GreenCape

Basic tariff guiding principles

Small-scale Embedded Generation (SSEG) tariffs

This brief outlines the basic guiding principles in tariff design for municipalities, to support and adapt to a changing electricity landscape that includes renewable electricity generation.

South Africa is experiencing an electricity supply crisis, coupled with rising interest by residents to feed excess electricity (generated by renewable means) back into the grid. In this changing energy landscape, electricity tariff design is a key issue for national and local regulatory authorities. With low financial or legal risk, municipalities can use sustainably designed tariffs as a management tool to support the drive for the generation of additional local renewable electricity. At the same time, they need to manage parallel connections to the grid to ensure the safety of municipal staff, customers and the public, and to ensure the quality of municipal electricity supply.

1. Basic consumption tariff elements and principles

Modern electricity tariffs should all include network costs, service charges and a time-of-use (TOU)[1] variable energy charge.

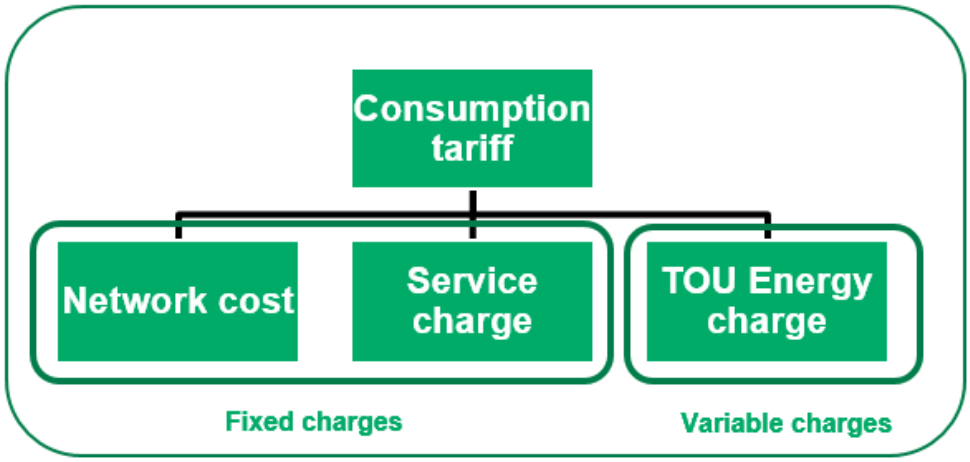

Figure 1: Fixed and variable elements of a consumption tariff

This is a fixed cost levied at a rand amount according to the relevant electricity connection size (i.e. 10A, 20A).

- The fixed costs associated with maintaining and operating the network should be recovered through appropriate network charges.
- This cost needs to be implemented across all consumers to ensure equity and transparency.
- Network costs should be the same for SSEG and non-SSEG consumers.

[1] A time-of-use energy charge is priced based on when the energy is consumed (i.e. off-peak, peak or standard).

- Implementing different network charges for SSEG consumers creates poor incentives for solar photovoltaic (PV) installations. This could result in many consumers not considering PV as a potential option, given the limited potential gain.

1.2. Service charge

This is a fixed cost per customer classification (i.e. residential or commercial) that is levied for providing a retail service network (such as metering, billing, consumer call centre).

- The fixed costs associated with providing a retail service network should be recovered through appropriate fixed charges.
- The daily service charge, along with charges for consumption and credits for generated electricity fed into the utility network, should be billed monthly (as is done for other municipal services e.g. water and rates).
- As with the network cost, every customer classification should be required to pay a service charge to ensure equity and transparency.

1.3. Energy charge

This is a variable cost, levied at Rands per kilowatt hour of electricity consumed.

- The Eskom purchase price of energy must/should be recovered through an appropriate energy charge.
- This charge is a variable cost to the customer, and is associated with the amount of energy a customer consumes.
- A TOU energy charge is the most cost-effective energy charge.

2. Principles for adjusting tariffs to accommodate the SSEG environment

2.1.1. Introduce a feed-in tariff

- An energy export rate or feed-in tariff refers to the payment (R/kWh) offered to electricity customers for the electricity fed back into the municipal electrical grid (i.e. export of electricity). Feed-in tariffs form part of SSEG tariffs (which also include fixed charges, such as network and service charges).
- All customers should be able to be on an SSEG tariff:
  - SSEG tariffs should be designed so that customers cannot reduce their bill simply by switching onto that tariff (without making any other changes to self-consumption or generation).
  - The only difference between a consumption electricity tariff and an SSEG tariff should be the addition of a feed-in tariff component for those customers who feed energy back into the grid.

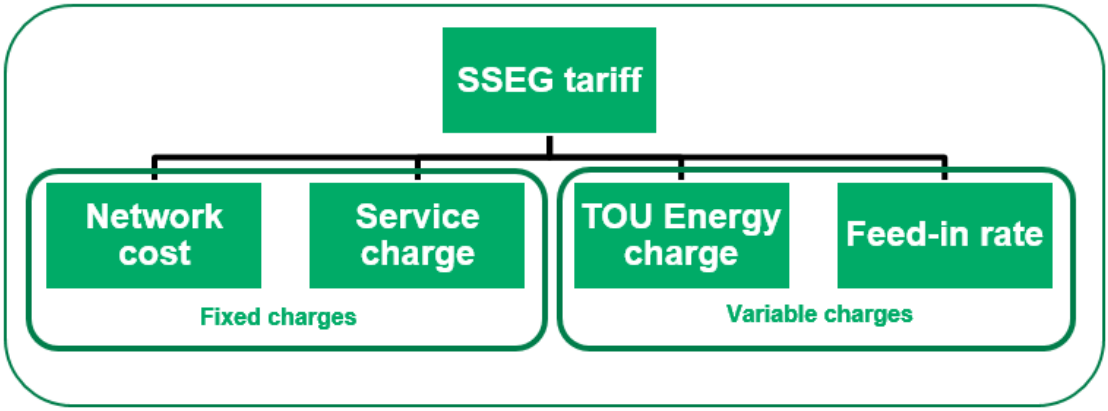

Figure 2: Fixed and variable elements of an SSEG tariff

There are many different approaches to setting feed-in tariffs. These can be grouped into two main categories: value-based approaches and cost-based approaches. The approach selected will depend on what the municipality is trying to achieve by introducing the tariff. The value-based approach is more conservative — i.e. paying the customer what the energy is worth when it is being produced. A cost-based approach is a more progressive stance looking to actively provide the customer with the best possible business case.

Table 1: Cost-based vs value-based approaches to setting export tariffs

Costing approach	Explanation
Cost-based	Tariff based on what it costs to generate a kWh of electricity for the customer, plus a targeted return.
Value-based	Tariff based on the value of that electricity produced by the PV installations to the municipal electrical grid. Value includes avoided energy cost/purchases, and network and line losses costs (if any). Can include a rand value linked other positive externalities such as climate change mitigation, reduced health impacts, less air pollution and increased supply security.

2.2. Set a duration for the payment of feed-in tariffs

- Payment duration refers to the agreed period that a SSEG customer will receive a specified feed-in tariff.
- Currently, in South Africa, there is no guaranteed period for continued payment. Therefore, the payment for electricity being fed back onto the grid could end or change at any time.
- That payment for electricity being fed back into the grid may end/change is an added risk faced by SSEG customers, as many still rely on the feed-in tariff to create a financially feasible business case. As the risk profile worsens, the cost of financing rises, increasing the cost of the system as a whole.

- Electricity customers and SSEG developers that are looking to implement an SSEG project require a reduced risk profile. The risk involved in SSEG project development can be lessened by ensuring that the payment stream will not end before the SSEG customer or developer has had a chance to recover their investment.
- Long-term price security in the midst of rapidly increasing electricity prices is important for decreasing the risk of PV investment. As noted, this reduced risk profile will result in lower system costs for developers and customers. Rather than providing higher tariff incentives through price security, the municipality is able to generate the same uptake of SSEG with less effect on municipal revenue. Providing customers with certainty can reduce the impact on the municipality's revenue (as fewer incentives are required to create the same uptake of SSEG) while still ensuring that the municipality uses its tariff policies to support the uptake of SSEG. Payment durations should be secure for as close to the lifetime of the projects as possible, wherever feasible.

2.3. Introduce time-of-use (TOU) metering for SSEG

- In TOU metering, electricity rates are broken down into three different time periods — peak, shoulder and off-peak — enabling users to pay different rates for electricity used and fed into the grid.
- All customers with SSEG installations should be on a TOU tariff (if a TOU tariff is available for that customer class).
- A TOU tariff is more cost-reflective than a flat or two-part tariff, in that it accounts for the varying costs of generating and supplying electricity during different hours of the day.
- Electricity demand and prices vary throughout the day and year, and solar panels generate the vast majority of their power during the cheaper sunshine hours. This means that customers who feed into the grid during the day should be paid less than those feeding electricity into the grid during peak hours.

2.4. Ensure that grid connections remain the most appealing option

- Critically, all decisions regarding SSEG tariffs should ensure that remaining grid-tied is the most attractive option, both financially and in terms of security of supply, when compared to off-grid alternatives.
- Grid defection would be the worst case scenario for the municipality and the grid, as most — if not all — municipalities depend on the revenue generated from electricity sales to cross-subsidise other services and electricity consumed by poor customers.

2.5. Encourage economically optimised PV installations

- All tariff policies and tariffs should be designed in such a way that they promote installations which are economically efficient.
- The most economically efficient systems are those with a low levelised cost of energy (LCOE) — one of the utility industry's primary metrics for the cost of electricity produced by a generator. LCOE is calculated by accounting for all of a system's expected lifetime costs

(including construction, financing, fuel, maintenance, taxes, insurance and incentives), which are then divided by the system's lifetime expected power output (kWh).

- The benefits of these systems are that they provide a better return on investment, as they are larger and of higher quality. Fewer incentives need to be offered by municipalities to promote such systems (which results in cost savings), because they benefit customers more and are more attractive investments.

2.6. Ensure that tariffs are transparent

- Changes to tariff structures, or the introduction of new SSEG tariffs, should be done in combination with some degree of consumer engagement — as is mandatory with National Energy Regulator of South Africa (NERSA) tariff approval processes.
- Public consultations should be underpinned by a transparent, accessible and easy-to-understand tariff policy.
- Public consultations should/can be used as an opportunity to explain the tariffs and how consumers can adapt energy usage to manage their electricity costs more effectively.

2.7. Understand the importance of cost-of-supply study

- A full cost-of-supply study should be carried out by all municipalities prior to developing new tariffs.
- The study will determine the true, fixed and variable costs of supplying electricity to consumers. Ideally, the costs should also be segmented by appropriate consumer type.

2.8. Develop accurate customer load profiles

- Customer load profiles are the pattern that customers' electricity consumption follows over a period of time.
- A sample of high-resolution consumer demand data should be collected over a period of time and used to generate representative high resolution load profiles.
- Load profiles can be used to model the resulting net electricity revenue and margins resulting from the proposed tariff change. This will help to verify revenue sufficiency and the effectiveness of the designed tariff.
- The impact on typical customer electricity bills from applying the various tariffs under different scenarios should also be modelled and analysed. This will help to test the fairness of the tariffs for the different customer types.

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