

(municipal logo)



---

# REQUIREMENTS FOR SMALL- SCALE EMBEDDED GENERATION

Conditions and application process to  
become a solar PV embedded generator in  
the Municipality of (municipality)

DRAFT FINAL

---

February 2017

## Contents

i.	Information on this document	4
ii.	Glossary & Definitions	5
iii.	Abbreviations	6
1.	Introduction	7
2.	Indemnity, Legal Requirements & Curtailment	7
2.1.	Legal and Illegal Connections to the municipal electrical grid	7
2.2.	Generation Curtailment	8
2.3.	Right to adapt rules & regulations	8
2.4.	Right to deny access	8
3.	General Guidelines - Small Scale Embedded Generators	8
3.1.	Registered Professional Sign off	8
3.2.	Testing of Inverters	8
3.3.	All generators shall be nett customers	9
3.4.	Generating licence	9
3.5.	Eskom grid connection	9
3.6.	Decommission of a SSEG system and transfer/change of ownership	9
3.7.	Transfer/change of ownership	9
3.8.	Islanding / Anti-Islanding installations	9
3.9.	Fire safety and emergency shut-off switch	10
3.10.	Off-grid system	10
3.11.	Load Profile Management	10
3.12.	Applicable technical standards	11
4.	Metering	11
4.1.	Municipal electrical grid connection and reverse power flow/ feed-in to the municipal electrical grid	11
4.2.	Adaption of electrical installation	11
4.3.	Refunds of electricity already pre-purchased	11
5.	SSEG connection criteria	12
5.1.	Shared LV feeders	12
5.2.	Dedicated LV feeders	13
5.3.	Cumulative SSEG capacity and impact on LV and MV networks	13
6.	SSEG Tariffs	13
6.1.	Residential SSEG Tariff	13
6.1.1.	Network charge	13
6.1.2.	Service charge	13
6.1.3.	Energy charge (c/kWh)	13
6.1.4.	Export (Feed-in) rate (c/kWh)	13
6.1.5.	Billing Period	13
6.1.6.	Increased Costs	13
6.1.7.	Example Tariff	14
6.2.	Commercial and Industrial SSEG Tariff	14
7.	Approvals required from other municipal departments	14
7.1.1.	Planning and Building Development Management	14
7.1.2.	Environmental Approvals	14
8.	Who pays for what?	15
9.	Residential, Commercial and Industrial SSEG application process	15

## Indemnity

Anyone using these Requirements for Small Scale Embedded Generation (SSEG), in part or in full, as a basis for their own SSEG program does so on the basis that they indemnify and hold harmless the authors and their successors or assigns in respect of any claim, action, liability, loss, damage or lawsuit arising from their use of this document.

## Acknowledgements



This document was based on the GreenCape SSEG guideline for Western Cape municipalities



The development of the document was funded by GIZ's support programme for renewable energy in South Africa



SALGA facilitated and contributed to the development of the standard AMEU documentation



Sustainable Energy Africa contributed to and compiled the standard AMEU documentation



AMEU Working Group on standardised SSEG documentation:



Johannesburg – City Power (Anthony Whittaker)



Tshwane (Ben Kriel)



eThekweni (Leshan Moodliar)



Nelson Mandela Metropolitan Municipality (Corrie Schmidt)



Buffalo City (Chris Gower)



Mangaung - Centec (Teboho Nkala)



Cape Town (Brian Jones)



City of Ekurhuleni (April Dlamini)

Contact details:

AMEU: 011 061 5000  
SALGA: 012 369 8000

## i. Information on this document

<b>Purpose of the document</b>	The purpose of this document is to guide stakeholders regarding the requirements and application process of the Municipality of (municipality) in connecting solar PV embedded generation to the municipal electricity network (other forms of generation will be included in future versions – e.g. wind, hydro).
<b>The need for this document</b>	<p>The parallel connection of any generator to the municipal electrical grid, however powered, has numerous implications for the local Municipality. It shall therefore be regulated and managed. This document serves to:</p> <ul style="list-style-type: none"><li>• Ensure the safety of the municipal staff, the public and the user of the SSEG installation.</li><li>• Uphold the power quality of the municipal electricity network</li><li>• Clarify metering and billing requirements and options</li><li>• Balance municipal revenue impact to enable continued operation of all municipal functions</li></ul> <p>In addition, municipalities are faced with low carbon development imperatives and economic growth challenges. SSEG can play a role in both of these areas, and the document therefore also serves to:</p> <ul style="list-style-type: none"><li>• Promote the development of the SSEG industry by creating a conducive environment for growth.</li></ul>
<b>Scope</b>	<p>This document covers:</p> <ul style="list-style-type: none"><li>• The connection of solar PV SSEG to the municipal electrical grid</li><li>• Installations up to 1MVA (although different conditions apply above or below 350kVA – see later)</li><li>• Installations connected to low voltage networks</li><li>• Installations where customers remain net consumers (consume more electricity from the grid than they generate on average)</li></ul> <p>This document does not cover:</p> <ul style="list-style-type: none"><li>• Systems above 1MW (anyone wanting to connect a SSEG system greater than 1MW will not be able to connect under the conditions of these requirements). Systems of 1MW or smaller do not require a generating licence from NERSA.</li><li>• Wheeling regulations</li><li>• The connection of SSEG to the Eskom electrical grid.</li><li>• Systems connecting to MV and HV networks (although the NRS 097-1 standards covering MV and HV connections are not complete), such systems may be approved by the municipality, but are likely to require grid impact studies and should be discussed separately with the municipality)</li><li>• Installations where customers are net generators (generate more than they consume on average)</li><li>• Non solar PV forms of generation (options such as wind and hydro will be included in future versions)</li></ul>
<b>Defining small scale embedded generation</b>	<p>Small-scale embedded generation (SSEG) refers to power generation installations less than or equal to 1MW/1000kW which are located on residential, commercial or industrial sites where electricity is also consumed. SSEG is in contrast to large-scale generation units that generate large amounts of power, typically in the multi-Megawatt range.</p> <p>A SSEG customer generates electricity on the customer's side of the municipal electricity meter, where the generation equipment is connected to, and synchronised with, the municipal electricity grid (i.e. 'embedded').</p>

**Commented [MB1]:** NOTE TO MUNICIPALITIES: Some municipalities may not have this requirement. If so, edit or delete.

**Commented [MB2]:** NOTE TO MUNICIPALITIES: Such standards were not complete at the time of writing. Their current availability should be established.

**Commented [MB3]:** NOTE TO MUNICIPALITIES: See earlier note on 'net consumers'.

**Who this document is for** This document will assist all relevant stakeholders involved in the commissioning, installation, management and ownership of a SSEG system, with generation capacity less than or equal to 1 MW (1000 kW), to the municipal electrical grid. It is intended to provide guidance in this regard to:

- SSEG project developers
- Residential and commercial property owners
- SSEG installers
- Energy consultants commissioned to design SSEG systems
- Municipal officials involved in SSEG generation
- Registered professional engineers, professional technologists or professional engineering technicians who are involved in SSEG commissioning

## ii. Glossary & Definitions

<b>Alternating current</b>	The flow of electrical energy that follows a sine wave and changes direction at a fixed frequency (i.e. it 'alternates'). Most residential and commercial uses of electricity require alternating current.
<b>Direct Current</b>	The flow of electrical energy in one constant direction. Direct current is typically converted to alternating current for practical purposes as most modern uses of electricity require alternating current.
<b>Anti-Islanding</b>	The ability of an SSEG installation to instantly and automatically disconnect the generator from the municipal electrical grid whenever there is a power outage in the utility municipal electrical grid, thus preventing the export of electricity to the municipal electrical grid from the SSEG. This is done primarily to protect municipal electrical grid workers who may be working on the grid and who may be unaware that the grid is still being energized by the SSEG.
<b>Bi-directional meter</b>	A meter that separately measures electricity flow in both directions (import and export)
<b>Cogeneration</b>	The sequential or simultaneous generation of multiple forms of useful energy (usually mechanical and thermal) in a single, integrated system.
<b>Customer</b>	In the context of this document, customers who also generate shall be referred to as "customers", although in effect they are "customer/generators".
<b>Generating capacity</b>	The maximum amount of electricity, measured in kilovolt Amperes (kVA), which can flow out of the generation equipment into the customer's alternating current wiring system. This is therefore the maximum alternating current power flow which can be generated by the system in its current configuration.
<b>Grid-tied</b>	An SSEG that is connected to the municipal electrical grid either directly or through a customer's internal wiring is said to be "grid-tied". The export of energy onto the municipal electrical grid is possible when generation exceeds consumption at any point in time.
<b>Inverter</b>	A power device that converts direct current to alternating current at a voltage and frequency which enables the generator to be connected to the municipal electrical grid.
<b>Isolated</b>	A section of an municipal electrical grid which is disconnected from all other possible sources of electrical potential is said to be isolated
<b>Load profile</b>	The profile or curve showing the variation of the customer's rate of electricity consumption (or demand) over time.
<b>Low-voltage</b>	Voltage levels up to and including 1 kV. (1kV= 1000 Volts)
<b>Medium-voltage</b>	Voltage levels greater than 1 kV up to and including 35 kV.
<b>Net customer</b>	A net customer is someone who purchases (imports) more kWh of electricity than they export (sell) it over any 12 month period.
<b>Net consumer</b>	See net customer.
<b>Net generator</b>	A situation where the site generates more electricity than is consumed on site over a 12 month period, and therefore exports more power onto the municipal network than it draws from the network.
<b>Pr Eng or Pr Tech Eng or Pr Techni Eng</b>	This refers to a professional engineer, professional technologist or professional engineering technician who is registered with the Engineering Council of South Africa (ECSA).

<b>Reverse power flow</b>	The flow of energy from the customer electricity installation onto the municipal electrical grid (i.e. export) as a result of the instantaneous generation exceeding the instantaneous consumption at the generation site in question.
<b>Reverse power flow blocking</b>	A device which prevents power flowing from an embedded generator back onto the municipal electrical grid.
<b>Small Scale embedded generator</b>	A small-scale embedded generator for the purposes of these guidelines is an embedded generator with a generation capacity of less than or equal to 1000 kW (1MW).
<b>Stand-alone generator/off-grid generator</b>	A generator that is not in any way connected to the municipal electrical grid. Export of energy onto the municipal electrical grid by the generator is therefore not possible.

### iii. Abbreviations

<b>AC</b>	Alternating current
<b>AMI</b>	Advanced Metering Infrastructure
<b>DC</b>	Direct current
<b>ECSA</b>	Engineering Council of South Africa
<b>kVA</b>	kilo-Volt Ampere (unit of apparent electrical power, often similar in magnitude to kW)
<b>kW</b>	kilo-Watt (unit of electrical power)
<b>kWp</b>	kilo-Watt peak (the rated peak output of solar PV panels)
<b>LV</b>	Low Voltage
<b>MV</b>	Medium Voltage
<b>MVA</b>	Mega-Volt Amperes (1000 kVA)
<b>MW</b>	Mega-Watt (1000 kW)
<b>NERSA</b>	National Energy Regulator of South Africa
<b>NMD</b>	Notified Maximum Demand
<b>PV</b>	Photovoltaic
<b>SSEG</b>	Small Scale Embedded Generation/Generator
<b>VAT</b>	Value Added Tax

## 1. Introduction

Due to increases in the price of electricity from the national grid and a steady decline in the price of decentralised generation options such as PV small-scale embedded generation (i.e. 'rooftop' type systems), these decentralised generation sources are becoming financially more attractive in South Africa. Increasingly such systems are being installed by businesses and residences. It is therefore important that approval procedures are established and standards are adhered to within municipal distributors to regularise this fast changing situation.

Municipal distributors are obliged to ensure that distribution grid power quality and safety standards are upheld to protect municipal staff working on the distribution system, to protect the public in general, and to protect municipal infrastructure. Also, the potential revenue impact of accelerating SSEG installations needs to be managed. This requires changes to tariff structures, in particular residential tariffs.

The above needs to be balanced with municipal obligations to embrace low-carbon energy and green economic growth opportunities, so a user-friendly framework around installation application and approval is important to promote the growth of this sector. Such a framework will also minimise systems being installed without going through official channels, thereby potentially not meeting required safety and quality standards.

Municipalities play a vital role in facilitating the necessary regulatory environment to enable the establishment and growth of the SSEG field. This document outlines the municipal requirements for prospective SSEGs such that the above factors are balanced.

## 2. Indemnity, Legal Requirements & Curtailment

### 2.1. Legal and Illegal Connections to the municipal electrical grid

Customers wishing to connect SSEG legally to the municipal electrical grid shall be required to follow the normal application procedure as detailed in this document, and comply with the regulations and standards listed herein.

Paragraph \_\_\_\_\_ of Electricity Supply By-Law states that no generation equipment may be connected to the municipal electrical grid without the express consent of the Manager of the Electricity Services Department.

Failure to obtain this consent constitutes an offence which could lead to a fine and/or imprisonment. Furthermore, the installation may also be in contravention of the Occupational Health and Safety Act, for which punitive sanctions also apply.

Customers found to have illegally connected SSEG to the municipal electrical grid (either before or after their electricity meter) shall be instructed to have the installation disconnected from the municipal electrical grid. A Certificate of Compliance issued by a registered electrical contractor shall be required as proof of such disconnection. Should the customer fail to have the SSEG disconnected from the municipal electrical grid, the Municipal Electricity Services Department shall disconnect the electricity supply to the property (as provisioned for in the \_\_\_\_\_ Electricity Supply by-Law).

In cases where unauthorised reverse feed-in takes place which results in the meter reversing to the benefit of the customer, the municipality will institute action to recover lost revenue and relevant punitive fines will be applicable.

**Commented [MB4]:** NOTE TO MUNICIPALITIES: The Municipal By-Law will need to be amended to reflect the need to comply with this SSEG Requirements document, amongst other conditions.

No exemption from any of the Municipality's requirements shall be granted for "retrospective applications".

## **2.2. Generation Curtailment**

In the event of operating conditions resulting in municipal electrical grid parameters not meeting statutory minimum quality-of-supply standards it may become necessary to impose peak generation limits on embedded generator installations. It is expected that these limitations would be of a temporary nature, applied only during abnormal system conditions or low load periods.

## **2.3. Right to adapt rules & regulations**

In the event of provincial or national changes to the regulatory environment it may become necessary to implement changes to the municipal requirements which SSEGs are to comply with. All SSEGs, new and existing, will be obliged to comply with these changes, and will do so at their own cost.

## **2.4. Right to deny access**

It is essential that all customers wishing to install a SSEG system, regardless of generation capacity, complete the relevant sections of the application process in full, and that written approval to commence is received from the Municipality before system installation starts. The Municipality needs to ensure that, amongst other considerations, the SSEG installation can be accommodated on the municipal electrical grid and that the total SSEG capacity of the municipal electrical grid has not been exceeded, considering parameters in the NRS097-2-3 and other applicable standards. Equipment should not be purchased prior to obtaining written approval from the Municipality to commence, as approval is not guaranteed and the Municipality shall not be held liable for equipment expenses where approval is denied.

# **3. General Guidelines - Small Scale Embedded Generators**

This section covers important considerations in terms of the Municipality's SSEG rules and regulations that apply to all customers including residential, commercial and industrial customers who wish to connect a SSEG system, with generation capacity no greater than 1 MW (1000 kW), to the municipal electrical grid.

Anyone wanting to connect systems over 1 MW shall not be able to connect under the conditions in this document, but should approach the municipality directly to discuss the way forward. It is likely that grid impact studies will be necessary in these circumstances, amongst other work. In addition a generating licence or exemption letter from NERSA shall be required before connection of systems over 1MW are considered.

## **3.1. Registered Professional Sign off**

Until SANS 10142-Part 3 covering SSEG installation requirements and DC wiring are published, all SSEG projects shall be signed off on commissioning by a registered professional engineer or technologist.

## **3.2. Testing of Inverters**

Until such time as a SABS mark is issued for inverters, the Municipality shall require proof in the form of test certificates, of type tests having been successfully carried out by a third party testing authority certifying compliance of the inverters with NRS097-2-1 (and NRS097-2-2 when published). The use of inverters without such certification is not permitted, both in new and existing installations.



The certification body must be SANAS accredited or be recognised by the International Laboratory Accreditation Co-operation (ILAC) or the International Accreditation Forum (IAF) in terms of ISO/IEC 17025:2005 for photovoltaic systems. The accreditation bodies must provide accreditation documentation for the specific test location.

The SSEG applicant should require the inverter suppliers to provide the necessary certification before the equipment is purchased.

### 3.3. All generators shall be nett customers

All SSEG installations shall consume more energy than they produce over a consecutive 12-month period.

### 3.4. Generating licence

Draft legislation stipulates that generators of 1MW or smaller do not require a license from NERSA. Should this requirement change, the Municipality will change the requirements in this document accordingly, and will require all existing and new SSEGs to comply with the new requirements, at their own cost.

If a NERSA generation licence is required then it is the customer's responsibility to interact with NERSA to obtain such. The Municipality is obliged to report to NERSA on a regular basis regarding all municipal electrical grid connected generation and it is also obliged to disconnect generators that are not adhering to regulations.

### 3.5. Eskom grid connection

Customers residing within the municipal boundaries, but located in Eskom's area of supply, need to apply to Eskom for consent to connect SSEG to the Eskom electrical grid. The municipality will not be involved in this process.

### 3.6. Decommission of a SSEG system and transfer/change of ownership

The Municipality requires notice of any SSEG system which has been decommissioned. The system shall be removed at the owners cost and a decommissioning report filed (on the prescribed form).

### 3.7. Transfer/change of ownership

If a transfer of the property and/or change of ownership of the electricity accountholder takes place, a new SSEG Supply Contract shall be signed or alternatively the SSEG system shall be decommissioned.

### 3.8. Islanding / Anti-Islanding installations

Grid-tied inverters are required to have an anti-islanding function (immediate disconnection when there is a general power outage) as stipulated in the NRS 097-2-1. Certification to this effect is required (see Testing of Inverters).

Should the inverter or SSEG installation have the facility to both comply with these anti-islanding requirements AND operate in "islanded mode" where the SSEG installation supplies power to a portion of the customer's electrical grid during a general power outage, it shall be effectively isolated from the municipal electrical grid during operation (as is legally required of any standby generator).

**Commented [MB5]:** NOTE TO MUNICIPALITIES: Some municipalities may not have this requirement. If so edit/delete. This condition may change with the publication of NERSA regulations.

If the SSEG installation is to be configured as a standby supply after islanding from the municipal electrical grid, a registered person in terms of the Electrical Installation Regulations (2009) shall issue a Certificate of Compliance to the owner if the generator is to be connected to the existing internal wiring of the property. Requirements of SANS 10142-1 (Section on 'Alternative supplies including low voltage generating sets, installations, etc') apply.

### 3.9. Fire safety and emergency shut-off switch

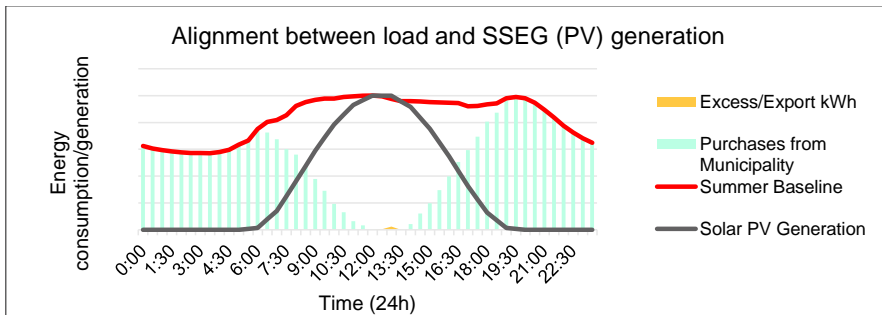
Emergency disconnection switching shall be in accordance with NRS 097-2-1.

### 3.10. Off-grid system

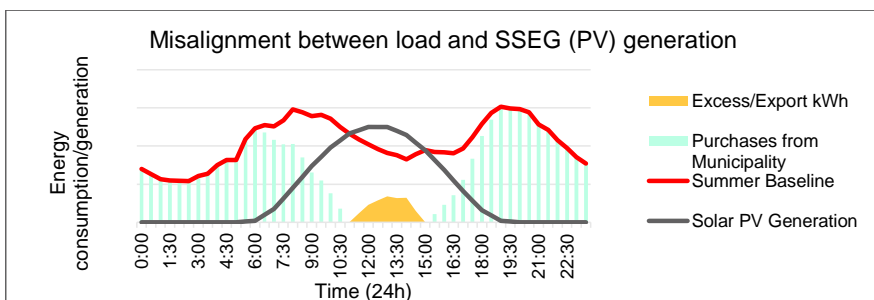
Stand-alone generators (not connected to the municipal electrical grid in anyway) do not need permission from the **electricity department**. However, approvals from other departments may still be necessary (e.g. building), and it is the responsibility of the applicant to comply with any such requirements.

### 3.11. Load Profile Management

Customers will generally find it most financially beneficial to ensure that they utilise as much of the generated electricity as they can and avoid or minimise reverse power flow. For example, with a residential SSEG PV system, loads such as geysers and pool pumps could be shifted to the middle of the day when solar generation is typically at its highest – between mid-morning and mid-afternoon.



**Figure 1: Load profile management - alignment between load profile (red line) and SSEG (PV) generation.**



**Figure 2: Load profile management - misalignment between load profile (red line) and SSEG (PV) generation.**

### 3.12. Applicable technical standards

Most of the technical requirements that SSEGs are required to comply with are covered in the following standards:

1. NRS 097-2: *Grid interconnection of embedded generation: Part 2 Small Scale Embedded Generators (Sections 1 to 4)*

In addition, SSEG installations are to comply with the following standards, legislation and regulations:

1. *South African Renewable Power Plant Grid Code (although the NRS 097-2 series cover most issues relevant to SSEG)*
2. *NRS 048: Electricity Supply – Quality of Supply*
3. *SANS 10142- Parts 1 to 4: The wiring of premises (as amended and published)*
4. *SANS 474 / NRS 057 : Code of Practice for Electricity Metering*
5. *Municipality of (municipality) Electricity Supply by-law*

## 4. Metering

### 4.1. Municipal electrical grid connection and reverse power flow/ feed-in to the municipal electrical grid

Customers installing SSEG shall have a bi-directional SSEG approved meter. The Municipality shall provide and install the requisite meters at the customer's cost. Conventional credit or prepayment meters are not allowed to run backwards.

### 4.2. Adaption of electrical installation

All customers moving onto a SSEG tariff shall adapt their electrical installations in such a way that metering is accommodated in a meter kiosk in the road reserve. This does not apply where an acceptable meter box or meter room already exists on the street-front property boundary. If no kiosk exists or there is no room for the meter in an existing kiosk, a meter kiosk shall be installed in the road reserve at the Municipality's cost. Only in cases where there are extremely narrow or no footways, thereby precluding the installation of a meter kiosk, shall customers be required to provide metering accommodation on the street-front property boundary. Such a meter box shall face outwards and be locked with a standard **Electricity Services Department** lock.

### 4.3. Refunds of electricity already pre-purchased

Where applicants currently have prepayment meters, these will need to be replaced with meters appropriate for SSEG systems and tariffs. Refund of Prepayment meter (PPM) units when a customer changes to the SSEG tariff and has an appropriate (credit) meter installed will be undertaken as follows:

- PPM vending unit tokens already loaded on the PPM:
  - The customer may delay the installation of an SSEG-appropriate meter
  - Alternatively the customer may elect to forfeit the units on the PPM
- PPM vending unit tokens not yet loaded onto the meter
  - The customer may request a refund. The token shall be validated to confirm that it has not been used after which the customer shall be refunded at the original tariff rate at

**Commented [MB6]:** NOTE TO MUNICIPALITIES (OPTIONAL APPROACHES): As an initial measure, some municipalities may want SSEG customers to install reverse-flow blocking and have them remain on their current tariff and use their existing meter. However this should be an interim measure (e.g. while SSEG tariffs are still being developed or bi-directional meters are being identified), as it does not make financial sense for the municipality or customer in the longer-term.

which the token was purchased. The refund shall be credited to the customer's municipal account and shall not be paid out in cash.

## 5. SSEG connection criteria

Simplified SSEG connection criteria are specified in the NRS 097-2-3, and applications for systems that fall within these parameters are likely to be easily processed by the municipality, and only in rare cases will require grid impact studies in their assessment. Such parameters include:

- Systems not larger than 350kVA
- Connecting to a LV network

Applications for systems which exceed the parameters of the NRS097-2-3 but do not exceed 1MW will also be accepted by the municipality, but may require specialist grid-impact studies in their assessment. The municipality will advise the customer of such needs after the application form is received.

There are different criteria for simplified connection in shared and dedicated LV feeders, as described below (for details see the relevant sections of the NRS097-2-3):

### 5.1. Shared LV feeders

The NRS 097-2-3 specifies that the maximum individual generation limit in a shared LV feeder (which applies to most small commercial and residential situations) shall not exceed 25% of the consumer's NMD, and be up to a maximum of 20kVA. The following SSEG size limitations are derived from NRS 097-2-3 for Shared LV connections.

**Table 1: SSEG size limitations - NRS 097-2-3 for Shared LV connections**

Service connection		
No. of Phases	Service Circuit Breaker Size (A)	Maximum Total Generation Capacity of SSEG (kVA)
1	40	2.3 (10A)
1	60	3.5 (15A)
1	80	4.6 (20A)
3	40	6.9 (30A)
3	60	10.4 (45A)
3	80	13.9 (60A)
3	100	17.3 (75A)

Notes to table:

- To determine if you have a single-phase or three-phase connection, check the main circuit-breaker on the distribution board. A single-phase supply will generally have a single main circuit-breaker, and a three-phase a triple main circuit-breaker. If in doubt consult an electrician.
- 'Maximum total generation capacity' refers to the total output capacity of the generator. For PV systems in particular, this refers to the maximum output of the inverter. Due to system losses this is typically 10 to 20% lower than the maximum output of the PV panels, which is specified in DC kilo-Watt-peak (kWp). The system designer/installer will provide guidance here.

If SSEG generation capacity is 4.6 kVA or less, a single-phase inverter can be installed even if the customer has a three-phase connection. Systems above 4.6 kVA are required to be balanced across the phases.

## 5.2. Dedicated LV feeders

On dedicated LV feeders the maximum generator size is limited to 75% of the NMD.

## 5.3. Cumulative SSEG capacity and impact on LV and MV networks

Should the cumulative installed capacity of SSEG systems be such that it may impact negatively on local LV or MV network functioning, as per the stipulations of NRS097-2-3, the municipality will not allow further SSEG connections until they can be undertaken without such negative impact. Specialist grid impact studies may be requested of the new SSEG applicant to demonstrate this, even if the system size falls within the NRS097-2-3 parameters.

# 6. SSEG Tariffs

## 6.1. Residential SSEG Tariff

The Residential SSEG tariff comprises of:

- A service and network charge
- Electricity consumption charges for kWh consumed
- A rate per kWh at which the Municipality shall purchase residential generation exported to the grid

### 6.1.1. Network charge

This charge ensures that fixed costs associated with maintaining and operating the municipal electrical grid are recovered through appropriate charges.

### 6.1.2. Service charge

The fixed costs associated with providing a retail service network (metering, billing, customer call centre) are recovered through appropriate service charges.

### 6.1.3. Energy charge (c/kWh)

The variable cost associated with the volume of energy consumed is recovered through appropriate charges. This is billed on a per kWh basis and may be simple (Flat or Inclining Block tariff) or complex (Time of Use or other tariff).

### 6.1.4. Export (Feed-in) rate (c/kWh)

The SSEG customer should be compensated through an export tariff for any resulting reduction of cost to the utility (energy bulk purchase costs and line loss costs).

### 6.1.5. Billing Period

The daily service charge along with charges for consumption and credits for feed-in shall be billed monthly (as is done for other Municipal services e.g. water and rates). Tariffs are determined annually by the Municipality and are subject to approval by NERSA. SSEG applicants should check the Municipality's website ([www.\\_\\_\\_\\_\\_](#)) for the latest tariffs.

### 6.1.6. Increased Costs

The Municipality bears no responsibility should the customer's electricity bill increase due to changes in the applicable tariff. It is up to the customer to ensure that they understand the financial implications of having an SSEG system installed and the applicable tariffs.

**Commented [MB7]:** NOTE TO MUNICIPALITIES: Municipalities may approach SSEG tariff setting differently, so you may need to edit this section to match your specific tariff details.

### 6.1.7. Example Tariff

The following table illustrates how the above tariff components may be quantified.

**Table 2: Example 2015/16 Municipality Residential SSEG Tariff**

Domestic Embedded Generation Tariff	
Daily (service & network) charge	R13.03
Energy 0-600kWh	R1.09 /kWh
Energy 600kWh +	R2.14 /kWh
Export tariff	57c/kWh (VAT Excluded)

### 6.2. Commercial and Industrial SSEG Tariff

Commercial and industrial customers that are on tariffs which already have a fixed service charge and network demand charge will remain on this tariff, and an export (feed-in) generation tariff component will be added for reimbursement for energy exported onto the municipal electrical grid. Customers on a tariff that does not include fixed service charge and demand charge will be changed to an appropriate tariff.

Commercial and Industrial customers should note that the demand charge component of the tariff is unlikely to change after the installation of the SSEG because the monthly maximum demand is unlikely to reduce due to the regular occurrence of cloudy weather.

Time of Use tariffs are considered best practice for both consumption and export (feed-in) tariffs, and municipalities may increasingly move to such tariffs over time.

Tariffs are determined annually by the Municipality and are subject to approval by NERSA. SSEG applicants should check the Municipality's website for the latest tariffs.

## 7. Approvals required from other municipal departments

### 7.1.1. Planning and Building Development Management

No building plans are required to be submitted provided the SSEG installation does not project more than 1.5 m, measured perpendicularly, above the roof and/or not more than 600mm above the highest point of the roof. If the above parameters are exceeded then full building plans, including an engineer's endorsement, are required. A relaxation in terms of the Zoning Scheme Regulations is also required under either one or both of the above circumstances.

**Commented [MB8]:** NOTE TO MUNICIPALITIES: Check with Buildings Dept.

**Ground-mounted PV systems:** no building plans are required to be submitted provided the panel(s) in its installed position does not project more than 2.1 metres above the natural/finished ground level. Full building plans are required where any part of the installation projects more than 2.1 metres above the ground level.

### 7.1.2. Environmental Approvals

Solar PV SSEG installations covered by this document do not require Environmental Approval<sup>1</sup>.

<sup>1</sup> Large-scale embedded generation installations would require environmental authorisation (EA) in terms of the NEMA 2010 EIA Regulations if they generate > 10 MW electricity. In addition the electrical transmission infrastructure that may be

## 8. Who pays for what?

The customer is responsible for paying for the following:

- The supply and installation of meters (in accordance with the Municipality's metering policy)
- Specialist municipal electrical grid impact studies (if required)
- Any changes required to the municipal electrical grid upstream of the connection point as a result of the SSEG installation.
- Specialist test that are required, e.g. Inverter testing
- Any other costs associated with obtaining approval for the SSEG connection to the municipal grid

**Commented [MB9]:** NOTE TO MUNICIPALITIES: Check that customers paying for meters is in accordance with your metering policy, and edit as necessary.

## 9. Residential, Commercial and Industrial SSEG application process

The *Application for the Connection of Solar PV Embedded Generation* form shall be completed for all embedded PV generation. Should metering changes be required for the SSEG installation, the general application form for new or modified connections shall also be completed. The forms are available on the Municipality's website.

**Commented [MB10]:** NOTE TO MUNICIPALITIES: Check that this is consistent with your processes.

- **Step 1: Visit the Municipality website**
  - Visit the Municipality's website (www. ) and download the relevant application form/s as noted above.
- **Step 2: Complete application for the connection of solar PV small scale embedded generation form and, if required, the general application form for new or modified connections**
  - The Municipality requires that the application form/s be signed by the current electricity account holder.
  - Details of the proposed installer shall also be provided.
  - The applicant may need support from the proposed installer or a registered professional in completing the application form.
- **Step 3: Obtain permission from other Municipality departments**
  - The Electricity Services Department requires prior approval of the proposed SSEG installation from Planning and Building Development Management Department.
- **Step 4: Submit completed application form/s and attachments**
  - Form/s shall be submitted to the relevant contacts at the Electricity Service Department.
  - Attachments to the application include an initial design circuit diagram (for >100kVA systems) and the inverter certification of compliance with NRS 097-2-1.
- **Step 5: Installation commencement upon approval from the municipality**
  - After due consideration of the application, the applicant will be informed in writing whether the application has been successful or not.
  - If further information or grid studies are required by the municipality, the applicant will be notified thereof.

associated with a large scale embedded generation system would also require EA if it has a capacity of 275 kV or more within an urban area, or more than 33kV outside urban areas.

- Once notified of a successful application, the applicant may commence installation (it is advised that the applicant does not pay for any equipment until municipal approval to install is granted in writing, as such approval is not guaranteed).
  - **Step 6: Commissioning and documentation to be submitted to the Electricity Services Department.**
    - Commissioning of the system shall be undertaken by a registered professional, who shall complete and sign off the *SSEG Installation Commissioning Report*.
    - In addition to the Commissioning Report, the following documentation shall also be completed:
      - Final as-built circuit diagram
      - Inverter type test certificate according to NRS 097-2-1.
      - An electrical installation Certificate of Compliance as per SANS 10142-1 (and SANS 10142-3 when published).
      - A signed *SSEG Contract*. This is a legally required contract that governs the relationship between the Municipality and the customer. The contract is valid for as long as the project is in existence.
    - All completed documentation shall be submitted to the relevant **Electricity Services Department** office.
  - **Step 7: Inspection of installation if necessary**
    - The Municipality shall inspect the installation if they deem it necessary, although this is unlikely in the case of a residential application.
  - **Step 8: Approval granted to connect to the municipal electrical grid and generation commences**
    - If all of the above is satisfactory, the Municipality shall install the necessary meter.
    - Approval to connect SSEG to the municipal electrical grid shall be provided by the **Electricity Services Department** to the customer, in writing, together with any operation and other requirements deemed necessary.
    - Once this is done, the change to the tariff shall be implemented if applicable.
  - **Step 9: Repeat the process in the case of SSEG capacity expansion**
    - Should an expansion or a change to the system be required, a new application shall be completed.
-