local electricity demand. Beneficiaries on the FBE programme should be encouraged to use electricity for lighting and electronics and alternative sources of energy for cooking and heating.

8. CONCLUSION

Despite an increase in the amount of FBE provided to the poor and indigent households in some major cities, the FBE is still pegged at a level too low to make a major impact on people's quality of life. FBE is provided on a household basis but does not pay regards to larger households, making it difficult for these households to manage and economise with 50 – 100 kWh of free electricity. A minimum of 200 kWh of free electricity has been proposed to be sufficient to meet basic energy needs of the poor and such an amount would go a long way in improving social development of the poor. The 50kWh allocation was based on research data collected almost ten years ago when FBE was initiated. It is possible that standards of living have since risen and the average South African household now requires more energy.

There is a high level of inconsistency in terms of roll-out of the project across the country. This is because Eskom and municipalities responsible for implementation in different areas do not follow the same principles, guidelines and standards, and pricing. Cities like Tshwane and Johannesburg are giving out up to 100 kWh of free electricity per month and some small towns and cities registered with the municipality are sticking to the proposed 50 kWh per month. The supply inconsistencies might be solved with the promulgation of a bill that provides for establishment of an Independent System Market Operator (ISMO), whose major function is to cater for electricity distribution throughout the country. The bill envisages that ISMO will lead to a minimisation of electricity prices charged to a consumer.

It is clear from this assessment that FBE distorts the energy market and creates a culture of dependency whereby poor consumers expect the Government to meet all their energy demands. In addition, FBE gives a false expectation that grid electricity is enough to provide all household energy services, while it is possible to meet some of them more cost-effectively with efficient utilisation of common paraffin, and with LPG in more well-off households. On the other hand, FBE does not represent the best way to ensure equity, innovativeness, sustainability, and technology penetration. The current system of FBE delivery has created a culture of entitlement and lack of enterprising spirit. (In addition, the FBE implementation makes no provision for providing energy services for indigent households not connected to the grid).

Prepayment and use of pre-paid meters has been deployed in previously electrified households as a means of 'revenue protection', ensuring that the electricity supplied was paid for. This mechanism has been received with widespread resistance, with some communities complaining that the prepayment meters kept on charging even when there was no credit left, resulting in some households accumulating spurious debt of hundreds of Rand to the municipality. Others complained that they had to stand in long queues and that much time and money was spent in vending transactions. This has prompted some residents to demonstrate and vandalise public entities and property belonging to some councillors resident in 'hot spots'.

On the other hand, prepayment systems have aided in revenue collection systems especially in problematic or 'hot spot' areas (e.g. Soweto and Tembisa) where the use and payment of electricity is overly politicised. However, the implied right to electricity obliges the state to ensure equitable energy services to all citizens. This means that everyone should receive an equal and an equitable standard of service regardless of their socio-economic standing.

REFERENCE

[1] Adam, F.: *Free Basic Electricity: A Better Life for All*, Earthlife Africa, Johannesburg. February, 2010.

[2] Davidson, O. & Mwakasonda, S.A.: "Electricity access for the poor: a study of South Africa and Zimbabwe", *Energy for Sustainable Development*, Vol. VIII No 4, 2004, pp. 26-40.

[3] Malzbender D. & Kamoto, B.: *Domestic electric provision in the democratic South Africa*, Nordic Africa Institute's Conflicting Forms of Citizenship Programme, September 2005. http://www.acr.co.za/pdf_files/01.pdf (accessed 18 January 2012).

[4] Mapako, M. & Prasad, G.: "The Free Basic Electricity (FBE) policy and rural grid-connected households, solar home systems (SHS) users and un-electrified households", *Domestic Use of Energy Conference*, Cape Peninsula University of Technology, Cape Town, 2005.

[5] Gaunt, C.T.: "Researching a basic electricity support tariff (BEST)", *Domestic Use of Energy Conference*, Cape Peninsula University of Technology, Cape Town, 2003.

[6] DME: Free basic energy policy guidelines (low-income household energy support programme, DME, South Africa, 19 May 2004.

[7] DME: "Electricity basic services support tariff policy", Government Gazette, Vol. 457, No. 25088, Republic of South Africa, July 2003.
[8] Ruiters, G.: "Free basic electricity in South Africa: A strategy for helping or containing the poor", in D.A. McDonald (ed.) *Electric Capitalism: Re-colonising Africa on the power grid*, HSRC, Pretoria.
[9] SEED: "Municipalities meeting the call for increased levels of household FBE", *URBAN SEED Update*, Vol. 2, No. 2, September 2008, pp 1-2.
[10] DME; Guidelines for the Introduction of Free Basic Electricity Service, Department of Minerals and Energy, Pretoria, 2003.
[11] Dugard, J.: "Power to the people? A rights-based analysis of South Africa's electricity services", in D.A. McDonald (ed.) *Electric Capitalism: Re-colonising Africa on the Power Grid*, HSRC, Pretoria, 2009.
[12] Prasad, G and Rarringer, P.: "The social impact of the basic electricity support tariff (BEST)", *Domestic Use of Energy Conference*, Cape Peninsula University of Technology, Cape Town, 2003.
[13] Sparks, D.A., White, N.W., and Mwakasonda, S.: "Environmental and health impacts of the basic electricity support tariff", *Domestic Use of Energy Conference*, Cape Peninsula University of Technology, Cape Town, 2003.
[14] NRDC: *Efficient appliances save energy and money*, Natural Resources Defence Council, 2010. http://www.nrdc.org/air/energy/fappl.asp (accessed 18 January 2012).
[15] Escobar, A.: *Encountering Development*, Princeton University Press, New Jersey, 1995.
[16] Casarin, A.A. & Nicollier, L.: *Prepaid meters in electricity: A cost benefit analysis*, Working Paper Series, IAE Business School, Austral University, March 2009.
[17] Tewari, D.D. & Shar, T.: "An assessment of southern African prepaid electricity experiment, lessons learned, and their policy implications for developing countries", *Energy Policy*, Vol. 31, 2003, pp. 911-927.
[18] Maphaka, M.: "Challenges and risks in universal provision of electricity energy in South Africa", Approaches and Challenges in Slum Classification, UN Headquarters, Nairobi, 26-28 October 2009.
[19] Nefale, M.: "A survey on attitudes to prepaid electricity meters in Soweto", Johannesburg: Law and Transformation Programme, Centre for Applied Legal Studies, University of Witwatersrand, 2004.
[20] Taylor, D.: "Historical perspective on the development of prepayment industry and technological advancement in South Africa", Unpublished report, Actaris, 2006.
[21] van Heusden, P.: "Discipline and the new 'logic of delivering': Prepaid electricity in South Africa and beyond", in D.A. McDonald (ed.) *Electric Capitalism: Re-colonising Africa on the Power Grid*, HSRC, Pretoria, 2009.
[22] Anderson, R. & Fuloria, S.: *On the security of electricity metering*, 2010 http://www.cl.cam.ac.uk/~rja14/Papers/meters-weis.pdf (accessed 24 January 2012).
[23] Department of Energy: *Independent system and market operator bill*, Government Gazette No. 34289, Notice 290, Republic of South Africa, May 2011.

AUTHOR(S)

Author:

Tafadzwa Makonese is a PhD (Energy Studies) candidate at the University of Johannesburg. His main focus is on the development of alternative protocols and stove testing procedures for different fuel/stove combinations. His current research interests are on the formation, development and transformation of fine particles from domestic coal combustion processes. taffywandi@gmail.com

Co Author:

Prof Harold Annegarn has researched atmospheric pollution, environmental management and energy efficient housing in southern Africa for 30 years. He has supervised over thirty MSc and PhD students. His current research interests are on energy and sustainable Megacities, through the EnerKey programme in partnership with the University of Stuttgart; and the development and testing of improved domestic combustion stoves, and their contribution to air pollution reduction. hannegarn@gmail.com

Author:

David Kimemia holds a MSc. in Environmental Management. He is currently reading for a Doctorate in environmental management at the University of Johannesburg. His research interests interrogate the interface between society, environment, energy and economy. The current research pursuits are situated in the following themes: renewable energy; environmental management; waste management, water management, environmental impact assessments and air quality management. Email: dkimemia@gmail.com

Presenter: The paper is presented by David Kimemia.