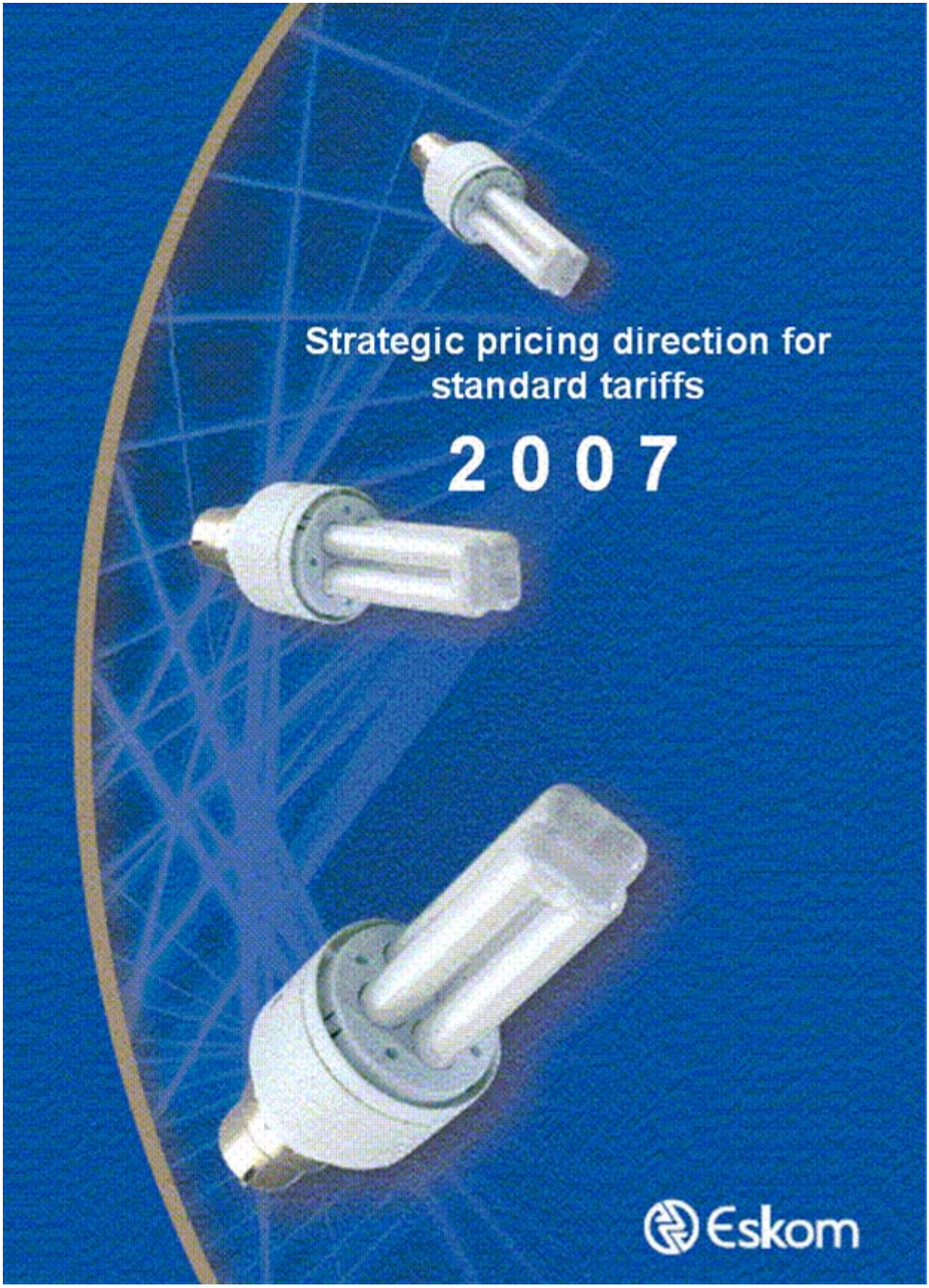
Strategic pricing direction for
standard tariffs
2007
Eskom

Contents .....Page No.

STRATEGIC PRICING DIRECTION FOR ESKOM'S STANDARD TARIFFS

Executive summary

This document sets out Eskom's strategic direction for standard electricity tariff structures over the next few years, in order to provide stakeholders with a clear view of Eskom's goals for tariff structures. This document is a continuation of the previous 1999 Strategic Pricing Direction. The previous strategic direction proposed:

1. The introduction of network (or "wires") charges
2. The retention for some tariffs of a demand charge to recover some of the energy costs.
3. The pooling of capital costs associated with making supplies available to customers.
4. The discontinuing of the consumption-based rebate on monthly rentals.
5. The discontinuing of the reactive energy charges (kvarh) for the TOU tariffs.
6. Differentiating of basic charges (or monthly per customer charges) on 4 customer size classes.
7. The alignment of the TOU time zones and seasons with the Wholesale Electricity Tariff.
8. The merging of Standardrate tariff with the Nightsave tariff.

As all of the above were implemented by 2005, a new strategic pricing direction is required. This new strategic pricing direction is aligned with Eskom's vision of "Together building the powerbase for sustainable growth and development" and takes into account customer needs, international practices and the changing business environment. Eskom's strategic objectives for tariffs are now formulated as:

- **Economic efficiency and sustainability**: tariffs will contain cost-reflective signals that promote economic efficiency and sustainability.
- **Revenue recovery**: tariff structures will not expose Eskom to unacceptable revenue risk and will provide a means of recovering adequate revenue to ensure reliability of supply.
- **Fairness and equity**: tariffs will be designed to be as non-discriminatory as possible by taking into account the needs of all customers on a fair and equitable basis.

The goals given to achieve the above objectives are as follows:

Economic efficiency and sustainability

- Tariff structures will reflect cost drivers, risk and the customer's ability to respond and understand.
- Standard retail tariffs will reflect the underlying network tariff.
  - For larger customers the underlying Transmission tariff structure will be reflected in the retail tariff charges. For smaller customers this cost will be averaged in the tariff rates.
  - There will be a Distribution Network Levy (DNL) applicable to direct Transmission-connected customers to ensure a fair and equitable contribution to subsidies.
  - Network charges will be differentiated on the basis of voltage and urban/rural differentiation for Distribution costs and for larger customers as per the Transmission tariff structure differentiation for Transmission costs.
  - Network charges will be recovered partly through a fixed R/kVA annual based charge and partly through a variable R/kVA monthly based charge or c/kWh based charge.
  - Eskom tariffs will continue to provide a cost signal for the impact that capacity required and utilised has on the network.
- Where practical Eskom tariffs will contain both a load shifting (energy) and load reduction (capacity) signal.

  - Where appropriate customers will be offered a choice of a TOU tariff that reflects the wholesale purchase tariff structure.
  - For lower consumption customers in the absence of a TOU tariff, energy based charges should contain rates that provide economic signals for usage and capacity.
  - Eskom' will offer tariff structures that give mutual benefit to the business and to customers
  - Eskom will not offer fixed energy rate tariff structures to higher consumption customers.
  - Eskom will offer tariffs combined with enabling technologies/products to promote energy efficiency.
- Energy losses will be recovered using unbundled Transmission and Distribution loss factors based on the voltage of the supply and the geographic location.

Revenue recovery

- Tariffs will be designed to not expose the business or customers to undue revenue risk.
- Tariffs will recover adequate revenue to ensure reliability of supply.
- Eskom tariffs will be structured to ensure a fair and economic balance between fixed and variable charges so as to provide benefit to the business and the customer.
- The NMD rules will be updated from time to time, taking into account needs and risks of customers and the business.
- Eskom will minimise the underlying cause of windfall benefits gained by customers from conversion between tariffs, such as the reduction of the differences in the rate rebalancing levy between tariffs.
- Eskom will offer an optimal choice of tariffs.
- The potential for customer to be able to respond to a pricing signal will be taken into account when designing tariffs.

Equity and fairness

- Eskom will rationalise and remove inequities between similar tariff categories.
- Bills will be simplified by publishing only rates inclusive of all factors applicable to the tariff component on the bill.
  - For larger customers, energy charges will be shown in a matrix of rates differentiated by TOU period and season, voltage and transmission zone
  - For larger customers, network charges will be shown in a matrix of rates differentiated by voltage and transmission zone.
  - For smaller customers (LV), network charges where applicable will be nationally averaged.
- Any reduction in subsidies will only be done considering the full economic impact and under the guidance of national policy.
- The voltage level differentiation between the highest and the lowest voltage categories will be increased to a level that is more cost-reflective, yet not impact the lower voltage supplies on average by any significant percentage.

Eskom believes the principles and goals set out in this document will send out the correct pricing signals for a viable electricity industry, providing a sound and justifiable foundation for electricity tariffs. These principles should be adopted irrespective of the structure of the electricity supply industry, to ensure fair and equitable treatment of all electricity consumers in South Africa.

1 THE PURPOSE OF THIS DOCUMENT

In 1999 Eskom developed its strategic pricing direction, wherein specific goals were set for Eskom's standard tariffs. By 2005 most of these had been completed (see Appendix A).

The purpose of this document is to set out the new strategic direction, objectives and goals to be achieved to guide the design of Eskom's standard retail tariff structures over the next few years. (The standard tariffs are those published in Eskom's schedule of standard prices as approved by the National Energy Regulator of South Africa (NERSA).)

This document does not set out the specific changes to be made to each tariff, as this will be addressed in the Retail Tariff Restructuring Plans. The pace for achieving the objectives and goals contained in this document will depend on inputs from all stakeholders.

This strategic direction looks at the standard retail tariff structures only and not at the overall price level, which is determined through the multi year price determination (MYPD) process. Tariff structural changes are done on a revenue neutral basis; i.e. the sum of all tariffs and their components must equal the revenue requirement. Structural changes could, however, impact on the average price for individual tariffs or individual customers within a tariff.

2 INTRODUCTION

This document sets out Eskom's strategic direction for electricity tariff structures over the next few years, in order to provide stakeholders with a clear view of Eskom's goals for tariff structures.

Tariffs are the means of recovering the utility's revenue and therefore they need to be structured to recover this revenue adequately, both in the level of the tariff and in the combination of different charging parameters that will recover the revenue. Goods need to be priced at the level that provides the optimal economic use of the goods. If prices are set too high above the value of the goods, the result will be an unwillingness to use the goods or an inability to afford the goods. Yet pricing goods too low creates wastage and is an uneconomic use of the goods.

One of the main drivers for changing Eskom's tariffs is the need for cost reflectivity, both as regards the level of the tariff and the structure: the chargeable components that make up the tariff must reflect the nature of the costs. This improves efficiencies and results in a fairer recovery of costs.

Eskom is still a vertically integrated generation, transmission and distribution business. Before 2001 Eskom's tariffs bundled the cost of these three separate businesses. The bundled tariffs gave no indication of the different costs associated with each separate part of the business, nor of the different cost drivers within each business.

In order to design tariffs based on unbundled costs, these costs need to be identified, ring-fenced and allocated, using justifiable segmentation in a cost-of-supply study. Eskom is able to do this, as the Eskom divisions are ring-fenced and regulated separately by the National Electricity Regulator of South Africa (NERSA) on this basis. Further to the ring-fencing of the Eskom divisions, it is important that costs should be allocated appropriately into justifiable cost categories, as all costs do not have the same cost driver. Eskom used NRS 058 as the framework for its cost-of-supply studies, but has expanded its models to allow for more sophisticated allocation of costs.

Cost-reflective tariff design therefore flows from a properly segmented cost-of-supply study. Once the costs are understood and allocated, they can be re-aggregated into categories driven by the same cost driver. Thereafter, tariffs can be designed and scaled to take into account stakeholder needs and to ensure revenue neutrality (i.e. the sum of all the tariff components cannot be more than the NERSA approved revenue requirement). There is, however, no standard formula that can be used to design a tariff. Many factors must be taken into account in determining a suitable tariff, such as:

- Current price and impact on customers
- Business risk
- Affordability
- National policy and regulation
- Implementation practicality
- Simplicity for customers
- International best practices applicable to South African circumstances

It is impossible to satisfy all these factors equally, but it is important to have a framework that guides the development of tariffs.

3 BALANCING OF STAKEHOLDER NEEDS AND DRIVERS FOR CHANGE

There are different stakeholders whose needs provide the drivers for tariff changes and must therefore be considered in determining tariffs. These stakeholders are the government, the business needs and the customers. The biggest challenge is to balance the needs of one stakeholder against the needs of another stakeholder and still achieve the pricing objectives.

3.1 NATIONAL POLICY

National needs are guided by national policy and the NERSA. This includes legislation, codes and guidelines on tariffs that form the foundation within which tariffs are designed.

Government provides direction as contained in the White Paper on Energy Policy. The NERSA provides guidance through guidelines and codes. The guidelines provided and therefore the objectives or drivers for change regarding tariffs at a high level are:

- Tariffs that strike an appropriate balance between satisfying equity, economic growth and environmental goals
- A price level that ensures financial sustainability for electric utilities; the price level to be determined by revenue requirement and tariff structure by the utility's structure of costs
- Price signals that result in economically optimal investments in electricity through cost-based electricity tariffs
- Encouragement of energy prices that are as cost reflective as possible
- Following a cost-of-supply approach to non-domestic tariffs
- Regulation of domestic electricity tariffs by the Regulator in order to rationalise the large variety of tariffs available in South Africa and ensure that there are affordable prices for households and affordable energy services for disadvantaged households, small businesses, small farms and community services
- A suite of supply options and progressive capacity differentiated tariffs and connection fees available to domestic customers

- Promotion of energy efficiency through time-of-use tariffs and demand side management programmes
- Subsidies that are transparent to the public and that depend upon agreed criteria
- Tariffs that are non-discriminatory

3.2 ESKOM'S BUSINESS NEEDS

Eskom's business needs are guided by the shareholder, regulatory rules and the requirements of good corporate governance. A fundamental principle in designing tariff structures is that Eskom should not incur unacceptable business risk as determined by the Eskom Board, and that these tariff structures should promote the sustainability and viability of the business as well as the electricity industry.

In the past, changes to tariff structures were always tested against the following pricing objectives to ensure a balanced approach that satisfied the Eskom business requirements:

- Tariffs should provide the means to recover adequate revenue to ensure that the business remains profitable and customers can receive a reliable and an acceptable level of service.
- Tariffs should promote overall economic efficiency – electricity should be priced in a way that encourages the sustainable, efficient and effective usage of electricity.
- Tariffs should be fair, equitable and transparent – where cross-subsidies exist between customers they should be justifiable and explicit.
- Tariff rates should accurately reflect the cost of supplying different customer categories and, where prudent, tariff structures should reflect the nature of costs – hence the requirement that the cost of separate businesses should be reflected in the value chain of one product.
- There should be stability in tariffs in order to facilitate customer choices.
- There should be a suite of tariffs to give customers a choice of the most affordable tariffs based on usage patterns that satisfy customer needs.

3.3 CUSTOMER NEEDS

Success in pricing optimally comes from an understanding of how customers evaluate your pricing decisions, since the customer's response to those decisions will ultimately determine their success or failure. The customers' goal is to obtain the best value for their money. For commodities such as electricity, that often means purchasing electricity as cheaply as possible. It is therefore important for individual customer needs to be fairly balanced against the needs of all customers. As Eskom does not serve only one customer category, Eskom must, to the best of its ability, design tariff structures that address the interests of all customers.

It is important to understand customer needs and the impact of proposed changes on the customer. The following have been identified by customers as important factors and need to be considered among the drivers for change:

- Non-cost-reflective tariffs, surcharges and subsidies
- Charging on a time-of-use basis
- The conversion surcharge payable when converting from non time-of-use (TOU) tariffs to TOU tariffs
- The appropriateness of the current voltage categories
- Fixed charges due to operation of their businesses
- The notice period and penalties in the notification of demand rules

- The need for more tariff options.

Based on all these factors, this document proposes Eskom's new strategic pricing objectives.

4 ESKOM'S STRATEGIC PRICING OBJECTIVES

Having taken all of the above needs and drivers for change into consideration, and in order to focus the strategy for tariff design and align it with Eskom's vision of "Together building the powerbase for sustainable growth and development", Eskom's strategic objectives for tariffs are formulated as:

- **Economic efficiency and sustainability**: tariffs will contain cost-reflective signals that promote economic efficiency and sustainability.
- **Revenue recovery**: tariff structures will not expose Eskom to unacceptable revenue risk.
- **Fairness and equity**: tariffs will be designed to be as non-discriminatory as possible by taking into account the needs of all customers on a fair and equitable basis.

These objectives will be achieved by setting principles and goals for electricity tariff structures over the medium term linked to the MYPD process.

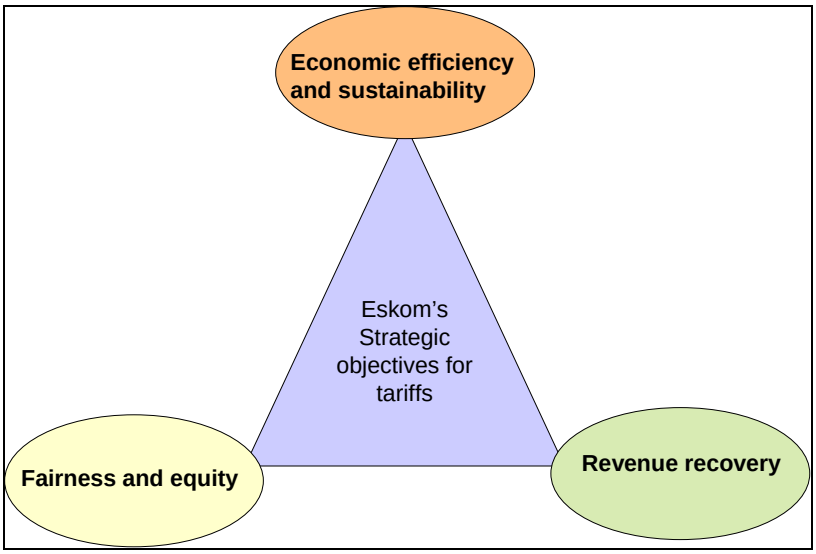

Figure 1 - Eskom's strategic objectives for tariffs

5 PRINCIPLES AND GOALS FOR TARIFF DESIGN

Once strategic objectives are set, it is important to set strategic goals, which are more concrete and apply to activities. Based on the above strategic objectives, the following principles and goals were determined to set Eskom's strategic direction for tariff design.

[The process followed by Eskom from cost allocation to tariff design does not form part of this document, but is set out in the document *Eskom's tariff design methodology*.]

Note: In this document the principle is stated first (in the framed text) and if the principle has not yet been achieved, the goal towards achieving this principle is set out thereafter. Time lines and actions towards achieving the goals will be set out in the retail tariff restructuring plans.

5.1 ECONOMIC EFFICIENCY AND SUSTAINABILITY

Tariffs will reflect the economic value of resources in order to ensure economic efficiency and welfare – as regards both structure and level.

To ensure greater economic efficiency and welfare in the electricity industry, tariffs and their pricing signals must reflect the economic value of the service provided, while considering how the resources providing this service are equitably allocated within the community. In order to achieve economic efficiency, prices and tariff structures should be based on current cost drivers, but must consider the sustainability of the business by taking into account long-range marginal costs. Tariffs, in both structure and level need to minimise the risk to the business and consider the customer's ability to respond to any pricing signals. Tariff structures should contain pricing signals that persuade customers to optimise their use of Eskom's resources as much as possible. In the current environment of no surplus generating capacity and network constraints, economic efficiency is of particular importance as a pricing strategy. Tariffs now, more than ever, need to ensure that the correct signals are sent to customers reflecting the cost of energy and capacity on a daily basis.

Economic efficiency in tariffs will be achieved through a number of strategic goals and pricing strategies as follows.

Goal 1

Tariff structures will reflect cost drivers, risk and the customer's ability to respond and understand.

Although this reflects the overall strategic goal, it is not possible to implement fully cost-reflective tariff structures for all tariffs, owing to customer needs and/or practicality issues such as metering constraints.

5.1.1 Unbundling energy, network and service costs

Eskom tariffs will be unbundled to reflect energy, network and service costs.

In order to be cost reflective and provide economically efficient signals to use electricity effectively, electricity tariff structures and levels should reflect separately the costs of energy, network and the service provided and the nature of each of these various costs. Unbundling the costs to reflect their nature assists in determining the proper chargeable parameters (components) in the tariff structures, for instance energy costs recovered through c/kWh charges and network costs recovered by R/kVA charges

5.1.2 Unbundling network costs

Network charges need to reflect the underlying network tariff; that is, the DUoS (Distribution Use of System) and TUoS (Transmission Use of System) charges payable by the customer.
Network charge = DUoS + TUoS

Network costs refer to costs associated with investments into and the maintenance and operation of the total network business.

Goal 2

Standard retail tariffs will reflect the underlying network tariff.

5.1.2.1 Transmission Charges (TUoS)

Transmission costs are recovered by means of transmission use of system (TUoS) network and ancillary service charges. These charges are regulated through an approved structure. In order to minimise risk and to provide the correct economic signals provided in the TUoS structure, retail tariffs should reflect the structure of TUoS. This will enable customers to identify the contribution of the transmission charges to their overall use of network costs.

This is, however, not practical for smaller customers because of the complexity and administration required, so the costs will be allocated and averaged within the customer category.

Goal 3

For larger customers the underlying of TUoS network and ancillary service charges structure will be reflected in retail tariffs. For smaller customers this cost will be averaged in the tariff rates.

5.1.2.2 Distribution network charges

Networks costs for a customer comprise the Distribution network costs plus the Transmission network costs. Where network costs are recovered through an unbundled cost-reflective tariff they are referred to as Distribution use of system charges (DUoS), which include the Transmission use of system charges (TUoS). The closer the network charge is to the DUoS charge, the more cost-reflective the network charge is. All tariffs currently contain both components, but bundled.

5.1.2.3 Distribution network levy

As per the NERSA decision and the Grid Code, in order to ensure that all Eskom electricity consumers in South Africa make a fair contribution to socio-economic and low-voltage subsidies, customers connected directly to Transmission as defined by the NERSA will continue to be charged a network charge that includes Distribution costs called the Distribution Network Levy (DNL).

Goal 4

There will be a DNL applicable to direct Transmission-connected customers to ensure a fair and equitable contribution to subsidies.

5.1.3 Voltage and location categorisation

Network costs are dependent on a number of factors. In order to simplify tariffs, network charges are categorised according to justifiable common shared characteristics such as:

- The voltage of the supply
- The location of the supply

The voltage of the supply is related mainly to distribution costs and the location of the supply is related to the transmission zonal price and whether a customer is urban or rural.

In order not to have a multitude of different network charges based on each voltage level, networks are pooled into voltage categories. No change is proposed to the voltage *categories.* They remain as follows:

Table 1 – Voltage categories

EHV (Extra high voltage)	>132 kV
HV (High voltage)	≥ 66 and ≤ 132 kV
MV (Medium voltage)	> 500 and < 66 kV
LV (Low voltage)	≤ 500 V

The distribution network charges will differ on the basis of the differences in cost between urban and rural networks.

The transmission network charges for larger customers will be based on the NERSA approved zonal differences in the tariff. To avoid administrative complexities, it is not proposed to differentiate smaller customers on a geographic basis; their transmission-related costs will be averaged.

Goal 5

Network charges will be differentiated on the basis of voltage and urban/rural differentiation for Distribution costs and for larger customers as per the Transmission charges differentiation for Transmission costs.

5.1.4 Balancing the recovery of variable energy costs and fixed network costs

A portion of network costs will be recovered through a variable charge; depending on the type of customer this charge may be c/kWh based or a R/kVA demand charge. Where appropriate, these charges should also contain a DSM signal promoting off-peak usage.

And

A portion of the network costs will be recovered through a fixed charge that reflects the annual cost of providing the capacity reserved by the customer on the network. This annual fixed charge will provide a continuous pricing signal to manage demand in all time periods and in all seasons.

The above principles have been achieved to a large extent and only need to be refined. In developing the strategy with regard to fixed versus variable cost, it is realised that the pricing signal needs to support both the energy and network pricing signals. Even though energy costs have both a fixed and

variable component, they are charged on a variable basis by Eskom Generation. While there might be a correlation between the TOU energy periods and network use, this is not always true.

Network costs are in the short term largely fixed, i.e. not significantly dependent on usage, but rather on the capacity required. As network costs are largely fixed in the short term, if they are recovered through a variable charge there is risk of over- or under-recovery if the actual volume is different from the forecast volume.

From a Distribution perspective it is logical to recover as much of the fixed costs as possible through a fixed charge to ensure that there is no volume risk. However, it is recognised that such a strategy is not always the correct approach to take.

Table 2 – Comparing the benefits of fixed cost recovery of network charges versus variable cost recovery

Reason for variable network cost recovery	Reasons for fixed network cost recovery
Customer resistance Customers prefer to pay based on usage and do not favour high fixed charges.	**Fairness** Customers should always make a fair contribution to their network requirements regardless of consumption, as the network is always available to provide the potential use of capacity.
Punitive High fixed charges are punitive to low load factor customers, leading to large impacts on the structural changes, which are not favoured by the NERSA	**Reduces inter tariff subsidies** The network costs should not be recovered from variable charges that are not related to specific network requirements. By charging for network costs on a more variable basis, customers with high load factors will subsidise customers with low load factors.
Usage can impact on cost It can be argued from an economic point of view that Distribution costs are not fixed in the longer run: distribution costs will vary over time depending on the energy to be delivered, the number of customers and the demand required. Increased energy usage does impact on the long-run distribution costs, and if all distribution costs are recovered through a fixed charge this provides a signal that usage does not impact on the distribution network costs, which is not true.	**Revenue requirement** If all costs are recovered through variable charges the network business is exposed to volume risk.
Increases the DSM signal If tariffs recover all fixed costs through a fixed charge and only variable costs through a variable energy charge, the TOU signal is weakened.	**Strengthens the load reduction signal** If costs are recovered on a fixed basis, customers will try to manage demand to reduce their fixed charges.

It is recognised therefore that there may be a conflict between the signals required to recover energy and network costs and therefore an acceptable and economic balance between the two needs to be achieved, which may differ depending on the tariff and the customer being served.

Goal 6

Network charges will be recovered partly through a fixed R/kVA annual based charge and partly through a variable R/kVA monthly based charge or c/kWh based charge.

5.1.5 Demand side management

Eskom tariffs will contain both a load shifting (energy) and load reduction (capacity) signal.

Demand side management is the management of the way a customer uses electricity through programmes that motivate change in the amount of electricity used and/or the time electricity is used. Electricity tariffs can be used as demand side management (DSM) strategy to provide both a time-of-use signal (aimed at load shifting) and a capacity signal (aimed at load reduction). Energy charges need to reflect the time variation in marginal costs, while network charges need to reflect the impact that the demand has on the network.

While it is not practical to provide full DSM signals in the case of all tariffs, all of Eskom's tariffs do contain a signal that reflects the capacity required.

Goal 7

Where practical, Eskom tariffs will contain both a load shifting (energy) and load reduction (capacity) signal.

5.1.5.1 Time variation in energy costs

Retail energy charges will reflect the wholesale purchase tariff structure.

The purchase of energy is done through a tariff regulated both in rate and structure. This tariff is time-of-use (TOU) based and reflects daily differentiation in price as well as seasonal differentiation. TOU tariffs do not reflect the actual cost of generation in each time period as a real-time pricing signal would, but contain pricing signals that are based on marginal energy costs in the different time periods and seasons. This is done to provide incentives to customers to reduce consumption in expensive daily and seasonal generation periods.

The retail tariffs will pass through the energy costs and mirror the wholesale purchase tariff in structure.

For all supplies $\geq$ 100 kVA, this principle is well-established in Eskom's tariffs. Eskom will, however, ensure that, where appropriate, customers will have a choice of a TOU tariff.

Goal 8

Where appropriate customers will be offered a choice of a TOU tariff that reflects the wholesale purchase tariff structure.

5.1.5.1.1 Lower-consumption customers

For lower consumption customers where demand and/or TOU tariffs are not practical, tariffs may be based on more volumetric charges.

Where the consumption is low (such as in electrification), there is limited potential for customers to respond to a price signal, i.e. to shift load or reduce load, even though these customers may have a significant impact on the Eskom peak demand. To ensure that neither Eskom nor the customer is exposed to unacceptable risk, the pricing signal must limit the impact smaller customers would have on the peak demand. This can be done by rates differentiated by supply size, where the higher supply sizes pay a higher rate. This principle is contained in all of Eskom's tariffs for supplies $\leq$ 100 kVA.

- For smaller, lower-consumption supplies, high fixed charges are generally unacceptable and perceived to be unaffordable. There are also unintended consequences resulting from high fixed charges i.e.
    - Where fixed charges fully recover network costs, the energy charge is generally low.
    - The marginal cost to the customer of using more electricity is also therefore low.
    - This could incentivise wastage, as the signal for usage is significantly reduced.

In the absence of a TOU tariff, energy based charges should be set at a level that provides the correct economic signal for usage, while still retaining an appropriate capacity-related charge.

Goal 9

For lower consumption customers in the absence of a TOU tariff, energy based charges should contain rates that provide economic signals for usage and capacity.

5.1.5.1.2 Higher-consumption customers

Eskom will not offer non time-of-use based standard tariffs for higher consumption customers.

AND

Customers will retain the option to negotiate special pricing agreements giving a mutual benefit to Eskom and the general customer and the customer entering into the agreement.

It is accepted that higher load factor and higher consumption customers would prefer a single energy rate tariff, as their load profile is generally flat, with limited ability to shift load.

Single energy rate tariffs are not favoured for the following reasons:

- In contrast to the situation with lower-consumption customers, variable network charges recovering fixed network costs expose the utility to the maximum risk if there is a reduction in volume.
- From an energy perspective, single energy rate charges that do not reflect the purchase tariff add risk if profile changes occur, for instance if more consumption occurs in peak periods than forecast – especially if offered as a standard tariff.
- Where there is an alternative choice of tariff, then this risk is passed back to Eskom as a tariff conversion risk: only customers that would pay less on the variable rate would convert, resulting in a revenue loss.

- The customer is exposed to risk as the standard tariff is based on an *average* customer. Customers that use more than the average would pay more on a single energy rate than the cost, while customers that use less than the break-even would pay less than the cost, as shown in Figure 3. This penalises customers that have increasing consumption, as the average price does not reduce as it would with a tariff structure with fixed and variable components.

Therefore customers with good load factors will benefit from tariffs that combine fixed and variable charges, because the marginal cost of usage reduces as consumption increases. The following figure shows the features of a single energy rate tariff.

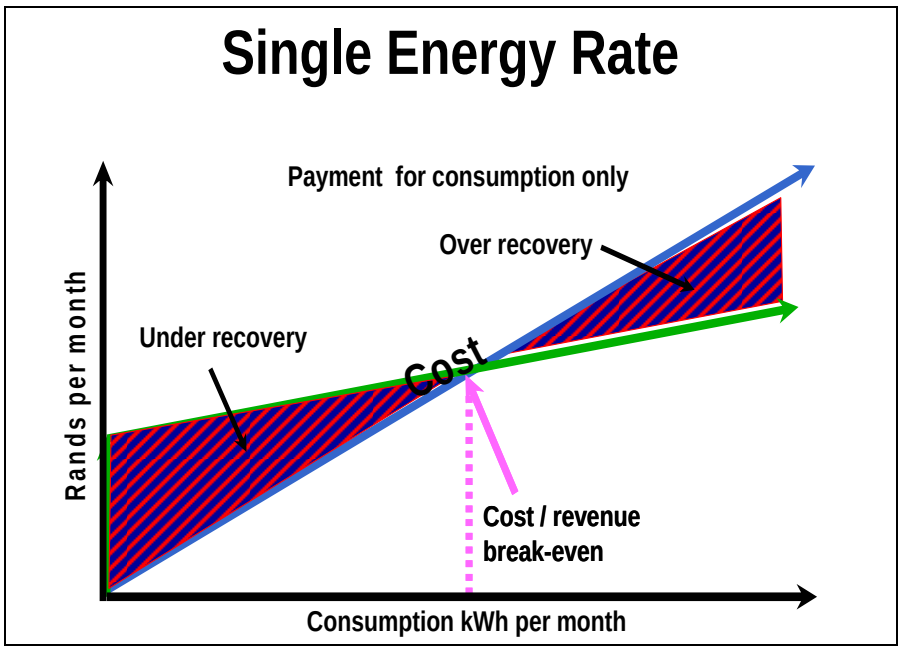

Figure 2 - Features of a single energy rate tariff

If this tariff structure were offered on a per customer basis, i.e. not through a standard tariff but through a customised rate for a specific customer, using the standard rate and a forecast demand and consumption, such a flat rate could be considered if the volume and profile risk could be properly mitigated or shared.

Where Eskom and the customer can mutually benefit through special pricing agreements, deviation from the standard retail tariffs can be considered. This will occur when Eskom is prepared to offer a non-standard tariff structure and where the customer is prepared to offer an equivalent benefit, such as interruptibility. Such agreements will be specific to the customer and will not place any risk on Eskom and the general customer base.

Goal 10

Eskom will offer tariff structures that give mutual benefit to the business and to customers

5.1.5.2 Goals for optimising energy costs through pricing products

Pricing products could be offered to customers to further promote the efficient use of energy. These products would typically be:

- **Curtailable and interruptible rates** – where customer are paid to reduce consumption in critical periods
- **Critical peak pricing (CPP) tariffs** – TOU tariffs with certain periods of very high prices during times where the system reliability is threatened
- **Real-time pricing products** – in which rates are given ahead of time (usually hourly or daily)

It was found in various pilot projects around the world on demand response programmes that pricing products, especially when combined with enabling technologies, can produce much larger reductions in peak demand than traditional TOU or non-technology enabled CPP rates (source: *Primer on Demand-Side Management*, produced for the World Bank by Charles River Associates.).

Goal 11

Eskom will offer tariffs combined with enabling technologies/products to promote energy efficiency.

5.2.1 Customer's ability to respond to the price signal

Tariffs will take into account the customer's ability to respond to a price signal

The extent to which economic signals can be fully implemented depends on the customer that is being served, i.e. the practicality of implementation and the customer's ability to respond to the pricing signal. Any tariff or pricing intervention introduced on its own to promote efficiency will fail if it does not take the customer's perspective into account.

A pricing signal might have to be complex to provide theoretically economically efficient behaviour, but if in practice it cannot be measured because the cost of metering is not financially viable, such a pricing signal does not achieve its purpose.

Moreover, if a customer cannot respond to the pricing signal, the pricing signal does not achieve its purpose. This typically happens where the customer's usage is very low and therefore the customer has no ability to shift or reduce load, or the customer has a fixed consumption of energy every day.

Goal 12

The potential for customer response to a pricing signal will be taken into account when designing tariffs.

5.1.5.3 Management of demand

Eskom tariffs will provide a cost signal for the impact that capacity required and utilised has on the network.

Customers have the ability to place demand on the Eskom system at any time. Having TOU tariffs provides a signal that relates to demand that occurs during the peak time, but does not provide a signal relating to continuous management of demand at all times. This may have an impact on the network even during times of system constraints that may be outside of the peak period.

Therefore customers should be provided with a continuous demand side management signal. This can be done by charging for the annual peak capacity or the reserved capacity, which incentivises the customer to manage the load in all time periods.

This principle is already well-established in all of Eskom's tariffs.

Goal 13

Eskom tariffs will continue to provide a cost signal for the impact that capacity required and utilised has on the network.

5.1.6 Goals for recovering retail-related costs.

Retail costs are linked to the type of service a customer receives, which in turn is related to the size of supply.

Eskom has already implemented service and administration charges based on size of supply.

5.1.7 Energy losses

Energy losses will be recovered in as cost-reflective a manner as possible.

Losses will vary according to the voltage of the supply and the distance the supply is from the source. Losses on the transmission system as well as distribution system losses must be recovered through the tariff.

With the unbundling of the distribution and transmission network charges, the losses previously recovered through the surcharges will now be recovered through Transmission and Distribution loss factors.

Loss factors will be applied on energy to recover the cost of losses. The loss factors to determine transmission losses will be set by Eskom Transmission based on the Transmission zones. For Distribution networks, the loss factor will differ and be applied per voltage and rural and urban category.

Goal 14

Energy losses will be recovered using unbundled Transmission and Distribution loss factors based on the voltage of the supply and the geographic location.

The cost of losses will be re-bundled with the energy costs to simplify tariffs. This will be set out in a matrix of costs – refer to 5.3.1.1 for the matrix.

5.2 REVENUE RECOVERY

Eskom's choices in tariff structures will not expose the business or customers to undue revenue risk.

Tariff structure design choices expose Eskom to a higher or lesser degree of revenue risk if the forecasted volumes and profiles are not achieved. Risk could be an under- or over-recovery of revenue. It is unlikely that Eskom would be allowed to hedge or recover any negative revenue risk in the price increase process unless it was significant, and therefore all changes will include a full risk assessment.

If tariff choices are made that result in under-recovery of revenue, this exposes the customer to risk in future years as Eskom will have a shortfall in revenue that needs to be recovered through price increases (if allowed by the NERSA). This risk needs to be mitigated in an acceptable manner that does not disadvantage Eskom or the customer.

Goal 15

Tariffs will be designed to not expose the business or customers to undue revenue risk.

5.2.2 Risk mitigation through tariff structure design

A tariff structure choice exposes either the customer or Eskom to varying amount of risk. A view of the customer risk versus utility risk is demonstrated in the diagram for energy related costs and for network related costs.

This diagram shows that flat energy rates have the least risk for the customer and the most risk for the utility, and vice versa for real-time energy rates. Eskom energy tariffs will be designed to minimise the risk for the business and for the customer.

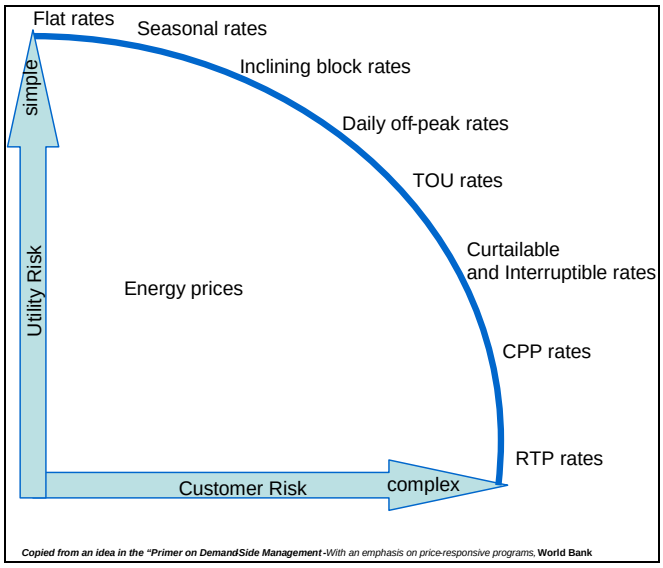

Figure 3- Energy charge tariff structure choice

One of the biggest challenges facing tariff designers is ensuring that pricing signals do not result in long-term negative impact on a business. Pricing structures and levels need to ensure that the price paid reflects the true economic value, but must also provide incentives to further maximise the efficiency of the usage.

It is difficult to look at tariff levels and structures with only a short-term view. In the short term, when a range of tariff options is offered, customers will opt for the tariff structure that gives the maximum benefit.

In the longer term, the challenge is to ensure that pricing signals are updated to accommodate changing circumstances and promote the efficiency of the usage and thereby reduce costs.

The next diagram looks at the risk exposure regarding network charges. Where network charges are recovered totally through the energy rate, this has the most risk for the utility and least risk for the customer, and vice versa if all costs are recovered through a fixed charge. Again, as in the energy tariffs, network tariffs will be designed to minimise the risk and provide benefit to both the business and the customer.

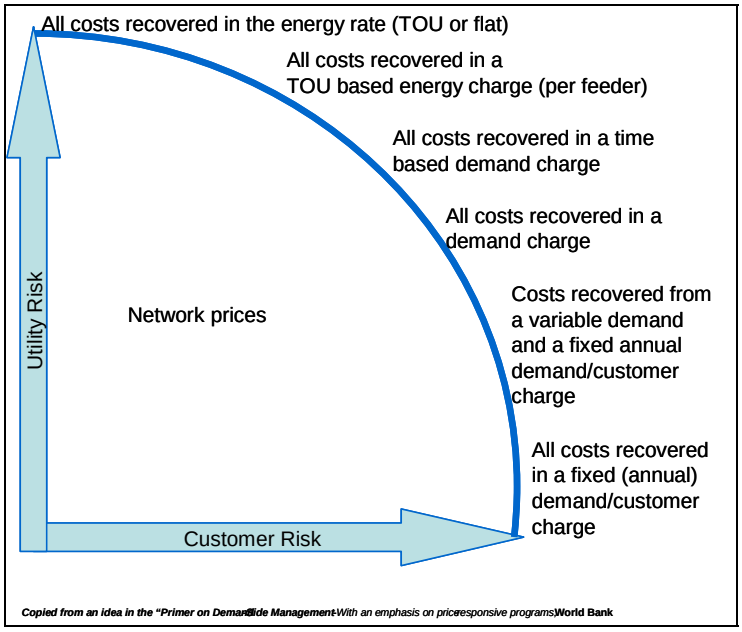

Figure 4- Network tariff structure choice

Refer to the principle in Section 5.1.4 which also addresses this issue. The goal therefore is:

Goal 16

Eskom's tariffs will be structured to ensure a fair and economic balance between fixed and variable charges so as to provide benefit to the business and the customer.

5.2.3 Rules to ensure fair recovery of fixed costs

Eskom will have rules in place to ensure a fair recovery of fixed network costs.

Eskom contracts with its customers to make available the capacity requested based on the notified maximum demand (NMD). In order to provide this capacity, Eskom needs to invest in infrastructure and the requested capacity has to be held in reserve so that Eskom is in a position to satisfy the customers' requirements at all times as contracted for. The purpose of fixed network charges is to recover the cost, over time, of making this capacity available.

Eskom needs to ascertain the capacity required by customers for a 12-month period. Appropriate tariff charges can then be calculated that will recover the costs of providing the requested capacity to customers. Eskom's tariff charges are calculated on an annual basis and are applicable for a 12-month period based on the notified demand. As a customer pays the higher of actual demand or notified demand, there is little incentive for the customer to notify demand correctly. This makes it difficult to plan from a network perspective, and creates risk of over- or under-recovery of revenue, as changes in the demand not forecast will impact on the revenue to be recovered.

To mitigate this, the NMD rules were developed (see www.eskom.co.za/tariffs). These rules will be updated from time to time based on customer inputs and business requirements.

Goal 17

The NMD rules will be updated from time to time, taking into account needs and risks of customers and the business.

To ensure that the rules are not unfair to customers that manage their demand correctly, the rules must incentivise the correct notification of demand.

5.2.4 Tariff conversion risk

The risk of tariff conversions that benefit customers without a true reduction in cost will be mitigated/managed.

It is impossible to have two different tariffs offered to the same customer that will result in the identical average price. One tariff will always benefit the customer, without there necessarily being a true reduction in cost. When customers are offered a choice of tariffs, especially when tariffs are restructured, there is always the potential for revenue loss as customers could move to the cheaper tariff. This revenue loss will be revenue lost to Eskom, or will need to be made up in the next regulatory period if the regulator allows it.

Tariff choice and tariff conversions therefore often have the unintended consequence that there will be customers that benefit without there being a true reduction in cost.

The goal for reducing conversion risk between tariffs is:

Goal 18

Eskom will minimise the underlying cause of windfall benefits gained by customers from conversion between tariffs, such as the reduction of the differences in the rate rebalancing levy between tariffs.

Any remaining risk will be managed through rules. With due consideration of the risk due to tariff choice, Eskom will offer an optimal number of tariffs.

Goal 19

Eskom will offer an optimal choice of tariffs.

5.3 EQUITY AND FAIRNESS

Eskom will ensure that customer needs regarding tariffs are satisfactorily catered for, without compromising the sustainability of the business or the needs of other customers, within the national policy and benchmarks.

Satisfying the principles of equity and fairness, while less tangible or scientific than the revenue risk and efficiency principles, becomes the final checkpoint in the tariff design process.

In this section, the primary driver for fairness and equity goals is national direction, in particular the Energy White Paper and the NERSA subsidy framework. Eskom, however, has a role to play to ensure that each tariff is tested against equity and fairness criteria. This is done by assessing and minimising the impact of tariff changes on customers and by ensuring that one tariff is equitable when compared with other tariffs in a similar category.

Goal 20

Eskom will rationalise and remove inequities between similar tariff categories.

5.3.1 Simplicity

Tariffs need to be simple and understandable for customers without compromising the efficient, sustainable and revenue-recovery pricing signals.

Simplicity implies significant pooling of costs, which does not correspond with cost reflectivity. However, if effective pricing signals are not compromised by simplifying tariffs, simpler tariffs should be considered. This is generally relevant only for smaller customers.

A tariff might be complex in the various components, but when displayed on the bill, each line item reflecting a tariff component could be simplified by not adding factors, surcharges and other charges to the published rate. This can be done by determining and publishing the rate inclusive of all the charges and showing only this value on the bill.

Goal 21

Bills will be simplified by publishing only rates inclusive of all factors applicable to the tariff component on the bill.

5.3.1.1 Matrix of network charges

It is proposed for the larger customers to show the network charges in a matrix of rates that will differ according to the voltage and transmission zone as follows:

Table 3 – Matrix of rates for network charges

Transmission zone	Voltage	Rate
X	>132 kV ≥ 66 and ≤ 132 kV ≥ 500 and < 66 kV < 500 V	R R R R
Y	>132 kV ≥ 66 and ≤ 132 kV ≥ 500 and < 66 kV < 500 V	R R R R
etc.		

Goal 22

For larger customers, network charges will be shown in a matrix of rates differentiated by voltage and transmission zone.

For smaller customers (supplied at LV), it is impractical to have tariffs that are geographically differentiated into Transmission geographic zones. For this reason the cost for these tariffs will be averaged nationally.

Goal 23

For smaller customers (LV), network charges where applicable will be nationally averaged.

5.3.1.2 Matrix of energy charges

It is proposed to show the energy charges in a matrix of rates that will differ according to the TOU period and season, voltage (for the distribution loss factor) and transmission zone (for the transmission loss factor). This means that the cost of losses is to be "re-bundled" with the energy costs to simplify tariffs. This will be set out in a matrix of costs as follows.

Table 4 – Matrix of rates for energy charges

Transmission zone loss factor	Voltage (Distribution loss factor)	Peak energy rate (High demand season)	Standard energy rate	Off-peak energy rate
X	>132 kV ≥ 66 and ≤ 132 kV ≥ 500 and < 66 kV < 500 V	c/kWh c/kWh c/kWh c/kWh	c/kWh c/kWh c/kWh c/kWh	c/kWh c/kWh c/kWh c/kWh
Y	>132 kV ≥ 66 and ≤ 132 kV ≥ 500 and < 66 kV < 500 V	c/kWh c/kWh c/kWh c/kWh	c/kWh c/kWh c/kWh c/kWh	c/kWh c/kWh c/kWh c/kWh
etc.				

Goal 24

For larger customers, energy charges will be shown in a matrix of rates differentiated by TOU period and season, voltage and transmission zone

5.3.2 Inter-tariff subsidies

Tariff restructuring will be done within the current levels of inter-tariff cross-subsidies from the urban tariffs to rural tariffs and Homelight. Eskom will fairly balance the level of subsidies between contributing tariffs.

The NERSA has developed a guideline on subsidies and the following is extracted from the document and forms the framework for subsidies in Eskom's tariffs.

The NERSA guideline states that there are five broad principles for cross-subsidies in electricity tariffs. These are:

- Effective targeting criteria
- Transparency
- Fairness of levies
- Administrative simplicity
- Transition towards cost reflectivity (the DME's draft policy on "The Electricity Pricing Policy in SA" states that this covers a possible 10-year period).

The NERSA guidelines refer to the government policy (Energy White Paper) which requires that cross subsidies, for reasons of affordability, be directed to:

- Identified poor households (those without access and correlated to low usage).
- Small businesses and farms (indigent).
- Associated community supplies.

The NERSA Board approved the following principles on cross subsidies:

- *Any levies or intentional cross-subsidies should be made explicit and transparent over a period of time.*
- *Electricity supply to identified low-income customers should be held below full cost-reflective levels to account for affordability considerations.*

- *Electricity tariffs should, in the long-term, reflect as closely as possible the underlying costs of supply for the majority of customers. The level of electricity prices should essentially be determined by the utility's regulated revenue requirement, while the structure should be determined by the structure of costs.*
- *Cross-subsidies should not prejudice the competitiveness of the productive sector of the economy and should be kept within reasonable limits.*
- *Cross-subsidies should be easy and economical to administer, and their regulation needs to ensure stability, simplicity and understandability.*

The NERSA document also states that based on Eskom's data and extrapolated data for municipalities:

- *The existing level of cross-subsidies does not appear to have significant negative impact on contributing customers. However, long-term elasticity as opposed to short-term elasticity needs to be investigated.*
- *Existing levels of cross-subsidies are likely to make a significant contribution to affordability.*
- *Thus, the overall level is maintainable but there is scope for improved efficiency and transparency.*

In Eskom's tariffs there are cross-subsidies from the urban tariffs to rural tariffs and Homelight. These subsidies were initiated through government-led programmes to support the electrification of South Africa.

(Please note, however, that free basic electricity is not a tariff design function and is therefore not discussed in this strategic document.)

Eskom is satisfied that the current subsidies provided are in line with the above guidelines, except that no guidance has been provided with respect to the amount of rural subsidies. Removal of rural subsidies would entail an estimated doubling of the tariffs to rural customers. From international research, it appears that most countries do not separate rural and urban tariffs; the cross-subsidies from urban to rural are there but they are hidden.

Eskom favours the view that the levels of subsidies, in view of the imminent changes to the distribution industry, should be maintained until REDS have been established. Only then should subsidies be reviewed by taking into account the impact on all customers within each RED. The removal of subsidies will have a broader effect than on the Eskom customer base.

Eskom will therefore do all tariff restructuring within current subsidy levels, ensuring equity and fairness between similar customer categories. Any reduction in subsidies in one tariff means an increase in the level of another tariff and should only be done after considering the full economic impact and under the guidance of national policy.

Goal 25

Any reduction in subsidies will only be done considering the full economic impact and under the guidance of national policy.

5.3.3 Changes in intra-tariff subsidies – impact of changes on customers.

Eskom will phase in structural tariff changes based on the impact on customers and within the NERSA approval process.

Intra-tariff subsidies are caused by averaging or pooling of costs within a tariff and/or customer category. As it is impossible and impractical to accurately charge a tariff for each customer, justifiable pooling of costs occurs when designing a tariff. Any change to a tariff structure changes the way costs are recovered, and this could result in price increases or reduction for the individual customer. The changes implemented should ideally not impact on any customer severely.

5.3.4 Voltage differentiation subsidies

Eskom will make changes to voltage differentiation (category and level) subject to the impact on lower voltage customers.

Eskom currently has four voltage categories according to which network charges and energy losses are differentiated. These voltage categories are not cost reflective, as the lower voltage supplies are subsidised by the higher voltage supplies. This means that true cost differentiation based on the existing pooled cost is much higher than the existing 17.3% between the lowest and highest voltage. The voltage categories may be changed on the basis of cost grouping and functionality (network configuration).

Any changes to move towards cost-reflective differentiation will mean that the lower voltage customers will pay significantly more. As this will impact on the customers who could least afford it and increase the potential for by-pass, there needs to be economic justification for making any changes.

It can be noted that in order to move to true cost reflectivity, the LV network charges would need to increase by 149% and the HV network charges would need to reduce by 82%.

This change would impact on LV customers the most severely. The LV customers to be affected by such a change would include smaller mining and manufacturing activities, smaller municipalities and the majority of commercial customers, including small, medium and micro enterprises. Such a change should not be done without appropriate guidance from national policy and an assessment of the overall economic impact.

However, if the distribution and transmission network charges are to be unbundled, the impact to customers of increasing the voltage differential between the highest and lowest voltage categories would be significantly reduced. The voltage differentiation in the price will now only be applied to the distribution network charges and not to other charges as would be the case with the bundled tariffs. Therefore with the unbundling of the tariffs, it is possible to increase the differential in price between the lower and higher voltage network charges without significantly impacting the lower voltage supplies. Such a move would make the network charges more cost reflective.

Goal 26

The voltage level differentiation between the highest and the lowest voltage categories will be increased to a level that is more cost-reflective, yet not impact the lower voltage supplies on average by any significant percentage.

5.3.5 Rural tariff differentiation

Eskom will differentiate tariffs between rural and urban tariffs.*

(Note that in the context of the above, "urban" refers to customers in areas that are proclaimed and/or electrification projects or with densities described in NRS 069 or supplies > 22 kV. Rural areas are all those not defined as urban.)

The cost of providing supply in an urban area and in a rural area differs significantly, owing to differences in the average cost per connection, the cost of service and administration and losses. Even though rural tariffs have higher charges, these tariffs do not recover the cost of providing supply i.e. there are currently inter-tariff cross-subsidies from urban tariffs to rural tariffs. However, as stated in Section 5.3.2, no changes are proposed to remove these inter-tariff cross subsidies unless direction is provided as stated in Goal 25.

In order to be more cost reflective in level, tariffs in rural and urban areas would need to be different. For rural supplies, a significant portion of the capital cost is recovered through subsidies and in the tariff, making connections more affordable. If the urban and rural tariffs were combined, the overall effect is that the urban tariffs would increase and the rural tariffs would decrease and the subsidies paid by the urban tariffs and received by the rural tariffs would be hidden...

Based on the current level of cross-subsidies, there is no economic justification for combining the rural and urban tariffs.

6 CONCLUSION

Eskom believes the principles and goals set out in this document will send out the correct pricing signals for a viable electricity industry, providing a sound and justifiable foundation for electricity tariffs. These principles should be adopted irrespective of the structure of the electricity supply industry, to ensure fair and equitable treatment of all electricity consumers in South Africa.

Eskom accepts that if changes are implemented, the rate of change will depend on technology, system requirements and the impact that the structural changes will have on customers' bills.

Appendix A – Summary of 1999 Strategic Pricing Direction

Proposed change	Action
9. The introduction of network (or "wires") charges as a separate charge for most tariffs. Where this charge is demand based, apparent power (kVA) should be used.	Done – implemented for all relevant tariffs by Jan 2005
10. The retention for some tariffs of a demand charge to recover some of the energy costs. In order not to penalise customers for poor power factor; where there are no significant costs associated with power factor, active power should be measured (kW).	Done - the energy demand charge retained in Nightsave Not measured in kW due to metering constraints
11. The pooling of capital costs associated with making supplies available to customers. Network charges will therefore be based on R/kVA/km/month and will be voltage differentiated.	Not implemented as it was impractical.
12. The scrapping of the up-front capital allowance, the cost of which is recovered through the basic charge.	Not implemented due to not implementing above.
13. The discontinuing of the consumption-based rebate on monthly rentals as well as monthly rentals for existing customers and new customers.	Almost complete – just needs to be removed for Ruraflex and Nightsave.
14. The discontinuing of the reactive energy charges (kvarh) for the TOU tariffs.	A decision was later made to keep these charges.
15. Differentiating of basic charges (or monthly per customer charges) on 4 customer size classes.	Done
16. The alignment of the TOU time zones and seasons with the Wholesale Electricity Tariff.	Done
17. The merging of Standardrate with Nightsave.	Done
18. The possible regrouping of the supply voltages (for pricing purposes).	Not done due to major implications for low voltage supplies.
19. The possible merging of Megaflex with Miniflex (studies still to be done to confirm the feasibility).	A decision was later made not to pursue this.
20. Expansion of the NER's pricing framework to allow for the proposed structural changes.	Done