Document type	Requirements to connect Small Scale Embedded Generation
Approved By	
Date Approved	
Review	

Requirements to become a Small-Scale Embedded Generator in eThekwini Municipality.

Contents

1. Purpose

This document primarily sets out the requirements and application process of the Municipality in connecting all forms of Embedded Generation (EG) to the municipal electricity network. The focus is on Small-Scale Embedded Generation (SSEG), but information is also provided for the connection of larger generators.

2. Scope

This document covers:

- The connection SSEG installations to the municipal electrical network.
- Installations below 1MVA.
- Installations with self-consumption.

The document will assist all relevant stakeholders involved in the commissioning, installation, management, and ownership of an SSEG system, with generation capacity less than or equal to 1 MVA (1000 kVA), including:

- SSEG project developers.
- Residential and commercial property owners.
- SSEG installers.
- Energy consultants commissioned to design SSEG systems.
- Municipal officials involved in SSEG generation.
- Registered technical personnel who are involved in SSEG commissioning.

3. Definitions

Small Scale Embedded Generation- Small-scale embedded generation (SSEG) refers to power generation installations **less than or equal to 1MVA/1000kVA** which are typically located on residential, commercial, or industrial sites, and generated power is mainly for **self-consumption**. SSEG contrasts with large-scale generation units that generate large amounts of power, typically in the multi-Megawatt range, and are often pure generators (not for self-consumption).

Alternating current- 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.

Direct current- 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.

Anti-Islanding- The ability of an SSEG installation to disconnect the SSEG installation instantly and automatically from the municipal electrical network whenever there is a

power outage in the municipal electrical network, thus preventing the export of electricity to the municipal electrical network from the SSEG installation. This is done primarily to protect municipal electrical network workers who may be working on the electrical network and who may be unaware that the electrical network is still being energized by the SSEG.

Bi-directional meter- A meter that separately measures electricity flow in both directions (import and export).

Customer- In the context of this document, customers who also generate shall be referred to as “customers”, although in effect they are generators.

Embedded generator- A generator connected to the municipal distribution network. These are typically on a customer’s property and behind their meter.

Generating capacity- 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.

Grid-tied- An SSEG installation that is connected to the municipal electrical network either directly or through a customer’s internal wiring is said to be “grid-tied”. The export of energy onto the municipal electrical network is possible when generation exceeds the customer’s consumption at any point in time.

Hybrid grid-tied system- A generation configuration, typically solar PV, which includes battery storage and where the system can operate in grid-tied mode as well as independently of the grid – for example during loadshedding.

Inverter - A power device that converts direct current to alternating current at a voltage and frequency which enables the SSEG installation to be connected to the municipal electrical network.

Isolated- A section of a municipal electrical network which is disconnected from all other possible sources of electrical potential is said to be isolated.

Load profile-The profile or curve showing the variation of the customer’s rate of electricity consumption (or demand) over time.

Low-voltage- Voltage levels up to and including 1 kV (1kV= 1000 Volts).

Medium-voltage- Voltage levels greater than 1 kV up to and including 11 kV.

Pr Eng or Pr Tech Eng -This refers to a professional engineer, professional technologist or professional engineering technician who is registered with the Engineering Council of South Africa (ECSA).

Reverse power flow- The flow of energy from the customer electricity installation onto the municipal electrical network (i.e. export) as a result of the instantaneous generation exceeding the instantaneous consumption at the generation site in question.

SSEG Connection Contract-The terms and conditions governing the connection of the SSEG installation to the municipal electrical network accepted by the customer.

Small Scale embedded generator or SSEG- 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 kVA (1MVA).

Stand-alone generator/ off-grid generator- A generator that is not in any way connected to the municipal electrical network. Export of energy onto the municipal electrical network by the generator is therefore not possible.

Grid Tied Solar PV Systems-Solar PV systems that connect to and run in parallel with the grid and don't include any form of energy storage. These systems need the grid supply to synchronize and supply power simultaneously with the utility network. When installed on the customer side of the utility meter, they are mainly installed for self-consumption to reduce the customers' electricity bill. They cannot supply back-up power during a power failure.

Off Grid or Stand-Alone solar PV systems- Off grid solar PV systems, are systems that supply power from both solar and/or batteries through an off-grid inverter that has no electrical connection to the utility grid. These systems can be supported with a back-up generator to charge batteries and/or supply loads when there is insufficient solar PV and/or battery energy available.

Back-up or standby (UPS) systems- Back-up or standby uninterruptable power supply (UPS) systems stors energy in batteries through a charger and then only supplies power to the loads from these charged batteries via an inverter during a power outage. Fuel generators can also be used as back-up or stand by power supply. These systems require a suitable change over switch to select power supply between the utility and the back-up power supply, as the two supplies shall never be supplied simultaneously.

Hybrid Grid Tied Solar PV systems -Grid tied/connected hybrid systems are those that combine two or more energy sources like solar PV, batteries, diesel generator or wind, which are connected to and runs in parallel with the utility network. The most common and most relevant hybrid system for Municipal Distributors is a solar PV - battery hybrid. These systems mainly run from the solar PV and battery power, and only use the utility to supplement the supply when there is insufficient from the PV or batteries. These systems can also operate during a power outage – hence their increasing popularity.

4. Abbreviations

AC	Alternating current
AMI	Advanced Metering Infrastructure
DC	Direct current
ECSA	Engineering Council of South Africa
EG	Embedded Generation/Generator
HV	High Voltage
kVA	kilo-Volt Ampere (unit of apparent electrical power, often similar in magnitude to kW)
kW	kilo-Watt (unit of electrical power)
kWp	kilo-Watt peak (the rated peak output of solar PV panels)
LV	Low Voltage
MFMA	Municipal Finance Management Act
MV	Medium Voltage
MVA	Mega-Volt Amperes (1 MVA)
MW	Mega-Watt (1 MW)
NERSA	National Energy Regulator of South Africa
NMD	Notified Maximum Demand
PV	Photovoltaic
SSEG	Small Scale Embedded Generation/Generator
VAT	Value Added Tax
IPP	Independent Power Producer
POC	Point of Connection
MEC	Maximum Export Capacity
IC	Installed capacity
UPS	Uninterrupted Power Supply

5. 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 solar PV small-scale embedded generation (e.g. 'rooftop' type systems), decentralised generators 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 and standards are established by municipal distributors to regularise this fast changing situation.

Municipal distributors are legally obliged to ensure that distribution grid power quality is maintained, and safety standards are upheld to protect municipal staff working on the network, to protect the public in general, and to protect municipal infrastructure. Also, the potential revenue impact of accelerating EG installations needs to be managed. This requires that specific EG tariffs are introduced.

Municipalities are obliged to provide open and non-discriminatory access to embedded generators according to the Distribution Code and are moving to embrace low-carbon energy and green economic growth opportunities. Municipalities play a vital role in facilitating the growth of the EG market. A user-friendly framework around installation application and approval is important in this regard. Such a framework will also minimise systems being installed without permission, thereby potentially not meeting required safety and quality standards.

This document outlines the eThekwini Municipality requirements and processes for prospective EG installations to connect to the municipal electrical network such that the above factors are balanced. The focus is on SSEG, although broad guidance is provided for larger generators.

5.1 Connecting larger generators to the distribution grid

This document covers SSEG with a detailed focus on generators falling under the simplified connection criteria assessment method (see Table 1). Larger generators typically require Network study Impact and/or Grid Code compliance assessments.

Table 1: Summary of connection assessment requirements for small- and large-scale generators

Generator characteristics			Connection assessment method	
Scale	Size	LV or MV connected generator	Simplified criteria (NRS097-2-3)	Grid studies
Small-scale (up to 1MVA)	<1MVA	LV connected	✓	× (if complies with NRS097-2-3)
		MV connected	×	✓
Large-scale (>1MVA)	>1MVA	LV or MV	×	✓

Large generators and others requiring further grid studies, including all Independent Power Producers (IPPs), should obtain guidance from the municipality.

6. Indemnity, Legal Requirements & Curtailment

6.1 Legal and Illegal Connections to the municipal electrical network

Customers wishing to connect SSEGs to the eThekwini Municipality network are required to follow the normal application procedure as detailed in this document and comply with the regulations, specifications and standards listed herein.

EThekwini Electricity Supply By-Law (as promulgated) and national regulations state that no electrical generation equipment may be connected to the municipal electrical network without the express consent of the Municipal Electricity Distributor.

Failure to obtain this consent constitutes an offence which could lead to a fine and/or disconnection of supply. Furthermore, the installation may also be in contravention of the Occupational Health and Safety Act (1993), for which punitive sanctions also apply.

Customers found to have illegally connected an SSEG installation to the municipal electrical network (either before or after their electricity meter) shall be instructed to have the installation disconnected from the network. Should the customer fail to have the SSEG disconnected from the network, the eThekwini Municipality will disconnect the electricity supply to the property.

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

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

6.2 Generation Curtailment

Maximum export limits for installation will be provided by the Municipality and may be revised from time to time to ensure network stability.

In the event of operating conditions resulting in municipal electrical network 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.

6.3 Right to adapt rules & regulations

In the event of provincial or national legislative changes to the regulatory environment, or other technical developments, it may become necessary to implement changes to the municipal requirements which SSEGs are to comply with. EThekwini Municipality will consider the implications for existing customers of such changes and will require these only where grid safety or other important criteria are potentially compromised. All SSEGs, new and existing, will be obliged to comply with such changes, and will do so at their own cost.

6.4 Right to deny access

On receipt of a complete application for an SSEG installation, the Municipality needs to check that, amongst other considerations, the SSEG installation can be accommodated on the municipal electrical network and that the total SSEG capacity of the municipal electrical network 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 of the SSEG as proposed by the applicant is not guaranteed and the Municipality shall not be held liable for equipment expenses in such cases.

6.5 Unsuccessful applications

Where proposed SSEG systems are not approved by the Municipality, the Municipality will provide information to the customer on amendments to the proposed system required, and/or advise on conditions to be met, for it to be acceptable to the Municipality or further studies required to be carried out at the applicants costs.

6.6 Application processing timeframes

The Municipality will aim to assess applications for SSEG submitted and respond to applicants within reasonable time. Where applications are more complex leading to delays or require further studies, customers will be notified accordingly within this timeframe.

6.7 Recourse for the customer

Where the Customer feels they have been unfairly dealt with by the Municipality, they should address their complaint to the Municipality in writing, or failing a suitable response, they may submit their complaint to NERSA in writing.

6.8 Contract with the municipality

All SSEG customers are required to read and accept the document *General Terms and Conditions for Connection of an Embedded Generator* which is available on the eThekwini website. In accepting the SSEG Application Form, the customer agrees to be bound by the terms and conditions in this document.

6.9 Transfer/change of ownership

If a transfer of the property and/or change of ownership of the electricity accountholder takes place, the new owner needs to sign the declaration in Annex A, which must be submitted to the Electricity Department. Alternatively, the SSEG installation should be decommissioned.

7. General Guidelines - Small Scale Embedded Generators

This section covers important considerations in terms of the eThekwini SSEG rules and regulations that apply to all customers, including residential, commercial, and industrial customers, who wish to connect an SSEG to the municipal grid.

7.1 Registration or Generation licence

In terms of the Electricity Regulation Act (2006), any person that owns or operates a generation facility is required to obtain a generation licence to be issued by NERSA unless otherwise exempt as per Schedule 2 of the Act. Table 2 clarifies NERSA license and registration requirements.

Table 2: NERSA Requirements for different size systems (January 2023 revision of ERA Schedule 2)

System size*	NERSA license?	NERSA registration?
Any size EG with self-consumption (can also export, but no wheeling)	✗	✗
EG for wheeling up to 100kW	✗	✗
EG for wheeling over 100kW	✗	✓

* - applies whether the EG has storage or not

If a generation licence or registration is required in terms of the Electricity Regulation Act (2006), then it is the customer's responsibility to interact with NERSA in this regard. EThekwini Municipality is obliged to report to NERSA on a regular basis regarding all municipal electrical network connected generation and it is also obliged to disconnect generators that are not adhering to regulations.

7.2 Self-consumption vs IPPs (pure generators).

This document focuses on embedded generators which are largely for self-consumption. Independent Power Producers (IPPs) or 'pure generators' (where there is no self-consumption) generally will automatically require grid impact studies, and, if they intend to wheel power, will fall under wheeling policies or regulations of the municipality. Pure generators not wheeling power but receiving export credits from the municipality will also be subject to MFMA conditions (such as a transparent and competitive procurement process).

7.3 Exporting electricity

Municipal requirements regarding embedded generators exporting power back onto the network will be provided by Network planners for dedicated and shared feeders.

7.4 Wheeling.

All generators wishing to connect to eThekwini Electricity network must obtain permission to connect as described in this document, whether wheeling or not. For generators wishing to wheel electricity, the municipality should be approached regarding whether a process for this is in place, and contractual and other arrangements to be complied with.

7.5 Applicable technical standards

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

1. NRS 097-2 series: Grid interconnection of embedded generation: Part 2 Small Scale Embedded Generators, in particular[1]:
    a. *NRS097-2-1: Utility interface*
    b. *NRS097-2-3: Simplified utility connection criteria for low-voltage connected generators*

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 10142-1 and 10142-1-2: The wiring of premises (as amended and published)
4. SANS 474 / NRS 057: Code of Practice for Electricity Metering
5. EThekwini Electricity Supply by-law
6. Grid Connection Code for Battery Energy Storage Facilities (BESF) connected to electricity Transmission System (TS) or the Distribution System (DS) in South Africa.

[1] Note that the Grid Code is the overarching technical regulatory framework applicable to all generators, however the NRS097 series covers the aspects of the Grid Code relevant to SSEG, and therefore the Grid Code does not need to be directly referred to for generators covered by NRS097 specifications.

7.6 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 installation of reverse feed blocking does not exempt the customer from providing the NRS097-2-1 certification.

In general, the test certificate must be for the most recent version of NRS097-2-1. EThekwini Municipality reserves the right not to accept test certificates for old versions of NRS097-2-1.

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 customer should require the inverter supplier to provide the necessary certification before the equipment is purchased.

7.7 Islanding / Anti-Islanding installations

All SSEG installations 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.

Should the inverter or SSEG installation have the facility to both comply with the NRS 097-2-1 requirements for grid-connected systems (including anti-islanding requirements) AND operate in “islanded mode” (or “off grid” mode) where the SSEG installation supplies power to a portion of the customer’s electrical grid during a general power outage, the islanded system shall be effectively isolated from the municipal electrical network during islanded mode operation.

If the SSEG installation is to be configured as a standby supply after isolating from the municipal electrical network (in which case it becomes an ‘alternative supply’, not an embedded generator any longer) using a break-before-make changeover switch, 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 apply.

7.8 Battery or other Storage.

Battery or other storage may be included in the SSEG configuration. Where it is connected in standby power supply mode (i.e., it is not configured to provide power in parallel to the SSEG but only to operate in islanded mode) the provisions for 'island mode' generators in **Section 7.7** Islanding / Anti-Islanding installations apply.

Where storage is connected such that, it can provide power onto the network, it shall do so via an NRS097-2-1 certified inverter. If this is achieved via a separate storage/battery inverter (even only to feed into the customers wiring which is in turn connected to the municipal network), the storage/battery inverter shall be NRS097-2-1 certified, and evidence of such compliance provided to the municipality.

Maximum battery charging current limits are applicable to reduce cold load pickup and are covered in the NRS097-2-3.

7.9 Hybrid inverters operating in islanded (off-grid) mode.

Inverters which can be operated in grid-tied or islanded (off-grid) mode, but where physical wiring connections with the grid exist (e.g. via the distribution board), are considered grid-tied SSEG systems and require municipal permission as described in this document. This applies even if they are being operated in off-grid (islanded) mode. Only where the customer does not have a physically Municipal electricity connection to their property, it is then not considered an embedded generator.

7.10 Fire safety and emergency shut-off switch

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

7.11 Dead Grid safety Lock

Dead Grid Safety Lock shall be in accordance with SANS10142-1-2 (as published).

7.12 SSEG Sign-off on Commissioning

Until SANS 10142-1-2 '*The wiring of premises; Specific requirements for embedded generation installations connected to the low voltage distribution Network in South Africa*' is published, upon commissioning, all SSEGs shall be signed off by Professional Engineer/ Professional Technologist.

7.13 Decommission of SSEG system.

EThekwini requires notice of any SSEG installation which has been decommissioned. The SSEG installation must, at the owners' cost, be disconnected from the municipal electrical network by the removal of the wiring that connects the SSEG with the municipal electrical network and a decommissioning report filed including the provision of a Certificate of Compliance to confirm disconnection.

7.14 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 the SSEG installation to the Eskom electrical grid. The municipality will not be involved in this process.

7.15 SSEG applications from sub-tenants, complex residents or other non-municipal customers.

The municipality will only engage with applications from their existing or new customers. Where an SSEG installation is intended but the person purchases electricity from a re-seller (e.g. landlord/lady, complex body corporate), for example, not directly from the municipality, the application will need to come from the re-seller who is a registered municipal electricity customer.

7.16 Off-grid system

Stand-alone generators (not connected to the municipal electrical network in anyway) will need permission from the Municipal Electricity authority and approvals from other departments may still be necessary (e.g., Building Dept), and it is the responsibility of the owner to comply with any such requirements.

7.17 Advice for the customer

7.17.1 Load profile management to maximise benefit to the customer

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 export/reverse power flow. With solar PV SSEG, for example, with a residential SSEG installation, 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.

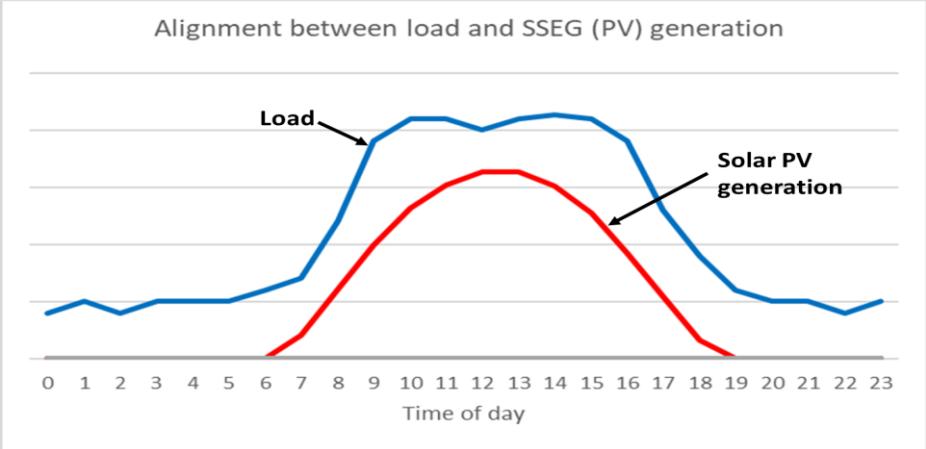

Figure 1: Good alignment between load profile and SSEG (PV) generation

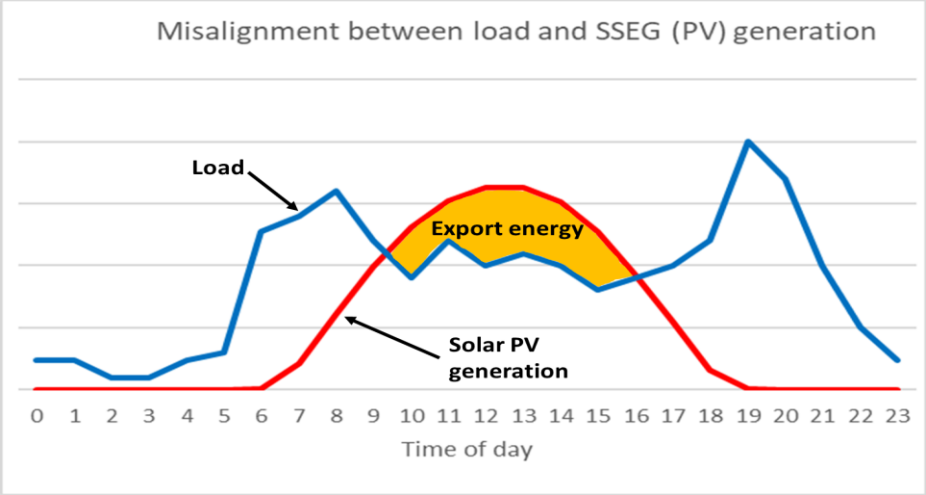

Figure 2: Poor alignment between load profile and SSEG (PV) generation)

7.17.2 Installer experience and accreditation

Customers are advised to check that the installer they intend to use has adequate competence and experience to undertake such projects.

8. Metering

8.1 Metering installation and reverse power flow/ feed-in to the municipal electrical network

All customers installing SSEG, whether with reverse feed blocking or not, shall have an approved bi-directional meter. The Municipality shall provide and install the requisite meter at the customer's cost.

8.2 Adaption of electrical metering installation

EThekwini municipality reserves the right to require customers moving onto an SSEG tariff to adapt their electrical installations in such a way that the metering is in a kiosk in the road reserve. SSEG customers will be informed accordingly should this be required.

8.3 Refunds of electricity already pre-purchased

Where applicants currently have Prepayment meters (PPM), these will need to be replaced with meters appropriate for SSEG systems and tariffs. Refund of Prepayment meter units when a customer changes to the SSEG tariff and has an appropriate meter installed will not be given. The customer should therefore delay the installation of an SSEG-appropriate meter until the units purchased are used. Otherwise, units purchased on the PPM will be forfeited.

9. SSEG connection criteria

Simplified SSEG connection criteria are specified in the NRS 097-2-3 (2023), and applications for systems that fall within these parameters are likely to be easily processed eThekwini Municipality.

Applications to connect SSEG installations which exceed the parameters of the NRS097-2-3 will also be accepted by the eThekwini Municipality but may require specialist grid-impact studies in their assessment. Customers will be advised 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)

9.1 Shared LV feeders

The NRS 097-2-3 specifies that the maximum individual limit on a shared LV feeder (which applies to most small commercial and residential situations) is as follows:

- SSEG nameplate power rating shall not exceed the consumer's NMD (or IC – Installed Capacity).
- SSEG maximum export capacity shall not exceed 25% of the customers NMD.
- Maximum battery/storage charging current shall not exceed 25% of the NMD.

The following SSEG size limitations are derived from NRS 097-2-3 for Shared LV connections.

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

Service connection			**SSEG parameters**		
No phases	Service circuit breaker (A)	Maximum demand (NMD) (kVA)	Max export capacity (kVA) (25%)	Max nameplate power rating (kVA) (100%)	Max battery charging current (per phase) (A) (25%)
1	40	9.2	2.3	9.2	10
1	60	14	3.5	13.8	15
1	80	18	4.6	18.4	20
3	40	28	7	28	10
3	60	41	10	41	15
3	80	55	14	55	20
3	100	69	17	69	25
3	125	86	22	86	31
3	150	104	26	104	38
3	175	121	30	121	44
3	200	138	35	138	50
3	225	155	39	155	56
3	250	173	43	173	63
3	275	190	47	190	69
3	300	207	52	207	75
3	325	224	56	224	81
3	350	242	60	242	88
3	375	259	65	259	94
3	400	276	69	276	100

Notes to table:

- *To determine if it is 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.*

9.2 Dedicated LV feeders

On dedicated LV feeders, the NRS 097-2-3 specifies that the maximum individual limit on a Dedicated LV feeder is as follows:

- SSEG nameplate power rating shall not exceed the consumer's NMD (or UIC – Utility Installed Capacity).
- SSEG maximum export capacity shall not exceed 75% of the customers NMD.
- Maximum battery/storage charging current shall not exceed 25% of the NMD.

The following SSEG size limitations are derived from NRS 097-2-3 for Dedicated LV connections.

Table 4: SSEG size limitations - NRS 097-2-3 for Dedicated LV connections

Service connection			**SSEG parameters**		
No phases	Service circuit breaker (A)	Maximum demand (NMD) (kVA)	Max export capacity (kVA) (75%)	Max nameplate power rating (kVA) (100%)	Max battery charging current (per phase) (A) (25%)
3	125	86	65	86	31
3	150	104	78	104	38
3	175	121	91	121	44
3	200	138	104	138	50
3	225	155	116	155	56
3	250	173	129	173	63
3	275	190	142	190	69
3	300	207	155	207	75
3	325	224	168	224	81
3	350	242	181	242	88
3	375	259	194	259	94
3	400	276	207	276	100
3	500	345	259	345	125
3	630	435	326	435	158
3	800	552	414	552	200
3	1000	690	518	690	250
3	1250	863	647	863	313
3	1500	1035	776	999	375

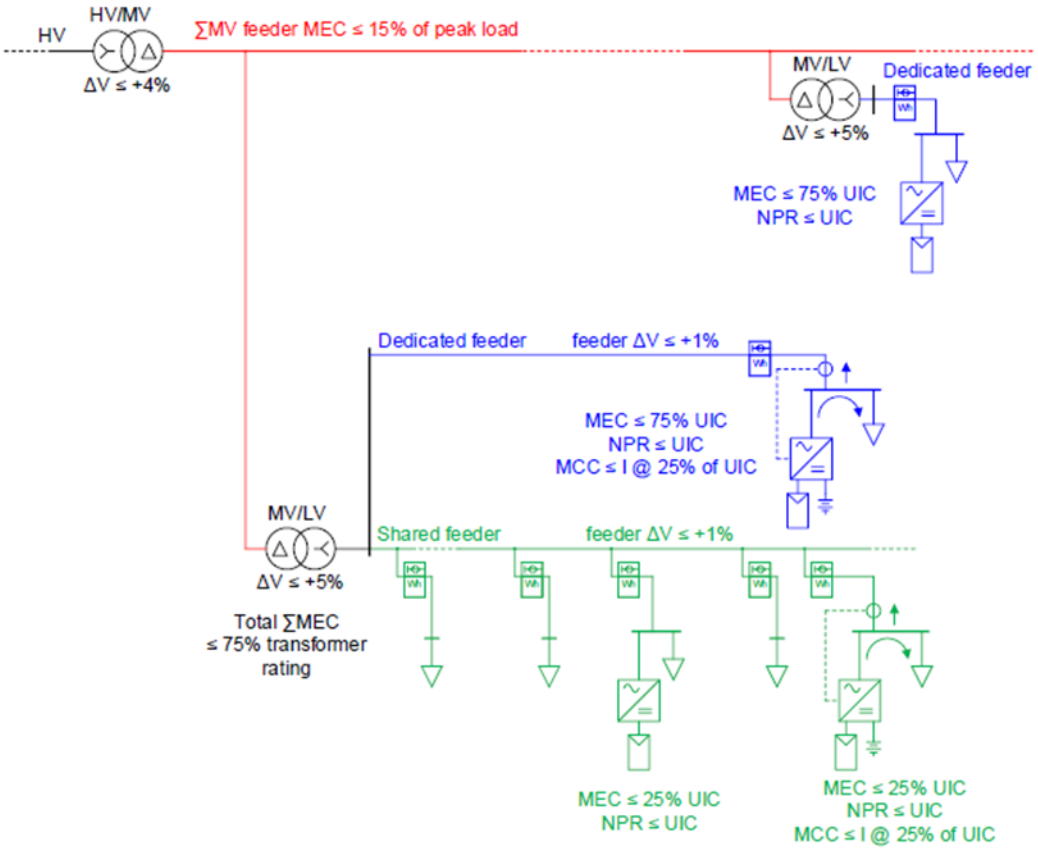

Figure 3: Simplified connection criteria

9.3 Cumulative SSEG capacity and impact on LV and MV networks

Should the cumulative installed capacity of an SSEG installation 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 demonstrated to be undertaken without such negative impact. Increasing the SSEG current carrying capacity on feeders may require network hardware upgrades. Specialist grid impact studies may be requested of the new SSEG applicant to demonstrate the impact, even if the individual system size falls within the NRS097-2-3 parameters.

9.4 Grid/ Network impact studies

Should the SSEG being applied for cause the parameters in the NRS097-2-3 (Simplified Connection Criteria) to be exceeded, either:

- The system should be modified to fall within these parameters, or
- A Grid Impact Study is likely to be requested eThekwini Municipality before the application can be assessed. Content and coverage of such a study may vary depending on the circumstance.

Should such impact studies be required, details of method, data and payment requirements should be discussed with the eThekwini municipality. Responsibilities of the eThekwni municipality (who has the network data) and the customer in completing the study will also need to be clarified. Even in the case of SSEG with no reverse feed, scenarios such as Load Rejection may still need to be assessed in the study. In some cases, Network studies will be required especially in networks saturated with EG.

Where network hardware upgrades are found to be necessary to accommodate the proposed SSEG, costs will be for the customer's account. This should be discussed with the municipality.

10 SSEG Tariffs

The Municipal SSEG tariffs is available on the municipal website or from the Electricity Department offices on request. Tariffs are updated annually.

General information on SSEG tariffs is given below:

10.1 Residential SSEG Tariff

The Residential SSEG tariff comprises the following parts:

Fixed charge: This comprises (1) a Network Access Charge, which ensures that fixed costs associated with maintaining and operating the municipal electrical network are recovered through appropriate charges.

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 rate).

Export (Feed-in) credit (c/kWh): The compensation to the customer for energy provided back onto the network.

10.2 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 retain a similar tariff structure, and an export (feed-in) generation tariff credit will be added for reimbursement for energy exported onto the municipal electrical network. Customers on a tariff that does not include fixed service/network charge and demand charge will be changed to an appropriate Net billing 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.

10.3 Billing Period

The service charge along with charges for consumption and credits for feed-in will be billed monthly. Any credits from excess SSEG generation in a particular month will be rolled over to the following month.

10.4 Connection Costs

The municipality may stipulate a connection cost to be paid by SSEG customers prior to system generation approval. This will be reflected on the proforma invoice provided to the customer.

10.5 Increased Costs

The municipality bares 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 installation installed and the applicable tariffs.

10.6 Time-of-Use Tariffs

Time of Use tariffs are considered best practice for both consumption and export (feed-in) tariffs, and EThekwini Municipality may move all customers to such tariff in future.

11 Approvals required from other municipal departments

Where relevant, approvals required of other municipal departments are to be obtained prior to submission of the SSEG application form.

11.1 Other Approvals

SSEG installations covered by this document generally do not require Environmental Impact Assessments.
For generators that produce noise or air pollutants (e.g., diesel generators, gas generators, coal generation), approval from other Municipal Departments is required (e.g. Health, Environment).

12 What payments may be due by the customer?

The customer is responsible to pay for the following:

- The supply and installation of bi-directional meter (in accordance with the eThekwini Electricity's metering policy).
- Schedule of connection charges (if applicable)

- Specialist Municipal electrical network impact studies – if required.
- Any changes required to the municipal electrical network 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 (re-inspection fees, etc)

13 SSEG application process

- **Step 1: Makes an application**
  - Customer makes an application on the eThekwini Electricity website under SSEG.

- **Step 2: Complete application form for the connection of SSEG**
  - EThekwini Municipality requires that the application be signed by the current electricity customer/account holder.
  - Details of the proposed installer shall also be provided.
  - The customer may need support from the proposed installer or registered personnel in completing the application form.
- **Step 3: Obtain permission from other Municipality Departments**
  - Electricity Department may require prior approval of the proposed SSEG installation from other departments (e.g, Buildings Department) if relevant. All relevant approvals must be reflected in or submitted with the application form.

- **Step 4: Submit completed application form/s and attachments**
  - Attachments to the application include the detailed design circuit diagram and inverter NRS097-2-1 certification.
  - Customer's ID document or company /organisation registration documents.

- **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.
  - Once notified in writing 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 Department.**
  - Once installation is complete, commissioning of the SSEG installation shall be undertaken by a professionally registered Engineer/ Technologist with ECSA, who shall complete and sign off the SSEG Installation Commissioning Report.
  - In addition to the SSEG Installation Commissioning Report, there is a list of other documentation specified on the Commissioning Report for submission with the Report, including:
    - 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 10142-1-2 when published).
    - All completed documentation shall be submitted online or to the relevant electricity department office.

- **Step 7: Inspection of installation if necessary**
  - EThekwini Municipality reserves the right to inspect the SSEG installation.

- **Step 8: Approval granted to connect to the municipal electrical network and generation commences**
  - If all the above is satisfactory, the necessary meter will be installed by the municipality.
  - Approval to connect the SSEG installation to the municipal electrical network shall be provided by the Electricity Department to the customer, in writing, together with any operation and other requirements deemed necessary.
  - Once this is done, the change to the SSEG tariff shall be implemented.

14 Changes to existing approved systems

SSEG installations that have previously been approved by the municipality but where changes to the SSEG are planned, will require the following:

14.1 A new application shall be completed when the following is intended:

- An expansion in the SSEG capacity
- A change in the SSEG configuration (e.g. adding storage)

14.2 A new commissioning process needs to be undertaken, and a new Commissioning Report completed, when the following changes are made:

- Significant components are replaced (i.e., inverter, anti-island device, other protection equipment) but system capacity is not increased
- A system is moved but no changes to capacity or significant components are made (i.e. inverter, anti-island device, and other protection equipment all stay the same)

15. ANNEX A: New Owner/Account Holder Declaration

In the event of transfer of property and/or ownership, the below Declaration is to be signed by new owner / account holder:

Declaration regarding the SSEG system located at:	
Property Erf number:	
Physical address:	

Township / Suburb / Farm		Post code:
Site GPS coordinates:	Latitude (dd mm ss)	S ° '
	Longitude (dd mm ss)	E ° '
Name of owner/account holder:		
Electricity Account Number:		
Telephone Number:	Land:	
	Mobile:	
Email Address:		

Acceptance of Terms and Conditions

I, the Customer (Account Holder) acknowledge that I have read and understood the General Terms and Conditions: Contract for Connection of Embedded Generator and that by signing this declaration form, I agree to be bound by the General Terms and Conditions: Contract for Connection of Embedded Generator. I note that a copy of the General Terms and Conditions: Contract for Connection of Embedded Generator can be found on the Municipal website or is obtainable from the Electricity Department offices on request. Any amended terms and conditions found on the website will form part of the terms and conditions of the General Terms and Conditions: Contract for Connection of Embedded Generator, to which terms I, the Customer, agree to be bound. The information provided in the SSEG Application Form accepted by the Municipality also forms part of the General Terms and Conditions: Contract for Connection of Embedded Generator.

Customer (Account Holder) Signoff:

_____	_____	_____
Name	Date	Signature

The declaration must be submitted to the Electricity Department.