TRADE AND INDUSTRY CHAMBER

FUND FOR RESEARCH INTO INDUSTRIAL DEVELOPMENT,
GROWTH AND EQUITY (FRIDGE)

A study into approaches to minimise the impact of electricity price increases on the poor

Final Report

April 2010

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Contents

Table of abbreviations

COGTA	Department of Cooperative Governance and Traditional Affairs
DME	Department of Minerals and Energy
DoE	Department of Energy
FBE	Free Basic Electricity
FRIDGE	Fund for Research into Development, Growth and Employment
GWh	Giggawatt hour
kVA	Kilovolt ampere
kWh	Kilowatt hour
NEDLAC	National Economic Development and Labour Council
NERSA	National Energy Regulator of South Africa
RED	Regional Electricity Distributor
SALGA	South African Local Government Association

Executive Summary

Context and purpose

The cost of generating electricity is increasing as a result of a need to develop new generation capacity.[1] The cost of distributing electricity needs to increase to provide adequately for maintenance and rehabilitation of the network.[2] Failure to find the resources to match these necessary and efficient expenditures will result in supply shortages and a degraded, unreliable network. This will increase the cost of doing business, reduce foreign direct investment and negatively affect job creation. These impacts will be felt most acutely by poor households. Therefore, finding the resources to match the necessary expenditures is pro-poor. However, sharply rising electricity costs and prices will have a significant impact on the welfare of poor households and effective ways need to be found to target affordable subsidies that will mitigate these impacts.

Establishing a framework for protecting poor households through tariff and subsidy design, in the context of increasing costs, is the primary focus of this study, as it is these measures that will have the greatest impact on poor households.

Existing pro-poor subsidies are significant

It is important to note that existing pro-poor subsidies (that is, electricity subsidies to protect poor households) are significant. These are summarised in the table below.

Table 1: Existing pro-poor subsidies

Subsidy	***Amount*** *(R billion per annum)*	***Comment***
Electrification grant	2.7 [1]	During the last few years, new electricity connections have not been keeping pace with new household formation.
Free Basic Electricity	1.0	Data uncertain, could be substantially less. Many do not receive FBE.
Eskom tariff subsidy to poor households	2.1	Cross-subsidies to poor households within municipalities are excluded. The available data on this is poor and it is hard to quantify these subsidies.
Theft	2.5	About 4 000 GWh per annum, equivalent to 50% of Eskom's domestic sales. Excludes municipal theft.
Total	**8.3**	More than 10% of revenue in the industry.

Notes: 1. Submission to parliament by Minister of Energy, 4 February 2010

[1] Eskom's costs (and hence prices) will increase by a factor of 1.95 (25% per annum for three years) over the next three years.

[2] Electricity Pricing Policy (2008).

It is also important to note that not all poor households currently get subsidies.

The electrification grant has not yet reached all poor households. There are still 3.4 million households (25%) without electricity. About R60 billion is needed to connect these households.[3]

The Free Basic Electricity grant does not get to all poor households. It is estimated that about R4 billion per annum will be needed in future to cover the cost of providing 50 kWh of Free Basic Electricity to 4 million households.[4]

Full application of existing policies will increase subsidies substantially

The total cost of applying existing pro-poor subsidies fully will rise substantially as a result of more comprehensive cover combined with an increase in electricity costs. Indicative figures are presented in the table below.

Table 2: Indicative future pro-poor subsidies (existing policies with greater coverage and higher costs)

Subsidy	***Amount*** *(R billion per annum)*	***Comment***
Electrification	6	To achieve universal access in 10 years.
Free Basic Electricity	4	50 kWh to 4 million households.
Tariff subsidy for poor households	5.5	4 million connections.
Theft	5	Assume constant 4 000 GWh per annum at higher cost of supply.
Total	**20.5**	A 2.5 times increase in real terms, representing more than 25% of current sector revenues.

Note: Eskom's costs are assumed to double over a three-year period. See main report for details.

The important point to note here is that the full implementation of existing policies within the context of increased costs could result in subsidies that are reaching possible fiscal and macro-economic constraints.

Subsidies that are not pro-poor negatively impact poor households

There are also substantial subsidies that are not pro-poor:

⇒ Farmers get a subsidy of R2 billion per annum;

⇒ Energy intensive industries with special price agreements get a subsidy of about R1 billion per annum at present; and

[3] 2009/10 Rands. In 2010/11 R2.7 billion will provide 150 000 connections.

[4] Assuming Eskom's generation cost doubles in next three years from about 30 c/kWh to 60 c/kWh, and 50% of connections eligible. Note that this 4 million households refer to households who already have electricity connections, but do not receive FBE. In other words, this is over and above the 3.4 million unserved households referred to in the previous paragraph.

⇒ Municipalities pay more than cost for their bulk supply by about R1.4 billion per annum.

These subsidies are relevant because they negatively affect poor households by reducing the amount of money available to subsidise poor households.

Correcting these distortions would reduce the cost of electricity supplied to municipalities by about 7.5% (current costs) and could make available about R1.6 billion per annum which could be used to subsidise poor households.

Approaches to protecting poor households

Subsidising the cost of electricity for poor households is by far the most effective mechanism to protect poor households. The costs involved in doing this are substantial, as already indicated above. For these reasons, this study has focussed much of its attention on electricity tariff and subsidy design.

There is a sound rationale to subsidise tariffs to poor households. The most significant benefit is moving from no electricity to access to electricity. Affordable access can be promoted through:

⇒ Connection fee subsidies (low or zero cost to get connected); and

⇒ Monthly fixed fee subsidies (low costs for low levels of consumption).

There are various ways to subsidise consumption:

⇒ Free basic allocation

⇒ Tariff subsidy with or without consumption limit

Subsidies can come from two sources: government revenue or cross-subsidies within the electricity sector.

International best practice

The lessons from international best practice are clear. First, subsidise connections to the grid through zero connection costs because the poorest households are those without electricity.[5] Then subsidise fixed costs (no monthly fixed fee).[6] Then provide a free allocation to support use of at least a basic amount that provides a strong public good (in particular, access to lighting and communications which supports education and which reduces the household and social costs of unsafe energy sources such as paraffin and candles).

It is best to maintain an energy charge that is related to the variable cost of providing electricity. This provides the appropriate signals to value electricity and to use it wisely. If necessary, this can also be subsidised, but subject to a consumption limit otherwise this subsidy will tend to benefit large consumers more than poor households and become very expensive.[7]

The total subsidy needs to be affordable and sustainable.

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[5] Subsidising connection costs promotes access to the grid. This is an important benefit for households without access to electricity and is pro-poor.

[6] Subsidising fixed costs for a category of small users lowers the entry cost of use and is pro-poor. Fixed costs are sunk costs and hence subsidising these costs does not affect the efficiency of use.

[7] Subsidising the variable energy cost will always benefit larger users more than small users and therefore is inherently regressive unless the energy subsidy is limited to a defined group of poorer users. This is possible through service level and tariff level self-selection

The better the subsidy is targetted, the greater the benefit to poor households. A general subsidy is the least pro-poor tariff. The international literature (on theory and practice) overwhelmingly recommends service level and tariff self-selection as the best practice to target electricity subsidies to poor households. This approach is objective, allows free choice, is effective (low errors of inclusion/exclusion) and is inexpensive to implement. The alternatives - indigent registers, income determination, and area targeting - all suffer from significant disadvantages.

South Africa's pro-poor tariffs align with international best practice

South Africa's primary pro-poor tariffs align with international best practice, as shown in the table below.

Subsidy	***Best practice?***	***Comment***
Electrification grant	Yes	This is the most pro-poor subsidy.
Free Basic Electricity	Yes	Promotes affordability of modest use with high public benefit (lighting, communications).
Eskom Homelight tariff [8]	Yes	This is a well-targeted subsidy with zero fixed monthly cost and no connection cost.

A number of existing practices do not align with best practice

A number of other practices in the electricity industry in South Africa do not align with international best practice. These are described in the table below.

Subsidy	***Comment***
Theft	This practice is extensive (1.3 million connections or more), inequitable and threatens financial sustainability.
Subsidies to large industries	Subsidies to large industries come at a high opportunity cost for poor households.
Subsidies to farmers	Similarly, subsidies to farmers come at a high opportunity cost for poor households.
Municipalities pay more than cost	Municipalities supply a large proportion of poor households nationally and this practice is therefore not pro-poor.
Cross-subsidies within municipalities	At present, cross-subsidies within municipalities for electricity are not transparent (poor reporting on costs, lack of ring-fencing), hard to quantify, and are inequitable (poor households in the poorest municipalities benefit the least).

[8] Eskom's Homelight tariffs are its tariffs for low-income "modest-usage" consumers (typically less than 500 kWh per month). Eskom's tariff terminology is explained in the main report.

A strategy to protect poor households

In light of the above, the appropriate strategy is to extend and build on the best practices whilst ensuring financial viability and fiscal affordability, and to eliminate or reduce the subsidies that are not pro-poor (to free more resources to protect poor households).

Gaps in implementation

The current gaps in protecting poor households have more to do with implementation difficulties rather than the approach. The main implementation gaps are as follows.

In the case of the **electrification grant**, strategies need to be developed to increase the pace of new connections and effectiveness of spending.

In the case of the **Free Basic Electricity grant**, practical obstacles to a wider reach of the benefit need to be addressed before considering increasing the amount of the benefit.[9]

In the case of **Eskom's Homelight tariff subsidy**, the number of "inactive" connections needs to be decreased by addressing theft effectively.[10] This will convert an informal subsidy into a formal subsidy with more equitable outcomes.

In the case of **municipal pro-poor tariffs**, there are too many tariff categories, the equivalent of Eskom's Homelight tariff subsidy option is often not available, there is a lack of transparency around costs and subsidies and households in poorer municipalities are disadvantaged.

Who is poor?

For the purposes of this project, a pragmatic approach has been adopted, in which poor households are defined as follows:

- Households without an electricity supply (about 3.4 million households);
- Households with a demand limited 20 Amp supply (about 2.5 million households); and
- Households with a single-phase 60 Amp supply (or lower) and that consume modest amounts of electricity (such as the Eskom Homelight 1 customers with 60 Amp supplies and prepaid meters) accounting for about 1.5 million households (there is no accurate estimate of this number available).[11]

This approach is consistent with the Electricity Pricing Policy.

Institutional arrangements affect pro-poor strategies and options

More than half of domestic connections are provided with electricity by Eskom (about 4.1 million connections). The majority of these households are poor. The six metros provide electricity to about 30% of domestic connections (about 2.4 million connections). The remaining 20% of domestic connections are provided by the other municipalities (about 1.4 million connections).

Eskom applies a uniform approach consistent with the Electricity Pricing Policy for its 4.1 million connections. Municipalities apply a wide variety of tariffs. Municipal systems

[9] In the case of Eskom, for example, only a third of eligible households receive Free Basic Electricity.

[10] About 1.3 million of the approximately 4 million Homelight tariff connections recorded zero consumption over the period of a year.

[11] Although good data exists for Eskom, this is not the case for municipalities.

and capacity vary greatly between municipalities. No good comprehensive municipal data on electricity tariffs applied, and associated costs by tariff category, exist.

The cross-subsidy pool is not equally distributed

Non-domestic consumption is unequally distributed between distributors with most non-domestic sales being supplied by Eskom. Within the current institutional context, a pro-poor strategy that relies on cross-subsidies within electricity distributors will not be equitable.

Practices to avoid

There are a number of practices that are not pro-poor and could be avoided.

Not finding the revenues (tariffs and taxes) to meet the required efficient expenses to sustain the industry will have a devastating impact on the economy and hence on the ability to eradicate poverty through economic growth. This is not a pro-poor option.[12]

Providing a general subsidy to Eskom is not pro-poor.[13]

An inclining block tariff is not equitable and therefore not pro-poor for the following reasons: The tariff cannot be implemented for a large proportion of domestic users because these users use prepaid meters and these meters do not have clocks.[14] The tariff cannot be applied with any sound rationale to non-domestic users. Within the current institutional environment, the tariff relies on local cross-subsidies. These are inequitable. An inclining block tariff is incompatible with the more appropriate time-of-use tariff structure for high demand consumers. The Electricity Pricing Policy provides for time-of-use tariffs. Most municipal distributors do not understand their own consumption distributions and therefore are unable to accurately predict revenues when implementing a block tariff model. This creates a revenue risk.

Means testing and indigent registers, as a means of targeting poor households, are expensive and error prone. They are subject to errors of both inclusion and exclusion.

Condoning theft is inequitable and threatens the financial sustainability of the industry.

Key options for protecting poor households

A wide set of options to protect poor household are set out in the main report. A number of them are described below.

Because of the significant benefits of household access to electricity, and because many households still do not have access to electricity, any subsidies available to (and in) the electricity supply sector could prioritise the facilitation of affordable access to electricity through the electrification grant and zero connection fees for poor households.

A national pro-poor set of electricity tariffs with subsidies prioritised to level 1 tariffs first and then to level 2 tariffs could be implemented as follows:

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[12] The experience in Zambia, discussed in the main report, and also Zimbabwe, are relevant.

[13] For every one billion Rand of general subsidy from government to Eskom, Eskom's average tariff will reduce by just 0.6 c/kWh (and less in future years), and provide a benefit of just over R1 per month to a household using 200 kWh per month (the average use of households with a 20 Amp single phase connection). In contrast, Eskom's average industrial user will receive a benefit of over R9 000 per month.

[14] It is possible to fix this, but it will require either a replacement of the meters (over 4 million in total) or the development of on-line vending systems (which are difficult to maintain).

Demand limited 20 Amp supply, with free connection, no monthly charge, free basic allocation, energy tariff set equal to generation and transmission cost (fixed network cost) is subsidised. ("domestic level 1").

An intermediate supply (40 to 60 Amp), with no fixed charge, free basic allocation and an energy charge set to breakeven with full cost at 350 or 500 kWh per month. Households to switch to domestic level 3 at breakeven consumption, or technical switch. ("domestic level 2").

Standard domestic supply (60 Amp single phase) with full cost recovery through two part tariff - monthly fixed charge and energy charge set equal to generation and transmission cost. ("domestic level 3").

High demand (3-phase) supply with full cost-recovery tariff with time-of-use introduced to create incentives to shift demand to off-peak periods. ("domestic level 4").

Household choice between these four service levels could be allowed, with subsidies targeted to the domestic level 1 (20 Amp single phase). This provides a very effective mechanism for targeting subsidies to poor households.

The service level 1 tariff could be amended to be more pro-poor by subsidising the fixed network costs and setting the energy tariff to equal the variable energy cost only.

The domestic level 1 tariff could be extended to be available to all households. (Currently this option is typically not available for households supplied by municipal distributors.)

The subsidy implications of adopting this approach are very significant. If the energy charge for domestic level 1 connections is maintained at 60 c/kWh[15] in real terms, then the subsidy requirement will increase to **R9 billion per annum** in the next three years. This is as a result of the increase in costs and the expansion of the subsidy to a further 1.3 million users (from 2.7 to 3.8 million users). That is, maintaining Homelight 1 tariffs at current levels in real terms (adjusted only by inflation) and making this subsidy available to all those that are likely to qualify will result, on its own, in a significant expansion of the subsidy required.

Another option is to introduce a domestic level 2 (intermediate) tariff option and to set the tariff level nationally. This subsidy could be made conditional on disclosure of costs and consumption distributions. This option would require undertaking more detailed modelling to determine subsidy implications and affordability (in combination with all of the other subsidies) as well as implementation details.

A further option is to extend the reach of the free basic allocation to all eligible households, but do not increase the amount of the allocation. Difficulties currently experienced in implementing the free basic allocation should be resolved and its reach extended before consideration is given to increasing its amount.

A new dedicated grant mechanism to support poor households could be introduced. This grant could be available to domestic service level 1 users only (or to domestic level 1 and 2 users), and be used as an incentive to municipalities to offer these service level options. This will ensure that the subsidy is targeted to poor households.

[15] This is approximately the current average Homelight 1 tariff, and also coincidently equates roughly to the long run average cost of generation and transmission, that is, the likely future average cost of generation and transmission. The long run marginal cost of new generation will be higher than this.

A dedicated national grant can be complemented with a national cross-subsidy pool. A national cross-subsidy is more equitable than reliance on local cross-subsidies.

Theft could be reduced. Prior to implementing a theft reduction strategy, it is necessary to undertake a study to quantify the estimated losses arising from theft and non-payment, and the geographic, institutional and customer tariff incidence of these losses. Once the magnitude and distribution of theft is better understood, recommendations can be made as to how best to address this issue.

Initiatives to finance the displacement of electricity could be strengthened and accelerated.

Designing a pro-poor strategy

A strategy to protect poor households requires more than a selection from a menu of options. A number of different considerations must be balanced and there are trade-offs between options. The subsidy design must be viewed as an integrated whole. There are also important issues related to timing, practicality, effectiveness and overall affordability.

Towards a pro-poor policy framework

There is an existing electricity tariff policy framework for electricity and poor households in South Africa, which is reflected in a suite of policies, described in the main report. The existing policy-framework compares well with international best practice and protects poor households.

Some options to refine the framework are proposed in the main report. What is most important is that decisions made in terms of this policy framework, and in the design of a pro-poor strategy (the selection and sequencing of options, together with more detailed choices related to subsidy levels), are coordinated.

There are at least three key actors whose decisions can have major impacts on subsidies for poor households:[16]

⇒ **National Treasury**, through the division of revenue to local government (equitable share) and the regulation and management of government grants;

⇒ **Department of Energy**, through the Free Basic Electricity policy; and

⇒ **NERSA**, through approval of Eskom revenues and tariffs and the regulation of municipal tariff structures and levels.

Within the context described, it is particularly important that the policies and decisions made by these actors are coordinated, and that the full implications of the combined options and choices are fully understood in a holistic and integrated way.

Implementation considerations

The primary implementation challenges are summarized below:

⇒ There are still a significant number of households (one in every four households) without electricity. Within this context, the pace of electrification is not as great as it could be.

⇒ Many poor households do not make use of, or do not have access to, Free Basic Electricity. (For example, in the case of Eskom customers, only a third of eligible households benefit from Free Basic Electricity. Challenges also exist in municipal areas.)

[16] Only the primary channels are described.

⇒ There are a very large number of inactive connections. (For example, 1.3 million connections in the case of Eskom customers, representing nearly one third of all of their domestic connections. Inactive connections are likely to also exist in municipal areas, however good data is not available.)

⇒ Theft is significant. (For example, about half of Eskom's current domestic sales for Eskom's customers. Theft is also significant in municipal areas.)

⇒ The existing level of understanding of subsidy flows within municipal electricity distributors is very poor. (It is not possible to quantify these subsidies on the basis of existing information.)

Solving these implementation issues will:

⇒ Increase the understanding of existing subsidies (through better cost accounting and reporting on tariffs, costs, revenues, consumption and subsidies); and

⇒ Increase the amount of subsidies going to poor households significantly (more poor households connected to the grid and more households getting Free Basic Electricity).

As costs increase, the amount of subsidies will also increase.

The combined effect of better implementation together with increased costs will result in very significant subsidies going to poor households. The researchers estimated this to be R20 billion per annum. This represents more than 25% of current sector turnover and is a very substantial amount, possibly reaching fiscal and macro-economic affordability limits.

This context suggests a prudent approach when considering new subsidies, or increasing subsidies. In particular, new and/or increased subsidies could be carefully modeled within a full understanding of the total subsidy flows within the sector.

Consideration also could be given to strengthening the role of the regulator, particularly in the area of reporting and increasing the transparency of existing subsidies.

Monitoring domestic retail tariff design and subsidies

It is the role of the regulator to monitor and regulate electricity tariff structures and levels. This mandate includes the monitoring of the implementation of Free Basic Electricity, as this is part of the tariff. Options to strengthen this monitoring role are set out in the main report.

Monitoring solar water heater rollout

The national solar water heater rollout is being facilitated by the Eskom managed solar water heater rebate programme and the draft South African National Solar Water Heating Framework and Implementation Plan (DoE). There are specific monitoring and verification approaches in the Eskom programme and the Solar Water Heater Framework will be including specific targets as well as specific monitoring and verification approaches.

Monitoring thermal efficiency of household stock

With respect to the thermal efficiency of housing stock it is recommended that this be seen as an important design parameter for the national subsidised housing programme and be integrated as one of the performance indicators for all state-subsidised low-income housing.

Summary and way forward

Options to protect poor households from rising electricity prices have been presented. These need to be carefully considered in light of the fact that the primary constraint to increasing subsidies appears to be macro-affordability. Existing subsidies account for more than 10% of the current electricity turnover and this will increase to 25% with increased subsidy coverage (all eligible households get subsidies) and the increased electricity costs (doubling of energy costs over three years).

The subsidy options that are most targeted to poor households are:

⇒ The electrification grant (free connections to the grid for poor households);

⇒ The domestic level 1 subsidy for 20 A single phase connection (no fixed charge, free basic allocation and an energy charge which covers the cost of generation but not the sunk network costs); and

⇒ Free Basic Electricity allocation of 50 kWh per month.

It is recommended for consideration that the extension of the first two subsidies be prioritised and that the implementation difficulties related to the Free Basic Electricity grant be addressed to ensure all eligible households receive this benefit.

The extension of any existing subsidies and the introduction of any new subsidies need to be carefully modelled (within the context of all existing subsidies) and coordinated to ensure medium and long-term macro-affordability.

1 Introduction

1.1 Context

The need to protect poor households

Eskom and municipal electricity tariffs will need to increase significantly if Eskom and municipalities are to recover their costs and to be financially sustainable. There is, at the same time, a very real concern as to what impact these tariffs will have on poor households and how these impacts can be mitigated. These dual imperatives are well stated in Eskom's annual report:

> "There is an urgent need to achieve an average tariff that recovers the full cost of producing electricity incurred by an efficient public utility, as well as allowing it to build up reserves to partly fund the capital expansion. Within the context of this, tariff measures can be put in place to ensure that electricity remains affordable for the poorest consumer. The South African government subsidises the first 50 kilowatt-hours of monthly consumption for all consumers. Eskom operates a "Homelight" tariff for rural communities, but *a nationally consistent and effective "pro poor" tariff is needed*." (Eskom Annual Report, 2009, p9, own emphasis)

Electricity subsidies for poor households

Subsidising electricity is a key (though not the only) mechanism to protect poor households and is therefore a primary (but not the only) focus of this report. There are three distinct arguments that can be put forward in favour of subsidising electricity tariffs for poor households (Komives, 2005, 36):

⇒ Subsidies help to make services affordable to poor households;

⇒ It may be desirable to promote or encourage the consumption of electricity through subsidies as this may result in a switch from alternative fuels with higher social costs (public benefit argument); and

⇒ Subsidies for services may be an effective way to address income poverty in situations where direct income support to households is administratively difficult or expensive, or in combination with household income support (such as welfare-related grants).

1.2 Study objectives, scope and deliverables

NEDLAC, through the mechanisms of FRIDGE, commissioned a study with the following purposes:

⇒ To recommend a consistent and overarching definition of poor/low income households in the context of this study;

⇒ To establish a mechanism that facilitates stakeholder monitoring that is inclusive of Eskom and municipalities of the socio-economic impact of electricity price increases at household level;

⇒ To review the status of measures to reduce the impact of electricity price increases on poor households and recommend if existing or further measures are required to minimise the impact on poor or low income households;

⇒ To review the effectiveness of measures to provide Free Basic Electricity services to poor households from an Eskom and municipal level; and

⇒ To develop a framework for a harmonised tariff policy to address the supply of electricity to poor households.

The scope of the study was to include:

⇒ A critical review of existing challenges and measures to promote access of poor households to electricity;

⇒ Identification of additional measures and strengthening of current measures to improve access to electricity for poor households;

⇒ A review and benchmarking of international practice and initiatives to identify good practices; and

⇒ The development of a framework for a harmonised tariff policy to address the supply of electricity.

The terms of reference requested one key deliverable, namely, a *brief report* that explains:

⇒ Existing measures to promote access of poor households, and what challenges were being experienced;

⇒ Identification of additional measures and strengthening of existing measures to improve access to electricity for poor households;

⇒ A review and benchmarking of international best practice, including a comparison of costs of electricity;

⇒ A set of options for enhancing the access of poor households to affordable electricity with an evaluation and approaches to implementation; and

⇒ A framework for a harmonised approach to electricity tariff policy.

1.3 Approach, outcomes and methodology

Based on the understanding that tariff and subsidy design lie at the heart of mechanisms to protect poor households from electricity cost increases, the researchers interpreted the project objectives with a view to realising two key outcomes (whilst at the same time meeting the project objectives and deliverables specified in the terms of reference):

- Ensuring that electricity tariffs are designed in such a way that poor people are protected from adverse effects of electricity price increases; in other words, that **sound pro-poor electricity tariff design** is in place; and
- Ensuring that **mechanisms to monitor** both the implementation of tariffs (especially effective targeting of poor households) and the impacts of these tariffs on poor households are in place; in other words, that government, labour, business and other key stakeholders have a level of comfort that poor people are being adequately protected from high electricity prices in practice.

The report is based on a review of international literature, a review of relevant South African documents and data, interviews and engagement with a range of people knowledgeable in the field, and an analysis and interpretation of this on the basis of the expertise and experience of the professional team conducting the study.[17]

1.4 A note on the status and quality of the data

The data (and analysis based on this data) presented in this report was the best obtainable at the time of collating the data and within the time and resource constraints of the project. This data is subject to change and may rapidly become out of date within the context of significant annual cost and price increases. The availability and quality of data for Eskom was generally good. In contrast, the availability of data on electricity prices, costs, consumption and subsidies for municipal distributors by category of consumer was generally very poor.

Most of the detailed data collected is presented in the Appendices. This data was used to develop and evaluate the options for protecting poor households. This data is only important to the extent that it provides a sound basis for the evaluations undertaken and conclusions drawn. Where current data is inadequate, this is noted.

2 Essential concepts in tariff design

2.1 Access and affordability

Policies that aim to facilitate the use and affordability of electricity for the poor focus on two broad sets of interventions.

The first set involves instruments for *promoting access* to electricity infrastructure such as:

- imposing universal service obligations on service providers;
- defining connection targets;
- using appropriate fit-for-purpose technologies;
- providing credit for connections; and
- subsidizing connection costs.

The benefits of extending access to electricity infrastructure are well documented. For example:

> "Better provision of electricity improves health care because vaccines and medications can be safely stored in hospitals and food can be preserved at home. Electricity also improves literacy and primary school completion rates because students can read and study in the absence of sunlight. Similarly, better access to electricity lowers costs for businesses and increases investment, driving economic growth." (World Bank, 2009)

The second set of interventions involves selected instruments for promoting affordability through subsidies embedded in tariffs design or through direct subsidies, or through technologies which limit consumption or match available income to purchases.

[17] A list of people interviewed as well as the literature and resources consulted is given in Section 9.

This review focuses on the latter – that is, instruments that promote affordability through tariff design (although it is also recognised that some mechanisms that aim to increase access – such as subsidising connection costs – also improve affordability).

2.2 The essential challenge

The issue of pro-poor electricity tariffs and subsidies is a common challenge around the world: electricity tariffs need to be *cost-reflective* to ensure the financial viability of the electricity utility and the sustainable provision of electricity services; but these prices are often unaffordable for the poor.

If poor households pay less than the cost-reflective tariff, then they will need to be subsidised, either by other electricity consumers (who will then have to pay more than the cost-reflective tariff) or from other financial sources such as government grants.

What does *cost-reflective* mean?

Cost reflective means that the revenue received from electricity tariffs covers the full and efficient operating and maintenance costs (including staff costs and overheads), primary energy costs (fuel costs such as gas and coal) and the full capital costs associated with using the assets (including interest and depreciation costs) which enable to asset to be replaced (or refurbished) as necessary and for the assets to be expanded as demand for electricity grows.

These costs are different for different consumer groupings – see *cost drivers* below.

2.3 Approaches to protecting poor households

Costs vary between consumers

Different consumers impose different costs on the system. For example, it costs more to provide electricity to a low-voltage, low-usage consumer in a remote rural area (per unit of electricity supplied) than it does to supply electricity to a very high volume consumer supplied off a high voltage network close to the source of generation.

When designing and developing cost-reflective tariffs (which is an important starting point in order to understand and design cross-subsidies or other subsidy mechanisms) it is important to understand the *cost drivers* (the factors that most affect the costs of supply).

What drives costs?

The key main cost components that make up the cost of supplying electricity to a consumer comprise the energy cost (cost of *generating* electricity), the *transmission* and *distribution* network costs (cost of moving electricity from where it is generated to where it is supplied) and the *customer service* costs (providing necessary and optional support services to consumers).

These costs are affected by: (*this list is not comprehensive*)

⇒ *the nature of the supply* (for example, where the demand is in the network, the voltage of the off-take, the maximum demand supplied, single phase or three phase supply, prepayment meter or not etc.);

⇒ *the characteristics of usage* (how much is used, when it is used, maximum demand, the load factor etc.);

⇒ the degree of maintenance backlog (the status of the network);

⇒ transmission and distribution losses;

⇒ commercial losses (the effectiveness of billing and payment); and

⇒ the standard and cost of customer services provided (administrative and technical support).

Cost-reflective tariff design

Domestic tariffs which reflect costs are typically made up of the following components:

⇒ The costs of connecting to the electricity network (usually a once-off charge, but can be charged again if a connection has been disconnected);

⇒ The costs of maintaining the connection (and the associated distribution network);

⇒ An energy cost (which is proportional to the amount of electricity consumed); and

⇒ Support service costs (the cost of customer support services as defined in the text box "What drives costs?").

This structure is sometimes simplified as follows:

⇒ A single energy related tariff (household pays only in proportion to the amount of electricity consumed – typically for low usage domestic consumers with low demand capacity, such as a 20 Amp limit); or

⇒ A two-part tariff with a monthly fixed charge and an energy charge.

The tariff structure can also be made more complex by:

⇒ Introducing a *time-of-use tariff* that varies depending on when electricity is used and how this relates to peak demand on the system.

⇒ Introducing a multiple block tariff where the tariff level is related to the level of consumption, typically with a low tariff at low levels of consumption and increasing higher tariffs at higher levels of consumption.

Adjusting tariffs for affordability – the main approaches

The affordability of electricity usage by poor households may be promoted in various ways by adjusting (lowering) the tariff levels for these different components.

The most common approaches used both internationally and locally are as follows:

⇒ ***Providing a partial or full subsidy for the connection fee***. This is a once-off capital subsidy which promotes access to the grid. In other words, affordability is not a constraint for *connecting* to the electricity grid (where a grid is available to be connected to).

⇒ ***Reducing or eliminating the fixed charge component of the tariff***. This has the effect of eliminating any "lump sum" payments required on the part of the poor household. That is, the household does not need to find R50 per month (or whatever the month fixed charge is) to maintain a connection to the grid. Access to electricity by the poor can be promoted through subsidizing fixed charges (including the connection charge).

⇒ ***Eliminating the energy charge for a defined maximum consumption per month***. This is what is referred to as "Free Basic Electricity". For example, in South Africa, the Free Basic Electricity amount subsidised by national government at present is 50 kWh per month.

⇒ ***Reducing the energy charge for a defined maximum consumption per month***, that is, a partial energy charge subsidy with a limit.

⇒ ***Reducing the energy charge with no defined maximum***, that is, an energy charge subsidy with no limit. That is, the higher the level of consumption, the greater the subsidy benefit to the consumer.

It is possible to combine some of these approaches.

Other approaches to improving household affordability

Affordability can also be promoted through direct subsidies to poor households. Various options exist:

⇒ Tax holidays or rebates for poor households, whose effect is to reduce the amount of tax that would otherwise (in the absence of the rebate) be payable to the state.

⇒ Grants allocated directly to poor households. This usually involves a physical transfer of money or value (in the form cash or coupon) to households or the direct crediting of household electricity (or rates) accounts.

⇒ Tolerating non-payment by poor communities.

⇒ Free or subsidised provision of energy efficient capital equipment or consumables. For example, the distribution of free energy efficiency light-bulbs (CFLs) by Eskom. This had the dual impact of reducing peak electricity demand and of reducing household electricity costs. Other examples include home insulation (commonly used in the United Kingdom as a 'fuel poverty alleviation' measure, and solar water heating.

This last option has been called a "complementary measure" in this report and is addressed in a separate section.

2.4 Targeting subsidies

There are also different approaches to targeting. Subsidies could be applied to some levels of service and not others. For example, households with demand limited supplies (such as single phase 20A supplied) could be eligible for all or some of the above subsidies, whereas households with "normal demand" supplies (60 Amp supplies) might be eligible for only a sub-set of the above charges, or none at all.

Important questions to ask are as follows:

⇒ How well are the subsidies targeted to poor households; and

⇒ Who bears the costs of the subsidy?

In general, the broader and less targeted the subsidy, the less effective it is in reallocating resources to poor people. Such subsidies also impose higher costs on society as a whole.

A key trade-off to be made in subsidy targeting is that between so-called errors of inclusion and errors of exclusion. It is inevitable that under any targeting approach some households will receive subsidies who should not (errors of inclusion) and some households who should be eligible for subsidies will not receive them (errors of exclusion). There is almost always a trade-off between these two errors – approaches that seek to reduce errors of inclusion will tend to be too 'strict' and will lead to larger errors of exclusion. Conversely, systems that are aimed at ensuring that as many worthy households receive the subsidy will tend to lead to higher errors of inclusion (too many wealthier households will also benefit).

These trade-offs are important and need to be acknowledged by policy-makers in the subsidy design process.

Where do the subsidies come from?

If a user pays less than the actual cost of providing the service, then somebody else is paying. Who pays? Who could pay?

In general, there are two broad options for the choice of who pays for the subsidy cost:

⇒ The subsidy is paid by other electricity consumers (that is, there is a cross-subsidy within the electricity sector between consumers). The cross-subsidy could operate at a national, regional or local level. Typically there is some form of cross-subsidy between sectors (for example, between industrial and residential consumers) and between residential consumers (between large domestic consumers and small domestic consumers).

⇒ The subsidy is paid for from general government revenues (at a national and/or local government level), that is, there is a subsidy from government (national and/or local government) to electricity consumers.

3 Defining poor households

3.1 Introduction

The researchers were asked to "recommend a consistent and overarching definition of poor/low income households in the context of this study". The outcome of this task is reported on this in this section.

It is important to have a common, and accepted, definition for poor households in order to both measure and understand the impact of electricity price increases on poor households, and to develop proposals to minimise or mitigate the impact of electricity price increases on poor households.

3.2 Approaches to defining poor households

Single versus multiple definitions of poverty

Poverty is multidimensional, there are competing and alternative approaches to defining and measuring poverty, there is contestation as to which approaches could be preferred, and this contestation occurs at both the technical and political levels. It is beyond the scope of this study to resolve this complex and long standing debate.

Criteria for a definition of poor households

A definition of poor households (and corresponding measurement approaches) is needed that:

⇒ Enables poor households to be clearly identified;

⇒ Is practical (the necessary measurements can be made regularly and cost-effectively, that is, the measurement can be up to date);

⇒ Is sensitive enough to measure the impacts of electricity price increases;

⇒ Can be measured within a municipality (as this is where retail electricity tariffs are applied); and

⇒ Can be broadly agreed by a wide range of stakeholders.

3.3 Definitions and measures currently in use

There are a wide range of definitions currently in use in South Africa as shown below (Towards a Fifteen Year Review, The Presidency, 2008):

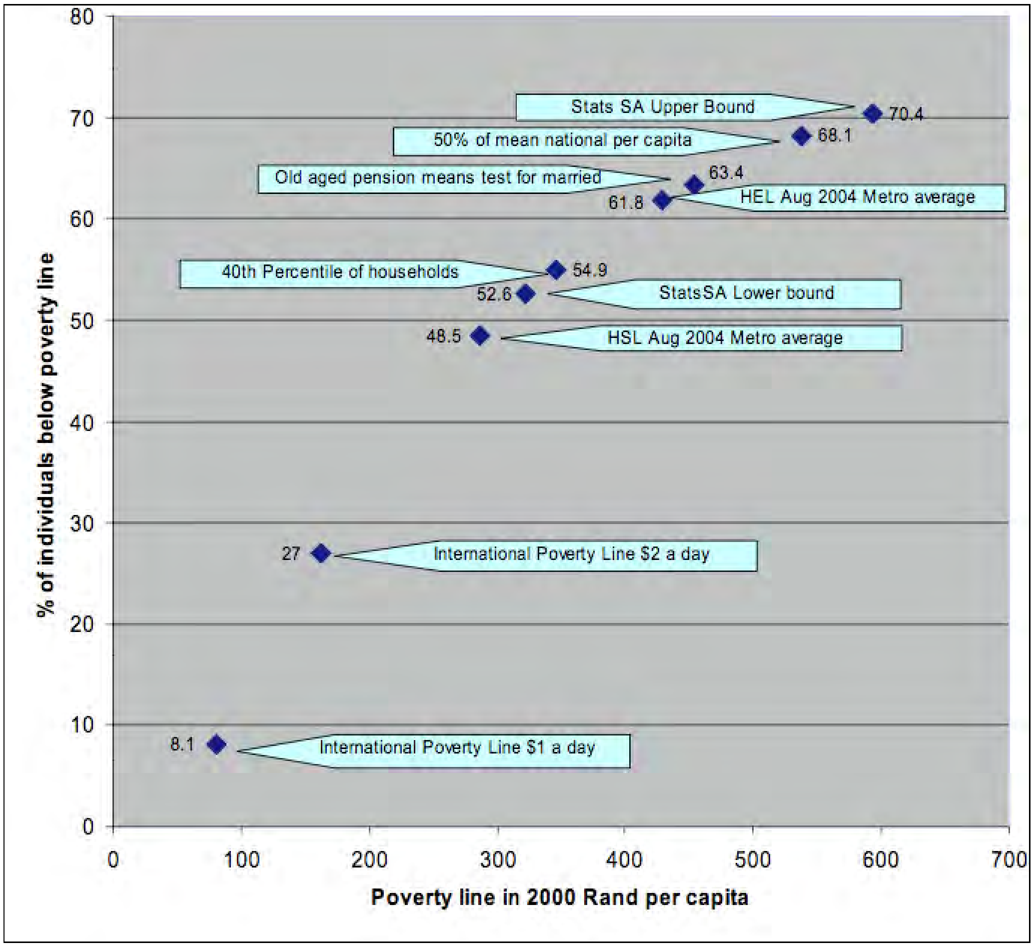

Figure 1: A range of poverty indicators

Depending on the definition used, between 8% and 70% of households living in South Africa could be considered as "poor".

Proposed common national poverty line

The problem of multiple definitions of a poverty line has been recognised by National Government and a common definition is being piloted by National Treasury.

In summary, the proposal calls for:[18]

⇒ A poverty line based on minimum food needs for daily energy requirements, plus essential non-food items, to be prepared.

⇒ Two additional thresholds below and above the poverty line as indicators of extreme poverty and of a broader level of household income adequacy.

⇒ Publication by Statistics South Africa of an annually updated poverty line and the lower and upper thresholds to take account of price changes, using a basket of goods from the CPI, subject to review every five years to ensure that the poverty line and thresholds remain relevant and accurate.

[18] Presidency, 15 year review (Chapter 4); www.treasury.gov.za/publications/other/povertyline/default.aspx) and "A national poverty line for South Afirca" (StatsSA, 2007)

⇒ Further consideration to be given to the scope for separate poverty lines for rural and urban areas, provinces and major towns and cities, taking into account the adequacy of available statistical data.

This poverty line has not been operationalised to date.

3.4 Difficulties associated with income measures of poverty

Measurement of household income presents many practical difficulties. It is beyond the scope of this brief report to summarise and reflect on these difficulties here, save to mention that it is expensive and is therefore done infrequently at scale (only every ten years in the case of the census, with a more frequent national sample household income and expenditure survey in between).

These measures are either too infrequent (in the case of the census) or too coarse (in the case of the annual national household survey) to be able to determine the impact of annual electricity price increases (as translated through particular retail tariff structures in specific municipalities) on poor households living in a particular municipal area. Nevertheless, this national level data can be important for calibrating alternative and more specific methods for measuring the impact of electricity price increases on poor households.

3.5 Using a capability approach as the starting point

Amartya Sen, the Nobel-Prize winning economist, in his seminal work on inequality[19] makes a convincing case for using a capability approach for examining and measuring inequality and poverty. In terms of this approach, poverty (or, more correctly, the freedom or capability to be free of poverty) is measured in terms of a capability set, that is, a set of basic needs, such as (in no order of priority, and not necessarily complete):

⇒ Access to clean water and safe sanitation

⇒ Access to energy for cooking

⇒ Shelter from the environment, sufficient warmth and a home to live in

⇒ Access to health care

⇒ Access to education

⇒ Access to lighting

⇒ A safe environment

⇒ Access to income earning opportunities

⇒ Food security (the means to obtain sufficient food to meet daily nutrition requirements)

Households deprived of any or all of these can clearly be said to be poor, and lacking in the capability to be free from poverty. Access to a core set of capabilities (such as that defined above) is clearly a pre-requisite for freedom from poverty. This can be said to be a core or primary capability set.

How does electricity fit into this capability set?

Whilst electricity is not explicitly on the above list (cooking, lighting and warmth can be obtained from energy sources other than electricity), it is true to say that electricity

[19] Sen. A. 1992. Inequality re-examined.

confers significant benefits where it is available to households, and it is particular cost effective in facilitating lighting (important for learning) and also for communications – television, radio, charging cell phones etc.

In South Africa, access to electricity has long been considered a basic need and an extensive electrification programme was initiated as part of the original Reconstruction and Development basic needs programme and is still ongoing.

From a poverty and basic needs perspective then, households without access to electricity (that is, without the opportunity and capability to connect to an electricity grid) must be considered to be poor relative to those that do have access to electricity.

Therefore, the first definition of poor households, for the purposes of this study, is households without access to electricity. In other words, in examining the impact of electricity price increases (and any associated subsidy measures proposed), the impact of these on households *without* electricity must be examined in the first instance. If measures impact negatively on households without electricity, then inequality will increase, and it cannot be said that poor households are being protected.

The opportunity to self-select the level of electricity access

Where households do have access to an electricity network (which is not universally the case), households typically have a choice in the level of electricity service received. The Electricity Pricing Policy defines three broad levels of service (with sub-categories within each broad level):

⇒ Low usage single phase supplies (20A) (corresponding to Eskom's Homelight suite of tariffs), with maximum demand limits as follows: 4200 Watts (Homelight 1[20]).

⇒ Moderate to high usage (60 Amp, single and three-phase supplies with capacity up to 100 kVA, maximum 12 500 Watts for single phase supplies) (corresponding to Eskom's Homelight and Homepower[21] standard suite of tariffs).

⇒ Moderate to high usage (60 Amp, three-phase supplies with capacity up to 100 kVA with advanced metering infrastructure (smart metering technology) and automated remote energy and demand management functionality (corresponding to Eskom's Homeflex[22] time-of-use tariffs).

It is possible that, due to network constraints, households may not be able to choose higher levels of service (compared to what they have), but it is possible (at least in principle) for a household to elect to have a lower level of service (for example, choosing a single phase 20 Amp supply with a corresponding lower tariff rather than a 60 Amp supply with a higher tariff).

However, there may be social and political difficulties in asking households to opt for a lower level of supply (reduced demand limit) to be able to access a subsidy and to make the service more affordable. This is a key challenge to an approach favouring self-selection through service level and tariff categories.

[20] Eskom's tariff structures and tariff names are explained in Annexure 3. Homelight is an electricity tariff for single-phase, low-usage residential supplies in urban areas. Can be 10 Amp, 20 Amp and 60 Amp single-phase supplies. Subsidised

[21] Electricity tariff for medium to high-usage residential customers in urban areas with an NMD of up to 100kVA, including churches, schools, halls, old age homes etc.

[22] Time of use electricity tariff suitable for medium to high residential customers in urban areas with an NMD of up to 100kVA.

3.6 How do electricity service levels relate to poverty?

Conceptual approach

It is anticipated that there will be a relationship between electricity service levels and household income. The following relationship is anticipated:

Electricity service level (and corresponding Eskom tariff)	**Relative household income** (between categories)	**Frequency distribution of low household income** (within categories)	**Geographic incidence**
No electricity connection	Lowest	All households are likely to be poor;	Mostly rural
Single phase 20 Amp connection with low use (Homelight, Landlight[23])	Lower	All households are likely to be poor;	Rural and low income urban
60 Amp single connections with low to moderate use (Homelight, Landlight)	Low and middle	Many poor households in this category	Mainly urban
60 Amp single and three phase connections with moderate to high use, (Homepower, Landrate[24])	Middle and high	Unlikely for there to be poor households in this category?	Mainly urban

Empirical data on service levels

There is good service level data for Eskom and some service level data for some of the metropolitan municipalities. There is not good availability of service level data for most municipal electricity distributors. To complicate matters, there is not necessarily an income logic in the choice of service levels (and tariffs) given to households in the case of many municipalities.

3.7 Household income distribution – an overview

Household income distribution has been calculated using Census 2001 data and adjusting for inflation.[25]

The proportion of households in each income band per rural and urban settlements per municipal category is depicted graphically below.[26]

[23] Electricity tariff for rural customers with low usage, subsidized.

[24] Electricity tariff for rural customers with an NMD up to 100kVA with a supply voltage ≤500V

[25] The adjustment for inflation assumes no change in the income distribution, but simply takes into account the fact that R800 in 2007 was R533 in 2001, once CPIX has been taken into account. So (assuming an even distribution of households within each income category) only 67% of those households that were earning less than R800 a month in 2001 are still earning less than R800 a month in 2007, if their incomes have risen at CPIX only.

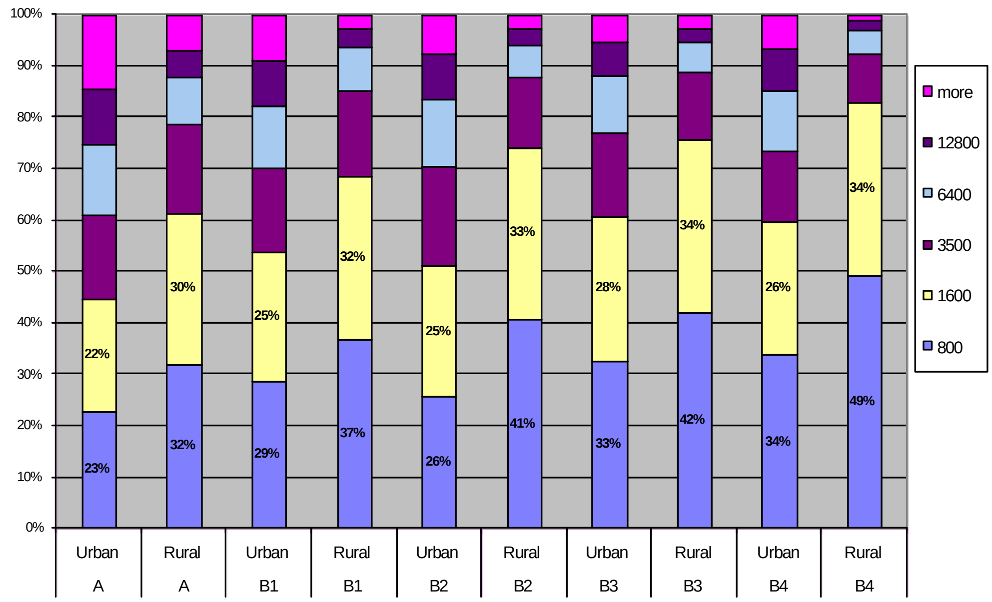

Figure 2: Income distribution per settlement type per municipal category

The higher proportion of poor households living in rural areas compared to urban areas is clearly evident from the data presented in the figure above. However, it is notable that even the metropoles and secondary cities have a high proportion of their households who are poor.

3.8 The key challenges – understanding price impacts on poor

There is no single nationally agreed definition of poor household in South Africa.

Comprehensive income distribution data exists only for the Census which is carried out every 10 years. This is too infrequent for the purposes of monitoring the impact of electricity price increases on poor households.

Dedicated household surveys to understand price impacts are expensive. These surveys are few and far between and are generally not consistent over time.

Service level and tariff self-selection is an effective method of identifying poor households where this approach is consistently practiced. However, poor households with municipal electricity connections cannot be identified as being poor on the basis of service and/or tariff self-selection only.

3.9 Pragmatic definition of poor households

In light of the above, and for the purposes of this project, a pragmatic approach has been adopted, in which poor households are defined hierarchically as follows:

- Households without an electricity supply
- Households with a demand limited supply (20 Amp)

[26] The municipal categories are A = metropolitan, B1 = secondary cities, B2 = regional centres, B3 = small towns, B4 = predominantly rural municipalities.

- Households with a 60 Amp supply and that consume *modest* amounts of electricity (such as the Eskom Homelight 1 customers with 60 Amp supplies and prepaid meters).[27]

This is an approach in which households with electricity self-select the service level and tariff, and is consistent with the Electricity Pricing Policy.

4 National status quo and existing measures

4.1 Introduction

The researchers were asked to "explain existing measures to promote access of poor households, and what challenges were being experienced".

This section presents an overview of the status quo with respect to the provision of electricity and how this affects poor households (both positively and negatively), that is, existing measures to protect poor households. Only the key facts and findings are summarised here in the main report. More detail is provided in the Appendices.

4.2 Access to electricity and the electrification grant

Many households still do not have access to electricity

Some 3.4 million households still do not have access to electricity. This represents one in four households, or 25% of the total of 12.7 million households in South Africa.[28]

Current subsidies for electrification

Annual funds allocated for electrification are shown below.[29]

[27] Here modest usage is defined as less than 350 kWh per month. About 58% of all domestic households use less than 350 kWh per month. The average consumption for Eskom's Homelight users is about 220 kWh per month. See Annexure 5 for the details.

[28] Source: http://www.dme.gov.za/pdfs/energy/electricity/Fact_Sheet_2009.pdf

[29] Source: http://www.dme.gov.za/pdfs/energy/electricity/Fact_Sheet_2009.pdf

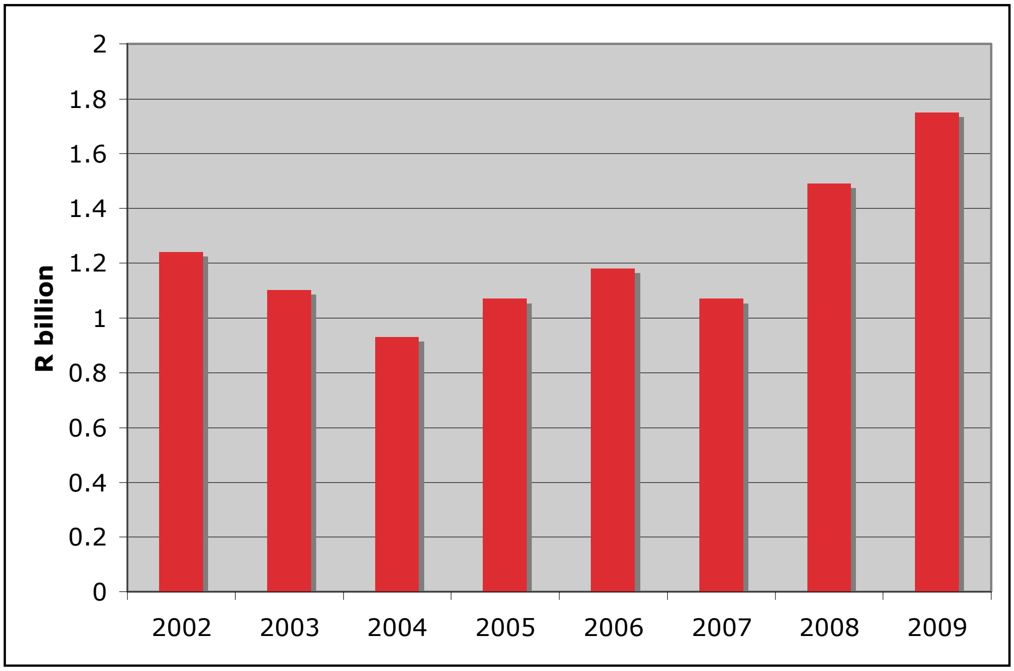

Figure 3: National electricity subsidy allocation

The pace of electrification has slowed

Notwithstanding the increase in available subsidies, the pace on new electricity connections has slowed significantly in recent years and now no longer keeps pace with new household formation.[30]

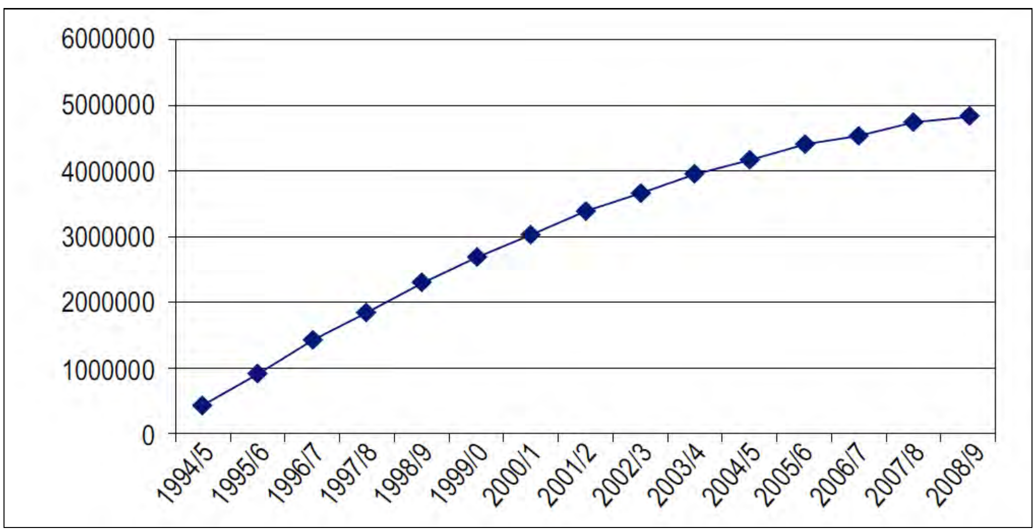

Figure 4: Total number (cumulative) of newly electrified households

The reasons for this include:

[30] See http://www.dme.gov.za/pdfs/energy/electricity/Fact_Sheet_2009.pdf

- As the penetration increases, the remaining households without electricity are both harder and more expensive to reach (more remote from the grid).
- Municipalities face capacity challenges in terms of availability of planning and technical personnel to execute the electrification programme in their areas.
- Electrification spending has been used to upgrade (and rehabilitate) the network backbone, with a lower share of the available money going directly to new electricity connections.

4.3 Costs and use

Understanding costs

In order to evaluate different subsidy options, it is necessary to understand the current cost structure and how this is likely to evolve over time, as this will affect the total amount of subsidies needed and how effective these subsidies are.

In South Africa the cost of producing and distributing electricity both efficiently and sustainably is increasing. There are two primary drivers of these cost increases: the need to build new generation and transmission capacity and the need to redress historic under-investment and under-maintenance of the distribution network.[31]

An assumed current and future cost structure is presented in Annexure 8. The main assumption used here is that transmission and generation costs will effectively double over a three-year period. This cost structure (and the assumed future costs) are used to model the impact of different subsidy implementation options.

The importance of understanding electricity use patterns

It is not possible to understand the distributional impacts of tariff and subsidy design (and hence the effect on poor households) without understanding electricity use patterns.

Overall distribution of electricity use in South Africa

Our best estimate of electricity use in South Africa is set out below.

[31] The case of cost increases related to new investment in supply capacity is made in the Eskom Multi-Year Price determination (MYPD2) dated 30 November 2009. The need to redress underinvestment in the distribution network is set out in the Electricity Pricing Policy (2008).

Table 3: Estimated breakdown of electricity use in South Africa (2008/9)

	Customers			Use		
	Total	Domestic	Non-domestic	Total	Domestic	Non-domestic
Municipalities	*n*	*n*	*n*	*GWh*	*GWh*	*GWh*
Metros	2,508,431	2,370,493	137,938	53,752	18,789	34,963
Secondary cities	653,352	592,726	60,626	28,600	7,436	21,164
Other towns	814,888	751,038	63,850	9,600	3,933	5,667
Rural centres	57,917	47,962	9,955	964	491	473
All municipalities	4,034,588	3,762,219	272,369	92,916	30,649	62,267
Eskom direct	4,361,000	4,163,440	197,560	121,934	8,135	113,799
Total	**8,395,588**	**7,925,659**	**469,929**	**214,850**	**38,784**	**176,066**
Eskom direct sales						
Homelight - active	2,700,000	2,700,000	-	6,058	6,058	-
Homelight - zero	1,300,000	1,300,000	-	-	-	-
Homepower	163,440	163,440	-	2,077	2,077	-
Eskom - other	197,560	-	197,560	113,799	-	113,799
Sub-total	**4,361,000**	**4,163,440**	**197,560**	**121,934**	**8,135**	**113,799**

Sources and notes: An amalgamation of DME, National Treasury, Eskom and municipal data. Source data may be for different years. This data is not reported on in a comprehensive and systematic way on an annual basis. Explanations of Eskom's tariff categories are given in Annexure 3. Homelight zero refers to customers with a Homelight connection but recording zero consumption over a period of a year.

It is estimated that domestic electricity use accounts for about 17% to 18% of the total, amounting to about 38 800 GWh per annum compared to Eskom's total sales of 214 850 GWh.

Domestic consumption distribution patterns

It is essential to understand consumption distribution patterns in order to understand the distributional impacts of tariff and subsidy design. This data is very limited in its availability.

Based on the distribution data that was obtained, there appear to be two distinct patterns of distribution that can be discerned in domestic electricity usage, shown below.[32]

[32] This data comes from two sources: Eskom's Homelight and Homepower tariff categories and Ethekwini's prepaid and conventional meter categories. Explanation of Eskom's Homelight and Homepower tariff categories are given in Annexure 3.

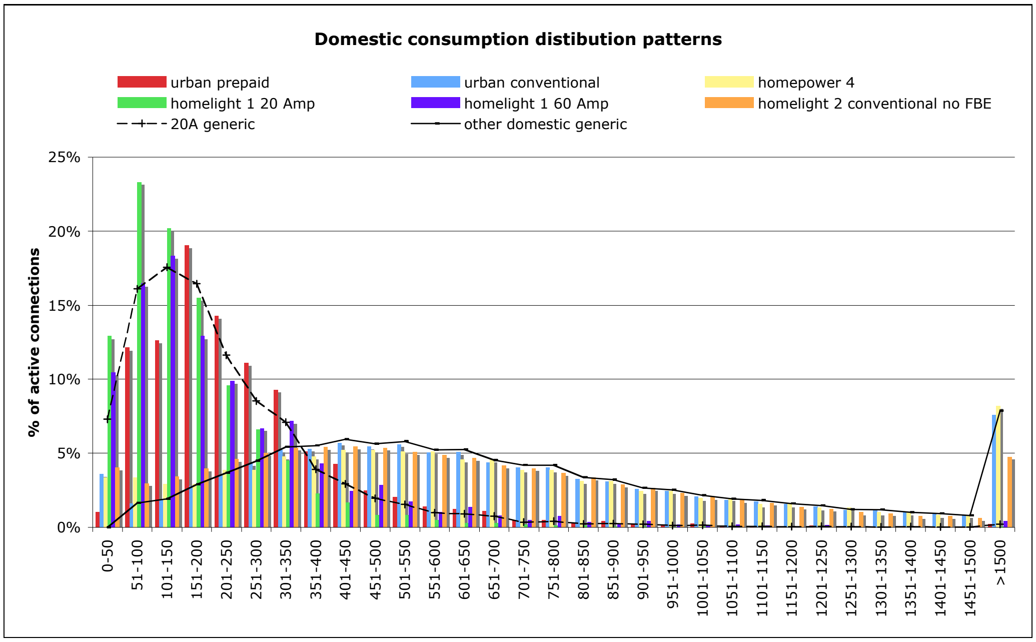

Figure 5: Domestic consumption distribution

Customers supplied with prepaid meters by municipalities, together with Eskom's Homelight 1 20 Amp and 60 Amp (prepaid) customers cluster with consumption less than 500 kWh per month, with an average use of about 220 kWh per month. Customers with conventional credit meters, including Eskom's Homepower and Homelight 2 conventional meter categories have flatter profiles that are remarkably similar to each other, with an average use of about 750 kWh per month.

The split between these two types of consumption distributions nationally is estimated to be as follows: 3.8 million households ("domestic service level 1)" and 2.7 million households ("domestic service level 2"). In addition there are a further 1.3 million households with electricity connections recording zero consumption over a period of a year.

Household use

It is estimated that about 3.8 million households (58% of active domestic connections) use less than 350 kWh per month, on average. A household using 350 kWh per month could have a usage pattern that looks something like the following:

Table 4: What 350 kWh per month can be used for

	Rating per unit *Watts*	units *n*	hours per day	days	Total use *kWh pm*	Cumulative use *kWh pm*
Lighting	15	10	5	30	23	23
radio	10	1	8	30	2	25
music	100	1	3	30	9	34
TV	100	1	6	30	18	52
kettle	2400	1	0.8	30	58	110
2-plate stove	2000	1	4	30	240	350

A household, who in addition to this has a 2000 kW geyser used for 5 hours per day would have an additional consumption of 300 kWh per month bring the total to 650 kWh per month. Electricity for space heating could add another 200 kWh to bring the total to 850 kWh per month.

This pattern of use is supported by empirical evidence. The average use for Eskom's 1.6 million active Homelight 1 single phase 20 Amp customers is 163 kWh per month, and average use for all Eskom's 2.7 million active Homelight 1 and 2 customers is 200 kWh per month. (See Annexure 5.)

4.4 Tariffs

4.4.1 Tariff structures

A review of electricity tariff structures in South Africa is presented in Annexures 3 and 4. Only the main findings are summarised here.

Eskom's tariffs structures follow the Electricity Pricing Policy quite closely. However, there is a great deal of inconsistency in the approach to, and application of, retail electricity tariffs between Eskom and municipal electricity distributors. This make the regulation of electricity prices complex and severely complicates the development of an effective national approach to the mitigation of electricity price increases for poor households.

The Free Basic Electricity policy is not clear and is not well regulated. Consequently, there is not good data in the efficacy of its implementation. Suggestive data indicates that the effectiveness of the subsidy is only 50% (that is, it reaches only 50% of the intended target users). The implementation challenges related to the Free Basic Electricity Tariff are discussed in more detail in a later section.

4.4.2 Tariff levels

Knowledge gaps

Good data on electricity tariff levels, and related costs, consumption, cross-subsidies does not exist (or is not readily available) for most municipalities with the exception of some of the metropolitan municipalities. This data is not collated, analysed and reported by NERSA.

Eskom's overall price levels

Eskom is not recovering its costs and hence its average prices are below cost at present.

Tariff imbalances within Eskom

There are tariff imbalances within Eskom (that is, tariffs that are not cost-reflective). These are relevant as they are either pro-poor (protect poor households) or are not (disadvantage poor households). See Subsidies below.

Eskom's domestic tariffs

Eskom's domestic tariffs are generally aligned with national policy, are pro-poor and allow for self-selection. See Annexures 3 and 5 for details.

Municipal domestic tariff levels

Data to assess the appropriateness of tariff levels for municipalities is not readily available. The available evidence suggests:

⇒ Inconsistencies in approach between municipalities, including Free Basic Electricity (see below);

⇒ The incidence of cross-subsidies across municipalities is likely to be inequitable;

⇒ There is under-investment in the distribution systems (in maintenance and refurbishment); and

⇒ There appears to be an extraction of "surpluses" from the electricity industry in the case of many municipalities who use this money to subsidise the general rates account. However, these "surpluses" may not be real if expenses were properly accounted for and appropriate investments were made in refurbishment and maintenance and customer service.

Implementation of FBE

There is a divergence in approach between Eskom and municipalities. The approaches adopted by municipalities are not consistent across municipalities.

The data on the uptake and effectiveness of FBE for municipalities is weak.

The uptake of FBE for Eskom is low (28%).

4.4.3 Comparison with international tariff structures and levels

A comparison of Eskom's current tariffs with tariffs from a selection of countries internationally is presented in Annexure 7. Such price comparisons are fraught with difficulties and are subject to different interpretations. It is hard to be certain that the same things are being compared. For example, which industrial tariff could be used in South Africa for the purposes of comparing with other countries (and what tariff has been used for these other countries)? In the case of household tariffs, which of very many tariffs implemented could be used, and for what use level? Data for a representative set of middle-income countries is particularly difficult to obtain, and it is hard to get up-to-date information. Notwithstanding these difficulties, the key findings of this review are as follows:

⇒ Residential tariffs are proportionally much higher than industrial tariffs in South Africa compared many other countries.

⇒ On Eskom's calculations, the residential tariff (which takes into account the provisions for low income households) is 74% higher than the industrial tariff, whereas in middle income countries such as Brazil and Korea, residential tariffs are only around 30-35% above industrial tariffs.

⇒ However, South Africa's residential prices compare favourable with residential price levels of other middle-income countries.

4.5 Subsidies

4.5.1 Scope

This section summarises the main subsidies that are currently in place in the electricity industry. All of these subsidies are relevant as subsidies that are not pro-poor (such as subsidies to industries) reduce the scope for cross-subsidies to poor households.

4.5.2 Eskom cross-subsidies

The main subsidy flows within Eskom are illustrated below.[33]

[33] Refer to Annexure 5 for details.

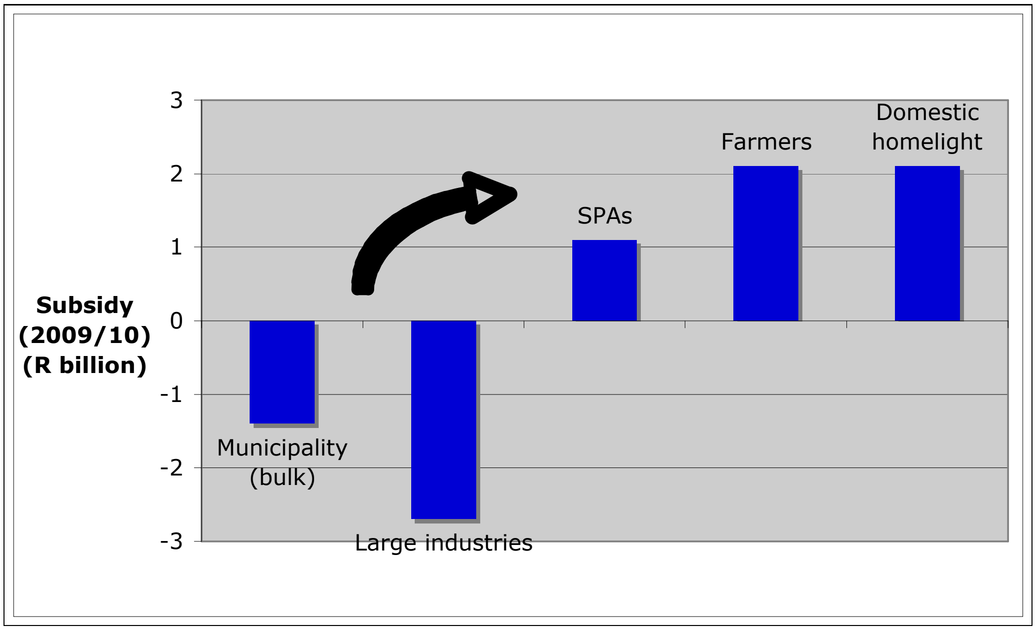

Figure 6: Major cross-subsidy flows within Eskom[34]

The data is based on Eskom's cost allocations. It may be argued that there is some uncertainty in these cost estimates due to the fact that they are not independently verified. Nevertheless, this is the best data that is available.

It could be noted that the Eskom large municipal, industrial and mining customers are normally on Megaflex[35] and Nightsave Urban[36] tariffs. Such customers pay more than their cost of supply (R4.1 billion more). This category includes bulk sales to municipalities which have also been shown separately in the table.

The implication of this is that the R4 billion over-recovered from the above-mentioned tariffs is used to subsidise the Eskom Homelight[37] (low-income households), Landrate[38], Nightsave Rural[39] and Ruraflex[40] tariffs (rural/agricultural tariffs).

In other words, Eskom's industrial and municipal customers currently subsidise most of Eskom's residential and rural customers and not the other way round.

The one exception to this is the subsidies related to special pricing agreements. The magnitude of the subsidy to these special customers (large energy intensive industries) is estimated to be about R1.1 billion (see below).

[34] SPA = Special Pricing Agreement

[35] A time of use electricity tariff for urban customers who are able to shift load and with an Notified Maximum Demand (NMD) greater than 1MVA.

[36] An electricity tariff for urban customers with an NMD (notified maximum demand) from 25kVA.

[37] Electricity tariff for single-phase, low-usage residential supplies in urban areas. Can be 10 Amp, 20 Amp and 60 Amp single-phase supplies. Subsidised.

[38] Electricity tariff for rural customers with an NMD up to 100kVA with a supply voltage ≤500V.

[39] Electricity tariff for high-load-factor rural customers with an NMD from 25kVA with a supply voltage ≤ 22kV (or 33kV where designated by Eskom as rural).

[40] Time of use electricity tariff for rural customers with dual- and three-phase supplies with an NMD from 25kVA with a supply voltage ≤ 22kV (or 33kV where designated by Eskom as rural).

Cross-subsidies from industry to other users

It is fairly common practice internationally for industrial (and other non-domestic users) to cross-subsidise domestic users. In South Africa at present there are two distinctive (and somewhat contradictory) features in this context:

⇒ Large industries (on the Megaflex and Nightsave Urban tariffs) subsidise other users by about R2.7 billion per annum, amounting to a tariff premium of about 10%, or 3 c/kWh on an average tariff of close to 30 c/kWh (2009/10).

⇒ Some very energy intensive industries have special pricing agreements with Eskom. It is likely that these industries are, as a whole, being subsidised by other consumers. The amount of this subsidy is about R1.1 billion, or about 9 or 10 c/kWh on an average tariff for these customers of 21 c/kWh. (Total revenue reported from these customers for 2009/10 was R2.3 billion.)

4.5.3 Existing domestic subsidies

Existing domestic subsidies are significant, but are unevenly distributed across consumers. The main domestic subsidies and their characteristics are summarised below.

Table 5: Domestic subsidy estimates (2009/10)

Kind of subsidy	Subsidy Amount (R million)	Households (approximate)	Average Benefit per household (R per month)	Tariff benefit (c/kWh)	Comment
Eskom Customers					
Tariff subsidy for Eskom Homelight customers.	2 100	2 500 000	R70	32	Based on difference between cost of supply and revenue
FBE subsidy	265	725 000	R30	61	Calculated at 61 c/kWh
Implicit subsidy theft	2 500	1 300 000	R163	61	Calculated at 61 c/kWh
Total	**4 865**	**3 800 000**	R107		
Municipal customers					
Tariff subsidy	?	?	?	?	Not able to be determined
FBE subsidy	720	2 400 000 ?	R25	50	Data is doubtful
Implicit subsidy theft	?	?	?	?	Data not available
Total	**720 ?**	**2 400 000 ?**	R25 ?	50 ?	
Total – all customers	**5 585 ?**	**5 200 000**	R90		

Source: Data complied from various sources. Much of the data is uncertain. See Annexures 3 to 6 for further details.

The main points to note about existing subsidies are as follows:

- Data for Eskom on subsidies to households is much better than that for municipalities.
- The total existing subsidies to households for Eskom customers amount to about R4.6 billion.
- Theft accounts for half of the total subsidy (R2.3 million) – see further discussion on theft below.
- The tariff subsidy (for the Homelight tariff) accounts for just less than half of this amount (R2.1 billion).
- For Eskom customers, the Free Basic Electricity subsidy contributes a very small proportion (only 6%) of the total subsidy (R275 million out of R4.6 billion). L*ess than a quarter of customers eligible for Free Basic Electricity use it*.

- In contrast to the Eskom data, our knowledge of domestic subsidies for customers supplied by municipalities is very poor. The reasons for this are multiple: poor knowledge of actual costs of supply, poor record keeping and poor reporting on the part of municipalities and NERSA. This situation could improve as cost of supply studies are implemented by municipalities and as the regulatory environment for electricity distribution matures.
- COGTA reported in 2009 that 3.2 million households have access to Free Basic Electricity. If the households supplied with FBE by Eskom are subtracted, this leaves about 2.2 million households supplied with FBE by municipalities with a calculated value of R720 million. However, this information is doubtful and is unverifiable, that is, the data is not and cannot be supported by audited financial information.
- There are possibly very significant cross-subsidies within some municipalities, especially the larger metropolitan municipalities and other municipalities incorporating major cities. However, these are not reported and are difficult to quantify due to the multiplicity of domestic tariffs and lack of reporting (and in many cases knowledge) of actual costs and consumption distributions.
- The incidence of cross-subsidies within municipalities is very uneven. Metropolitan municipalities have a much greater opportunity to cross-subsidise household electricity (due to the larger proportion of electricity consumed by non-domestic consumers) compared to smaller municipalities where a high proportion of electricity is consumed by domestic consumers.

4.5.4 The use of the equitable share for electricity in municipalities

It is important to understand how municipalities are using their equitable share allocation, particularly whether they are transferring an appropriate proportion of it to their electricity service (or to Eskom, where Eskom provides the service).

One way to think about this problem is to consider the following four indicative situations:

Type of municipality	Service provider	Municipality transferring ES for electricity?	Outcome
Economically strong municipality	Municipality	Yes	Poor households get the intended benefit from the ES (nominally R45 a month).
		No	Reliance on cross subsidy to provide FBE.
	Eskom	Yes	Poor households get benefit of subsidy from national fiscus.
		No	Poor households benefit from national cross subsidy within Eskom account.
Economically weak municipality	Municipality	No (they can't afford it based on arguments given above).	If municipality is providing FBE then this implies very high levels of cross subsidy from what is likely to be a fairly small group of other electricity consumers served by the municipality.
	Eskom	ditto	Poor households benefit from national cross subsidy within Eskom account.

In practice, the economically weakest municipalities (mostly what is known as "B4" municipalities by National Treasury) are not licensed and are served solely by Eskom.

What does this mean?

Our national knowledge on how the equitable share is used to support Free Basic Electricity in municipalities is not good.

Due to the shortcomings of the equitable share formula (or rather the values of the parameters used), the poor in economically weaker municipalities often do not benefit from the intended subsidies.

National Treasury are aware of problems with the equitable share and its use for Free Basic Electricity and are considering providing a subsidy to Eskom to cover or contribute to their costs of Free Basic Electricity. However, it is important to note that this will have to go along with a reduction in the equitable share allocation to those municipalities which are served by Eskom. This would mean that data on the relative split within a municipality of poor people served by Eskom and the municipality itself will need to be available.

National Treasury are also considering monitoring the way the equitable share is used within a municipality. If there are means to ensure that municipalities transfer an appropriate amount to the electricity account, regardless of the provider, by far the neatest solution would be to fix the equitable share formula (it has to be fixed for other sectors as well) and not subsidise Eskom directly.

But there is another aspect to consider relating to the future of REDs. With REDs, the electricity component of the equitable share will potentially fall away and the REDs would be subsidised directly from the national fiscus.

4.5.5 Free Basic Electricity

Municipal choice

How poor households are defined is up to the municipality and the approach to providing Free Basic Electricity is also at the municipality's discretion. The four approaches are defined in the table below and the proportion of municipalities applying each approach as measured in the 2007/08 StatsSA non-financial survey of municipalities.

Table 6: Approaches to targeting poor households

Approach	*Proportion of municipalities*	*Definition*
Broad-based	17%	Each consumer unit in that municipality receives free basic services on the current billing system of the municipality
Geographical	2%	The process whereby consumers living in a particular area are assumed to have the same socio-economic profile and therefore tariffs can be set on location.
Self targeting / indigent	72%	A system whereby only indigent households receive the benefits of the free basic services programme as mutually determined by the service provider and service authority.
Technical / service level	9%	The process whereby technology is used to regulate the provision of free basic services (including electricity meters).

Data on who benefits

CoGTA reports on the provision of free basic services by municipalities. This reporting is based on self-reporting by municipalities. The data is not considered to be reliable for the following reasons:

⇒ Methods of reporting, including interpretation of data, are inconsistent.

⇒ Reporting is incomplete.

⇒ Municipalities typically have an incomplete picture of electricity service provision in their area where Eskom is also providing distribution services.

⇒ Many municipalities do not have the data systems and capacity to monitor and report accurately.

The available data, which could be treated with caution, suggests that the FBE allocation benefits about 50% of poor households.

Data on financial flows

Free Basic Electricity is a component of Free Basic Services which is a local government competency and thus funding is allocated by CoGTA through the equitable share. It was not possible to locate reliable data on the financial flows associated with Free Basic Electricity.

Implementation challenges

The challenges facing Free Basic Electricity implementation include[41]:

- Limited financial resources. Municipalities report that the grant allocations are insufficient. There are also competing demands for the use of the equitable share.
- Limited technical and human resources capacity in poorer municipalities to effectively implement the Free Basic Electricity allocation.
- Lack of electricity distribution networks in rural areas, so that many households do not benefit from the Free Basic Electricity allocation.
- Limited information on consumers in smaller, poorer and/or rural municipalities which makes effective provision, monitoring and evaluation of FBE difficult.
- Lack of compatible billing, collection and vending infrastructure.
- How to deal with connection and reconnection fees in respect of new connections and cut-offs respectively.
- How to deal with under-recovery of network fixed charges.
- High levels of electricity theft in some areas make Free Basic Electricity irrelevant.
- Where users use less than the free basic allocation amount, municipalities lose the leverage of electricity cut-offs to incentivise consumers to pay for other municipal services.
- Municipal freedom of choice makes the effective regulation and enforcement of the Free Basic Electricity difficult.

4.5.6 Theft

Theft is a form of subsidy, a transfer between paying customers and those using electricity beyond the free basic amount without paying.

Eskom estimate their annual *non-technical* distribution losses to be about 5 850 GWh (which represents about 50% of total distribution losses of 11 700 GWh) per annum. This is very significant compared their total Homelight consumption of 6 000 GWh and total domestic (Homelight and Homepower) consumption of 8 000 GWh per annum. It

[41] DoE Presentation of FBE roll out, Provincial, district, municipal workshop 2009.

may be assumed that the bulk of non-technical losses are in these categories as Eskom has much more incentive to address non-technical losses for its larger non-domestic customers and hence losses for these customers are unlikely to be very large.

If it is assumed that 70%[42] of this can be attributed to Homelight and Homepower customers, this means that non-technical losses are at least 4 100 GWh per annum, presenting about 50% consumption over and above the recorded and billed consumption for Eskom's domestic consumers, equivalent on average to 82 kWh per connection per month for each of the approximately 4 165 000 Homelight and Homepower customers, or 260 kWh per customer per month if allocated to the Homelight customers recording zero consumption over the period of a year (1.3 million customers).

The value of this subsidy is about R2.5 billion per annum at a tariff of 62 c/kWh (Eskom's average Homelight tariff in 2009/10).

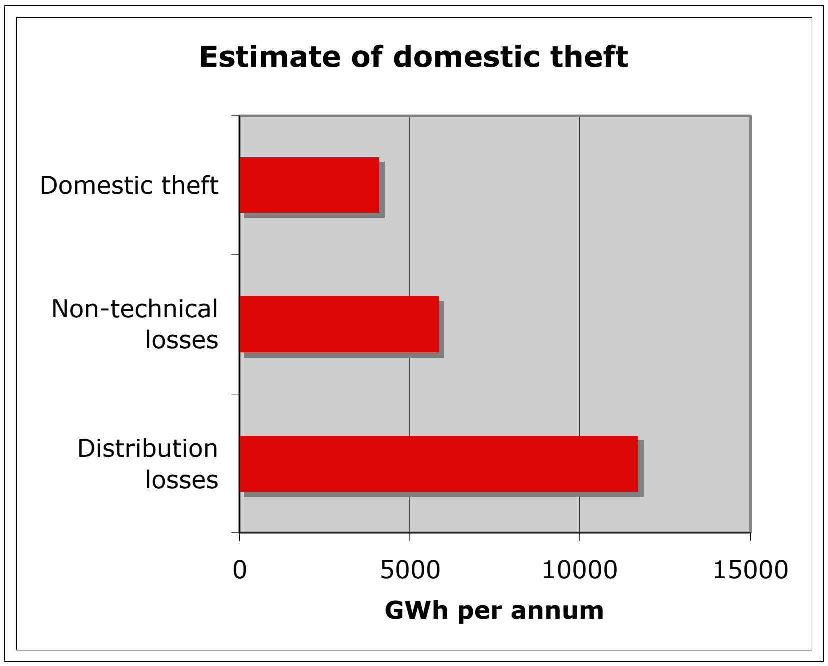

Figure 7: Losses and estimated domestic theft - Eskom

[42] This is a conservative estimate. It is likely to be more.

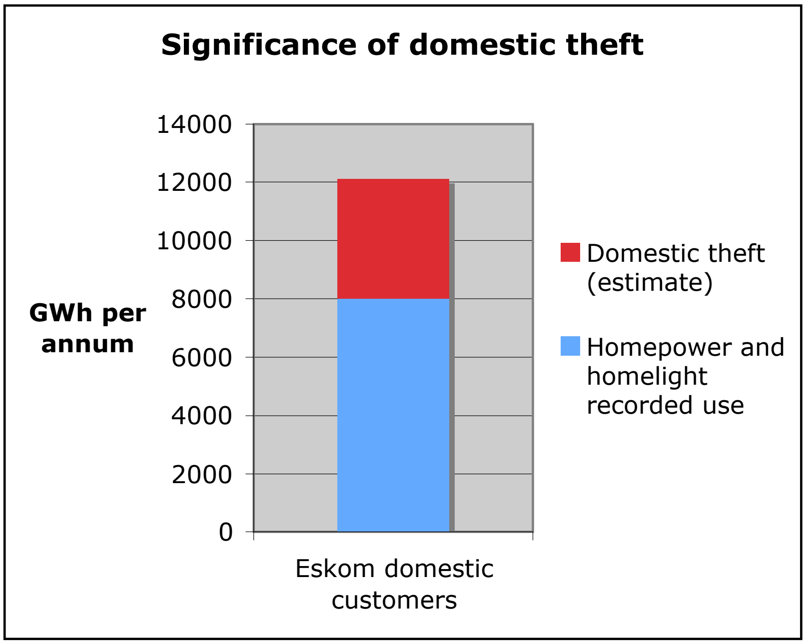

Figure 8: Significance of domestic theft (Eskom)

Yelland (2008) estimated total losses from theft (Eskom and municipalities) to be 13 000 GWh per annum. However, this is a very crude estimate and it could be misleading.[43] A better estimate of theft for municipal distributors does not exist.

4.5.7 Summary of existing pro-poor subsidies

A summary of the existing pro-poor subsidies is provided in the table below.

[43] Yelland (2008) argued that "the impact of electricity theft and non-payment in South Africa on the national electricity demand is about 3600 MW, which is equivalent to the output of a major coal-fired power station, or about 10% of the current national demand of around 36 000 MW." He calculated theft to be close to 13 000 GWh per annum and to have a lost revenue value of over R5 billion.

Table 7: Existing pro-poor subsidies (2009/10)

Subsidy	Amount (R billion per annum)	Comment
Electrification	2.7 [1]	During the last few years, new electricity connections have not been keeping pace with new household formation.
Free Basic Electricity	1.0	Data uncertain, could be substantially less. Many do not receive FBE.
Eskom Homelight	2.1	Cross-subsidies to poor households within municipalities are excluded. The available data on this is poor and it is hard to quantify these subsidies.
Theft (practice, not by design)	2.5	About 4 000 GWh per annum, equivalent to 50% of Eskom's domestic sales. Excludes municipal theft.
Total	**8.3**	More than 10% of revenue in the industry.

Notes: 1. Submission to parliament by Minister of Energy, 4 February 2010

It is also important to note that not all poor household currently get subsidies:

The electrification grant has not yet reached all poor households. There are still 3.4 million households without electricity. About R60 billion is needed to connect these households.[44]

The Free Basic Electricity grant does not get to all poor households. About R4 billion per annum will be needed in future to cover the cost of providing 50 kWh FBE to 4 million households.[45]

The total cost of applying existing pro-poor subsidies fully will rise substantially. Indicative figures are presented in the table below.

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[44] 2009/10 Rands. In 2010/11 R2.7 billion will provide 150 000 connections.

[45] Assuming Eskom's generation cost doubles in next three years from about 30 c/kWh to 60 c/kWh, and 50% of connections eligible. Note that this 4 million households are over and above the 3.4 million households who are as yet without electricity.

Table 8: Future pro-poor subsidies (existing policies) – indicative only

Subsidy	Amount (R billion per annum)	Comment
Electrification	6	To achieve universal access in 10 years
Free Basic Electricity	4	50 kWh to 4 million households
Eskom Homelight	5.5	4 million connections
Theft (practice, not design)	5	Assume constant 4 000 GWh per annum at higher cost of supply
Total	20.5	A 2.5 times increase in real terms, representing more than 25% of current sector revenues

The important point to note here is that full implementation of existing policies within the context of increased costs could result in subsidies that are reaching possible fiscal and macro-economic constraints.

4.5.8 Summary of subsidies that are not pro-poor

There are also substantial subsidies that are not pro-poor:

⇒ Farmers get a subsidy of R2 billion per annum

⇒ Energy intensive industries with special price agreements get R1 billion per annum

⇒ Municipalities pay more than cost for their bulk supply by R1.4 billion per annum

Correcting these distortions would reduce the cost of electricity supplied to municipalities by about 7.5% (current costs) and could make available about R1.6 billion per annum which could be used to subsidise poor households.

4.6 Supporting policies

The two key policies relevant to the protection of poor households in relation to electricity costs are:

⇒ The Electricity Pricing Policy

⇒ The Free Basic Energy Policy

The key provisions of these policies are summarised in Annexure 9.

4.7 The institutional environment

4.7.1 The structure of the electricity industry

The National **Department of Energy** (DoE), previously the Department of Minerals of Energy (DME), is responsible for the management of South Africa's energy resources. The Electricity and Nuclear Branch is responsible for electricity and nuclear-energy affairs and the Hydrocarbons and Energy Planning Branch is responsible for coal, gas, liquid fuels, energy efficiency, renewable energy and energy planning.

The departments Energy Policy is based on the following key objectives:

- Attaining universal access to energy by 2014;
- Accessible, affordable and reliable energy, especially for the poor;
- Diversifying primary energy sources and reducing dependency on coal;
- Good governance, which must also facilitate and encourage private-sector investments in the energy sector; and
- Environmentally responsible energy provision[46].

The electricity sector is **regulated** by the National Energy Regulator of South Africa ('NERSA') which was established in terms of the National Energy Regulator Act of 2004. NERSA is mandated to regulate electricity, piped gas and petroleum industries through issuing licences, setting and approving tariffs and charges, mediating disputes, gathering information, and promoting competition and the optimal use of resources.

Electricity **generation** is dominated by Eskom who own and operate the national electricity grid. Eskom is a wholly-owned public enterprise and although is does not have exclusive generation rights, it has a practical monopoly on bulk electricity. Eskom generates 96% (including 5% imports) of the current requirements, municipalities 1% and others 3% (inter alia Independent Power Producers). As the only transmission licensee Eskom is responsible for all transmitted electricity. Almost 90% of South Africa's electricity is generated in coal-fired power stations. A nuclear station, Koeberg, provides about 5% of electricity and the remaining 5% is provided by hydroelectric and pumped storage schemes. In 2003, Cabinet approved private-sector participation in the electricity industry and decided that future power generation capacity will be divided between Eskom (70%) and Independent Power Producers (30%). Despite extensive planning and interest, the market structures for Independent Power Producers were absent or inhibiting and thus Independent Power Producers are not major players in the market[47].

Although electricity **distribution** is a municipal function in terms of the Constitution, Eskom provides electricity to approximately 60% of all users, including commercial farmers, rural and informal households and large industrial consumers. About 180 municipalities distribute 40% of electricity sales to 60% of the customer base. The government's policy on the electricity distribution requires the division to be separated from Eskom and merged with the electricity departments of municipalities to form a number of financially viable regional electricity distributors (REDs). To facilitate this restructuring Electricity Distribution Industry ('EDI') Holdings was established in March 2003 by the then DME. The implementation of this policy has been slow. There has been resistance from local government, primarily larger municipalities, who see electricity distribution as an important function and one that contributes significantly to their financial viability.

4.7.2 The constitutional and legislative environment

Constitution

The responsibility for electricity distribution is commonly understood to be a local government competence in terms of the constitution.

[46] http://www.dme.gov.za/energy/overview.stm

[47] All figures in this paragraph are taken from the Electricity Pricing Policy.

It is argued by some that this poses restrictions on national government's ability to reform the electricity distribution sector and to directly regulate municipal electricity tariffs.

National Electricity Regulation Act of 2006

The National Electricity Regulation Act (2006) asserts the right of the National Energy Regulator (NERSA) to regulate electricity tariffs of licensees, including municipalities.

It provides for conditions pertaining to the setting and approval of tariffs to be specified in the license conditions, as well as the methodology to be used to determine tariffs, and for the regulation of revenue requirements. (Section 15).

The Act further states that tariffs: (Section 16)

⇒ Must enable an efficient licensee to recover full costs including a reasonable margin or return;

⇒ Must give end users proper information regarding the costs that their consumption imposes on the system;

⇒ Must avoid undue discrimination between customer categories; and

⇒ May permit the cross-subsidy of tariffs to certain classes of customers.

Electricity Regulation Amendment Act of 2007

This amendment addresses specifically the regulation of municipal reticulation.

The Act places duties on municipalities who are distributors to:

⇒ Comply with all technical and operational requirements for electricity networks as determined by the regulator;

⇒ Prepare plans and budgets;

⇒ Progressively ensure access;

⇒ Provide basic electricity services free of charge or at a minimum cost to certain classes of consumers within available resources;

⇒ Ensure sustainable reticulation services;

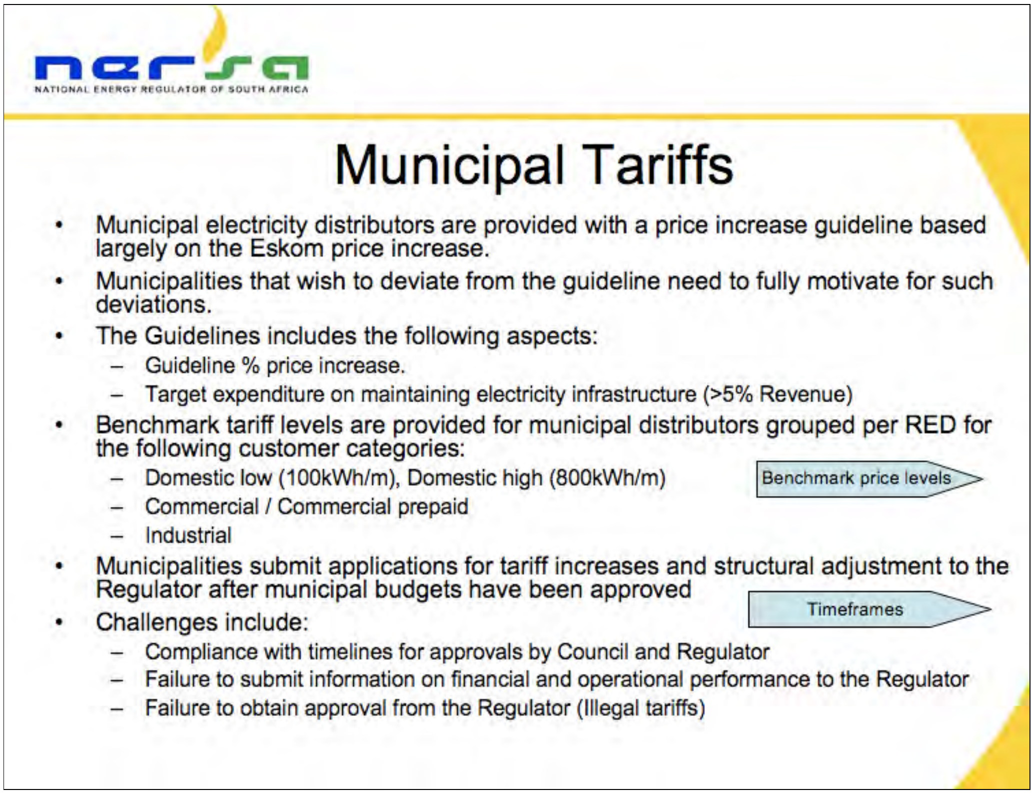
⇒ Regularly report to customers, the regulator and national government; and

⇒ Keep separate financial statements, including a balance sheet of the reticulation business.

The Act gives the Minster the power to make regulations pertaining to a wide range of aspects pertaining to the distribution of electricity (Section 47 in original act as amended in Section 12 of the amendment Act).

4.7.3 The regulation of retail tariffs by NERSA

In a presentation to Parliament in September 2009, NERSA had the following to say about regulating municipal tariffs:



Data on municipal electricity provision

The availability of information on municipal electricity tariffs, including consumption, revenue and cost data is very poor. Good quality data must form the basis of good regulation.

5 A review of international best practice

5.1 The literature

A review of the international literature (presented in Annexure 1) suggests the following elements of good practice:

The electricity sector as a whole should aim for cost-reflective tariffs with subsidies well targeted to address affordability for poor households.

The most effective *initial* subsidy for the poor is to subsidize the connection charges. Subsidies for consumption could not compromise the appropriate prioritisation of extending the grid and connecting new low-income households onto the grid. The benefit of the move from not having electricity to having an electricity connection is a much greater benefit than the benefit of subsidised consumption. While there are still households without access to electricity, ongoing attention needs to be given to the appropriate balance between subsidies for new connections and subsidies for consumption. The former could always receive priority if there has to be a choice.

If consumption is subsidised, the subsidy could be limited to a specified level considered adequate to promote adequate use by low-income households. Consumption subsidies could not benefit middle and high-income households.

Where subsidies are implemented, the level of subsidy needs to be determined, how the subsidy will be funded, its sustainability over time and how the subsidy will be distributed. It is generally accepted that the amount of subsidy could be the difference between the incremental cost of providing the service and the customer's ability to pay.

Subsidy funds could be collected and distributed in a way which minimises price distortions and which minimises unintended consequences. Although it is more economically efficient for subsidy funds targeted towards poor households to come from tax revenues, there are circumstances in which cross-subsidies can be applied with relatively little distortion.

5.2 International practice

The benefits of cost-reflective tariffs

Electricity tariffs are cost reflective in most developed countries where networks are extensively developed and supply is generally secure. The tariffs applied allow utilities to invest in the required new capacity to meet growing demand and to main the security of supply (reliability and quality of supply).

What happens when tariffs are not cost-reflective?

There are many examples of electricity sectors that have got into trouble as a result of not implementing cost reflective tariffs. One example is the Zambian Electricity Supply Company (ZESCO). A recent review of the electricity sector regulator in Zambia revealed the following.[48]

With respect to generation capacity, the review team noted that "in addition to the country's existing capacity of approximately 1,700MW, Zambia could potentially produce in excess of 6,000MW. However, indications are that the power system is already running close to its installed generation capacity and this may have been a contributing factor to the nationwide power blackouts that were experienced in January 2007. This is partly attributable to pricing. (Generation planning and procurement of new capacity are also important issues). In theory, the revenue-requirement method applied by the regulator allows for full cost recovery for the utility but this is yet to be achieved. A 2007 cost of service study into ZESCO operations by the ERB showed that in order to reach cost reflectivity, tariffs would have to rise by an average of 45% in 2007/08 with a significant portion of this adjustment being borne by the residential sector whose tariffs were required to rise by 147%."

With respect to retail tariff levels and subsidies, the review team concluded as follows: "With access to electricity low and tariffs at sub-economic levels, it was somewhat of a contradiction that there was even an effort to subsidise electricity the effect of which was to make sub-economic tariff even more sub-economic to the increased detriment of the viability of the sector. In the current environment the Review Team was of the opinion that there might be better and more sustainable poverty alleviation methods that the government could pursue outside the realm of electricity tariffs."

[48] African Electricity Regulator Peer Review and Learning Network, A Review of Electricity Regulation in Zambia, June 2009.

On the relationship between the need for new capacity and tariff levels, the review team concluded as follows: "The urgency for new generation can therefore not be over-emphasised but the funding required for this is significant. In the absence of this investment, it is unlikely that electrification and electricity access targets shall be met and over time system security and reliability will become compromised. The situation is further complicated by the fact that electricity tariffs are sub-economic, thus stifling the attraction of private capital which is vital given ZESCO's likely inability to raise the significant sums required to fund generation expansion. … Over the period 2004 to 2008 the average electricity tariff increased from 1.92 to 2.96 US cents/kWh. By any standard these rates are low and at these levels ZESCO would be unable to earn an adequate rate of return or cover its depreciation charge *the result of which would be an increasingly poor electricity service*. *Needless to say, under these circumstances there is limited if any scope to fund required new investment*."

Electricity infrastructure, tariffs and subsidies in Africa

This relationship between significant infrastructure gaps (inadequate electricity generation capacity or low reliability of supply) and the lack of cost-reflective tariffs (required to enable the sector to raise the necessary finance to invest in new capacity and to maintain a reliable supply) is replicated in many countries in Africa. The African Infrastructure Diagnostic notes that: "Africa's largest infrastructure needs are in the power sector. Whether measured in generating capacity, electricity consumption, or security of supply, Africa's power infrastructure delivers only a fraction of the service found elsewhere in the developing world. The 48 countries of Sub-Saharan Africa (with a combined population of 800 million) generate roughly the same amount of power as Spain (with a population of 45 million). Power consumption, which is 124 kilowatt hours per capita per year *and falling*, is only a tenth of that found elsewhere in the developing world, barely enough to power one 100-watt light bulb per person for three hours a day. Africa's firms report that *frequent power outages* cause them to lose 5 percent of their sales; this figure rises to 20 percent for firms in the informal sector unable to afford backup generators."[49]

The report further notes the important relationship between electricity demand and economic growth: "Demand for power is almost directly proportional to economic growth. Installed capacity will need to grow by more than 10 percent annually (or more than 7,000 megawatts a year) just to meet Africa's suppressed demand, keep pace with projected economic growth, and provide additional capacity to support the rollout of electrification (In the past decade, expansion of the sector averaged barely 1 percent annually, or less than 1,000 megawatts a year.) Most of this power would go to meet nonresidential demands from the commercial and industrial sectors."[50]

The inability of the electricity sector to expand to meet demand, and to maintain a reliable supply is strongly related to the fact that tariff levels are, in most cases, below that required to cover operating and maintenance as well as capital costs. The report notes that "only one fifth of utilities in Africa set tariffs high enough to recover full capital costs."[51]

Where tariffs are well below cost-reflective levels, it is both socially and politically very difficult to raise tariffs to cost-reflective levels because of the steep increases required.

[49] World Bank (2009, 33)

[50] Ibid.

[51] Ibid.

Poor infrastructure hurts poor people the most

The study found that where infrastructure is limited, access is strongly skewed towards urban areas and towards more affluent households within urban areas and poor households typically do not have access to this infrastructure. In this context, the application of consumption subsidies disproportionately benefits more affluent households. The study reports as follows: "Results across a wide range of African countries, and for both the power and water sectors, show that the share of subsidies going to the poor is less than half their share in the population, indicating a very pro-rich distribution."[52]

High connection fees are a barrier to connection rates

High connection charges are widespread across Africa and are an obvious demand-side barrier to hook-up, even when use-of-service charges would be affordable. In these circumstances, it is legitimate to ask whether substantial one-time up-front connection charges are the most sensible way to recover the costs of making network connections. Alternatives can be considered, including repaying connection costs over several years through an instalment plan, socializing connection costs by recovering them through the general tariff and hence sharing them across the entire customer base, or directly subsidizing them from the government budget.[53]

Many African countries are reducing their life-line tariffs

The evolution of lifeline tariffs for some African countries is given below. What is interesting to note is the reduction in the lifeline amounts over time.

Table 9: Lifeline tariffs in selected African countries

Country	Structure	Date Introduced	Rate** (US$)	Rate** (ZAR)
Ghana	0 – 100kWh 0 – 50kWh	Pre 1998 Current	US$12.61 (block charge*)	ZAR93.44 (block charge*)
Kenya	0 – 50kWh	Current	2.7US¢/kWh	20.07¢/kWh
Namibia	No pro poor tariffs			
Tanzania	0 – 50kWh	Current	3.0US¢/kWh	22.23¢/kWh
Uganda	0 – 30kWh 0 – 15kWh	Pre 2005 Current	2.7US¢/kWh	20.07¢/kWh
Zambia	0 – 300kWh 0 – 100kWh	Pre 2007 Current	3.7US¢/kWh	27.42¢/kWh

*If consumption exceeds threshold, then charged at full rate in its entirety
**Exchange rates from www.xe.com
Source: Joe Kabila, African Electricity Peer Review and Learning Network (2009). MIR, Graduate School of Business, University of Cape Town

Other country examples of international practice are presented in Annexure 2.

[52] Ibid.

[53] Ibid.

6 Options to protect poor households

6.1 Introduction

The researchers were requested to present the options for enhancing affordability and access to electricity on the part of poor households by extending, enhancing and/or introducing new options. These are set out below.

These options are interlinked and require careful consideration as to how best to combine the appropriate options into a pro-poor strategy.[54]

6.2 Option 1: Expand and improve electrification grant

Benefits of access to electricity

The benefits of extending access to electricity infrastructure are well documented. For example: "Better provision of electricity improves health care because vaccines and medications can be safely stored in hospitals and food can be preserved at home. Electricity also improves literacy and primary school completion rates because students can read and study in the absence of sunlight. Similarly, better access to electricity lowers costs for businesses and increases investment, driving economic growth."[55]

Prioritise subsidies to connect households to the electricity

Because of the significant benefits of household access to electricity, and because many households still do not have access to electricity, any subsidies available to (and in) the electricity supply sector could prioritise the facilitation of affordable access to electricity through the electrification grant and zero connection fees for poor households.

Accelerate the electrification programme

The pace of new electrification connections could be increased to be substantially more than the rate of new household formation.

Financial implications

It is estimated that the cost of universal access to electricity is about R60 billion. A ten-year programme to achieve this would require R6 billion per annum, compared to the current annual allocation of R2.7 billion.

6.3 Option 2: Maintain a viable electricity sector

The costs of efficiently producing and distributing electricity need to be met. The consequences of not meeting these expenses are a degraded electricity supply with shortages in capacity and unreliable supply. This is both inconvenient and costly. It increases the cost of doing business, constrains economic growth and affects job creation negatively. There are many examples of countries with electricity supply industries in trouble as a result of being inadequately resourced with severe economic and social consequences, particularly for poor households.[56]

[54] A preferred approach has been developed and proposed by the researchers. However, it was requested by NEDLAC that this approach not be included in the report.

[55] World Bank (2009)

[56] The case of Zambia, for example, is illustrative. See International Review set out in the previous section.

6.4 Option 3: Accelerate the implementation of a national domestic tariff structure

The current large number of different domestic tariff structures makes it difficult to understand and monitor existing subsidies within the municipal distributors.[57]

The development of a national set of domestic tariff structures (as provided for in the Electricity Pricing Policy) will provide greater clarity and certainty for households and enable the regulator to better monitor and regulate tariffs and subsidies.

The following four domestic tariffs are proposed:

Demand limited 20 Amp supply, with free connection, no monthly charge, free basic allocation, energy tariff set equal to generation and transmission cost (fixed network cost is subsidised). ("domestic level 1")

An intermediate supply (40 to 60 Amp), with no fixed charge, free basic allocation and an energy charge set to breakeven with full cost at 350 or 500 kWh per month. Households to switch to domestic level 3 at breakeven consumption, or technical switch. ("domestic level 2")

Standard domestic supply (60 Amp single phase) with full cost recovery through two part tariff - monthly fixed charge and energy charge set equal to generation and transmission cost. ("domestic level 3")

High demand (3-phase) supply with full cost-recovery tariff with time-of-use introduced to create incentives to shift demand to off-peak periods. ("domestic level 4")

This is an elaboration of the existing Electricity Pricing Policy, moving from three domestic tariff categories to four. At present there is no distinction between domestic levels 1 and 2 in the Electricity Pricing Policy.

The domestic level 1 category is typically not available at present to households supplied by municipal distributors.

Establishing these tariff structures and requiring them to be implemented by all distributors will enable subsidies to poor households to be both more targeted and more transparent.

6.5 Option 4: A general subsidy to Eskom

Setting average tariffs below the revenue required to meet efficient costs will require the difference to be subsidised by government (or alternatively to allow the electricity supply system to degrade – see option 2 above). A subsidy of this kind, that is, *a general government subsidy to Eskom, is the least pro-poor subsidy option available*. Such a subsidy will benefit large industrial users much more than domestic consumers, and wealthy households much more than poor households.

A R1 billion general annual subsidy to Eskom would reduce Eskom's electricity price by just 0.6 c/kWh (and less in future years), and provide a benefit of just R1 per month to a household using 200 kWh per month, R6 per month to a household using 1 000 kWh per month and R570 per month to an industrial user using 100 000 kWh per month (at current 2009/10 prices).

[57] The Minister of Energy reported that over 1000 different tariffs are being used at present in the electricity distribution industry (Engineering News, 3 February, 2010).

In contrast to this, a R1 billion annual subsidy to Homelight 20 Amp customers will reduce the tariff by 15 c/kWh and provide a benefit of R30 to the average Homelight customer using 200 kWh per month.

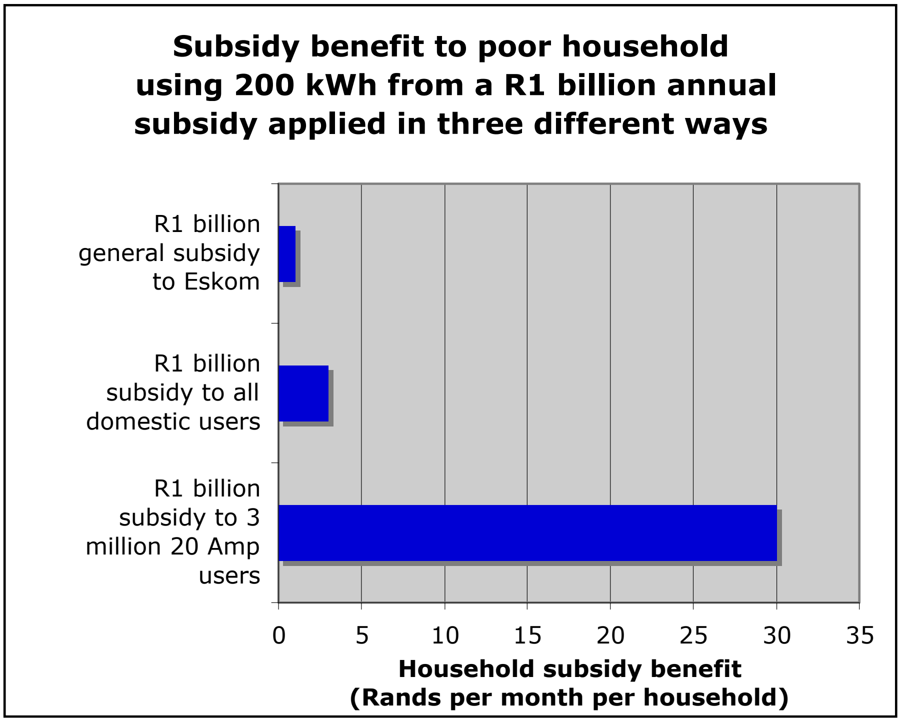


Figure 9: Distributional impact of subsidy choice for poor households

A targeted subsidy will benefit poor households 30 times more than a general subsidy to Eskom.

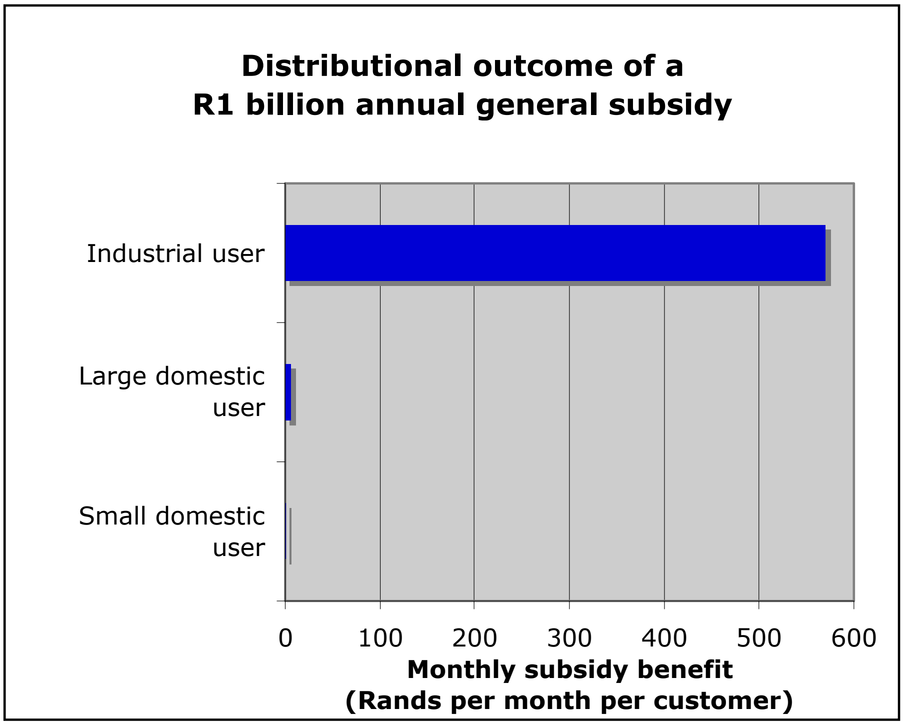


Figure 10: Distributional outcomes of a general subsidy to Eskom

In stark contrast to this, a general subsidy to Eskom will benefit a large industrial user using 100 000 kWh per month 500 times more than a poor household using 200 kWh per month.

In summary, a general tariff subsidy should be avoided as this will result in most of the subsidy going disproportionately to larger users. Consider the impact, for example, of a 10 c/kWh subsidy applied to all domestic consumers in South Africa. This subsidy would cost about R3.5 billion and have the following distributional impact:

Table 10: Large users benefit more from a flat rate subsidy

Consumption level (kWh per month)	**Benefit per connection** (R per month)
100	10
1 000	100 *(10 x)*

Table 11: Most of the flat rate subsidy goes to large users

Consumption category (kWh per month)	**Total benefit to category** (R billion)
< 500	1.2
> 500	2.3 *(66% of total benefit)*
All	**3.5**

16% of the total subsidy would go to 3% of the users (those users using more than 1500 kWh per month).

The benefit per consumer category is shown below.

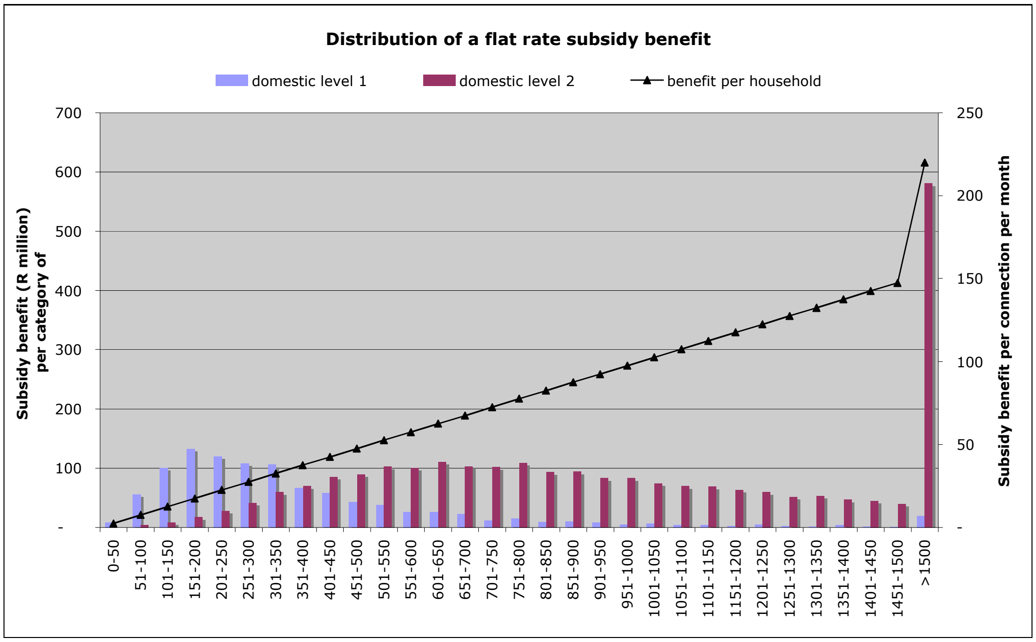


Figure 11: Distributional outcome from a flat 10 c/kWh subsidy

In summary, this option is not pro-poor and is not recommended for consideration.

6.6 Option 5: Increase cross-subsidy from industry

At present, some industries subsidise other consumers (including poor households) and some industries are subsidised.

The current price premium (percentage above cost) for industrial users (who are not party to special pricing agreements) is about 10%. The fact that this price premium has existed for some time suggests that such a price premium is acceptable. This is possibly assisted by the fact that the average tariff for industrial consumers (30 c/kWh in 2009/10), is lower than the average retail tariffs for municipal customers (for example, 49 c/kWh for eThekwini in 2008/9). [58]

While it could possibly be argued that this price premium could be increased (to reduce the difference in retail tariffs between large industrial and domestic consumers), this may be hard to achieve in the context of rapidly increasing costs and prices. In other words, it may be very hard achieve price increases for industry even higher than those required to meet the cost-based increases over the next few years.

A cross-subsidy of 10% of the revenues from all other users (all users that are not domestic level 1 users) may be considered a good benchmark. This could generate approximately R7 billion per annum (2009/10).

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[58] Both of these are average tariffs based on total revenue for that group of consumers divided by the consumption. Individual consumers in each category may face higher or lower tariffs depending on the specific tariff category.

It is recommended for consideration that a national cross-subsidy from non-domestic users form the primary pool for cross-subsidies to poor households. This is the most equitable form of cross-subsidy and is pro-poor. (See also the local cross-subsidy option discussed below.)

6.7 Option 6: Increase local cross-subsidies

Municipal electricity distributors typically rely on local cross-subsidies between consumers within their area of supply. These cross-subsidies are not transparent (it is almost impossible to quantify these cross-subsidies at present) and are not equitable for the following reasons:

- Economic activity and wealth is concentrated in South Africa's major urban areas. The six metropolitan areas account for more than 70% of South Africa's GDP.
- A large proportion of South Africa's poor households live in poor marginal urban and rural areas. Households in these rural areas, supplied by small local municipalities with little economic activity, have the most need for subsidy support. However, the scope for cross-subsidising electricity use within these areas is minimal – non-domestic use is a smaller proportion of total electricity use and the number and proportion of electricity consumers that are middle and high income are low. There are also significant differences in the ability of different regions (for example, at provincial scale) to deal with cross subsidies – for example, Limpopo and Eastern Cape versus Gauteng and the Western Cape.

Within this context, a subsidy system that is based on a national allocation of subsidies to poor households, using revenues from national government and/or the combined pool of electricity uses is far more equitable. In this system, the cross-subsidy burden is spread equitably across taxpayers (in proportion to their income and tax contributions) and evenly across electricity consumers nationally (in proportion to their electricity use).

In summary, a national electricity subsidy design that is significantly reliant on local cross-subsidies is not equitable and is not recommended for consideration.

6.8 Option 7: Allowing choice in service levels

If households were allowed free choice between the four service levels proposed (see Option 3 above), and if subsidies were targeted towards the lowest service level (domestic level 1: 20 Amp single phase), then this would provide a very effective mechanism for targeting subsidies to poor households. Households wanting or needing a subsidy for electricity, and who are willing to limit their instantaneous maximum demand to 4200 Watts, would select the 20 Amp supply and receive the subsidy, others would elect to have higher levels of supply and forgo the subsidy (or receive a reduced subsidy).

The implementation of such an approach is straightforward technically. However, there are some institutional and social hurdles. Many municipalities do not currently offer a 20 Amp single-phase option. These municipalities would be required to implement these by the national regulator. From a social point of view, it may be hard to implement a lower service level offering in a context where many households currently have a standard 60 Amp connection. However, if the subsidy and likely monthly bills are clearly explained, households will have a choice of whether or not they want to opt for a lower cost and subsidised service.

This is the most pro-poor tariff option and it is recommended for consideration that this service level and subsidy offering (domestic service level 1) be extended to households supplied by municipalities, and funded from a national cross-subsidy pool. (See Option 8 below.)

6.9 Option 8: Refine domestic level 1 subsidy

Demand limited 20 Amp supply, with free connection, no monthly charge, free basic allocation, energy tariff set equal to generation and transmission cost (fixed network cost is subsidised).

Eskom's current implementation of the life-line tariff for the domestic service level 1 tariff is as follows: Where a household does not pay a connection fee, the household faces a higher energy charge.[59] The pricing policy principles and objectives state that poor households could pay only the operating and maintenance costs (including the variable energy charge) and that the fixed infrastructure costs could be subsidised.

This tariff (domestic level 1) can be revised so that households with subsidised connections (Eskom's Homelight 1 customers) only pay the marginal operating and maintenance cost (excluding rehabilitation), and that the fixed network infrastructure costs for the household to gain access to electricity could be regarded as sunk costs, to be subsidised by the state (to promote affordable access to electricity as a public good). This is explained with reference to the figure below. This cost structure and discussion are simplified for purposes of clarity.

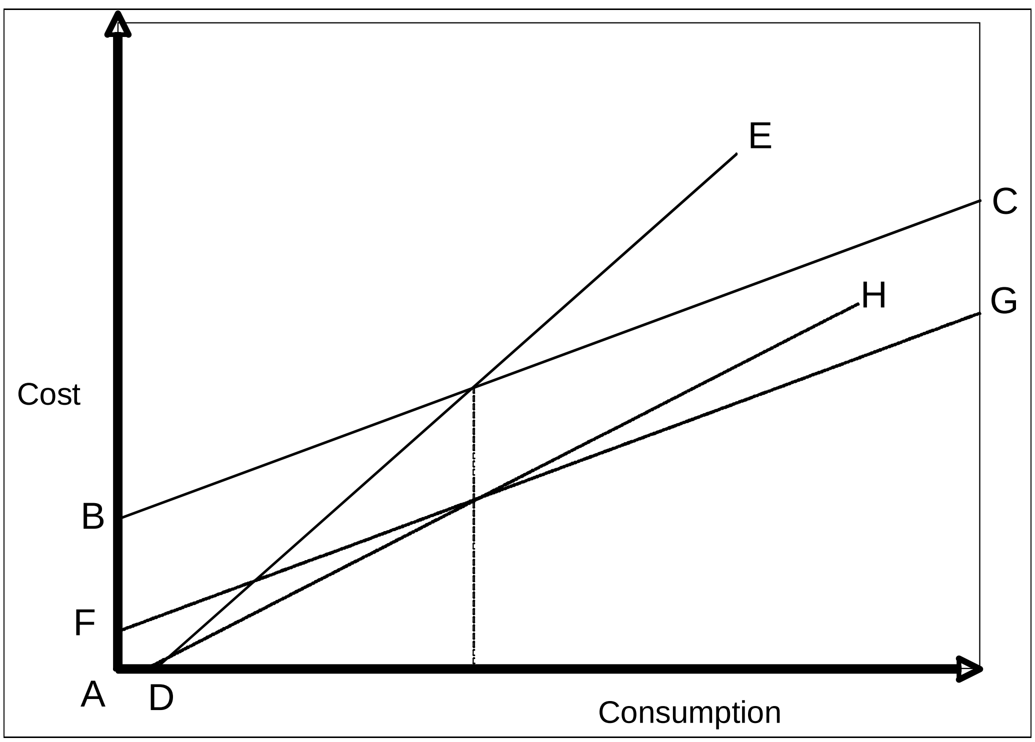

Figure 12: Cost and tariff structures

[59] Homelight 1 verses Homelight 2 tariffs. See Annexures 3 and 5 for details.

The cost of providing electricity is made up of fixed costs (incurred whether a consumer uses electricity or not, but necessary to make electricity available) and variable costs (costs directly proportion to the amount of electricity used). This is shown as the line A-B-C.

Eskom apply a tariff D-E for their Homelight customers that is made up of a free basic amount and a variable (energy) charge. The energy charge is higher than the variable cost – the slope D-E is steeper than the slope B-C. This means that the Homelight user enjoys a subsidy only up to the breakeven point (the intersection of B-C and D-E, shown with a vertical line). After that, the consumer pays more than the full cost. The breakeven point in terms of the Electricity Pricing Policy is 350 kWh.

The rationale for this is that the consumer has an incentive at this point to move across to the normal domestic tariff, with a fixed monthly fee and a lower variable (energy) charge, that is, to move on to a tariff that reflects the costs (A-B-C).

There are a number of consequences related to this approach:

⇒ Service level 1 (Homelight) customers experience a higher marginal tariff (energy charge) compared to Service level 2 (Homepower) domestic customers: 65 c/kWh for Homelight 60A customers compared to 50 c/kWh (a 30% difference) in 2009/10;[60]

⇒ Service level 1 (Homelight) customers who use more than the breakeven amount pay more for electricity in total than do the service level 2 (Homepower customers). Although this is a small proportion of Homelight customers it is still a large number of customers. There is no automatic switching of customers to the most cost-effective tariff.

⇒ There is a perception, arising from the above two facts, that service level 1 users pay more for electricity compared to service level 2 customers. Although this is not strictly true for most service level 1 customers (when looking at the total monthly bill for like consumptions), the perception is understandable.

⇒ This tariff structure contradicts the policy intent that the life-line tariff (that is the tariff for service level 1 customers) is intended to recover only the fixed and variable operating and maintenance costs, and variable energy costs of the service and not the fixed network infrastructure costs.

In terms of the policy, the costs that are relevant to the service level 1 user are shown as A-F-G, comprising a lower fixed cost related only to the ongoing customer service and maintenance costs and the same variable charge (the slope F-G is the same as the slope B-C).

The appropriate tariff is then A-F-G. However the policy is to apply a free basic amount and not to charge a fixed monthly fee. Hence the tariff can be transformed into D-H with revenue neutrality between A-F-G and D-H for the given consumption distribution.

Applying this tariff to service level 1 users will have important implications:

⇒ The energy or variable charge will be lower than is currently applied. (The actual amount would need to be modelled based on actual costs).

⇒ The revenues from this customer category will be less.

[60] Data from Eskom 2009/10 tariff book. Tariffs exclude VAT and environmental level. The 20A Homelight tariff is 57 c/kWh, a 14% variance.

⇒ There will be the need for an increase in the subsidy allocated to this customer group.

The incentive to switch to domestic service level 2 will be driven by a desire for increased demand capacity. Although it is theoretically possible for 20A load-limited customers to consume high kWh per month, in practice they won't because loads will not be on 24 hours a day. The incentive to switch will be driven by a desire to have a full 60A service so as to be able to use more appliances simultaneously. In other words, it is possible to rely to self-selection. The empirical evidence supports this.[61]

What this means in practice, is that the current Eskom Homelight 1 tariff for 20A supplied can be held constant in real terms until the energy cost (currently 30 c/kWh) reaches the current energy tariff for this tariff category (currently 57 c/kWh).

In other words, poor households currently with a Homelight 1 20 Amp supply can be almost completely shielded from the cost increases over the next three years. This is a very pro-poor tariff option and is highly recommended for consideration.

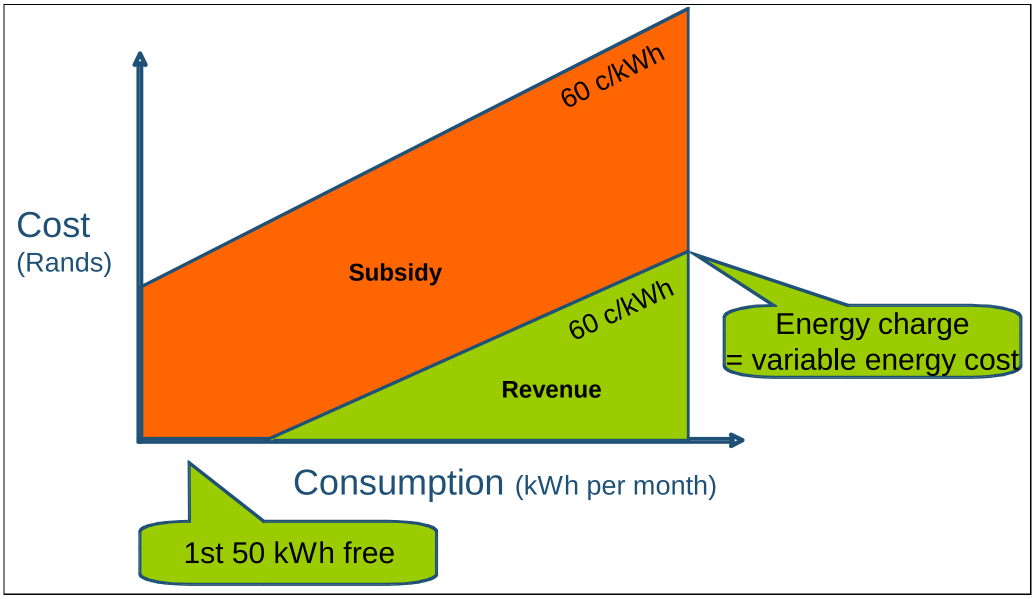

Figure 13: Structure of domestic 1 tariff

Practical considerations

This subsidy is very well targeted and benefits the poorest households only (those willing to limit demand)

There are currently about 1.5 million active and 0.9 million "inactive" connections on Homelight 1 20 A (Eskom)

This subsidy is typically not available for municipal customers but this is easy to implement.

It is possible to keep the current tariff constant until the tariff is equal to the variable energy cost, and then to set the tariff equal to variable energy cost.

[61] See the consumption distribution for Eskom's Homelight 1 60A prepayment users presented in Section 4.

The estimated subsidy required in three years time for 2.5 million and 4 million connections is R6 billion and R9 billion per annum respectively. This includes the Free Basic Electricity portion. See Annexure 8.

This subsidy could come from a national subsidy pool (combination of government grant and national electricity cross-subsidy).

The distributional outcome of this subsidy is very good. See below.

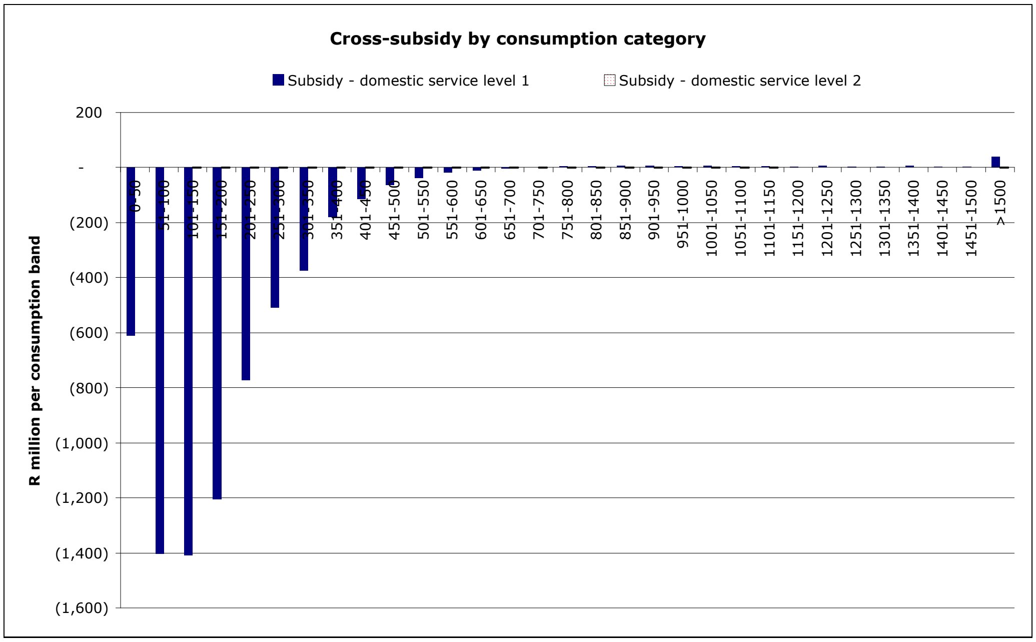

Figure 14: Distributional outcome of domestic level 1 tariff subsidy

6.10 Option 9: Extend domestic level 1 subsidy to municipalities

At present, the domestic level 1 tariff is only available to Eskom customers. This tariff can be made available to all domestic users. This will extend the benefits of the subsidy to all poor households opting for a demand-limited supply in order to benefit from the subsidy.

These households will be almost completely shielded from the cost increases over the next three years.

This subsidy could be funded from the national cross-subsidy pool. The subsidy is transparent, easy to quantify and is affordable.

This is a very pro-poor tariff option and is highly recommended for consideration.

6.11 Option 10: Extend Free Basic Electricity allocation

The cost of the Free Basic Electricity allocation is affected by:

- The number of households (connections) benefiting from the subsidy
- The free basic allocation
- The cost of energy

An indicative range of possible future costs of FBE is shown below.

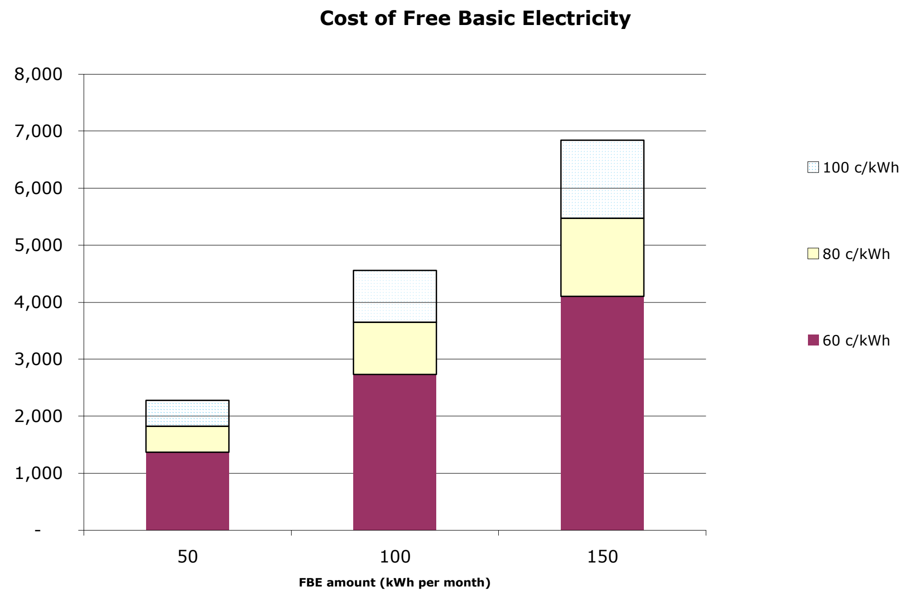

Figure 15: Free Basic Electricity costs

These costs assume an uptake by 3.8 million households (connections) – more than 50% of active domestic connections.

Should the FBE allocation be increased to 100 kWh per month, the subsidy requirement for FBE will increase from R1.3 to 2.7 billion per annum (current costs). If the energy tariff is higher, then the lost revenue will increase as shown in the future.

There is great variability in how the policy is applied and uptake is low. The challenges implementing the policy have been more fully described in Section 4.

Until these challenges are ironed out, it is not recommended that the Free Basic Electricity amount be increased.

The following options are recommended for consideration:

- Review the existing FBE policy and its implementation.
- Maintain the Free Basic Electricity amount at 50 kWh per month pending the review of policy as per the option identified above.
- Make Free Basic Electricity available to all consumers on Eskom Homelight 1 tariffs (households who received a subsidised connection). (Investigate why there is a low uptake rate and explore and implement mechanisms to overcome the obstacles.)
- All municipalities could be encouraged to create a domestic 1 tariff, subsidized as per previous option.
- In the interim, where municipalities do not distinguish between different domestic consumers, then make the Free Basic Electricity available to consumers consuming less than 350 kWh per month.
- Create a dedicated national fund for Free Basic Electricity. Have this fund administered by Eskom (pending the reform of the distribution industry). Require full reporting (disclosure of revenues, costs, consumption per consumer category) and compliant implementation of NERSA approved tariff structures

Comment [RE1]:

and Free Basic Electricity implementation, as conditions for transfer of the Free Basic Electricity money from Eskom to municipalities. The same applies to Eskom's own implementation of Free Basic Electricity. This may require the completion of the Free Basic Electricity policy review. This option would require further study prior to its implementation.

Implementation option

Maintain the level of Free Basic Electricity at 50 kWh pending a review of the policy and its implementation. The current benefit does not reach everybody it could. Increasing the FBE amount at this point may lead to unsustainable fiscal burdens in later years as costs increase. Great caution is needed here. It is much harder to reduce the amount later.

Undertake a careful analysis of the macro-affordability of increasing Free Basic Electricity in light of the magnitude of all of the subsidies in the system and how these will change as costs increase.

6.12 Option 11: Combat theft

The issue of theft and bad debt cannot be ignored for three very important reasons. Firstly, the amounts being stolen are significant. Secondly, households stealing electricity benefit at the expense of households who are paying. This is both inequitable (it is not fair to households who are paying for services and who, in addition, must bear the cost of those that are not paying) and unsustainable, especially in a context of increasing electricity prices where incentives to steal will increase markedly. Thirdly, condoning theft does not support key democratic and human rights principles.

Reducing theft will increase the revenues into the sector, and make subsidies to poor households more equitable and transparent. Addressing theft is therefore pro-poor.

A study is needed to quantify the estimated losses arising from theft and non-payment, and the geographic, institutional and customer tariff incidence of these losses. Once the magnitude and distribution of the issue is better understood, recommendations can be made as to how to address this issue. This matter could be considered both urgent and important.

Implementation option

Undertake studies to understand nature and extent of theft better (NERSA, Eskom and SALGA). Develop political support to address this issue. Develop detailed and practical initiatives to reduce theft, including education (why tolerance of theft results in highly unequal distribution of subsidies) and operational management issues.

6.13 Option 12: Address non-pro-poor subsidies

Reforming existing tariffs and subsidies that are not pro-poor will make more resources available to subsidised poor households.

There are three major subsidy flows that could be reviewed:

- The cross-subsidy from municipalities to other users through the over-pricing of bulk electricity sold to municipalities;
- The cross-subsidy to agricultural users through the under-pricing of agricultural tariffs; and
- Special pricing agreements.

There appears to be little justification for the practice of municipalities paying Eskom more than the cost of supply for their bulk tariff. This subsidy amounts to about R1.4 billion per annum currently, amounting to a tariff premium of 7.4% (2.2 c/kWh on an average bulk tariff to municipalities of about 30 c/kWh). Taking this subsidy out of the system would enable bulk tariffs to municipalities to be reduced by 7.4%. However this cost would need to be made up by increasing the tariffs to other users (a tariff adjustment of 3% if applied to all other users).

There appears to be little justification for a cross-subsidy by the electricity industry itself to agriculture. Should such a subsidy be deemed to be desirable, this is a subsidy that could be borne by the taxpayer, and not other electricity users.[62] Removing this subsidy would benefit other users by R2.2 billion. Alternatively, this money could be redirected so as to eliminate the municipal price premium and make the difference of R800 million available for subsidising the poor.

It will become increasingly hard to justify special pricing agreements to large energy intensive industries that result in significant (and increasing) subsidy benefits to these customers in a context where other electricity users are feeling significant pain as a result of increased costs and prices of electricity. Government and Eskom's hands are tied in relation to the existing special pricing agreements. These can be considered to be "property rights" (the present value of the contracts) and the expropriation of these rights is likely to be expensive. Eskom could be required to unwind these agreements as soon as is practical and in the most economically and financially efficient manner. (This may mean waiting out the contract period.) No new special pricing agreements could be entered into. The era of South Africa as a destination for energy intensive industries attracted on the basis of cheap electricity is over.

Addressing the above imbalances will alleviate some pressures in the system and could be done as early as possible. In particular, it will soften the price increase for municipal customers. It will be much harder to correct the imbalance later, after prices have risen sharply. This is because the subsidies will rapidly increase in magnitude if the current pricing policy is maintained, making adjustments that much more painful later.

These tariff reforms are pro-poor and are recommended for consideration.

6.14 Option 13: A flat-rate tariff

A flat-rate tariff to all users (or all domestic users) within a distributor, with no fixed charges has a number of advantages:

- ⇒ It is an ultra simple tariff (there is just one tariff per distributor).
- ⇒ The marginal energy tariff will be much higher for many users than it is now (because of the elimination of fixed monthly charges), with stronger incentives to use energy efficiently. The marginal energy tariff will be closer to the marginal cost of new generation, sending sound price signals for efficient energy use.
- ⇒ Larger users (both domestic and non-domestic) will cross-subsidise small users (the exact consumption break even point will vary between distributors).
- ⇒ Non-domestic users will cross-subsidise domestic users because costs per unit of energy supplied are typically higher for domestic users.
- ⇒ The approach may be suitable in the context of a few large REDs with pooled costs.

[62] The subsidisation of electricity to agricultural users is an historical artefact and was motivated largely on political grounds at the time.

However, the approach also has a number of disadvantages:

⇒ If applied equally to all users (domestic and non-domestic), non-domestic tariffs will need to increase significantly over and above the price increases needed to cover cost-related increases. This is likely to be strongly resisted.

⇒ If applied equally to all domestic users, the targeted benefit to poor households using domestic service level 1 falls away and the resulting cross-subsidies between larger and smaller consumers are less targeted and less pro-poor.

⇒ The tariffs will not be cost reflective and therefore will not be consistent with the current Electricity Pricing Policy.

⇒ There will need to be exceptions for large industrial users (for both Eskom and municipal distributors). It will be difficult to draw the line as to which categories qualify for these exceptions, as this line will be somewhat arbitrary.

This option is not consistent with the Electricity Pricing Policy and is not recommended for consideration.

6.15 Option 14: Inclining block tariffs

A rising block tariff has been proposed as a solution to affordability concerns through a cross-subsidy from large to smaller electricity users. What is intended here is that the tariff increases as consumption increases so that large consumers cross-subsidise small consumers at an even greater rate than would be the case with the single flat tariff described above.

In addition to the disadvantages of the flat rate tariff described above, there are a number of problems with this proposed solution:

- There are strong technical constraints to applying an inclining block rate tariff. These cannot be applied to prepaid meters (a significant percentage of the installed meter base) because these meters have no clock and vending systems, with few exceptions, are not on-line. Substantial investments will need to be made in systems to effect a fair implementation of this tariff.
- There is no logic for the implementation of these systems for non-domestic users as there is no basis for deciding on consumption blocks. It will be very hard to impose a significant tariff premium on very large users. For these reasons, inclining block tariffs are typically not applied to non-domestic users. This is not to say that non-domestic use cannot and could not subsidise domestic use. Rather, an inclining block tariff is not necessary to achieve this. The cross-subsidy can be effected equitably and effectively through a two-part flat rate tariff set at an appropriate level, or a one-part tariff (no fixed charge and a higher energy charge).
- The cross-subsidy sought from a inclining block tariff can therefore only be applied to domestic users. Within the current institutional context, this subsidy can only be applied locally. This is an inequitable subsidy for the reasons outlined in Option 6.
- It is not clear how an inclining block tariff will relate to the proposed time-of-use tariffs. Time-of-use tariffs seek to shift demand out of peak demand periods thus improving load factors and reducing the overall costs of the system. An inclining block tariff does not have this benefit.
- An inclining block tariff is not consistent with the Electricity Pricing Policy.

- An inclining block tariff requires an accurate knowledge of consumption distributions in order to accurately predict revenues. This data does not exist from most municipal electricity distributors.

In summary, an inclining block tariff is not necessary to implement a fair and effective subsidy for electricity consumption and it is impractical to implement.

This tariff option is not recommended for consideration.

6.16 Option 15: Domestic level 2 subsidy

An intermediate supply (40 to 60 Amp), with no fixed charge, free basic allocation and an energy charge set to breakeven with full cost at 350 or 500 kWh per month. Households to switch to domestic level 3 at breakeven consumption, or technical switch.

This tariff option is necessary because many poor households have a 60 Amp connection. The key risk here is introducing an expensive subsidy which is not well targeted and which will quickly become unaffordable as costs rise. The risk is also high because existing data is poor so it is hard to accurately predict the subsidy requirements and distributional impacts. Further risks include likely pressure to push the breakeven point further out as costs increase. This implies that a cautious approach could be adopted.

The mechanism of switching from domestic level 2 to 3 is important - this could be consumption based (at the breakeven threshold) or technology related (for example, domestic level 2 could be a 30A or 40A demand limited supply).

Another key consideration here is the source for the subsidy: this could be through a local cross-subsidy or from a national source. A national source is favoured for two reasons:

⇒ Local cross-subsidies are inequitable as poor households in poor municipalities are most disadvantaged.

⇒ Introducing a national-level subsidy will promote much better data and transparency with respect to consumption distributions, costs, revenues, subsidy flows and distributional impacts.

Practical considerations

This subsidy is already widely practiced. However, it is not possible to determine the current subsidies and to accurately model the subsidy implications of extending this tariff and subsidy. This calls for a cautious approach to the extension of this subsidy.

This subsidy already exists in practice in many municipalities. What is needed is the creation of a level playing field and national rather than local cross-subsidies within a framework of full transparency – see below.

Implementation options

Introduce a domestic level 2 (intermediate) tariff option. Set the tariff level nationally. Assume a uniform cost structure. Make subsidy conditional on disclosure of costs and consumption distribution. Undertake more detailed modelling to determine subsidy implications and affordability (in combination with all of the other subsidies). Be cautious in the implementation due to the associated risks. Implementation over a period of three years is proposed. Investigate the best mechanism of switching from domestic level 2 to 3 - consumption based (at the breakeven threshold) or technology related. Subsidise this subsidy from a national source.

6.17 Option 16: Creation of a dedicated conditional grant

Within the context of the current fragmented electricity distribution industry and increasing electricity costs, it may not be prudent to continue to rely on local cross-subsidies to support poor households supplied by municipalities.

Consideration could be given to the introduction of a new dedicated grant mechanism to support poor households. This grant could be made available to domestic service level 1 users only, and be used as an incentive to municipalities to offer this service level option. This will ensure that the subsidy is targeted to poor households.

If this option is taken further, more detailed work will be required on the following:

⇒ Developing a detailed tariff design for the domestic service level 1 tariff, for a single common tariff across the country.

⇒ Modelling the financial implications of this grant, including the appropriate level of the energy tariff and total subsidy amount. (This project provides a starting point for this analysis but is not sufficient in itself).

⇒ Investigating grant sources, including possible cross-subsidies within the electricity industry.

⇒ Investigating the institutional and governance implications.

⇒ Investigating the implications for the equitable share.

⇒ Investigating practical management and administrative arrangements for the grant, including conditionalities etc.

6.18 Option 17: Increased social grants

An alternative to providing direct support to electricity tariffs (through the targeted options set out above) is to provide income support directly to households through social grants. Whilst the social grant coverage is quite wide, supporting households with children and elderly members, there is a gap in this social net of working age adults who are unemployed and without income. The intention of the current grant is therefore not to provide general income support to poor households but to assist with particular social circumstances. A consideration of the merits of broadening the social grant is beyond the scope of this report and was not considered.

6.19 Option 18: Finance electricity displacement

Another approach to mitigate the impact of increases in household electricity bills is to assist households to reduce their overall electricity usage while maintaining their standard of living through financing electricity displacement options.

The three main possibilities for energy displacement are:

⇒ Switching to more efficient lighting, which can reduce electricity use for lighting by 80%.[63]

⇒ Switching to solar water heaters which can reduce energy use consumption for water heating by between 60% and 70%; and

⇒ Improving housing insulation which can reduce heating demand by well over 50%.[64]

[63] Compact fluorescent bulbs typically use 20% of the electricity for the same lighting compared to incandescent bulbs.

The corresponding financial savings are shown in the table below based on an estimated space and water heating use on the current average Eskom Homelight tariff of about 61c/kWh.

Table 12: Savings from displaced electricity

	Rating per unit	units	hours per day	days	Total use	Cost	SAVINGS	
	Watts	*n*			*kWh pm*	*Rands pm*	*%*	*Rands pm*
Lighting	75	10	5	30	23	86	80	69
Radio	10	1	8	30	2	15		
Music	100	1	3	30	9	21		
TV	100	1	6	30	18	32		
Kettle	2400	1	0.8	30	58	67		
2-plate stove	2000	1	4	30	240	213		
Geyser	2000	1	5	30	300	396	60%	238
Heater	2000	1	5	20	200	518	50%	259
Total						**1348**		**566**

Efficient lighting

Savings through more efficient lighting may be particularly significant for poor households for whom lighting may be a larger proportion of electricity use, compared to middle and high income households.

The switch to efficient lighting is already occurring through the widespread introduction of low wattage compact fluorescent light bulbs. Eskom has implemented a large-scale programme to subsidise the replacement of incandescent with compact fluorescent light bulbs (22 million compact fluorescent light bulbs have been handed out according to the Eskom compact fluorescent lightbulb exchange FAQ on www.eskomdsm.co.za). In addition, many households are making this choice voluntarily in response to rising electricity prices

The financial benefits of investing in Solar water heaters

The table below shows the financial benefits of the installation of a solar water heater. It can be seen that if a solar water heater is financed over a five year period there are immediate net financial benefits of R91 per month due to the energy savings.

Table 13: Solar water heating costs and benefits

Water heating energy savings (%)	60%
Solar water heater additional cost (Rands) [65]	10,000
Eskom rebate (Rands)[66]	3,500
Net cost to household (Rands)	6,500
Period (years)	5
Interest rate	11.00%
Monthly payments	-147
Energy bill savings	238
Net savings per month	**91**

[64] Winkler, H., Spalding-Fecher, R., Tyani, L., and Matibe, K., 2000: Cost benefit analysis of energy efficiency in low-cost housing, Energy Research Centre, UCT.

[65] Costs based on current solar water heater prices and are for 'low-end' solar water heaters of about 100-150 litres in capacity.

[66] Rebate from Eskom website.

If electricity prices increase in real terms over time, then the net benefits to households will increase. Similarly, the benefits to the households will increase if the subsidy is increased.

Similar savings can be shown for housing insulation interventions.

Financing mechanisms

Poor households will typically not be able to afford these technologies due to the barrier of the initial capital cost and the inability to access financing to spread these costs over time. Measures which could overcome this initial financing barrier would complement a pro-poor electricity tariff policy and have the advantage of securing permanent electricity use reductions which reduce the ongoing subsidy requirements. Such measures could include:

⇒ Municipality financed solar water heaters where the municipality would finance or lease the water heater to the household and recover the costs through a specific 'solar' tariff increment.

⇒ State support and encouragement to private financial service provides to provide finance to low-income households for solar water heater installation.[67]

The Eskom solar water heater support programme (which provides cash rebates for approved solar water heater installations) and the planned introduction of financial mechanisms by some local authorities to support solar water heater uptake therefore complement existing pro-poor tariff support.

The use of carbon finance, through the sale of registered greenhouse gas reduction credits, may provide further financing.

The same consideration could be given to home insulation and there are some local and international models that can be drawn on in this regard.

Targeting

These interventions do not provide financial relief to those households currently without electric geysers. Insulation interventions will similarly only reduce net household expenditure when other electricity or fuel use is displaced. These interventions therefore, will not be well targeted to the poorest households (see figure below). Of the two interventions, home insulation is arguably more likely to displace expenditure on energy (both electricity and other fuels) in the poorest households.

[67] For example, through the Clean Technology Fund.

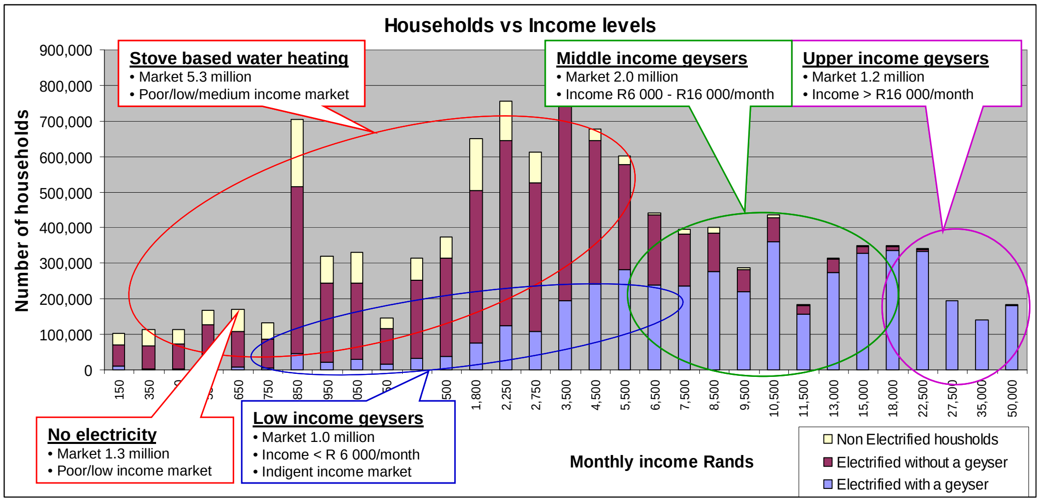

Figure 16: Water heating by income level [68]

Solar water heater introduction is also limited by the available water supply, in some cases houses will have an electricity supply but lack a piped water supply to the house or plot.

New housing

These interventions are significantly cheaper if introduced when new housing is built and their integration within the low cost housing subsidy programmes (and for all new housing stock) will be the most cost effective way of building in long term energy savings into the country's housing stock.

Reducing peak demand

Energy efficiency and the reduction in peak energy use is an important element in addressing the current electricity supply shortage and household energy efficiency interventions are amongst the most rapid and cost effective energy efficiency and peak reduction mechanisms. The savings due to reducing or postponing new power generation infrastructure will also result in lower costs in the electricity system as a whole.

The National Solar Water Heating Framework and Implementation Plan

The large scale introduction of solar water heaters is being addressed by the Department of Energy through a national strategy. It is likely that there will need to be significant interaction between responsible agencies (DoE, NERSA, Eskom, municipalities) to ensure the integration of solar water heater subsidy and financing approaches with the setting of electricity tariffs and linking these with billing systems. (If solar water heaters are financed, then the means to recover monthly charges need to be integrated with electricity bills.) Provision for the inclusion of capital financing support for energy efficiency interventions could be included in a pro-poor electricity tariff policy. This requires further detailed work.

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[68] Afrane-Okese, Y., 2009: Development of the South African National Solar Water Heating Strategy & Implementation Plan, World Bank/GEF funded "Renewable Energy Market Transformation (REMT)" project, presented at DoE Solar Water Heater conference, November 2009.

The financing of energy displacement (in particular solar water heating and passive space insulation) is a viable option to protect poor-households from rising electricity costs and current initiatives to achieve this could be strengthened and accelerated.

6.20 Summary evaluation of options

Evaluation parameters

The following parameters were used in evaluating the above options:

- Is the measure pro-poor?
- Is the measure well targeted?
- Is the measure equitable?
- Is the measure practical?
- Is the measure affordable? (both now and in the future)
- Is the measure efficient? (To what extend will the measure distort incentives for efficient use of electricity?)
- Is the measure consistent with current policy?
- Will it cost a lot to implement? (administrative costs)

Financial sustainability. It is much easier to introduce a subsidy than to remove a subsidy. Therefore, great care needs to be taken in how short term decisions are made in the context of a medium outlook of steeply increasing costs. It is particularly important that any subsidies introduced in the short term are sustainable in the long term. Hence any subsidy decision needs to be taken within the context of a medium to long term view.

Policy consistency. Any decisions related to subsidies should be consistent with approved policy. Where existing policies are considered to be deficient, a suitable policy review process could be undertaken to review the policy and to make policy amendments, including the introduction of new policies. Such a policy review process needs to be both thorough, carefully considering the full implications of any proposed policy amendments, and consultative.

Option	Pro-poor	Targetted	Equitable	Practical	Affordable	Efficient	Policy consistent	Admin cost	Overall evaluation and recommendation
1. Electrification grant	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Low	Yes – a priority
2 Viable sector	Yes	n/a	Yes	Yes	Yes	Yes	Yes	n/a	Yes – a priority
3 Four tariff structures	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Low	Yes – a priority
4 General subsidy to Eskom	No	No	No	Yes		No		Low	No – not pro-poor
5 Industry cross-subsidy	Yes	n/a	Yes	Yes	Yes	Yes	Yes	Low	Yes – maintain a price premium on industry (10%)

Option	Pro-poor	Targetted	Equitable	Practical	Affordable	Efficient	Policy consistent	Admin cost	Overall evaluation and recommendation
6 Local cross subsidy	Yes	n/a	No	Yes		Yes	Yes	Low	Do not increase as not equitable and not transparent. Better to use national subsidy pool.
7. Service level choice	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Low	Yes – equitable and effective
8. Refine domestic L1 subsidy	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Low	Yes – very targetted pro-poor tariff
9. Extend domestic L1 subsidy	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Low	Yes -- very targetted pro-poor tariff
10. Extend free basic amount	Yes	Yes	No	Yes	No	Yes	Yes	Low	No – extend coverage first & address implementation challenges.
11. Combat theft	Yes	Yes	Yes		Yes	Yes	Yes	High	Yes – priority
12. Address non pro-poor subsidies	Yes	No	Yes		Yes	Yes	Yes	Low	Yes – provides additional source of subsidy funds to support increase in subsidies to poor
13. Flat-rate tariff	Yes	Yes	No	Yes	Yes	Yes	No	Low	No – not equitable, relies on local cross-subsidies.
14. Inclining block tariff	Yes	Yes	No	No	Yes	No	No	High	No – not equitable, relies on local cross-subsidies, requires changes to most meters (expensive)
15. Domestic level 2 subsidy	Yes	Yes	Yes	Yes	To be modelled	Yes	Yes	Low	Yes, proceed with caution due to total cost considerations.
16. Dedicated national grant	Yes	Yes	Yes	Yes	Yes	Yes	Yes	High	Yes, investigate, needs further detailed work.
17. Broaden & extend social grants									Not evaluated
18. Financing electricity displacement	Yes	No	Yes	Yes	Yes	Yes	Yes	High	Yes. But complex to implement at scale due to institutional challenges. Needs further

Option	Pro-poor	Targetted	Equitable	Practical	Affordable	Efficient	Policy consistent	Admin cost	Overall evaluation and recommendation
									detailed work.

Other options considered include the use of indigents registers and/or income criteria and area targeting. The disadvantages of these outweigh the advantages and these approaches are not recommended for consideration. See International Review.

6.21 Designing a pro-poor strategy

A strategy to protect poor households requires more than a selection from a menu of options. A number of different considerations must be balanced and there are trade-offs between options. The subsidy design must be viewed as an integrated whole. There are also important issues related to timing and to practicality and effectiveness.

The researchers developed a draft strategy in the form a set of carefully thought through recommendations related to the extension and deepening of pro-poor subsidies taking these factors into account. However, the researchers were requested not to include this set of recommendations in the report, but only to present a set of policy options.

7 A framework for a harmonised approach to electricity tariff policy

7.1 Existing policy framework

There exists an existing electricity tariff policy framework for electricity and poor households in South Africa, which is reflected in a suite of policies. The main policies are:

⇒ The Electricity Pricing Policy;

⇒ The Free Basic Energy Policy, including a Free Basic Electricity Policy;

⇒ Policies related to inter-governmental financial flows, including the equitable share and the municipal infrastructure grant as reflected in the Division of Revenue Acts; and

⇒ Social grants policies (direct government transfers to households).

The key relevant policy provisions in the Electricity Pricing Policy and in the Free Basic Electricity are summarised in Annexure 9 for ease of reference.

The existing policy-framework compares well to international best practice and protects poor households.

The practical effects of these policies in terms of the actual subsidies applied have been described in Section 4.

Nevertheless, there are some policy challenges related to both the policies themselves and to their implementation.

7.2 Possible elements of pro-poor policy framework

Some possible elements of a pro-poor policy framework are set out below.

New connection subsidy. Government could subsidise the costs of connecting new households onto the grid (or accessing electricity from non-grid systems) where these households would otherwise not be able to afford the costs. This could to be regarded as a sunk cost and not be recovered from the user. The source of these subsidies could be from the government budget.

Public benefits of electricity use. An amount of 350 kWh per month could be regarded as being sufficient for households to enjoy important public benefits of access to electricity, namely lighting, communications (including entertainment) and cooking. Additional uses above that are most likely to be for additional water and space heating needs. Safe and clean alternatives exist for these uses and for cooking – solar water heaters, gas for heating and cooking.

Targeted electricity subsidy. Poor households using modest amounts of electricity could be subsidised on the grounds of public benefit and social and economic equity.

Four tariff categories could be made available to domestic and other small users:

- Domestic service level 1 (demand limited 20 Amp single phase)
- Domestic service level 2 (40 to 60 Amp supply with modest usage)
- Domestic service level 3 (normal domestic usage)
- Domestic service level 4 (time-of-use tariffs for higher end users)

One national domestic level 1 tariff. One national tariff could be developed for domestic level 1, set at a uniform rate for the country.

Domestic level 2 tariffs. Subsidies could also be made available for modest consumption for Domestic service level 2, subject to a consumption threshold.

Sources of subsidies. Subsidies to support domestic service level 1 could come from a combination of general government revenues and a national-level cross–subsidy between electricity users.

Subsidy mechanism. A national subsidy mechanism could be developed to fund the domestic level 1 subsidy. This subsidy could be managed by a capable national entity (to be determined) and could be a conditional subsidy (subject to proper implementation of the domestic service level 1 option, and full disclosure of costs, revenues, consumption levels and distributions and tariffs).

Cross-subsidies from other electricity users (domestic and non-domestic) to the domestic service level 1 could be set at less than 10% of the revenue generated from these consumers.

Free Basic Electricity. The Free Basic Electricity policy could be reviewed and a related set of guidelines could give clear guidance on the practical implementation of the policy, including technical and billing issues.

Theft is a form of free subsidised electricity. Existing levels of theft are significant. The outcomes are inequitable and threaten the financial sustainability of the industry. Clear policies and procedures to address and manage theft could be developed.

Balance between electrification and consumption subsidy. Direct government subsidies to the electricity sector could be balanced between the electrification programme and subsidising consumption. The amount contributed to consumption subsidies could be set such that is does not exceed the amount contributed to extending new connections (or that a ratio between these subsidies is maintained) because the subsidy for new electricity connections makes a greater contribution to reducing poverty and inequality than does a consumption subsidy. (The poorest households are those without electricity.)

One integrated policy. These pro-poor policies could to be integrated into the Electricity Pricing Policy so that there is just one national policy on electricity pricing, including the subsidisation of the electrification programme and Free Basic Electricity.

7.3 Some options to improve the policy framework

Options to improve the existing policy framework are set out below.[69]

Option 1: Combine Free Basic Electricity policy into the Electricity Pricing Policy

It could be helpful (though not essential) to combine the Free Basic Electricity policy into the Electricity Pricing Policy. Currently there is some overlap between these policies, and it may be argued that there is a need for greater clarity in, and a refinement of, the Free Basic Electricity policy, which addresses the challenges already identified.

Option 2: Provide for four domestic tariffs in the electricity pricing policy instead of three

This option allows for a more targeted and increased subsidy for the poorest households who have electricity connections.

Option 3: Change the structure of the domestic level 1 tariff in the Electricity Pricing Policy

The tariff structure could be changed so that fixed infrastructure costs are not recovered in the tariff. In other words, the domestic level 1 tariff could be structured so that it is more pro-poor.

Option 4: Increase transparency in use of local cross-subsidies

The Electricity Pricing Policy requires that subsidies be transparent. At present this is not the case for municipal electricity distributors. This is more of an implementation issue and could be rectified through stronger regulation (stricter reporting requirements) – see below.

Option 5: Place more reliance on national cross-subsidies

Significant reliance on local cross-subsidies is not equitable for reasons that have already been explained. Within this context it may be prudent to rely more on national-level cross-subsidies rather than local cross-subsidies as a significant source of revenue to protect poor households.

7.4 Implementation considerations

The primary implementation challenges are summarized below:

⇒ There are still a significant number of households (one in every four households) without electricity. Within this context, the pace of electrification is not as great as it could be.

⇒ Many poor households do not make use of, or do not have access to, Free Basic Electricity. (For example, in the case of Eskom customers, only a third of eligible

[69] A more detailed review and critique of existing policies is available

households benefit from Free Basic Electricity. Challenges also exist in municipal areas.)

⇒ There are a very large number of inactive connections. (For example, 1.3 million connections in the case of Eskom customers, representing nearly one third of all of their domestic connections. Inactive connections are likely to also exist in municipal areas, however good data is not available.)

⇒ Theft is significant. (For example, about half of Eskom's current domestic sales for Eskom's customers. Theft is also significant in municipal areas.)

⇒ The existing level of understanding of subsidy flows within municipal electricity distributors is very poor. (It is not possible to quantify these subsidies on the basis of existing information.)

Solving these implementation issues will:

⇒ Increase the understanding of existing subsidies (through better cost accounting and reporting on tariffs, costs, revenues, consumption and subsidies); and

⇒ Increase the amount of subsidies going to poor households significantly (more poor households connected to the grid and more households getting Free Basic Electricity).

As costs increase, the amount of subsidies will also increase. The combined effect of better implementation together with increased costs will result in very significant subsidies going to poor households. The researchers estimated this to be R20 billion per annum. This represents more than 25% of current sector turnover and is a very substantial amount, possibly reaching fiscal and macro-economic affordability limits.

This context suggests a prudent approach when considering new subsidies, or increasing subsidies. In particular, new and/or increased subsidies could be carefully modeled within a full understanding of the total subsidy flows within the sector.

Consideration also could be given to strengthening the role of the regulator, particularly in the area of reporting and increasing the transparency of existing subsidies.

7.5 Institutional constraints

7.5.1 Industry structure

The current structure of the electricity distribution industry does not lend itself to the implementation of a sound and uniform pro-poor tariff and subsidy approach. The reasons for this include:

- A large number of heterogeneous distributors with different capabilities and operating in diverse environments.
- The absence of clear financial ring-fencing of electricity within municipal distributors means that there is poor knowledge in the sector of cost structures and how these relate to tariffs and revenues. In other words, it is very difficult to quantify existing subsidies and cross-subsidies within the sector at the municipal level.
- Different municipalities face different local pressures with respect to the use of the unconditional equitable share, and hence these funds are used and allocated differently in different municipalities. Existing evidence shows that municipalities with the greatest financial viability challenges are least likely to

allocate an appropriate share of the equitable share to electricity even though this is most needed in these contexts.

- The ability to cross-subsidise between consumers differs substantially between municipalities, and existing cross-subsidies within the sector are almost certainly inequitable when taken a sector-wide view. Small distributors operating in contexts of low levels of economic activity and most needing the ability to cross-subsidise have the least ability to cross-subsidise.

In addition, the industry faces other important challenges, including:

- Making adequate investments in the maintenance and rehabilitation of the network. (Existing levels of maintenance spending and investments in network rehabilitation in the municipal distribution sector are grossly inadequate.)
- Attracting and retaining the necessary technical and managerial skills to run an effective electricity distribution service. (Skills shortages are increasing over time.)

Institutional uncertainty exacerbates these challenges. Comprehensive institutional reform of the distribution sector was first proposed in 1998. Progress has been very slow and this hinders the application of a sound and effective pro-poor tariff and subsidy framework.

7.5.2 Inertia arising from existing and historical practices

Most municipalities do not offer an option of different service levels to households (a demand limited option such as a 20 Amp single-phase supply and standard supply such as a 60 Amp single-phase supply) even though this is technically straight forward.[70]

Whilst it is conceivable that the need to offer such a choice could be imposed on municipal distributors by the national regulator, this will require strong leadership. The alternative is to offer strong incentives through, for example, a national conditional grant made available for domestic level 1 connections.

7.6 Co-ordination of policy decisions and implementation

There are at least three key actors whose decisions can have major impacts on subsidies for poor households:[71]

⇒ **National Treasury**, through the division of revenue to local government (equitable share) and the regulation and management of government grants;

⇒ **Department of Energy**, through the Free Basic Electricity policy; and

⇒ **NERSA**, through approval of Eskom revenues and tariffs and the regulation of municipal tariff structures and levels.

Within the context described, it is particularly important that the policies and decisions made by these actors are coordinated, and that the full implications of the combined options and choices are fully understood in a holistic and integrated way.

[70] A standard single-phase 60 Amp supply has a maximum instantaneous peak demand of 12 500 Watts compared to a peak demand of 4200 Watts for a 20-amp single phase supple. A standard supply will satisfy normal domestic demands for the vast majority of households. Only wealthy households with very high demands need a supply with a higher peak demand (offered, for example, by a 60 Amp 3-Phase supply.

[71] Only the primary channels are described.

8 Measuring and monitoring considerations

8.1 Tracking electricity service levels and consumption

It is relatively easy, in principle, to track both service levels and consumption for electricity consumers over time.

⇒ By retail licensee

⇒ Number of new electricity connections made

⇒ By service level, consumer and tariff category

- Number of consumers
- Electricity sales
- Electricity revenue
- Average consumption per consumer
- Average revenue per consumer
- Average tariff per consumer
- Consumption distribution for that category

There are many different ways to both report on and analyze this data and it may be helpful for the regulator to develop standard approaches to this reporting and to the analysis.

8.2 Measuring household income

As already indicated, measuring household income[72] is a complex and expensive undertaking. Consequently it is done infrequently for large samples.

The most robust source of household income information is StatsSA which produces Census data (approximately every 10 years, the last being Census 2001 and the next one being Census 2011) and annual Household Survey data.

Absolute or relative poverty?

A relative measure of poverty stratifies society into different segments (typically quintiles) based on defined criteria (for example, household income or expenditure) and identifies a proportion which is deemed to be poor relative to the rest, for example, the lowest quintile (20%) of the population.

An absolute measure is a fixed value calculated in a defined way, usually with reference to a fixed basket of goods that are deemed as basic requirements. The basket of goods is priced and households who are unable to afford these basic requirements are classified as poor.

A combination of these two models is relative poverty with an absolute core. This draws on the benefits of defining what is an absolute component of well being, what everyone needs to survive (the core), and then relative additional measures regarding health, material, employment, human capital, social capital and living environment. This combination is seen to be consistent with South African society as it looks beyond

[72] Household expenditure may be used as a proxy for measurement of household income. This approach also has methodological difficulties, not least the issue of false reporting.

meeting basic needs to a society in which people can live and actively contribute. This is the approach adopted by the Presidency.

A fourth option is a subjective measure which takes into account the views of ordinary people and poverty is defined as the outcome of people's perceptions and assessment of their own well being. This can be done through surveys seeking to find what people regard as minimum income, what households need to 'get along', what they rate as adequate consumption etc. Focus groups and interviews have been conducted in South Africa and a list of perceived necessities were incorporated into the Human Sciences Research Council's South African Social Attitudes Survey 2005 (see Studies in Poverty and Inequality Institute, *The measurement of poverty in South Africa project: Key issues* 2007).

Practicalities

A poverty line can be constructed from an absolute or relative measure of poverty. There is no universal definition of a poverty line, it is the cut off point from which poverty is measured and this varies one country to another. Following the relative poverty with an absolute core model, many countries publish two or more poverty lines where the primary measure is what constitutes minimum requirements and then higher standards which include provision for basic, but less essential goods and services. Various poverty lines can be used to create a 'poverty critical range'. A poverty line is useful partly because it is simple and can be widely understood. But it is no more than a crude and simplified index of a living standard, and it is no substitute for more detailed statistics and analysis of poverty and households welfare. (National Treasury, StatsSA).

National Treasury and StatsSA are piloting a proposed poverty line and the Presidency includes various poverty measures in their annual Development Indicators. The poverty line proposed by StatsSA for a national poverty line is set at R322 per capita per month in 2000-prices. There is also a lower and an upper threshold aimed to better capture the extent of extreme poverty on the lower end and include more non-food items at a higher level. The lower threshold proposed is R162 per capita per month which equates to the $2 a day international line; the upper threshold is R593 per capita per month. These are included in the table below with alternative poverty lines for South Africa.

	Poverty line in 2000 Rands*	% of individuals below the poverty line (2000 IES)
Poverty line set at per capita expenditure of the 40th percentile of *households*	R346 per capita	54.9%
Poverty line set at 50% of mean national per capita expenditure	R538 per capita	68.1%
Statistics SA – lower bound	R322 per capita	52.6%
Statistics SA – upper bound	R593 per capita	70.4%
"Dollar a day" - International poverty line of US$370 (1985 prices) per capita per annum	R81 per capita	8.1%
"Two dollars a day" - International poverty line of US$370 (1985 prices) per capita per annum	R162 per capita	27.0%
"Poverty line" implied by the Old Age Pension means test for married persons, assuming a household of 5 persons and no non-elderly income earners	R454 per capita	63.4%
"Indigence" line of R800 per household per month (in 2006 prices)	R573 per household	11.7%
"Indigence" line of R2400 per household per month (in 2006 prices)	R1720 per household	55.1%

Source: Leibbrandt and Woolard, 2006 and Magasela (2005) *Constructing an Official Poverty Line in South Africa*, http://www.naledi.org.za/docs/povertylineW2.pdf

8.3 Linking electricity consumption and income

It is not a trivial exercise to link electricity consumption to household income. This is because there is not a one-to-one correspondence between the household unit (used to measure household income) and the households obtaining electricity from an electricity connection. There may, for example, be several households obtaining electricity from a single electricity connection.

Understanding the relationship between household income and electricity service level and use therefore requires detailed and dedicated household surveys, something that is beyond the scope of work for this project.

8.4 Monitoring domestic retail tariff design and subsidies

Tariff structures and levels, including Free Basic Electricity

It is the role of the regulator to monitor and regulate electricity tariff structures and levels. This mandate includes the monitoring of the implementation of Free Basic Electricity, as this is part of the tariff.

Current monitoring is hindered by:

- The existence of too many different retail tariffs
- Weaknesses in the Free Basic Electricity policy
- Inadequate capacity within NERSA.
- Poor reporting by municipalities (incomplete reporting and unreliable data).

The following options exist to strengthen monitoring:

- Accelerate the reduction in the number of permissible electricity tariffs.
- Create a single national domestic level 1 tariff structure and level, with clear policies related to the level at which this tariff is set and how it is to be adjusted.
- Review the Free Basic Electricity policy.
- Review the Electricity Pricing Policy to improve clarity and to be more specific in relation to domestic level 1 and 2 tariff structure design and the setting of tariff levels – see pro-poor policy framework above.
- Develop a minimum data set that must be submitted by all distributors.
- Enforce compliance with the data reporting requirements.
- Improve data management, analysis and reporting on distributor tariffs, revenues, costs, electricity consumption by tariff category, consumption distribution etc.
- Make payment of a national subsidy conditional on proper implementation of the service level 1 option and tariff, as well as accurate reporting on a clearly defined data set.

Complementary measures

The national solar water heater rollout is being facilitated by the Eskom managed solar water heater rebate programme and the draft South African National Solar Water Heating Framework and Implementation Plan (DoE). There are specific monitoring and verification approaches in the Eskom programme and the Solar Water Heater

Framework will be including specific targets as well as specific monitoring and verification approaches.

- o With regards to solar water heaters it is recommended that the monitoring approaches in these complementary programmes be used.
- o Eskom has a similar compact fluorescent lighbulb roll-out programme and it is recommended that the monitoring data on the success and penetration of this initiative is, at this stage, sourced from Eskom and not replicated elsewhere.

With respect to the thermal efficiency of housing stock it is recommended that this be seen as an important design parameter for the national subsidised housing programme and be integrated as one of the performance indicators for all state-subsidised low income housing.

8.5 Stakeholder monitoring of socio-economic impact of tariff increases

In addition to the monitoring of tariffs directly, there is also the need for mechanisms of monitoring the outcomes of tariff policy changes and of the impacts of tariff increases at the household level. This monitoring could facilitate stakeholder involvement.

Principles for the monitoring of impacts

The following principles are recommended:

- o Use existing monitoring instruments
- o Seek and use credible and unbiased information sources
- o Present results to stakeholders regularly and in a clear and understandable format

Recommended sources of evidence

Household level monitoring is expensive and statistically and methodologically complex, often requiring the use of a number of data sources. In this regards StatsSA is likely to be best placed to use existing survey instruments to provide credible and consistent data on household impacts.

- o The *StatsSA Community Survey* provides information on household access to services, including electricity, and remains an important tool in gauging the continued expansion of access to electricity. Consideration could be given to include a question on the use of solar energy for water heating which is currently not included in the Survey
- o The *StatsSA Household Income and Expenditure Survey* provides detailed household level data on a range of expenditure categories including an "electricity, gas and other fuels" category which can be disaggregated into the separate energy sources. It is recommended that this Survey instrument remains the basis for a national assessment of household level impacts of electricity price increases.

In addition to these national surveys the background investigations have raised some important areas where there is insufficient data and analysis. These areas have a potentially material impact on subsidy sizes and on the affordability of electricity services to the poor and warrant specific once-off investigation. Specifically:

- o *Study on theft*: a study on theft and illegal connections is required to understand the scale and location of the problem and to identify specific steps and targets to reduce theft of electricity and associated damage to distribution infrastructure and to credit control measures. Existing evidence suggests theft is very significant.
- o *Inactive connections*: the data has revealed that a very large number of connections (1.3 million) appear to be inactive (using zero electricity). There are alternative explanations for this including incorrect data and database or customer account management problems; illegal connections leading to false zero reading; or households choosing not to use electricity due to it being unaffordable. All of these are concerning and a specific study into these 'inactive connections' is required.
- o *Household indicators*: indicators of household ability to pay for services could be developed. Municipalities could be required to report on these indicators as part of the dataset reported on to NERSA. Indicators could include numbers and percentages of disconnections due to non-payment; levels of bad-debt; numbers of new connections; access to and use of Free Basic Electricity and others.

9 Summary and way forward

Options to protect poor households from rising electricity prices have been presented. These need to be carefully considered in light of the fact that the primary constraint to increasing subsidies appears to be macro-affordability. Existing subsidies account for more than 10% of the current electricity turnover and this will increase to 25% with increased subsidy coverage (all eligible households get subsidies) and the increased electricity costs.

The subsidy options that are most targeted to poor households are:

⇒ The electrification grant (free connections to the grid for poor households)

⇒ The domestic level 1 subsidy for 20 A single phase connection (no fixed charge, free basic allocation and an energy charge which covers the cost of generation but not the sunk network costs)

⇒ Free Basic Electricity allocation of 50 kWh per month

It is recommended for consideration that the extension of the first two subsidies be prioritised and that the implementation difficulties related to the Free Basic Electricity grant be addressed to ensure all eligible households receive this benefit.

The extension of any existing subsidies and the introduction of any new subsidies need to be carefully modelled (within the context of all existing subsidies) to ensure medium and long term macro-affordability.

10 References, bibliography and resources

International literature

Alex Clark, Mark Davis, Anton Eberhard, Katharine Gratwick, Njeri Wamukonya, "Power sector reform in Africa: assessing the impact on poor people" (ESMAP and World Bank, March 2005).

Bahl, Roy. W. and J. F. Linn. 1992. Urban Public Finance in Developing Countries. Published for the World Bank. New York: Oxford University Press.

Beecher, J. A, P. C. Mann and J. R. Landers. 1991. Cost allocation and rate design for water utilities. Ohio University: The National Regulatory Research Institute. AWWA.

Berg, S (1998). Basics of rate design.

Bojanic,Antonio Krakowski, Michael (2003). Regulation of the Electricity Industry in Bolivia: Its Impact on Access to the Poor, Prices and Quality" Hamburg Institute of International Economics, Discussion Paper Series, 2003

Coase, R. 1946. The marginal cost controversy. Economica. 13: 169-189

Anton Eberhard, Vivien Foster, Cecilia Briceño-Garmendia, Fatimata Ouedraogo, Daniel Camos, and Maria Shkaratan. 2008. Underpowered: The State of the Power Sector in Sub-Saharan Africa.

Eberhard, Rolfe. Water pricing: a critical-realist approach. PhD Economics Thesis. University of London.

Estache, A, Foster, V, Wodon, Q (2002). Accounting for Poverty in Infrastructure Reform.. Learning from Latin America's Experience. WBI Development Studies, World Bank, Washington D.C. (see especially tables 3.5 & 4.1)

Feldstein, Martin S. 1972a. Equity and efficiency in public sector pricing: the optimal two-part tariff. Quarterly Journal of Economics. 86(2): 175-187

Gomez-Lobos et al (2000). Better households surveys for better design of infrastructure subsidies. World Bank

Jamison, M (2007). Rate structure: pricing objectives and options in network industries. PURC, University of Florida.

Kahn, Alfred. 1988. The economics of regulation: principles and institutions. Cambridge, Massachusetts: MIT press

Komives, K et al (2005). Water, Electricity and the Poor. Who benefits from Utility Subsidies. World Bank. Washington D.C. (see table 2.1)

Lovei, L et al (2000). A scorecard for susbsidies. How utility subsidies perform in transition economies. Note no. 218 in Public Policy for the Private Sector. Washington, D.C.

Mann, Patrick. 1989. Urban water supply: the divergence between theory and practice. In Nowotny, Kenneth, David Smith and Harry Trebing. 1989. Public utility regulation: the economic and social control of industry. London: Kluwer.

Sen, Amartya. 1992. Inequality re-examined. Oxford: Clarendon Press

Sudeshna Banerjee, Quentin Wodon, Amadou Diallo, Taras Pushak, Helal Uddin, Clarence Tsimpo, and Vivien Foster, "Access, affordability, alternatives: Modern infrastructure services in Africa" (Africa Infrastructure Country Diagnostic, February 2008)

Train, K and G. Mehrez. 1994. Optimal time-of-use prices for electricity. Rand Journal of Economics, Volume 25 number 2. Summer.

Whittington, Dale. 1992. Possible adverse effects of increasing block tariffs in developing countries. Economic Journal of Development and Cultural Change. 41(1): 75-87

Whittington, Dale. 1998. Administering contingent valuation surveys in developing countries. *World Development*. 26(1):21-30.

Wodon, Quentin and others. 2009. Electricity Tariffs and the Poor: Case Studies from Sub-Saharan Africa. African Infrastructure Country Diagnostic.

World Bank (2004). Ghana Poverty and Social Impact Analysis Electricity Tariffs: Phase I, June 2004

World Bank (2007). Electricity tariffs and the poor. Case Studies for Sub-Saharan Africa. June 2007.

World Bank (2009). Africa's infrastructure: a time for transition.

www.regulationbodyofknowledge.org

Yelland, Chris (2008). *Electricity theft and non-payment - Impact on the South African generation capacity crisis.*

Maintaining Utility Services for the Poor: Policies and Practices in Central and Eastern Europe and the Former Soviet Union. September 2000.

South African data

Eskom

⇒ Annual report 2008/9

⇒ MYPD2 price application (version 1, September 2009, Version 2, November 2009)

⇒ Tariff book 2009/10

⇒ Various consumption data related to tariff categories

DOE (previously DME)

Electricity Pricing Policy, Government Gazette, December 2008

Pricing and the tariff

Free basic alternative energy. Household Energy Support Programme

Free Basic Electricity policy for South Africa

Guidelines for the introduction of a Free Basic Electricity service

Socio-economic impact of electrification: Household perspective

Electrification statistics

http://www.dme.gov.za/pdfs/energy/electricity/Fact_Sheet_2009.pdf

Electrification categories eligible for subsidisation

http://www.dme.gov.za/pdfs/energy/electricity/m8_categories.pdf

Stakeholder meetings

Organisation	*Name*	*Position*
Department of Energy	Machwena Molomo	Director: Electrification policy development and management
	Matthews Bantjisang	Director: Electricity policy analysis and regulation
Eskom	Deon Conradie	Senior Manager: Electricity Pricing Department
	Terry Njuguna	Manager: Pricing Analysis
	Shirley Salvoldi	Corporate Specialist: Retail Pricing
NERSA	Thembani Bukula	Board member
	Willie Boeije	Special Advisor
	Tabisa Nkapo	
	Priya Singh	
	Robert	Special Advisor
National Treasury	Avril Halstead	Chief Director: Asset Management
	Wendy Fanoe	Chief Director: Local Government
	Witness Simbanegavi	Senior Economist: Micro economics
	Jan Hattingh	Chief Director: Local Government Budget Analysis
HSRC	Miriam Altman	Executive Director

Annexure 1: Literature review on subsidy design

There is a great deal of international literature that evaluates the costs and benefits, efficacy and sustainability of different interventions which seek to make electricity more affordable for the poor. South Africa can learn from this experience in designing a more effective and sustainable set of tariffs and subsidies in its own electricity sector.

The rationale for subsidising electricity services for the poor

There are three distinct arguments that can be put forward in favour of subsidising electricity tariffs (Komives, 2005, 36):

⇒ Subsidies help to make services affordable to poor households;

⇒ It may be desirable to promote or encourage the consumption of electricity through subsidies as this may result in a switch from alternative fuels with higher social costs (public benefit argument); and

⇒ Utility subsidies are an effective way to address income poverty in situations where direct income support to households is administratively difficult or expensive, or in combination with household income support (such as welfare-related grants).

The first approach assumes that cost-reflective tariffs are unaffordable and hence that subsidies are necessary. This raises a number of questions: what is the definition of affordable? How is affordability determined? What is an affordable tariff? If tariffs are set at affordable levels, would services be more accessible to the poor?

The definition of affordability is subjective. Willingness-to-pay surveys are one mechanism that can be used to test household's willingness to pay for a service (at a defined quantity and quality).[73] Alternatively, a normative approach is sometimes adopted. For example, the Chilean government adopted a burden limit of 5% of income to be spent on water and sanitation as a rule of thumb for assessing affordability and the magnitude of transfers required to close the affordability gap. Such benchmarks are not commonly used in the case of electricity (Komives, 2005, 41).

Another approach is to define a basic "subsistence" consumption amount. Komives (2005: 43) quotes a range in this subsistence amount for electricity usage of between 40 kWh per month (enough to supply a few electric light bulks and a radio) and 120 kWh per month (enough for a few light bulbs, a small refrigerator and a modest television).

Tariff design

A trade-off between efficiency and equity

Accepting the arguments given above that it is desirable to subsidise electricity tariffs, and further accepting that cost-reflective tariffs promote the efficient use of resources, then tariff design becomes a balancing act, a trade-off between efficiency and equity.

There is a very extensive literature on tariff design for networked infrastructure services and space and time do not permit a full treatment of this literature here. (For a review of this literature, see Eberhard, 2002).

[73] See, for example, Whittington (1998)

The basic approach is to start with a cost-reflective tariff, that is, a tariff which reflects the cost drivers of the service, split typically between fixed and variable costs, with the fixed charge related to "sunk costs" and other costs not related to the amount consumed, and the variable portion which is proportional to the amount of the service used. This approach can get very sophisticated, with the implementation of time-of-use tariffs for example. Tariffs can be differentiated geographically and by consumer category due to the fact that costs can vary depending on the location and the nature and structure of consumer demand.[74]

The classic basic tariff structure based on the above approach is a *two-part tariff*, comprising a fixed monthly (or annual) charge plus a linear consumption-related charge (usually expressed as cents per kWh).[75]

This basic tariff structure can be simplified by, for example, eliminating the fixed tariff and charging only a consumption-related charge, or made more complex by introducing time-of-use charges or non-linearity in the consumption-related charge, by introducing either a declining block or an inclining block tariff.

These adaptations can be justified on the basis of:

⇒ Moving the tariff closer to cost-reflectivity, or

⇒ Improving equity with "least distortion" to cost-reflectivity.

Tariff adaptations for efficiency

Tariffs that reflect actual costs more closely will be more economically efficient.

Because overall costs are related to both the average and peak demands on the system, it is efficient to relate tariffs to demand.

For large users, this is typically accomplished through the introduction of an explicit demand charge.

For smaller users, including domestic users, different tariffs can be introduced for different maximum demands. For example, in the case of household supplies, it makes sense to have a higher charge for 60 Amp supplies compared to those supplies that are limited to 20 Amps due to the different maximum demands placed on the system.

Another example of this is the introduction of time-of-use tariffs, where energy costs (variable costs) reflect the additional system cost of meeting peak demands in the network over peak demand periods. This encourages the shifting of demand away from peak periods resulting in more efficient use of the network and lower peak demand requirements, reducing overall costs and increasing efficiency.[76]

Cost of supply studies

The best way to ensure efficient tariffs is to undertake cost of supply studies for different categories of consumer, and then to set tariffs for that category of consumer to match the cost of supply (including time-of-use pricing where appropriate).[77]

Where possible, cost of supply studies could include external costs of supply of electricity, primarily environmental impacts such as local air pollution and greenhouse gas emissions, where these are significant and quantifiable.

[74] See, for example, Beecher et al (1991)

[75] See, for example, Feldstein (1972)

[76] See, for example, Train et al (1994)

[77] See Kahn (1988).

Tariff adaptations for equity

Tariffs that have been designed to reflect costs can then be modified to promote equity, that is, access and affordability.

The most significant adjustments for the purposes of equity are to:

⇒ Eliminate or subsidise the **cost of connection** to the grid (that is, to remove the affordability barrier to get access to electricity);[78]

⇒ Eliminate or subsidise the **monthly fixed charge** (that is, enable small users to maintain access and usage at a low cost without having to pay a monthly fee irrespective of how much energy they use);[79]

The second level of adjustment is to adjust the consumption-related energy charge. This can be done through:

⇒ Providing a monthly energy allocation at a zero cost or a reduced rate

⇒ Subsidising the energy charge (for all levels of consumption)

⇒ Introducing a non-linear (block) tariff – for example, an inclining block, or lifeline tariff where the first block is charged at a lower rate.

These approaches are discussed below.

Subsidised monthly allocation of energy (electricity)

The least distortionary subsidy from an efficiency point of view is to subsidise fixed costs and to charge variable energy consumption at marginal cost[80]. This level of subsidy may not be sufficient and so an additional basic monthly amount of electricity may be subsidized. The subsidy costs are easy to calculate accurately beforehand (they are known). The proportional benefit is higher for small consumers (a higher percentage of their monthly cost is subsidised) compared to large consumers. This approach (called Free Basic Electricity in South Africa) is a widely used approach.[81]

Non-linear block tariffs

There is little economic justification (from an economic efficiency point of view) for the introduction of non-linear electricity tariffs. It is better to use cost of supply studies for different categories of consumer and to set two-part and time-of-use tariffs based on these studies.[82]

Nevertheless non-linear tariffs have been popular for their perceived equity benefits – with larger consumers paying higher average tariffs than smaller consumers. As will be shown in the review of practice below, it is interesting to note that the international trend is to move away from non-linear tariffs.[83] The reasons for this are as follows:

⇒ There is no economic justification for non-linearity in the consumption charge – the marginal cost to the supplier is the same irrespective of the level of demand (for a given type and pattern of demand)

⇒ Defining the blocks and tariff levels for each block is somewhat arbitrary.

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[78] See Bahl et al (1992).

[79] Whittington (1992)

[80] Whittington (1992), Feldstein (1972), Bahl et al (1992)

[81] See, for example, Sen (1992).

[82] See Whittington (1992).

[83] World Bank (2009)

⇒ Non-linear increasing blocks typically result in cross-subsidies within the domestic consumer group. The resulting cross-subsidy burden is not necessarily equitable. (This is discussed further in the section on subsidy analysis in the main background document).

⇒ Non-linear decreasing blocks favour large users but without economic justification.

Subsidised energy charge

A subsidy that is applied to the energy charge as a whole is usually not well targeted, unless applied to a specific supply and tariff category which targets poor households – e.g. load limited supplies for small consumers. Otherwise this subsidy will benefit larger users of electricity more than smaller users and is therefore inequitable. This subsidy is also inefficient. Of the three approaches, this is the least efficient and least equitable.[84]

Setting the tariff level – average versus marginal costs

There is an extensive debate in the literature on what costs could be used when setting the tariff level. The basic choice is between the marginal cost (the cost of the next unit of supply) versus the average cost (the average cost of all units supplied).[85]

From a theoretical perspective, economists argue that it is more efficient to set price levels at the marginal cost of supply. However, the practical application of this is contested. For example, could short-run or long-run marginal costs be used? How could long-run marginal costs be calculated? Could these be averaged where supply increments are lumpy. How do you manage surpluses or deficits that arise from the application of marginal-cost pricing? Do you adjust fixed costs to compensate? What discount rate could be used to calculate future marginal costs (costs of increasing capacity to meet demand)?

Because of these difficulties, and largely for pragmatic reasons, cost-reflective tariffs are typically set on the basis of average historical costs.[86] These are known (based on audited figures) and tariffs tend to be smoother over time. Having established this as the basis, some marginal-cost based tariffs may be introduced, such as time-of-use tariffs to reflect the differential cost of making capacity available to meet peak demands.

Difficulties where average historic costs are much lower than marginal costs

One difficulty of historical average costs is that these costs may lag in contexts where significant new capacity must be built at a cost that is significantly higher than the historical average cost.[87]

The other disadvantage (also where marginal costs of new capacity are much higher than historical average costs) is that these tariff levels do not incentivise the introduction of new capacity by independent generators, including the introduction of renewable energy generation.

These difficulties can be mitigated to a large extent if the historical costs are calculated based on the replacement value of assets (rather than on book values).[88]

[84] Komives et al (2005)

[85] See, for example, Coase (1946)

[86] See for example, Mann (1989). The same principle applies for electricity.

[87] This situation is being experience in South Africa at present.

Summary – towards best practice in tariff design

In summary, the tariff structure and tariff levels are key instruments for allocative efficiency and equity.

The appropriate approach is to design a tariff which is cost-reflect and which promotes the efficient use of electricity, and then to adjust this tariff based on sound rationales for equity and affordability with least distortion to the efficiency signals.[89]

An approach which first understands the cost of service for different categories of consumer based on their level and patterns of energy demand and usage is sound.[90]

It is appropriate to take a pragmatic approach given data limitations and cost of implementation. This means that in practice, tariff structures are likely to be simpler than those advocated in theory.[91]

A thorough understanding of the theory and the literature (briefly reviewed above), together with the adoption of a pragmatic perspective, points to the following best practice approach:

1. It is appropriate to create separate consumer and tariff categories based on **cost of supply analysis** related to demand and energy usage patterns as well as the type and location of supply. These groupings to be justified by significant differences in the cost of supply between groupings.
2. The level of complexity in tariff design could be related to the level of demand placed on the system, with more complex tariff structures being justified where demand is high and where patterns of demand can be shifted through time-of-use tariffs.
3. It is appropriate to distinguish between 20 and 60 Amp supplies for household and small consumer use, and households could be able to self-select between these two levels of supply.
4. All *non-domestic* consumers using 60 Amp supplies and above could pay for the full cost of the electricity consumed, with some choice in their tariff structure based on their structure of demand.
5. In the first instance *domestic subsidies* could be targeted to households with a 20 amp supply (the lowest self-selected level of supply with a corresponding low peak demand on the system), commencing with a connection subsidy (free connection is obtaining a 20 amp connection), the elimination of a fixed monthly fee (that is, the application of an energy charge only) and the allocation of a free monthly allocation of energy. Internal literature suggests this amount to be between 50 kWh and 120 kWh.[92] All 20 Amp supplies could obtain these three-fold benefits (free connection, no monthly fixed fee, free monthly allocation of a fixed amount of energy limited to a predetermined amount.

[88] South Africa's average historic costs are low because they are based on the book value of assets which is valued at historical and not replacement prices. The new pricing policy identifies this as a problem and recommended that the return on assets be calculated on the replacement value of assets.

[89] See, for example, Bahl at al (1992)

[90] Kahn (1998)

[91] See, for example, Bahl et al (1992)

[92] Komives at al (2005)

6. Households with 60 Amp supplies (and with the corresponding ability and right to impose a higher demand on the system) could, ideally, pay for the full cost of the electricity service. (They have the opportunity to select a level of service with a demand limit and to benefit from the subsidies available to this category of consumers). This approach may, however, not be pragmatic for a combination of historical, institutional and socio-political reasons. In this case, there are different approaches to targeting subsidies to poor households within this category. This is discussed below.

Targeting consumption subsidies

International best practice points to service level targeting

Based on the review above, the international literature favours **service level and tariff self-selection** as the preferred means of targeting subsidies. This method is technically and administratively straightforward, is uncontested (it is by choice), is effective at targeting, and is inexpensive to implement.[93]

Within the South African context, the 20 Amp domestic (and small consumer) supplies are the appropriate **service level** to target for subsidies, as described above.[94] There is a clear differential in the cost imposed on the system between a 20 Amp supply and the next available level of supply of 60 Amps (with a maximum peak demand at least three times higher). This service level can and could enjoy three kinds of subsidy:

⇒ Free connection

⇒ Zero fixed monthly charge

⇒ Free monthly basic electricity allocation

If it is necessary to also subsidise poor households with 60 Amp supplies (and this is a proposition which must be tested), then the question becomes how could these subsidies be targeted. There are different possible approaches.

Consumption subsidies can be targeted in a number of ways.

Targeting free basic allocations

A free monthly basic electricity allocation can be applied in different ways:

⇒ A universal free basic allocation – all households benefit equally from a free basic allocation.

⇒ A free basic allocation based on means testing – only households registered as indigent are eligible.

⇒ A free basic allocation based on property value criteria – only households living in properties below a defined municipal property evaluation are eligible.

⇒ A free basic allocation based on geographic targeting – only households living in defined poor areas are eligible.

There is a large literature on the efficacy of targeting using these different approaches.[95] The key issues are:

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[93] Ibid.

[94] And any service levels which may be lower than this, if and where they exist – for example, some 5 Amp and 10 Amp supplies exist in South Africa as an historical artefact. (These levels are no longer being implemented and were only implemented as pilot projects in some areas.)

[95] See, for example, Komives et al (2005)

⇒ Are all poor households included?

⇒ How much leakage is there (subsidies going to non-poor households)?

⇒ How practical is it to implement? (What systems are necessary? How complex? Is there administrative capacity? What will it cost to implement?)

⇒ How much subsidy is required and how can it be funded?

⇒ How objective are the choices that need to be made? It is likely to be contested?

⇒ Can the approach be implemented in the same way across different institutions?

Some of the key points to be made in relation to each approach are given below:

⇒ A **universal allocation** does not target poor people (rich households benefit equally) and is more costly to implement (wider reach than a targeting approach), but has benefits of simplicity (no targeting necessary) and if higher levels of consumption are charged at a premium, then the larger consumers effectively pay for their own basic consumption. However, there are problems associated with inclining block tariffs and the resulting cross-subsidy incidence (that is, who pays for the cross-subsidy) may not be equitable (see below).[96]

⇒ **Means testing** requires relatively sophisticated systems, is expensive to implement, suffers from exclusion (many people who could be eligible are not registered), suffers from stigma (labelling households as indigent), is difficult to apply uniformly across institutions – implementation in one municipality will differ from implementation in another, is subject to corruption and malpractice, and is difficult for an electricity utility (such as Eskom) to implement, and requires strong capacity to implement.[97]

⇒ Using **property valuations** is less complex (and less costly) to implement but assumes a direct relationship between property value and income (which does not necessarily hold), is difficult to implement consistently between municipalities (municipal valuation roles will differ), and cannot be implemented by an electricity utility such as Eskom.

⇒ **Geographic targeting** is less precise compared to property evaluation but is simpler and can also be used by an electricity utility. However, the approach is somewhat arbitrary and difficult to implement uniformly and consistently across municipalities.[98]

In summary, all of these approaches have limitations and are less preferable compared to service level targeting. A better approach is a tariff self-selection approach (see below).

Tariff self-selection

Another way to target the benefit is to offer a choice between two tariff structures as follows:

⇒ A cost-reflective tariff comprising a fixed monthly charge and an energy charge.

⇒ A tariff with no fixed charge, with a free basic allocation but with a higher energy charge.

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[96] Ibid.

[97] See, for example, Bahl et al (1992)

[98] See, for example Bahl et al (1992)

The tariffs can be designed in such a way that the second tariff is favourable to consumption less than determined amount per month (say 350 kWh), creating an incentive for consumers who are willing to limit their consumption to this amount per month to benefit from the lower cost made available through this tariff.

Households who consume more than the break-even amount would have an incentive to choose the cost-reflective tariff.

This approach is easy to implement, because it is self-selecting, and favours consumers willing to limit their consumption to a pre-determined monthly amount. Although, once the breakeven consumption amount has been determined, it is straightforward to calculate the marginal energy tariff required.

The difficultly with this approach is that defining the break-even amount is somewhat arbitrary. At what consumption level could households be required to pay for the full cost of electricity?

Consumption self-selection (non-linear or inclining block rates)

Another approach is to implement an inclining block tariff. This allows consumers to “self-select” their consumption level and their costs will vary accordingly, with low average costs for low levels of consumption and high average costs for high levels of consumption. There are some difficulties with this approach. The choice of both the consumption bands and the tariff levels for each band are somewhat arbitrary. Another difficulty with this approach is that is cannot be used for prepayment meters where pay point systems are not online (which is mostly the case) because prepayment meters have no clock.[99]

Summary – targeting

In summary, the most effective and fair targeting approach is to target based on service level, with households willing to opt for a lower maximum demand (by choosing a 20 Amp supply, for example) receiving the benefits of subsidies which are available for that service level only.

If subsidies need to be provided for consumers with higher service levels (for example, 60 Amp supplies), then the use of tariff selection with a predetermined breakeven consumption is to be preferred to the alternatives (universal free allocation, means testing, geographic targeting, property value targeting, consumption self-selection with a rising block tariff).

[99] See, for example, Whittington (1998)

Annexure 2: Other international examples

Electricity subsidies in Ghana

Ghana is similar to South Africa with regards to electricity coverage. Access to electricity has more than doubled in both countries over the past ten years however backlogs still exist largely in rural poor areas. Measuring access to electricity among the poorest quintile of the population, South Africa is at 10% and Ghana is at 8%.

The electricity industry in Ghana is also almost entirely state-owned. The government in Ghana funded an extensive national electrification programme to connect households to the electricity grid and instituted a lifeline tariff to make electricity more affordable to the poor. The tariff was prompted by high increases in end-user electricity tariffs in 2002 and 2003.

The lifeline tariff was initially set at 100kWh per month to provide "basic needs" level of service and to ease the administrative burden on the utility. The tariff was benefiting both domestic and industrial consumers and was later adjusted down to 50kWh. In addition to the lifeline tariff, the government of Ghana pays a small subsidy directly to the utilities to ease the tariff burden on customers.

The World Bank undertook a poverty and social impact analysis in the electricity sector in Ghana in 2004 to research whether the lifeline tariff was an effective tool in protecting the poor from tariff increases[100]. This study found that the lifeline tariff had the potential to provide vital protection to poor consumers, however some of the key challenges were

- The lifeline tariff did not reach all poor electricity consumers, partly due to multiple/compound dwellings.
- Survey data showed that lifeline customers are no more vulnerable (missing meals; selling assets) than other customers.
- The minority of customers who exhibited signs of vulnerability (such as taking children from school because of an inability to pay school fees, selling assets) were as likely to be consuming above the lifeline as below it.
- As much as half of the subsidy would "leak" to households that did not fall below the poverty line.
- Consumers who had problems paying their bills where not using the lifeline due to a gap in knowledge of how to manage electricity resources and on the protection the lifeline tariff offers.
- Those reporting problems paying their bills were often not the poorest. However, people exhibiting indicators of vulnerability were more likely to report problems paying bills and to accumulate arrears than others.

The tariff was paid for by government through a direct payment to the utility although in practice it was not paid on time and the utility company would apply cross subsidisation from larger more profitable companies. The cost of the lifeline tariff was less than 1% of the electricity company's revenue and that the administrative cost of more detailed targeting schemes was unlikely to outweigh the savings generated. A

[100] World Bank: Ghana Poverty and Social Impact Analysis Electricity Tariffs: Phase I, June 2004

more efficient use of resources would be to educate vulnerable groups about how to take advantage of the lifeline tariff.

In summary, the experience in Ghana shows that:

⇒ Universal application of a lifeline (monthly basic electricity allocation) is practical in a developing country context.

⇒ However, such tariff has a lot of "leakage" (as much as 50% of the subsidy goes to households who do not need it.

⇒ The amount needed to be reduced (to improve targetting)

⇒ Alternative targetting mechanisms (such as means testing) were deemed to be too costly or too difficult to implemented.

Electricity subsidies in Bolivia

About two thirds of the country have access to electricity and this is concentrated in urban areas - urban coverage is almost 90% whereas rural coverage is only approximately 30%. The poor population are concentrated in rural area. The electricity industry in Bolivia was privatized in the mid-1990s. Following from this, cross-subsidisation was phased out to ensure efficient use of resources; however it does still occur.

In 2006 the government approved the "Tarifa Dignidad" (Dignity Tariff) to provide access and use of the public service of electricity to families of limited economic resources. The tariff provides for a 25% reduction to the bill of urban consumers using less than 70 kWh and rural consumers using less than 30 kWh. The tariff reduction aims to avoid cuts in services because of unpaid bills and to encourage the use of electricity. The subsidy is funded by the electricity companies. The dignity tariff was expected to benefit 2.4 million citizens in 480,000 homes, representing 37% of electricity users in the country.

This is an example of the implementation of a lower tariff for a certain modest monthly allocation of electricity. What is notable is the relatively small size of the allocations (30 kWh for rural households and 70 kWh for urban households).

Electricity subsidies in Eastern Europe

In the transition countries of Eastern Europe access to electricity and connection rates are generally high. The challenges are customers' actual ability to pay and their willingness to pay for the service.

Electricity prices in Eastern Europe were artificially low up until the mid-1990s when government adjusted prices to better reflect the cost of supply. Whilst government was initially lenient with households who did not pay these increased electricity bills, by the mid-1990s subsidy scheme's aimed at low income households were introduced.

The World Bank did a study[101] on the policies and practices regarding utility subsidies which identified and evaluated the following types of subsidies:

- No disconnection of delinquent residential customers
- Across-the-board household price subsidies
- Life-line tariffs (with two fixed or "floating" blocks, or with three blocks)

[101] Maintaining Utility Services for the Poor: Policies and Practices in Central and Eastern Europe and the Former Soviet Union. September 2000

- Price discounts provided to certain households selected on the basis of occupation, medical history, age, merit, etc.
- Compensation for the share of utility expenditures that exceeds a notional burden limit set as a given percentage of monthly household income (based on actual utility expenditures or expenditure norms)
- Other earmarked cash transfers helping low income households to pay for utility services
- Non-earmarked cash transfers to poor households.

The study found that no one subsidy mechanism outperformed all other mechanisms. When evaluated in terms of a subsidies ability to cover and reach the poor, predictability of the benefit to the poor, unintended consequences and other administrative burdens; some subsidies performed well in some criteria and not others. The study did however find that the mechanisms of no disconnection, across-the-board price subsidy, earmarked cash transfers, and burden limits were unlikely to be effective in any country. In terms of financing the subsidy, from the budget appeared to be the best option (as opposed to cross subsidisation or funded by the utility).

This review points to the difficulties of finding effective mechanisms to target consumption-related subsidies. Each of the options tried experienced limitations.

Annexure 3: Eskom tariff structures

Overview

Eskom's tariffs are uniformly applied countrywide and split between tariffs applied to bulk supplies to local authorities and tariffs that are applicable to all other suppliers (non-local authorities). Tariffs are structured with the following cost components:

- Service charge
- Administration charge
- Network charge
- Energy consumption charge
- Maximum power demand charge

The service, administration and network charges are all part of the basic charge and are separate in each category of capacity of supply. The energy consumption charge is a variable cost directly related to the number of kWh supplied. The maximum demand charge is related to peak Watts consumed.

In addition there are time of use tariffs and a Electrification and Rural subsidy. Eskom’s first time of use tariffs were introduced in 1992. These tariffs are intended for customers who are able to manage their electricity consumption and maximum demand according to Eskom’s specified time periods. The Electrification and Rural Subsidy (formerly known as Rate Rebalancing Levy) is an inter-tariff subsidy paid by rural customers towards the cost of rural and electrification connections.

Eskom tariffs are split between urban, residential and rural user categories. A list of the tariffs and their key features is provided in the table below.

Table 14: Tariff categories and descriptions

	Tariff	Description

Urban	Nightsave Urban	Electricity tariff for urban customers with an NMD (notified maximum demand) from 25kVA
	Megaflex	Time of use electricity tariff for urban customers who are able to shift load and with an Notified Maximum Demand (NMD) greater than 1MVA
	Miniflex	Time of use electricity tariff for urban customers with an NMD from 25kVA up to 5MVA
	Businessrate	Electricity tariff for small businesses, governmental institutions or similar supplies in urban areas with an NMD of up to 100kVA
Residential	**Homepower Standard**	Electricity tariff for medium to high-usage residential customers in urban areas with an NMD of up to 100kVA, including churches, schools, halls, old age homes etc.
	Homepower Bulk	Electricity tariff for residential bulk supplies, typically sectional title developments and multiple housing units, in urban areas connected prior to 1 January 2004
	Homelight	Electricity tariff for single-phase, low-usage residential supplies in urban areas. Can be 10 Amp, 20 Amp and 60 Amp single-phase supplies. Subsidised.
	Homeflex	TIME OF USE electricity tariff suitable for medium to high residential customers in urban areas with an NMD of up to 100kVA.
Rural	Nightsave Rural	Electricity tariff for high-load-factor rural customers with an NMD from 25kVA with a supply voltage ≤ 22kV (or 33kV where designated by Eskom as rural)
	Ruraflex	TIME OF USE electricity tariff for rural customers with dual- and three-phase supplies with an NMD from 25kVA with a supply voltage ≤ 22kV (or 33kV where designated by Eskom as rural)
	Landrate	Electricity tariff for rural customers with an NMD up to 100kVA with a supply voltage ≤500V
	Landlight	Electricity tariff for rural customers with low usage, subsidized.
Public lighting tariffs		Electricity tariff for public lighting or similar supplies

The three important sets of tariff structures for the purposes of this report are Eskom's domestic tariffs of **Homelight**, **Homepower** and **Landlight** tariffs (shown in bold in the above table).

Low usage domestic urban tariff - Homelight

Homelight provides a suite of tariffs that provide subsidies for low-usage single-phase residential supplies in urban areas as follows:

HOMELIGHT Non-Local Authority Rates

	Energy charge [c/kWh]		Environmental levy [c/kWh]		Total	
	VAT excl.	VAT incl.	VAT excl.	VAT incl.	VAT excl.	VAT incl.
Homelight 1						
10A	57.49	65.54	1.97	2.25	59.46	67.78
20A	57.49	65.54	1.97	2.25	59.46	67.78
60A	64.96	74.05	1.97	2.25	66.93	76.30
Homelight 2						
20A	49.78	56.75	1.97	2.25	51.75	59.00
60A	57.14	65.14	1.97	2.25	59.11	67.39

The key characteristics of this tariff are:

⇒ Single-phase supply only

⇒ Capacity limits of 20 or 60 Amps (and some historical 10 Amp supplies)

⇒ A single energy charge (no monthly fixed charge)

⇒ The energy charge which is related to maximum demand (20 Amp or 60 Amp)

⇒ A choice between a zero connection fee and a higher energy charge (Homelight 1) compared to a R1000 connection fee and a lower energy charge (Homelight 2).

⇒ Offered with a prepayment meter.

The Homelight 1 60 Amp tariff is not economical at consumption levels of more than 850 kWh, in which case the Homepower 4 tariff becomes cheaper (see below).

Low usage domestic rural tariff - Landlight

Landlight provides a subsidy to low usage single-phase supplies in rural areas and have the following characteristics:

LANDLIGHT

An electricity tariff that provides a subsidy to low-usage single phase supplies in rural areas, limited to 20A and is characterised by:

- a single c/kWh **active energy charge** inclusive of the Environmental Levy
- applicable for 20A supplies only
- no fixed charges applicable
- applicable only on prepayment metering technology
- not applicable to local-authority supplies

LANDLIGHT Non-Local Authority Rates

	Energy charge [c/kWh]		Environmental levy [c/kWh]		Total [c/kWh]	
	VAT excl	VAT incl	VAT excl	VAT incl	VAT excl	VAT incl
Landlight	139.95	159.54	1.97	2.25	141.92	161.79

Prepayment supplies

Prepayment technology will be offered to all Landlight supplies.

The energy charge is much higher compared to Homelight because of the higher costs experienced in rural areas. This tariff is not economical with a consumption of more than 525 kWh in which case a Landrate 4 tariff (rural tariffs for larger users) is cheaper.

Moderate to high usage supplies in urban areas – Homepower

This suite of tariffs is typically for 3-phase supplies for residences, schools, churches, halls, old age homes etc. for notified maximum demands ranging from 16 kVA (single-phase) up to 100 kVA (three-phase). The tariffs comprise a service charge, a network charge, an energy charge and an environmental level.

Homepower 1: for **25 kVA three-phase** supplies (40 A per phase)
Homepower 2: for **50 kVA three-phase** supplies (80 A per phase)
Homepower 3: for **> 50 kVA and ≤ 100 kVA three-phase** supplies (150 A per phase)
Homepower 4: for **16 kVA single-phase** supplies (80 A per phase)

HOMEPOWER Bulk and
HOMEPOWER Standard

Non-Local Authority Rates

	Service charge [R/POD/day]		Network charge [R/POD/day]		Energy charge [c/kWh]		Environmental levy [c/kWh]	
	VAT excl.	VAT incl.	VAT excl.	VAT incl.	VAT excl.	VAT incl.	VAT excl.	VAT incl.
Homepower 1	R2.45	R2.79	R3.04	R3.47	50.40	57.46	1.97	2.25
Homepower 2	R2.45	R2.79	R6.56	R7.48	50.40	57.46	1.97	2.25
Homepower 3	R2.45	R2.79	R13.21	R15.06	50.40	57.46	1.97	2.25
Homepower 4	R2.45	R2.79	R1.55	R1.77	50.40	57.46	1.97	2.25
Homepower Bulk ≥ 500V*	R5.89	R6.71	R1.05	R1.20	48.77	55.60	1.97	2.25
Homepower Bulk < 500V*	R5.89	R6.71	R1.17	R1.33	50.40	57.46	1.97	2.25

Time of use tariffs - Homeflex

From 1 September 2009 Eskom introduced a new tariff, Homeflex, with seasonally adjusted time-of-use active energy charge with smart metering and active load management. This is being implemented on a voluntary basis for 10 000 residential customers with notified maximum demands of up to 100 kVA.

Consistency with Electricity Pricing Policy

There is generally a good fit between Eskom's tariff offerings (in terms of tariff structures) and the national electricity pricing policy. The offerings are consistent with:

⇒ Offering a range of tariffs

⇒ Offering tariff and service level self-selection

⇒ Simpler and subsidised tariffs for low-usage

⇒ More complex cost-reflective tariffs for high demand and higher usage

⇒ Prepayment metering is offered for single phase low and moderate usage supplies with no discrimination in pricing

The tariffs differ from the policy in the following ways:

⇒ For a 20 Amp Homelight 1 tariff, although the connection fee is zero, the energy charge is higher than for a 20 Amp Homelight 2 tariff. It is not clear why this is the case. The cost of connection for the Homelight 1 user could be subsidised from the national government through the national electrification subsidy and so the Homelight 1 tariff user could not be penalised relative to the Homelight 2 user on the energy charge.

⇒ It is not clear why all Homelight 20 Amp connection fees are zero.

⇒ The tariffs do no include an explicit Free Basic Electricity allowance. This could be available to the 20 Amp Homelight 1 users.

Annexure 4: Municipal tariff structures

There is a multiplicity of municipal tariff structures in effect in South Africa. Although tariff information is public (municipalities are obliged to publish their tariffs annually and to make a copy of these tariffs available on their web-site), these tariffs have not been collated and analysed by NERSA.

Tariff structures in nine major cities

The electricity tariff structures for the nine municipalities forming part of the city's network – the six metropolitan municipalities as well as the three aspirant metropolitan municipalities of Mangaung, Buffalo City and Mangaung, were collated.

General characteristics of municipal tariff structures

The key characteristics of municipal tariff structures are the following:

⇒ There are very many different tariff structures in place across South Africa.

⇒ There is little consistency between municipalities in how tariff structures are designed and applied.

⇒ The principle of tariff self-selection is not widely applied. That is, consumer choice is, in many instances, limited.

⇒ 20 Amp service levels is not common for municipal electricity supplies (the most common domestic supply is a 60 Amp single phase supply).

⇒ Prepayment meters are reasonable widespread.

Consistency with Electricity Pricing Policy

It is fair to say that there is a low level of consistency between municipal tariff structures in effect in South Africa and what is required in terms of the national Electricity Pricing Policy. In particular:

⇒ The principle of service level and tariff self-selection is not widely practiced by municipalities.

⇒ This is little consistency in the way that Free Basic Electricity is applied between municipalities.

⇒ There is an urgent need for tariffs to be rationalised into one national set of tariffs as set out in the Electricity Pricing Policy.

Annexure 5: Eskom's tariffs, costs and subsidies

Subsidies by tariff category

The text and information in this sub-section were supplied directly by Eskom.[102]

Eskom's approach

Once the Eskom revenue requirement is determined by the NERSA it is translated into a price increase that is applied to all the Eskom tariff rates.

The Eskom tariffs are designed based on the cost to supply customers that reside in a specific tariff category. These costs are based on a comprehensive cost of supply study which is used to determine the costs associated with different cost drivers such as energy, networks and customer services. This is done for each customer category. Different customer categories will have different costs allocated to them depending on:

⇒ The voltage of the supply.

⇒ The density of the network to which customers are connected (rural/urban)

[102] Conradie, pers comm. (10 November 2009). Additional headings have been added for clarity.

⇒ How the energy is used during the day and season

⇒ The capacity used by the customer.

Care is taken to ensure that tariffs reflect the cost as closely as possible. The application of tariff structures and subsidies are approved by NERSA before implementation by Eskom.

Although the Eskom average price as normally quoted is based on the Eskom overall costs, individual price levels on tariffs per customer, or per customer class, may not be cost-reflective for that category. This is due to averaging, historical cross-subsidies and social factors such as the customer's ability to pay a cost reflective price.

Some tariffs therefore receive subsidies, i.e. pay less than the cost; and other tariffs pay towards these subsidies to ensure that overall, Eskom achieves its approved revenue requirement.

Common misperception

There is a common misconception that industrial customers are subsidised by residential customers, justified by comparing the average prices paid by residential and industrial customers respectively. For example, if you study the average prices for 2008/2009, you will find that industrial customers paid 22 cents for a kWh, while residential customers paid 54 cents.

The truth of the matter is that the two values (22 cents versus 54 cents per kWh) cannot, and could not, be compared. The reason for this is that the cost to supply Eskom's customers is not the same. It costs significantly less to supply the average residential customer than what it does to supply the average industrial customer.

Electricity supply cost chain

An argument based on the average price of electricity for different customer categories must take the electricity supply cost chain into account. It is also necessary to understand exactly where customers obtain their supply in this chain.

The bottom line is this: small users of electricity have much higher costs per kWh than large users. The reasons for this are as follows:

- A residential customer is supplied on the network at a low voltage whereas a large industrial customer is supplied at a high voltage. This means that many more electrical networks have to be built, maintained and operated to supply smaller customers than is the case for larger customers on higher voltage networks. The overall cost to supply residential customers therefore has a much bigger percentage of network costs than for larger customers.
- More electrical losses occur at the lower voltages as the electricity has to travel further distances.
- As a ratio of overall consumption, smaller customers also tend to use much more electricity in the more expensive peak periods
- Smaller customers use electricity more inconsistently during the day than larger customers. This means that their average cost of electricity per kWh is higher than that of a larger customer who uses electricity more evenly.

Comparison of costs and tariffs by user category

The following table compares on a c/kWh basis the cost of supply to the average rate per tariff:

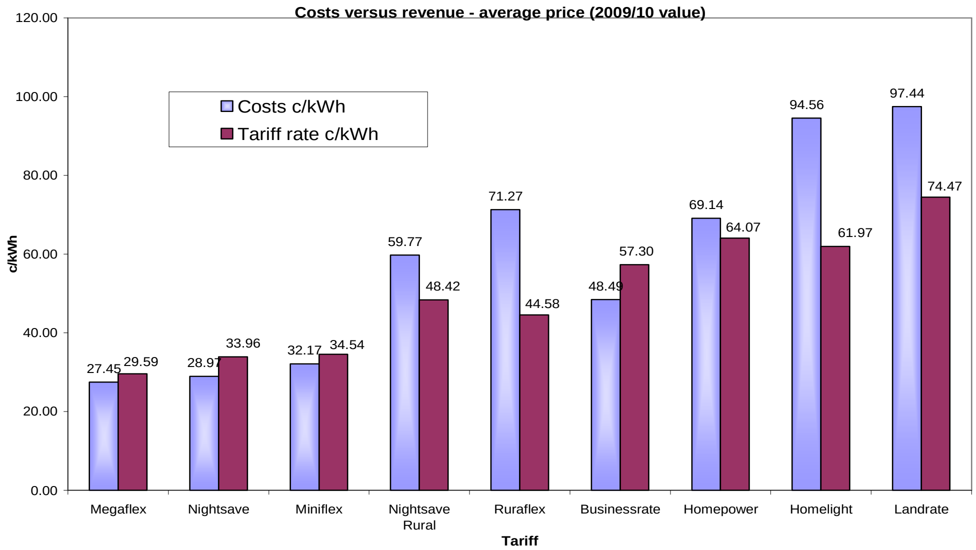


Figure 17 – Average cost compared to the average tariff (per kWh)

Note: Landlight is missing from this (new tariff category)

Subsidy by user category

The following table shows the estimated subsidies in R billion in 2009/10. [103]

Table 15: Eskom costs, revenues and subsidy per tariff (2009/10 estimate)

Tariff	**Cost** R billion	**Revenue** R billion	**Subsidy*** R billion	**Subsidy*** % of cost	**Customers**** Number
Megaflex	41.3	44.6	- 3.3	- 8.1	387
Nightsave Urban	4.5	5.3	-0.8	-17.5	2,566
Sub-total	***45.8***	***49.9***	***- 4.1***	***- 9.0***	
of which					
municipalities	*18.7*	*20.0*	*-1.4*	*- 7.4*	
industry & mines	*27.2*	*29.9*	*-2.7*	*- 10.1*	
Miniflex	0.8	0.9	- 0.06	- 7.6	932
Nightsave Rural	2.3	1.9	0.44	18.8	4,659
Ruraflex	1.8	1,2	0.68	37.3	5,663
Businessrate	0.45	0.5	-0.08	-18.4	27,286
Homepower	1.5	1.4	0.11	7.1	173,372
Homelight	6.2	4.0	2.1	34.5	3,880,698
Landrate	4.3	3.3	1.0	23.6	160,594
Landlight					
Special pricing	3.4 ***	2.3	1.1	32.0	?

[103] Data supplied by Eskom management. Total revenue of R65 billion, excluding environmental levy, compared to total revenue for 2008/9 of R54 billion. Corresponds to MYPD2 application data which has a revenue of R65.8 billion excluding the levy.

Total	**66.7** ***	**65.5**	**1.2**

*Note: * A negative subsidy means the user pays more than the cost. **The numbers of customers are represented by number of accounts for the large power users and by points of delivery (POD) for the smaller power user tariffs (Homepower, Businessrate, Homelight and Landrate). ***Total costs calculated from MYPD2 to impute special pricing cost.*

Source: Eskom (personal correspondence, 2009).

It could be noted that the Eskom large industrial and mining customers are normally on Megaflex and Nightsave Urban tariffs. Such customers pay more than their cost of supply (i.e. R4.1 billion more). This category includes bulk sales to municipalities which have also been shown separately in the table.

The implication of this is that the R4 billion over-recovered from the above-mentioned tariffs is used to subsidise the Homelight, Landrate, Nightsave Rural and Ruraflex tariffs (mainly associated with network costs).

It is therefore quite clear that Eskom's industrial customers subsidise the bulk of its residential and rural supplies and not the other way round as frequently stated.

Comment: The one possible exception to this is the subsidies related to special pricing agreements. The magnitude and direction of these cross-subsidies are not disclosed.

Using the annual report to analyse the average price

Using the annual report alone to analyse the average price could be misleading as it neither gives a view per tariff nor allows one to evaluate the cost per tariff.

For example, in the residential tariff category all residential supplies such as homes on farms, higher consumption homes in Sandton and homes in electrification areas are combined into one economic category. This means there is a mix of different tariffs in the residential tariff category. Such categories of customers have significantly different costs of supply as well as tariff levels.

Comment on main existing subsidy flows within Eskom

Assuming the costs given by Eskom per tariff category are reasonable accurate, there are come important tariff imbalances within the existing set up:

⇒ Municipalities overpay Eskom by R1.4 billion per annum, representing an overpayment of 7.4% compared to cost.

⇒ Agricultural users on the landrate tariff enjoy an annual subsidy of R1 billion per annum, representing a discount of their average tariff of 23.6% compared to cost.

⇒ Users on the ruralflex tariff get a subsidy of R684 million, representing a 37% tariff discount compared to cost.

Other notable features of existing cross-subsidies are:

⇒ Industry and mines subsidise other users by about R2.7 billion per annum, representing an additional cost of 10.1%.

⇒ Small domestic consumers on the homelight tariff get a subsidy benefit of R2.1 billion, representing a tariff discount of 34.5%.

⇒ Moderate and higher use domestic consumers on the Homepower tariff get a tariff discount of 7%, totalling R110 million per annum.

⇒ The effective subsidy for special pricing agreements was not disclosed. This could be significant.

Eskom's domestic tariffs in more detail

Low-usage domestic consumers

Low-usage domestic customers are supplied electricity by Eskom through the Homelight tariff. There are two Homelight tariffs: Homelight 1 which has lower connection fee and higher energy charges; and Homelight 2 which has a higher connection fee with lower energy charges. Both Homelight tariffs have a 20A and a 60A supply option.

The consumption data for Homelight tariffs is given in the tables below.[104]

Table 16: Homelight 1 and 2 customer and consumption data (2008/9)

Tariff	**Sales** million kWh per annum	**Total customers**	**Non-zero Users ***	**Monthly average **** kWh	**% with prepaid meters**	**% using FBE**
Homelight 1						
20A	3 064	2,458,083	1,561,767	104 / 163	100.0%	29%
60A	2 515	1,274,393	894 952	164 / 232	99.7%	26%
Homelight 2						
20A	103.2	54,046	22 750	159 / 193	76.7%	24%
60A	818.1	213,301	22 364	320 / 263	41.9%	25%
Total	**6,500**	**3,999,823**		**135**	**96.4%**	**28%**

Notes: * A large number of users recorded zero purchases for the year. This data for prepaid meters only. ** The first number (reported by Eskom) is misleading because it includes customers who recorded no consumption for the year. The second number is the average consumption for prepayment customers with non-zero consumption in the period. This data is representative for Homelight 1 but not Homelight 2 which have a higher proportion of conventional meters.

Homelight 1 is by far the larger of the two Homelight categories, with 93% of the users in the Homelight tariff category.

Average consumption in the Homelight 1 10 A category reported by Eskom is 104 kWh per month. But this may be misleading because many of in the category record zero consumption readings for the year. Correcting for this, the average consumption is 163 kWh per month.

The number of *prepaid connections* recording zero consumption for the year is very significant as show below.

Table 17: Significance of prepayment meter connections with zero recorded consumption

Tariff	**Total Connections** (Prepayment meters)	**Connections with zero consumption in 2008/9** (Prepayment meters)	**Percentage of total connections**
Homelight 1 20 Amp	2 458 083	896 316	36%
Homelight 1 60 Amp	1 270 232	375 281	30%
Homelight 2 20 Amp	41 466	18 716	45%
Homelight 2 60 Amp	89 390	22 364	25%
Total	**3 859 171**	**1 312 676**	**34%**

[104] Data supplied by Eskom. Shirley Salvoldi (pers comm., 20 November 2009). This data is very recent. It is possible that there are errors in the spreadsheets provided.

There are 1.3 million connections, representing over one third of prepayment meter connections on Homelight 1 and 2, that recorded *zero consumption* in the period September 2009 to October 2010. The reasons for this needs to be fully understood:

⇒ Are these households using electricity, but it is not being reflection on the system (meters have been by-passed and electricity is being stolen)? See separate section below on electricity theft.

⇒ Are households not using electricity for reasons for affordability?

⇒ Why are households not making use of the free basic allocation, which could give an annual consumption of 600 kWh with a monthly average of 50 kWh per month (only 28% of connections obtain the benefit of Free Basic Electricity).

Aside from the above anomaly, the broad pattern of consumption is as one would expect.

The consumption data is represented for 20A and 60 Amp groupings below.

Table 18: Homelight 20A and 60A customer and consumption data

Tariff	***Total consumption*** *kWh per annum*	***No of customers***	***average use * kWh pm***	***% using FBE***
Homelight 20A	3,167,096,352	2,512,129	105	
Homelight 60A	3,332,889,624	1,487,694	187	
Total	***6,499,985,977***	***3,999,823***	***135***	
Homelight 20A FBE	1,130,860,605	735,916	128	29%
Homelight 60A FBE	854,203,656	381,527	187	26%
Total	***1,985,064,261***	***1,117,443***	***148***	***28%***
Homelight 20A excluding zero kWh customers	1,130,860,605	500,830	188	
Homelight 60A excluding zero kWh customers	854,203,656	277,798	256	
Total	***1,985,064,261***	***778,629***	***212***	***19%***

Notes: * This average consumption data is misleading because it includes customers who recorded no consumption for the year (see previous table), which is a significant proportion of consumers.

Note the low proportion of households with Free Basic Electricity (between 25% and 29%) with no large difference between tariff categories.

Moderate to high usage domestic consumers

Eskom supply directly a small number of customers on their Homepower tariff.

Table 19: Homepower customer and consumption data

	Annual consumption	***No of customers***	***Proportion of customers***	***Average kWh /month***
Homepower 1	688,391,024	51,854	32%	1106
Homepower 2	109,383,111	5,135	3%	1775
Homepower 3	30,572,419	892	1%	2856
Homepower 4	940,215,132	105,559	65%	742
Total	**1,768,561,686**	**163,440**	**100%**	**902**

Average tariff levels of Eskom domestic consumers

Table 20: Average tariff levels and monthly bills (excluding zero connections)

	Consumption (kWh)	Revenue (Rand)	Average use (kWh/ month)	Average Tariff (c/kWh)	Average Bill (R/month)
Actual 08/09					
Homelight	6,058,359,836	3,238,070,681	212	53.45	113.31
Homepower	2,077,021,268	1,009,558,012	902	48.61	438.43
Budget 09/10					
Homelight	6,504,000,000	3,926,000,000	212	60.36	127.97
Homepower	2,239,000,000	1,424,000,000	902	63.60	573.67

Consumption distributions for Homelight tariffs

The consumption distributions given below for Eskom Homelight tariffs with and without FBE for customers using prepayment meters will be used to test the implications of different approaches to mitigate steep electricity cost increases on poor households.

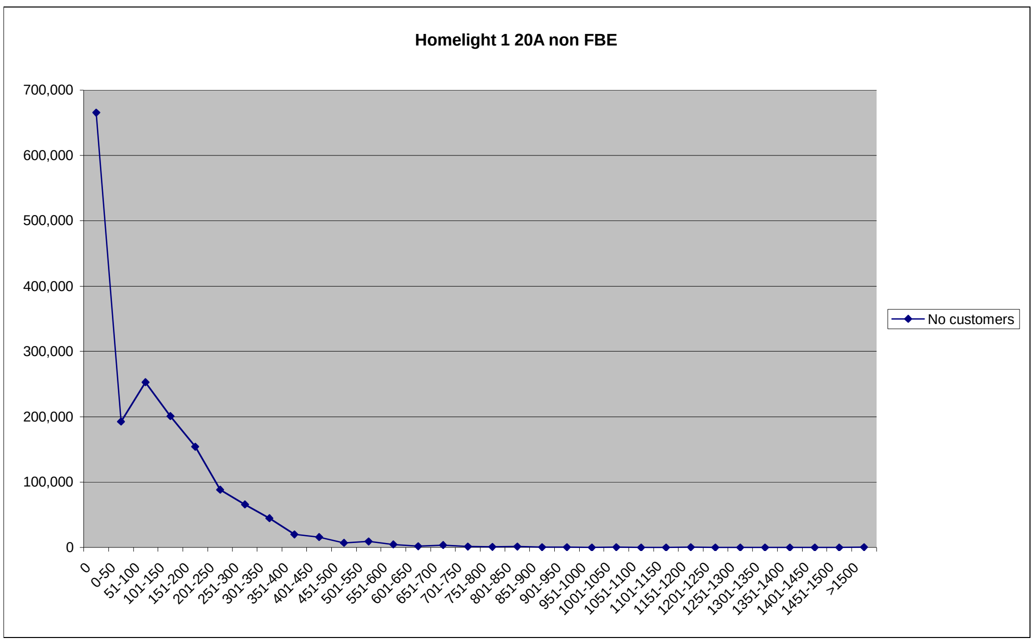


Figure 18: Homelight 1 20 A non FBE consumption distribution

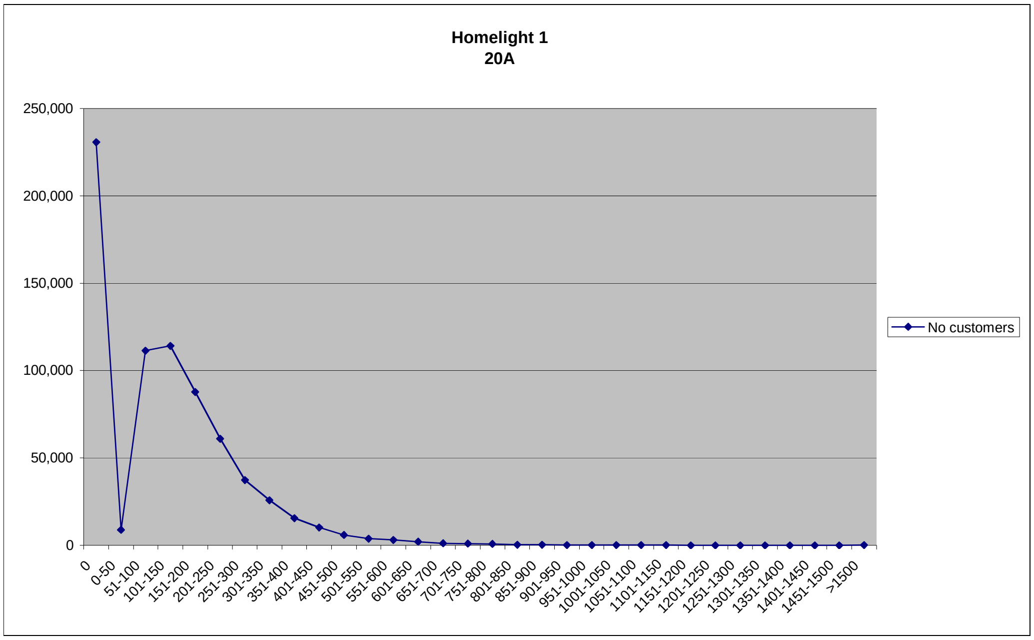


Figure 19: Homelight 1 20A consumption distribution

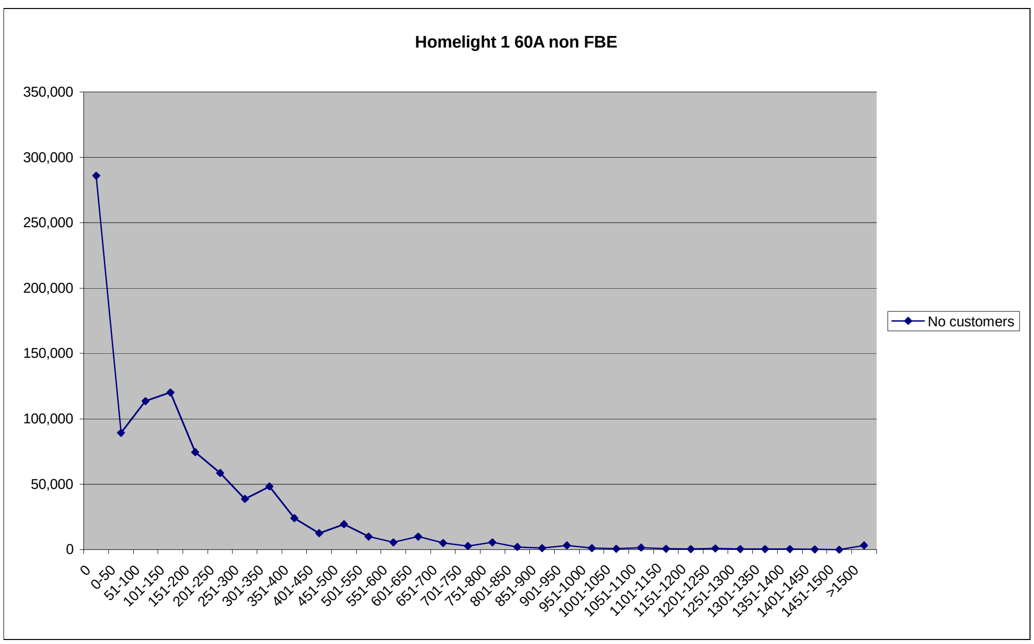


Figure 20: Homelight 1 60A non FBE

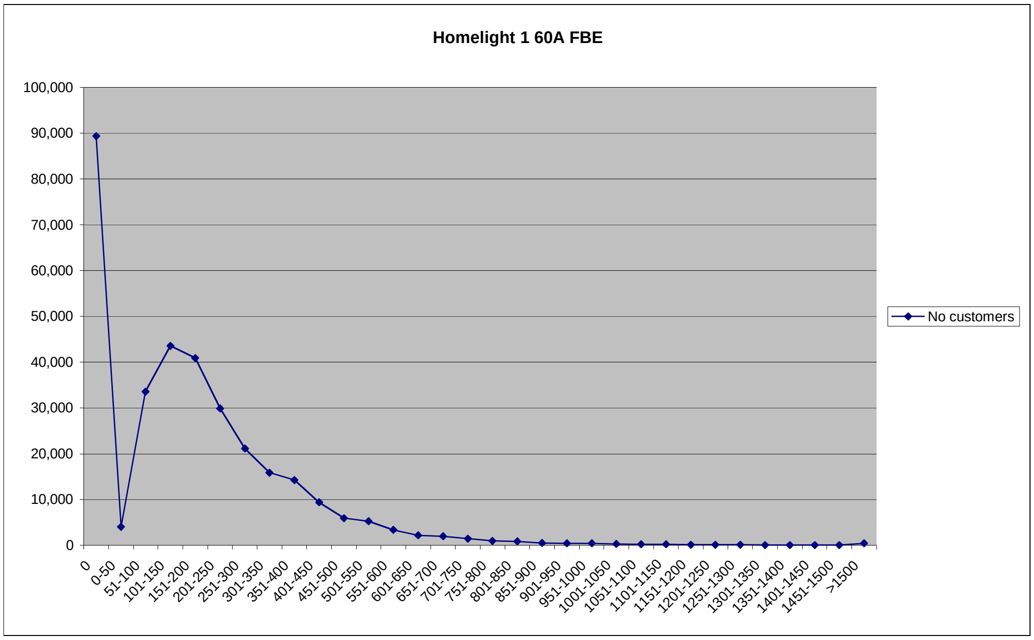


Figure 21: Homelight 1 60A FBE

Annexure 6: Municipal tariffs & costs

Tariff setting and NERSA approvals

Municipalities set their own tariffs and these are approved by NERSA.[105] Benchmark tariff levels are provided by NERSA for municipal distributors grouped per RED for each of the customer categories listed in the table below[106]. It is interesting to note that the benchmark tariff levels for domestic high consumption customers are generally lower than the benchmark for domestic low consumption tariffs; that commercial prepaid customer benchmarks are above conventional metered commercial customers; and industrial customers in Johannesburg and the North West are at the high end of the scale, with EThekwini and KwaZulu-Natal industries on the low end of the scale.

Table 21: Municipal benchmark price level (c/kWh)

Geographic Area	***Domestic Low***	***Domestic High***	***Commercial***	***Commercial Prepaid***	***Industrial***
RED 1 (Cape Town/ WC&NC)	45 - 49	44 – 48	45 – 49	55 - 59	45 – 49
RED 2 (Ekurhuleni/ FS&NC)	45 – 49	39 – 43	44 – 48	50 – 54	46 – 50
RED 3 (Nelson Mandela/EC)	45 – 49	43 – 47	45 – 49	47 – 51	47 – 51

105 Not all municipalities submit tariffs. It is not clear how rigorous the basis of approval is. NERSA does not obtain detailed cost data from municipalities, most municipal electricity functions are not effectively ring-fenced, asset registers are often incomplete, and NERSA does not have consumption data for municipalities.

106 Source: NERSA Presentation to the Parliamentary Portfolio Committee of Energy, 8 September 2009

RED 4 (Johannesburg/NW)	44 – 48	44 – 48	45 – 49	49 – 53	48 – 52
RED 5 (Ethekwini/KZN)	45 – 49	39 – 43	44 – 48	46 – 50	43 – 47
RED 6 (Tshwane/LP&MP)	43 – 47	44 – 48	43 – 47	47 – 51	44 – 48

Metropolitan municipalities

Eskom purchase price

The average price at which Eskom supplies electricity to metropolitan municipalities (excluding City Power) is 22.79 c/kWh. This varies between municipality depending on geographic distance, maximum demand and the pattern of demand. This price is calculated from Eskom data on sales to each municipality and the revenue received. Data on City of Johannesburg is from City Power annual report.

Information on municipal sales (total units and revenue) has been sourced from individual municipalities. Some information is still outstanding.

Table 22: Metropolitan municipalities' electricity purchases and sales

Municipality	***Units purchased million kWh***	***Average Purchase price ex Eskom c/kWh***	***Units sold million kWh***	***Total revenue from sales R million***	***Average retail price c/kWh***	***Difference between retail price and purchase price***
City of Cape Town	10,616,833,695	23.08	9,342,616,656	4,220,932,632	45.18	22.10
eThekwini	11,520,387,473	21.32	10,920,221,425	4,599,591,348	42.12	20.80
City of Tshwane	6,768,215,871	22.79	*6,194,806,071**			
Nelson Mandela Bay	3,587,901,404	23.07	3,293,520,000			
City of Johannesburg	13,091,000,000		*11,981,917,809**	4,860,112,048	40.56	
Ekurhuleni	10,898,955,515	23.96	*9,975,585,454**			

**Note: Figures in italics are estimates only*

Domestic versus non-domestic consumption

The split between domestic and non-domestic consumption per metropolitan municipality is given in the table below, where data was made available.

Table 23: Metropolitan municipalities' domestic and non-domestic electricity sales split

Municipality	***Total units sold by municipality million kWh***	***Domestic units sold***	***Non-domestic units sold***	***% domestic***
City of Cape Town	9,342,616,656	4,043,179,662	5,299,436,995	43%

eThekwini	10,920,221,425	3,639,390,011	7,280,831,414	33%
City of Tshwane	*6,194,806,071*	*3,786,719,323*	*2,408,086,748*	61%
Nelson Mandela Bay	3,293,520,000	1,145,883,000	2,147,637,000	35%
City of Johannesburg	*11,981,917,809*			0%
Ekurhuleni	9,975,585,454			0%

Note: Figures in italics are estimates only

Tariff structures

There is a wide range of tariff structure in operation in the metros. See **Error! Reference source not found.**.

Other local municipalities

An analysis of Eskom data on provision of electricity billed per municipality, given the total consumption and revenue figures, shows that on average the rural B4[107] municipalities are paying more per kWh than the urban cities. The average and median price, the range and number of municipalities in the sample is included in the table below.

Table 24: Cost of Eskom provision to municipalities per category

	A	B1	B2	B3	B4	Total
Total units supplied by Eskom	43,392,293,958	28,626,116,859	4,715,812,565	4,857,068,888	963,761,200	*82,555,053,470*
Proportion of total units	53%	35%	6%	6%	1%	*100%*
Average c/kWh	22.79	23.44	24.35	25.51	26.09	
Median c/kWh	23.07	23.90	24.65	26.02	31.40	
Min c/kWh	21.32	21.18	22.96	23.02	24.48	
Max c/kWh	23.96	30.52	46.54	76.25	84.89	
Count (n)	5	21	31	90	25	*172*

National subsidies to local government

This section provides a brief overview of the national subsidy framework for local government and the relationship between this and access to electricity by the poor.

The Equitable Share of national revenue (ES) which goes to local government is the main source of operating subsidies for local government and, therefore, is addressed specifically.

[107] Municipal categorisation: B1= Secondary city; B2= large town; B3=small town; B4= no urban core

The ES formula

The equitable share is calculated as follows: = BS + D + I – R +/- C where BS is the basic service allocation, D is the development component (not applied at present), I is the institutional component, R is the revenue raising capacity correction, C is the correction to provide for stabilisation of the grant from year to year.

The 'basic services' allocation is made for electricity, water supply, sanitation and refuse services, using the amounts given in the table below. Recently municipal health was added as a basic service and the costs used for the each of the services have been adjusted (See Explanatory memorandum which is part of the Division of Revenue Bill, 2009).

Service	Figures used in 2005		Figures used in 2009	
	Those with services	Those without services	Those with services	Those without services
Electricity	40	15	45	16
Water	30	10	30	10
Refuse	30	10	30	10
Sanitation	30	10	30	10
Municipal health (applied to all households)	Not applied		18	

The actual value of these figures is questionable. What is important is their relative value as it is this that influences the distribution of funds in practice.

The ES formula does not distribute funds equitably if the revenue raising capacity of municipalities is taken into account. Put another way, the equitable share does not close the funding gap in poorer municipalities and this obviously compromises their ability to provide free basic services to the poor.

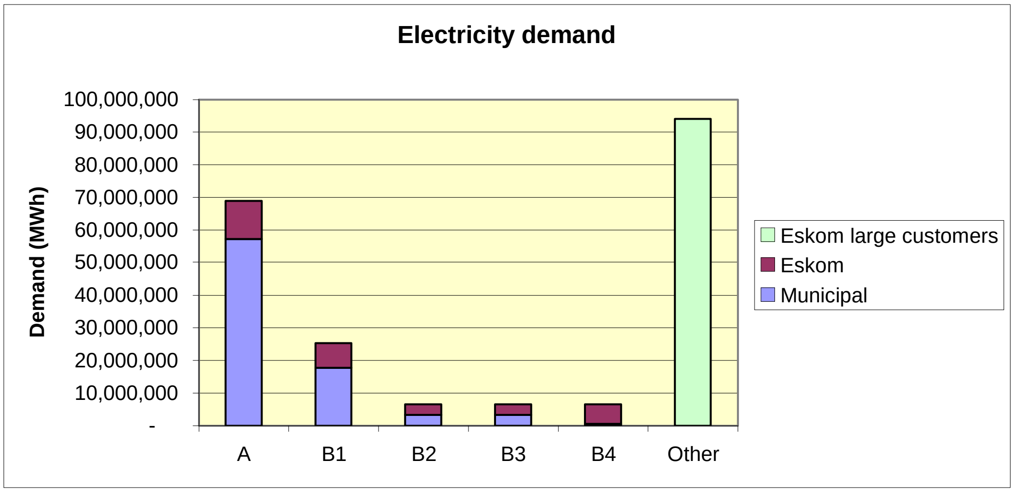
An analysis undertaken in 2005 analysis shows that the problem with the formula lies primarily in the values used for the 'I' component of the grant that is intended to cover administration and governance costs. With the very low figure of R1 per person per year for the administration component (estimates indicate this figure could be in the region of R120), the net result is that poorer municipalities, which raise very little of their own revenue, do not get their overhead costs funded and they therefore use the components intended for basic services (including electricity) for such overheads.

What this means in practice for Free Basic Electricity is that poor households in the poorer municipalities are very unlikely to benefit from the equitable share.

Cross-subsidies across and within municipalities

The distribution of consumption is skewed across municipalities.

Table 25: Electricity consumption across municipal categories



Although this data is old, the pattern would not have changed much.

It is fair to assume that Eskom distributes predominantly to poor households on behalf of municipalities. It is then obvious that the cross-subsidy burden between non-domestic and high-income consumers (combined as a group) and low-income consumers will differ radically across the types of municipality.

The implication of this is that any strategy that is reliant on cross-subsidies between consumers at the municipal level will be deeply inequitable.

Annexure 7: International price comparison

How do South Africa's electricity prices compare with international electricity prices? The SALGA comment on Eskom's MYPD2 application (30th September 2009) note that "international comparisons are important, since relative power prices will impact on investment, trade and general economic activity."

Four sources were reviewed:

- Eskom's own international comparison contained in the MYPD2 application (30 September 2009)
- The National Economic Development Department's comments on this comparison.
- SALGA's comments on this comparison
- International Energy Agency country comparative data from Key World Energy Statistics 2009.

Eskom's international comparison in the MYPD2 application

Eskom's analysis of industrial tariffs shows Eskom to be the cheapest (out of the countries selected) and to move to the 7th cheapest in 2012/13 (assuming other country's prices remain constant.

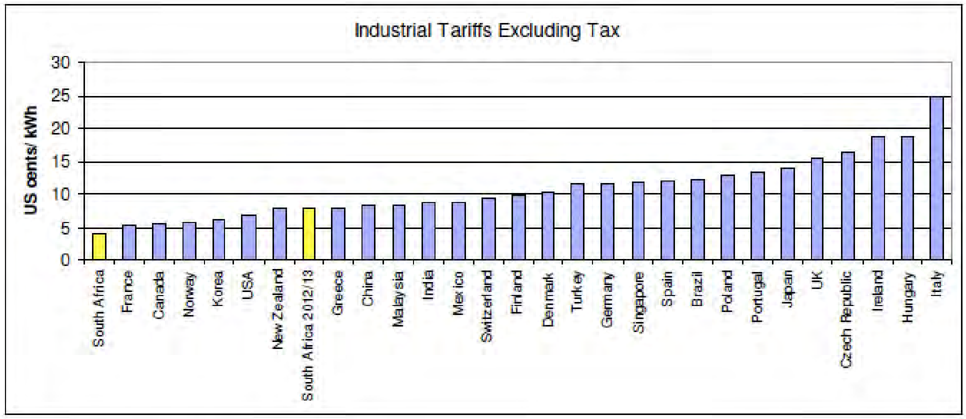


Figure 8: Price Comparison – Industrial

Eskom's comparison of domestic tariffs for use of 150 kWh per month with other African countries shows a favourable comparison:

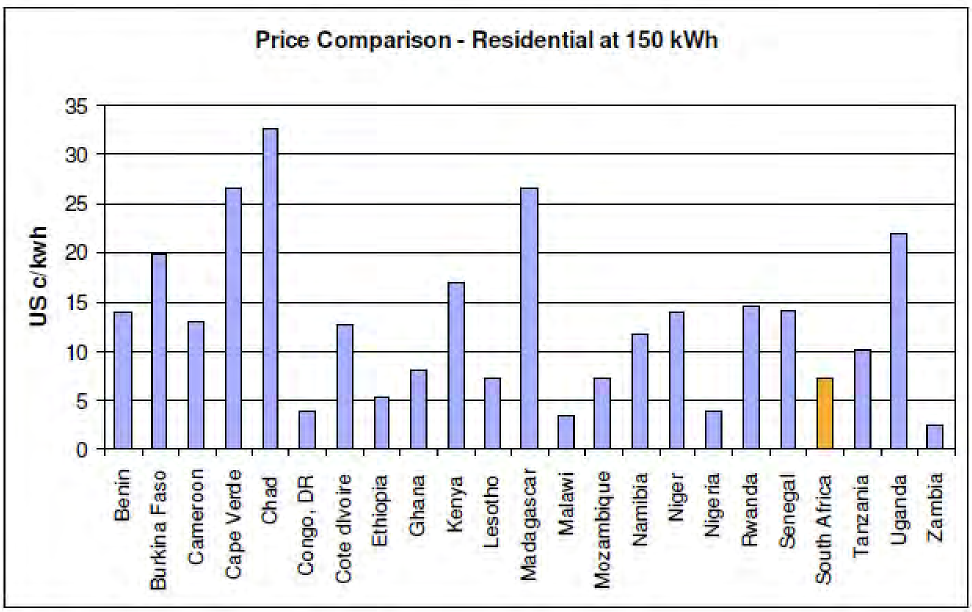


Figure 7: - Price Comparison – Residential

Comment by the National Economic Development Department

On Eskom's own comparisons, out of a set of 30 countries, the proposed industrial tariff increases will move Eskom from the very cheapest to the 7th cheapest.[108] And, this comparison assumes that there will not be increases, excluding taxes, in the other countries, suggesting that in actual fact South Africa will retain an even better position. For energy intensive users currently paying very low prices, the electricity prices will still be relatively competitive.

[108] Slide 30, Eskom/DPE presentation. This assumes an exchange rate of R10:$1 in 2012/13. Eskom also provided the spreadsheet of data used for this slide.

But, if the same set of countries, which includes both industrialized and developing countries, is used to compare residential tariffs (and, although this data is not available, also commercial and light industry users), the proposed changes will place South Africa above the mid-point. This reflects the fact that residential tariffs are proportionally much higher than industrial tariffs in South Africa than almost all other countries. On Eskom's calculations the residential tariff (which takes into account the provisions for low income households) is 74% higher than the industrial tariff (the Megaflex tariff, not including the special industry deals). This compares with an international average of 40%. Furthermore:

⇒ The greatest margins of residential over industrial are in mature industrial countries not involved in constructing new generation capacity, where residential use is a greater proportion of growth in demand.

⇒ In rapidly industrializing countries such as China, India and Malaysia, where new capacity is required for industry, industrial tariffs are actually higher than residential tariffs.

⇒ In middle income countries such as Brazil and Korea, residential tariffs are only around 30-35% above industrial tariffs.

Comment by SAGLA

International comparisons are important, since relative power prices will impact on investment, trade and general economic activity.

The Proposal includes some international tariff comparisons which suggest that Eskom's MYPD2 intended average tariff target of 87 c/kWh is reasonable and comparable to the country's major trading partners. However, SALGA believes that these comparisons may be misleading in that they incorrectly compare Eskom's average tariff with other country averages. The country tariff could include a weighted average of municipal distributor tariffs and is not simply Eskom's average tariff. The Proposal could also clarify the exchange rates and inflation rates used when making these comparisons, particularly when comparing Eskom's proposed future tariff with those in other countries.

SALGA recommends that Eskom improve this section of the MYPD2 Proposal by providing clear and reasonable comparisons of both country and utility average tariffs, as well as industrial and residential tariffs.

International Energy Agency Data

Table 26: International comparison of electricity prices provides a comparison of industrial and residential electricity price levels where data was available. The lack of published data, particularly for middle income countries, is notable. South Africa and other middle income countries are in bold.

Table 26: International comparison of electricity prices

Country	GDP per capita (USD 2008)	Electricity for Industry (US c/kWh)	Electricity for Residential (US c/kWh)	Electricity consumption/ population (kWh/capita)
Austria	49,900	15.41	25.72	8,020
Chinese Taipei	3,263	6.72	8.56	10,216

Czech Republic	20,760	15.12	19.15	6,503
Denmark	62,332		39.60	6,671
Finland	51,062	9.69	17.24	17,164
France	45,981	5.95	16.90	7,573
Hungary	15,409	16.97	22.34	3,976
Ireland	63,185	18.59	26.72	6,263
Italy	38,309	28.98	30.53	5,718
Korea	19,115	6.02	8.86	8,502
Malaysia	**7,221**	**10.23**	**8.37**	**3,668**
Mexico	**10,211**	**12.60**	**9.61**	**2,028**
Netherlands	52,321		24.26	7,099
New Zealand	30,617	7.14	16.44	9,722
Norway	94,353	6.36	16.39	24,997
Poland	**13,823**	**11.93**	**19.30**	**3,662**
Portugal	22,842	13.13	21.97	4,861
Slovak Republic	17,565	17.39	21.96	5,251
South Africa	**5,685**	**4.13**	**8.25**	**5,013**
Spain	35,204	12.52	21.80	6,296
Switzerland	64,015	9.38	15.43	8,209
Turkey	**10,745**	**13.88**	**16.48**	**2,210**
UK	43,088	14.59	23.13	6,142
USA	46,716	7.02	11.35	13,616

Source: Key World Energy Statistics 2009, International Energy Agency with the exception of South Africa (Source: Eskom) and Malaysia (Source: Suruhanjaya Tenaga, Electricity supply industry in Malaysia, performance and statistical information 2008). Prices excluding tax. Upper middle income in bold.

The residential and industrial electricity prices are depicted graphically below.

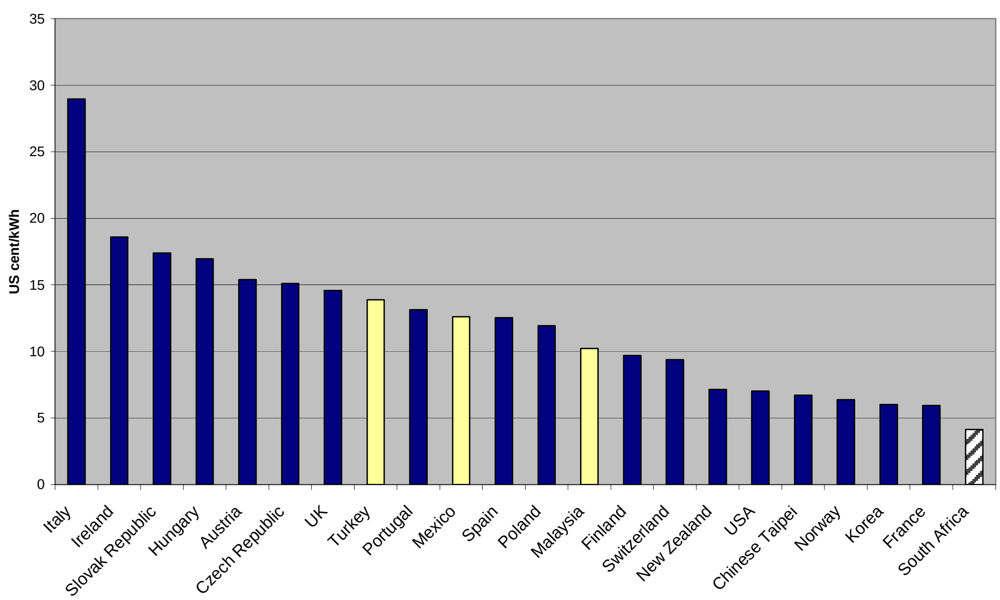


Figure 22: Industrial electricity price

South Africa's industrial electricity price is lowest in the range, considerably lower than the other middle income countries in the sample. South Africa's residential electricity prices are also the lowest in the range and half the price of the other middle income countries in the sample.

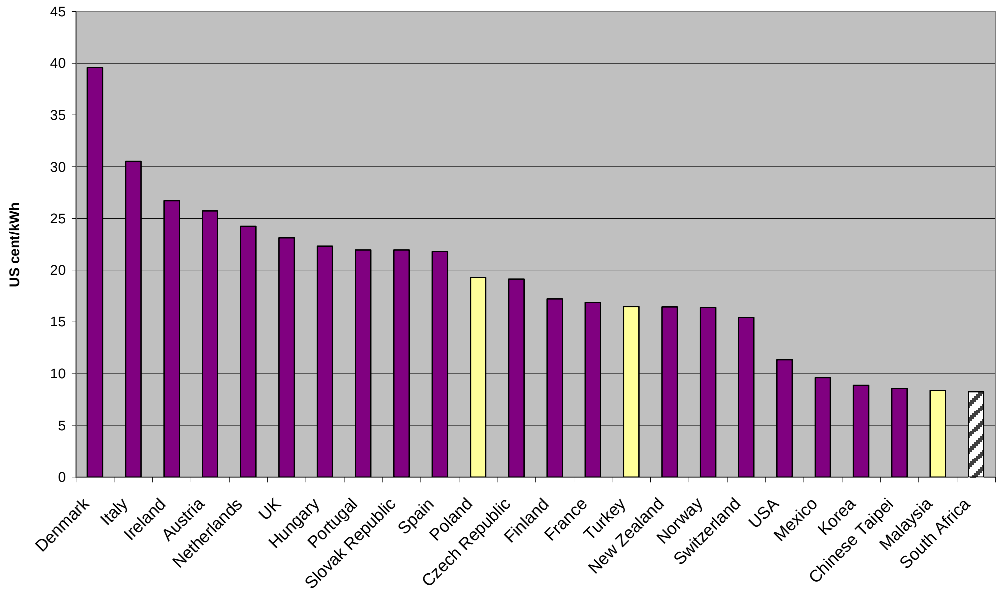
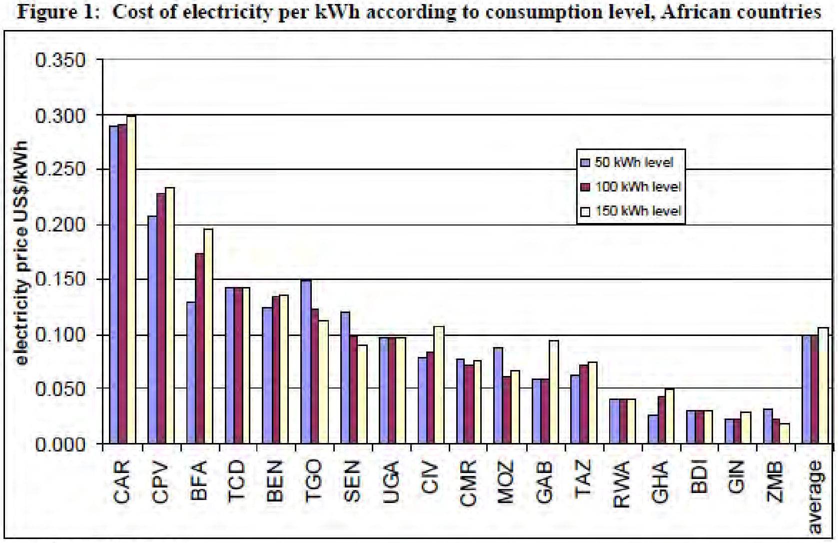


Figure 23: Residential electricity prices

Electricity tariffs for low domestic consumptions in Africa

Data on electricity prices for modest levels of domestic consumption for countries in Sub-Saharan Africa are given for context below (World Bank, 2007).

Figure 1: Cost of electricity per kWh according to consumption level, African countries



Source: Chapter 2.

Annexure 8: Modelling domestic level 1 subsidy

Consumption distribution assumptions

In order to model the implications and outcomes of a particular tariff design, knowledge of consumption distributions is needed.

This data is currently limited in its availability. For the purposes of this practical illustration, it is assumed domestic consumers can be categorised into two service levels, a limited demand service (domestic level 1) and a standard full service (domestic level 2). The following consumption distribution patterns for these two categories of service are assumed:

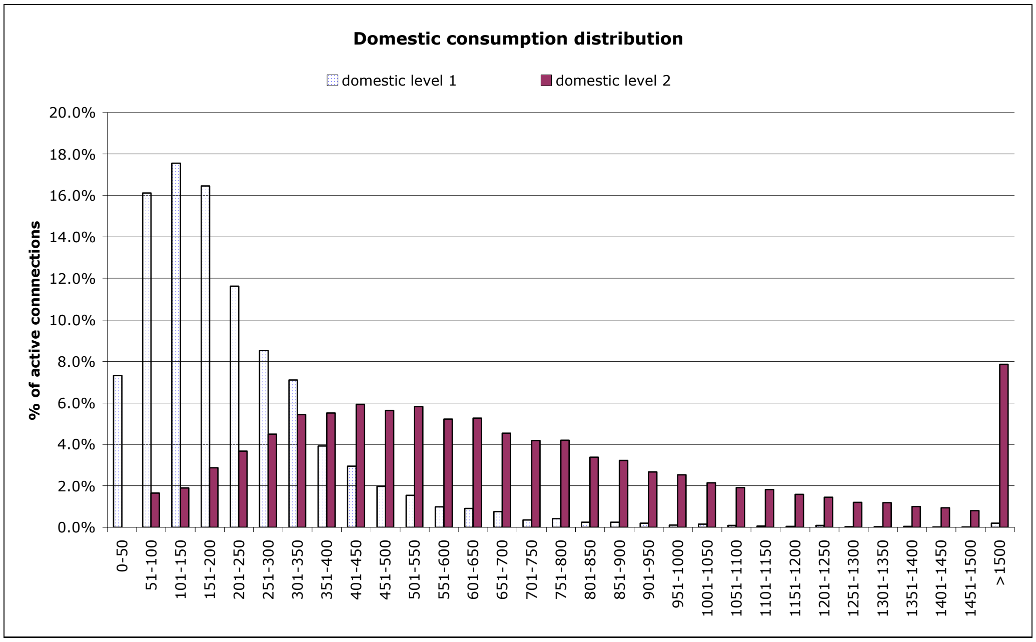


Figure 24: Domestic consumption distribution

There is strong empirical evidence for this distribution (see previous section). The distribution of users between these two service levels is estimated to be as follows (based on the best data available).

Table 27: Distribution of domestic connections by service level (millions)

	Eskom	Municipalities	Total
Service level 1	2.5	1.3	**3.8**
Service level 2	0.3	2.5	**2.8**
Total	**2.8**	**3.8**	**6.6**

Service level 1 connections could account for 58% of the active domestic connections (if households were able to elect this service level). There are, in addition, 1.3 million inactive service level 1 connections and these have not been included.

The implications of this data is that the domestic level 1 tariff could be expanded from the current approximately 2.5 million Eskom customers to a total of 3.8 million, and possibly more (by bringing back the 1.3 million "inactive" connections into service).

Tariff structures

A differential tariff is applied between these two categories as follows:

Domestic level 1

- Zero connection fee
- Zero fixed monthly fee (fixed network costs are subsidised for this level of service)
- A free basic amount (50 kWh, which is the current amount)[109]
- An energy charge which is equal to the long-run marginal cost of energy

Domestic level 2

- A connection fee (equal to the cost of network connection)
- A fixed monthly fee equal to the fixed costs
- An energy charge to recover the variable energy cost (long-run marginal cost of energy)

In other words, Domestic level 2 is a cost-reflective tariff structure. Alternatively, the fixed monthly charge could be done away with (or reduced in size) and a higher variable charge applied to achieve revenue neutrality.

Cost structure

The following cost structure is assumed:

Table 28: Illustrative cost structure – domestic services (simplified)

		2008/9 nominal	2009/10 nominal	2013/4 real	Comment
Energy & transmission	c/kWh	23	30	60	Assume 100% real increase over the period, equivalent to three 25% increases compounded. Pending MYPD2 outcome.
Distribution and retail	c/kWh	28	37	37	Assume 0% real increase over the period. However, distribution costs also need to increase to address maintenance and rehabilitation backlog.
Total cost	**c/kWh**	**51**	**67**	**97**	
Total domestic sales	GWh pa	36 000	36 000	36 000	Assume constant
Cost - total	R million	18 120	24 000	34 600	
Cost - fixed	R million	9 800	13 300	13 300	Distribution and retail costs
Active domestic connections	n	6 600 000	6 600 000	6 600 000	Assume constant
Fixed cost per connection	R pm/conn	124	167	167	

[109] The merits of increasing the Free Basic Electricity amount are considered in a later section.

This is a simplified version of costs for illustrative purposes. The cost structure matches our best estimate of the macro costs for the industry and the split between energy (including transmission) and distribution (including retail) costs at this macro level. Actual cost structures will vary between distributors.

Tariff levels

An illustrative best practice tariff structure, together with suggested tariff levels are presented in the table below. The key variable to be modelled is the energy charge for the Domestic Level 1 tariff (highlighted in the table). In this tariff structure, the level of this tariff will determine the level of subsidy required. (Domestic level 2 tariffs are set to recover full costs.)

Table 29: Illustrative tariffs for domestic level 1 and 2

		2008/9	2009/10	2013/14	Comment
Domestic level 1					
Energy tariff	c/kWh	51 *	62 *	**62 / 90 / 97 / 120**	Key tariff to be modelled
Domestic level 2					
Energy tariff **	c/kWh	23	30	60	Equal marginal energy tariff (generation and transmission) as per cost structure above.
Fixed charge **	R/m/conn	124	167	167	Equal fixed cost as per cost structure above.

* Eskom's average Homelight tariff in 2008/9 (actual) and 2009/10 (estimated)

The choice of the level of the energy tariff for the Domestic level 1 tariff is dependent of the following considerations:

- Current practices and the current tariff being applied. Eskom apply an average energy tariff for their Homelight customers of 62 c/kWh (2009/10).
- An interpretation of policy – could households with a level 1 connection contribute towards fixed infrastructure costs at all or could the tariff level be set at the marginal energy costs only, that is at 62 c/kWh in 2013/14?
- A view of what is an affordable tariff for this category of users.
- The total amount of subsidy needed and how this can be funded (from other users and government revenues).
- A desired breakeven point, if any, between domestic service level 1 and service level 2 users. Current policy is for a breakeven point at 350 kWh per month.
- A suitable transition path between current tariffs and the proposed tariff.

The implications of four tariff levels (applied to all domestic level 1 users in South Africa) were modelled and are as follows:

Table 30: Domestic level 1 tariff options and subsidy implications

Tariff option		A	B	C	D
Basis for tariff level		Marginal energy charge	700 kWh breakeven	Full average cost	350 kWh breakeven
Tariff level in 2013/14 (nominal)	c/kWh	60	90	97.4	120
Annual subsidy required	**R billion**	**9.0**	**6.6**	**6.0**	**4.2**

The energy tariff is modelled at the following levels: 60, 90, 97.4 and 120 for 2013/14 (in current 2009/10 cents). These correspond to four different choices as follows:

- Energy tariff equals variable energy cost only (60 c/kWh)
- Energy cost set to break even at 700 kWh per month (90 c/kWh)
- Energy cost set equal to full average cost (97.4 c/kWh)
- Energy cost set to break even at 350 kWh per month (120 c/kWh)

The subsidy implications vary from R4.2 to R9 billion per annum (in 2009/10 Rands).

The impact of these tariffs at the household level is shown below.

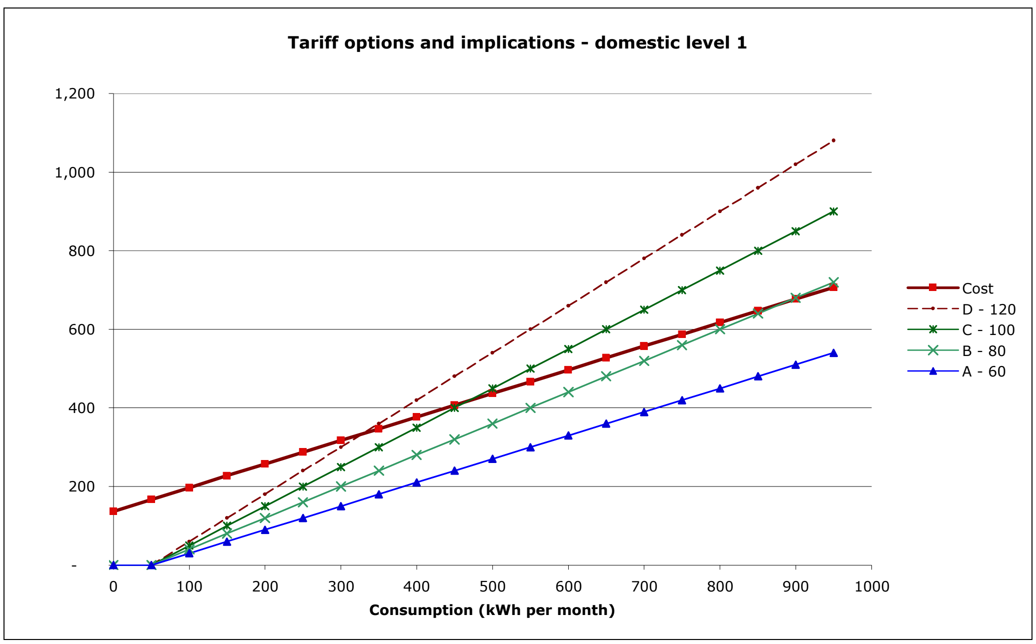


Figure 25: Implications of tariff options for households - level 1 tariffs

A subsidy benefit to the households is realised where the tariff line is below the cost line. In the case of tariff A, with the energy tariff set at 60 c/kWh, households benefit from a constant subsidy of R167 per month (irrespective of usage). For the other tariffs (B, C and D), the subsidy benefit reduces as consumption increases. Above the point where the tariff line crosses the cost line, the user pays more than the cost. This creates an incentive for the user to move to the cost-reflective tariff shown as the cost line.

The reducing "subsidy wedge" for an energy tariff of 80 c/kWh is shown below for purposes of illustration.

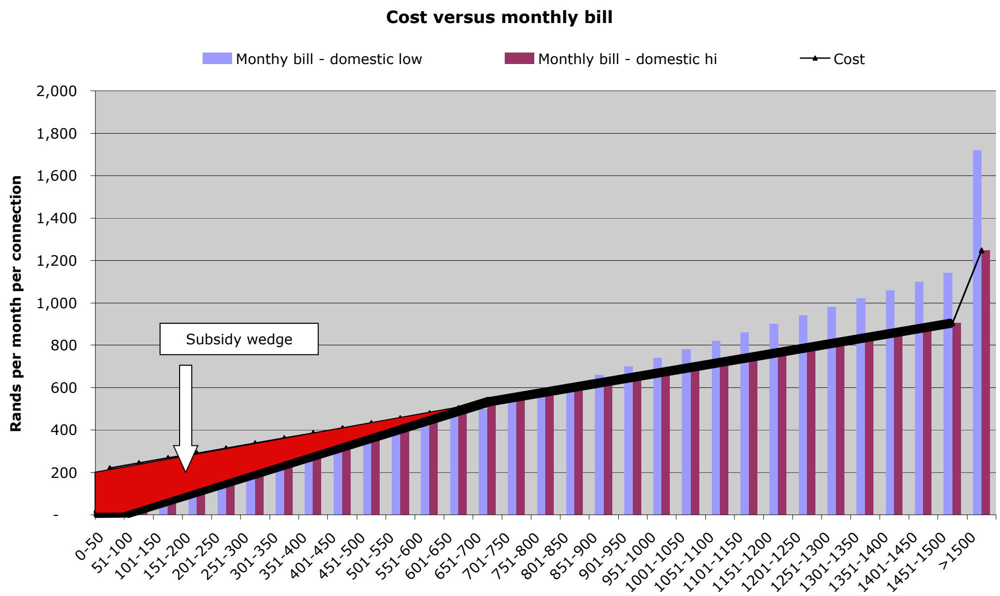


Figure 26: Tariff and cost structure with a 700 kWh breakeven point

The structure of the two tariffs work together in combination as follows:

- For domestic service level 1, the user has no fixed monthly charge, gets 50 kWh free, and pays an energy charge (to be determined).
- Users using less than 700 kWh[110] get a subsidy (as shown by the red subsidy wedge), the lower the consumption, the higher the subsidy benefit.
- Beyond 700 kWh the user switches to the service level 2 tariff which becomes more cost effective.
- For domestic service level 2, the user pays full cost of service with a connection fee, a monthly fixed fee and an energy charge.

Distributional outcomes

This tariff structure has a very favourable distributional outcome, as shown in the figure below (for an energy tariff set at 90 cents).

[110] The exact breakeven point will depend on the cost structure as well as the level of the energy tariff. In the illustration, 700 kWh is the breakeven point.

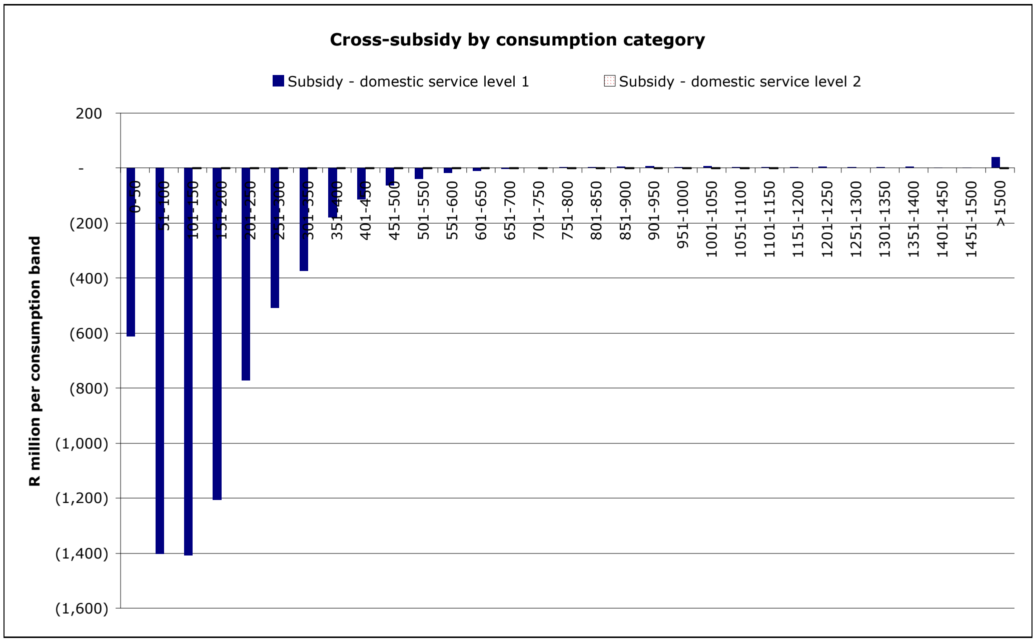


Figure 27: Distributional outcome of targeted service level 1 subsidy

This is a very effective and targeted subsidy, benefiting domestic service level 1 consumers only, with the major share of benefits going to users consuming in the range of 50 to 350 kWh per month.

Annexure 9: South African electricity pricing policy

No evaluation of national policies
An evaluation of the key policies presented below is available including recommendations for refinements and amendments. These have informed the evaluation of the options and implementation considerations. However, the researchers were requested not to report on this evaluation and the related recommendations to NEDLAC.

Electricity pricing policy

The Electricity Pricing Policy (EPP) was approved by Cabinet in December 2008. The policy takes two sector objectives set out in the Energy White Paper of 1998 as its departure point, namely improved social equity and enhanced efficiency. The scope of the EPP extends to generation, transmission, distribution, cross-subsidies, demand side management and related regulatory matters. The pricing policy consists of 60 policy statements which provide a clear framework on the determination of electricity prices, confirming existing practices and introducing new requirements which include ensuring cost reflective tariffs and transparent billing processes, allowing access and use of the network, renewable power trading and pricing, and protecting the poor.

The EPP has been developed without a specific industry structure in mind which ensures that the policy recommendations and positions remain valid under several industry scenarios. It is a comprehensive policy which eliminates uncertainties and provides excellent guidance in the sector.

Relevant policies (as they pertain to the impact of electricity prices on poor households) are summarised below with reference to relevant authorising or enabling legislation where applicable.

The existing *national policy on electricity pricing policy is the appropriate starting point for a discussion on approaches to mitigate the impacts of electricity tariff increases for poor households*. Important questions to ask are:

⇒ Does the policy provide an appropriate framework for subsidising electricity provision to poor households?

⇒ Are there any important gaps?

⇒ Are there areas of lack of clarity?

⇒ Are there any contradictions?

⇒ Are the policies practical in terms of implementation?

⇒ What are the implications of implementing these policies?

⇒ How do these policies compare to international best practice?

General pricing principles

⇒ Tariffs must enable an efficient licensee to recover full costs, including a reasonable return on assets. (Electricity Regulation Act, 2006, section 16)

⇒ Tariffs must avoid undue discrimination between customer categories (Electricity Regulation Act, 2006, section 16)

⇒ Tariffs may permit cross-subsidies between customer categories (Electricity Regulation Act, 2006, section 16)

⇒ Users of municipal services could be treated equitably in the application of tariffs (Municipal Systems Act, 2000)

⇒ The amount a user pays could generally be in proportion to the use of the service (Municipal Systems Act, 2000)

⇒ Low-income households must have access to at least a basic level of service through tariffs which cover only operating and maintenance costs, life-line tariffs for other direct or indirect subsidy mechanisms. (Municipal Systems Act, 2000)

⇒ The extent of subsidisation could be fully disclosed (Municipal Systems Act, 2000)

⇒ Tariffs may differentiate between different categories in users so long as such differentiation does not amount to unfair discrimination. (Municipal Systems Act, 2000)

Summary of tariff objectives

For consumers, tariffs need to be affordable for poor households, non-discriminatory, predictable and stable, transparent (subsidies disclosed) and unbundled (costs defined and allocated to user categories).

For utilities, tariffs need to ensure adequate revenue recovery (to cover full costs including a return on assets), encourage efficient use, reflect costs and be practical and low cost in their implementation. (The benefits of a more complex tariff implemention need to be greater than the costs of implementation.)

From the government's perspective, there is justification to subsidise tariffs to promote the public good, tariffs need to support environmental sustainability (by internalising, for example, external environmental impacts), tariff levels need to enable sufficient new generation capacity to be built and for the industry as a whole to be financially self-sufficient (with the exception of the public good subsidies mentioned above).

Tariff policies related to general principles

⇒ **Revenue requirement**: the revenue requirement for a regulated licensee must be set at a level which recovers the full cost of production, including a reasonable risk adjusted margin or return on appropriate asset values. The regulator must adopt an asset valuation methodology that accurately reflects replacement values of those assets. In addition the regulatory methodology could anticipate investment cycles and other cost trends to prevent unreasonable price volatility and shocks while ensuring financial viability, continuity, fundability and stability over the short, medium and long term assuming an efficient and prudent operator. (Policy position 1)

⇒ **Cost-reflectivity**: Tariffs must reflect the efficient cost of rendering electricity services as accurately as practical. (Policy Position 2)

⇒ **Transparency and unbundling**: There could be full disclosure including providing a breakdown of key cost drivers. (Policy Position 3)

⇒ **Non-discrimination**: All forms of discriminatory practices must be identified and removed, other than those permitted under specific cross-subsidisation programmes, or be transparently reflected to unlock the full potential of electricity for all. (Policy Position 4)

⇒ **Geographic differentiation**. Costs differ depending on the location in the country. Differentiation of prices based on geographic location is permitted as long as these are based on real cost differences. (Policy Position 20 - paraphrased)

Tariff policies – distribution and retail tariffs

⇒ **Cost of supply studies**. Electricity distributors shall undertake cost of supply studies at least every five years, but at t least when significant licensee structure changes occur. The cost of service methodology used to derive tariffs must accompany applications to the regulation for changes to tariff structures. (Policy Position 23)

⇒ **Refurbishment/maintenance backlog**. The distribution industry has largely neglected its obligations to undertake appropriate maintenance and refurbishment of infrastructure. Tariffs (and related revenue requirements) must reflect these costs taking care to avoid the non-transparent removal of funds from the sector in the absence of ring-fencing. (Policy Position 24 paraphrased)

⇒ **Distribution losses and bad debt**. NERSA must develop acceptable standards for non-technical losses and provisions for bad debt. The component of non-technical losses and bad debt which exceed the approved standard must be removed from the approved revenue base that would otherwise impact on the return of owners. (Policy Position 25)

⇒ **Differentiation of costs and tariffs by consumer category**. Costs differ depending on consumption patters, type of supply, type of metering, position on the network and other factors. Where costs between groups of consumers differ by more than 10%, a new consumer and tariff category must be established. (Policy Position 26)

⇒ **Cost reflective tariff components**. Within five years, NERSA must ensure that tariffs reflect the following cost components as far as is possible [practical]: energy cost, network demand charge, network capacity charge, customer service charge, point of supply cost, cost of poor power factor. (Policy position 27)

⇒ **Tariff simplification**. Simple metering or billing systems may require tariffs to be simplified. (Policy position 28)

⇒ **Cost-reflective tariffs**. Cost-reflective tariffs are considered the most effective pricing signal. Tariff structures and levels must be aligned with the Cost of Supply studies with resultant income equal to the revenue requirement. Any additional pricing signals over and above the cost must be motivated and specifically approved by NERSA. (Policy Positions 29 and 30)

⇒ **Seasonal and Time of use tariffs**. Tariffs could be differentiated by season. Within two years, all consumers supplied at or above 1 MV must be charged time of use tariffs, and within five years, all consumers supplied at or above 100 kVA must be charge time of use tariffs, and where metering provides for this, and for other customers where warranted. (Policy position 31)

⇒ **Geographic differentiation within distributors**. Not to be applied within a distributor's areas of supply except for farms (low density agriculture) and supplies associated with lower density. (Policy position 33.)

⇒ **Cost pooling**. Licensees shall apply pooling of costs per consumer category to achieve reasonable tariff. (Policy position 34.)

⇒ **Alignment of costs to voltages supplied**. At present there is a lack of alignment between costs of supply and tariffs between users with high and low voltage supplies respectively. NERSA must drive a plan to the phased increase in tariffs at lower voltages and decrease in tariffs at higher voltages. (Policy position 35)

⇒ **Domestic tariffs**. Domestic tariffs are to become more cost-reflective, offering a suite of supply options with progressive capacity–differentiated tariffs and connection fees. At the one end a single energy tariff with no basic charge, limited to 20 Amps and nominal connection charge (see Cross-subsidies below), at the next level a tariff which could contain tariff charges to reflect a basic charge, customer service charge, capacity charge and energy charge with cost-reflective connection charges; and at the final level time-of-use tariffs for users with higher demands (or where meters enable time of use pricing) with time of use energy rates instead of flat-rate energy charge. (Policy position 36)

⇒ **National tariff structure**. NERSA, together with the industry, could develop a set of national tariff structures for the industry. All utilities need to then adapt their tariffs in terms of the approved national tariff structure. The policy position is stated as: "NERSA shall rationalise existing distribution tariffs into a set of electricity tariff structures for the Electricity Distribution Industry. The *number of sets* will be governed by rationalising the number of distribution licenses through the restructuring process." (Policy position 37)

⇒ **Network capital contributions**. Any assets not financed by the distributor (government grants, developer contributions, connection fees etc.) are to be excluded from the asset base for purposes of determining depreciation and return on assets, and also excluded from cost-of-supply studies. But provision for replacement when this is due shall form part of the licensee's revenue requirement. (Policy Position 38 - paraphrased).

⇒ **Public lighting**. Public lighting (and related uses such as traffic lights) are consumers of electricity and not part of the electricity supply system. The costs are to funded by the owner of these assets (the municipality in most cases). (Policy Position 39 - paraphrased).

⇒ **Quality of supply (risk of power outages)**. A quality of supply based on the formula of "n-1" is to be provided for all supplies greater than 10 MVA or supplied at any voltage higher than low voltage as set out in NERSA defined grid codes, with charges based on the cost of the standard applied. (Policy position 41: paraphrased)

⇒ **Customer service quality**. NERSA must develop and implement an effective system, which must include compensation to the customer, to ensure quality customer services are provided by distributors. (Policy position 42)

Cross-subsidy policies

⇒ **Cross-subsidy policy**. The application of only specifically approved cross-subsidies, subsidies, levies and surcharges must be instituted in the electricity supply industry to address certain socio-political-environmental needs. Cross subsidies could have a minimal impact on price of electricity to consumers in the productive sector of the economic. (Policy position 44)

⇒ **Transparency**. All levies, subsidies and cross-subsidies shall be made transparent while moving towards cost-reflective and transparent tariffs. Licensees are required to establish and publicise the average level of cross-subsidy between customer categories. (Policy position 45)

⇒ **Funding new connections to the grid (electrification programme)**. National government is to fund, from the national budget, the costs of electrifying new customers in terms of a national electrification policy and programme. Consideration could be given to including the costs of refurbishing and upgrading of networks related to this programme in this funding (Policy position 46 – paraphrased)

⇒ **Past electrification capital debt**. Government funding for the national electrification programme commenced in 2001. Prior to this Eskom and many municipalities funded this from their own sources. Eskom and some municipalities continue to fund new connections that could be considered to be part of the national electrification programme. The Policy notes that this debt is significant. Various ways to address this situation have been proposed. The Policy puts forward the following policy position: "The capital costs incurred by distributors over and above those funded by State funds to affect electrification must be ring-fenced and a mechanism found to address this in a transparent way before and after restructuring, preferably by licensee." (Policy position 47)

⇒ **Lifeline tariff components**. "Qualifying customers shall be subsidised through the application of a life-line tariff: a single energy rate; with no fixed charge; limited in capacity to 20 Amps; and a nominal connection fee" (Policy position 48).

⇒ **Lifeline tariff level**. The level of the life-line tariff could be set at a rate that will breakeven with the cost reflective tariff of the licensee for a 20 Amp supply at a recommended consumption level of 350 kWh per month. (Policy position 49)

⇒ **Free Basic Electricity allocation**. The Policy notes that "FBE is proceeding well and is reaching the target market, but there are certain application problems that need to be continually monitored to ensure that they are applied correctly and are addressing the needs of low income households". The policy position is stated as: "where municipalities wish to apply Free Basic Electricity in excess of the amount provided for by the equitable share to more customers or for more kWhs, such amount shall be funded by municipal revenue and not from electricity income." (Policy Position 51)

⇒ **Funding for the life-line subsidy**. The shortfall in revenue between the life-line tariff and the cost of supply after deducting the electrification grant shall be addressed within the distributor. The impact of the cross-subsidy must be pooled over all customers in the licensee, not only domestic customers and could be shown transparenty as a c/kWh levy on consumption. (Policy Position 50)

⇒ **Tariffs on farms**. This is included here because at present there is a significant subsidy enjoyed by this category of user. The policy position suggests that, for pragmatic reasons, this subsidy must be sustained for the time being and converted to a regional (RED) level or national levy over time. (Policy position 52: paraphrased)

⇒ **Municipal surcharge on electricity**. Under no circumstances shall the new MSOE be introduced in addition to the current non-transparent / un-ringfenced surpluses. NERSA shall regulate the electricity prices excluding the transparent MSOE. (Policy position 54)

⇒ **Viability assistance**. The State, as owner of public entities, must consider forfeiting dividend payments, making equity contributions and/or offering guarantees, if needed to assist electricity utilities in maintaining appropriate gearing ratios and business indicators while incurring capital expenditure for the expansion and refurbishment of existing network where appropriate increases in the tariff are not sufficient. (Policy position 55)

Demand-side management policies

The Policy paper notes that domestic demand contributes more than 35% to peak demand (that is, this sector contributes significantly to the total system cost) and presents very significant demand side management and energy efficiency opportunities, and that, so far, not much has been done to date to realise these opportunities. Factors contributing to these are subsidised rates, tariffs lot linked to capacity limits, almost no tariffs with a time-of-use price signal, no emergency pricing signal and very high levels of non-payment and theft.

⇒ **Time of use tariffs with smart meters**. Sophisticated time of use tariffs with dynamic emergency price signals, DSM and load management features with support of smart meters on an integrated basis must be planned for rapid implementation where economically viable and practical. Mechanisms for special funding for this purpose need to be made by DOE. (Policy position 58)

The role of NERSA in terms of the Elecricity Pricing Policy

The role of the Department of Energy is to determine the policy for electricity pricing. It is NERSA's role to establish the rules, regulations, plans, programmes and projects in relation to how the policy is implemented in practice.

In terms of the Electricity Regulation Act of 2006, and within the context of the implementation of the Electricity Pricing Policy, NERSA is required to give attention to the following:

⇒ Issuing of licensing, including a system for appeals and public hearings (licenses need to stipulate how tariff approvals with work)

⇒ Set timeframes for implementation, where these are not already specified.

⇒ Develop and publish a multi year price path for Eskom and other publicly owned distribution entities (REDs when formed) – setting average price levels for Eskom and REDs.

⇒ Develop a national set of retail tariff structures.

⇒ Approve municipal tariff structures in terms of this nationally defined set.

⇒ Oversee the implementation of time-of-use and seasonal tariffs.

⇒ NERSA must drive a plan to the phased increase in tariffs at lower voltages and decrease in tariffs at higher voltages.

⇒ Develop an asset valuation methodology for the REDs and for municipal distributors.

⇒ Oversee the ring-fencing of electricity distribution activities in municipalities.

⇒ Approve municipal tariff levels by municipality for each of the approved tariff structures, based of cost-of-supply studies undertaken by or on behalf of municipalities, supplemented by bench-marking studies. Until these are done, regulation of tariff levels can only be approximate.

⇒ Regulate the implementation of Free Basic Electricity.

⇒ Develop standards as and when appropriate. For example, NERSA must develop acceptable standards for non-technical losses and provisions for bad debt.

⇒ NERSA must develop and implement an effective system, which must include compensation to the customer, to ensure quality customer services are provided by distributors.

⇒ Monitor and regulate adherence to standards (for example, grid code quality of supply standards).

⇒ Define regulatory processes in more detail, with timeframes, consultation, appeals, etc, as provided for in the National Electricity Regulation Act.

The responsibilities of distributors in term of the Electricity Pricing Policy

⇒ Ring-fence electricity distribution and retail activities (from other activities within Eskom and in municipalities).

⇒ Undertake cost of supply studies.

⇒ Reform tariff structures to conform to the national set of tariff structures as defined by NERSA which are aligned to the national Electricity Pricing Policy

⇒ Set cost-reflective tariffs and implement life-line tariffs and Free Basic Electricity as per the national policy.

How does policy compare to international best practice?

Overall, the Electricity Pricing Policy provides a sound basis for the development and implementation of cost-reflective electricity tariffs with the appropriate targeting of subsidies to poor households using modest amounts of electricity.

There are various aspects of the policy that need clarification and/or amendments (see text box above).

Key challenges related to implementation of the policy

The key challenges lie in:

⇒ Clear communication of the policies, their overall intent and their soundness

⇒ The translation of these policies into effective practice, that is, the proper and effective implementation of these policies.

⇒ Effective economic regulation of municipalities.

Free Basic Electricity

The Electricity Basic Services Support Tariff (Free Basic Electricity) Policy was adopted by government in 2003.

The key policy provisions are set out below (in full, where necessary) because of the importance of this policy to an approach to mitigate the impact of steep electricity price increases on poor households.

⇒ **The amount**: "Grid connected households will be provided with 50 kWh of Free Basic Electricity funded mainly through the relevant inter-governmental transfers, subject to the contractual obligations between the service provider and the consumer being met. Any consumption in excess of the set limit will be payable by the consumer."

⇒ **The intention** of the free basic allocation is to provide for lighting, media access and limited ironing and water heating.

⇒ **Eligibility**: "The provision of Free Basic Electricity shall be limited to existing *qualifying households*, legally connected to both grid and non-grid electricity systems, and those qualifying through the national electrification programme."

⇒ **Non-grid**: "Consumers connected to non-grid systems, installed through the national electrification programme will receive a subsidy of up to 80% (or R48 per month per connection in 2002 Rands) of the monthly service fee to provide access to non-grid systems, subject to the contractual conditions between the service provider and the consumer being met."

⇒ **Self-targeting**: "The recipients of Free Basic Electricity allocation shall be those households that either apply to their service providers for a current-limited supply of 10A, or who apply to be charged a special non-current-limiting tariff that provides the Free Basic Electricity allocation. The choice of method for self-targetting is left to the service authority and the respective providers.

⇒ **Funding**: The free basic allocation is to be funded from the equitable share. (paraphrased).

Principles and restrictions

⇒ The free basic allocation is to be made available to all qualifying households that meet the requirements of self-targeting. Where more than one household is bulk metered, the service providers will need to take this into account in allocating the free basic service.

⇒ Normal municipal connection fees levied by the distributor will be applied to all new electricity services.

⇒ Basic or fixed monthly charges (if applicable) will only become effective when monthly consumption exceeds the free allocation.

⇒ No carry over of allocation from one month to the next.

⇒ Implementation to be as simple as possible to avoid cost system and hardware upgrades.

⇒ No free allocation is disconnected for non-payment until all outstanding obligations settled.

⇒ No direct cash transfers to consumers.

⇒ Only for authorised connections.

⇒ These principles are an integral part of the policy.