



GUIDELINES FOR EMBEDDED GENERATION

Application process to become an
embedded generator in
Overstrand Municipality

Reviewed: 21.01.2022

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Foreword

The purpose of this document is to give guidance regarding Overstrand Municipality's requirements and application process for connecting all forms of small-scale sustainable embedded generation such as photovoltaic panels to Overstrand Municipality's electricity network, including both renewable energy and cogeneration. The approval process for a small-scale embedded generation (SSEG) installation in Overstrand Municipality varies depending on the size of the system and consumer category. This guide applies to systems with a generation capacity smaller than 1 MVA (1000 kVA), and all SSEG applicants up to this limit are required to comply with the conditions and processes described herein. In addition, for systems over 17.3kVA an initial consultation with Overstrand Municipality is mandatory to determine the full set of requirements before proceeding.

Note: It is important to ensure that you have the latest version of the various application forms and other relevant documents before proceeding with an SSEG application. These are available on Overstrand Municipality's website.

Glossary

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.

Anti-Islanding

The ability of an SSEG installation to instantly and automatically disconnect the generator from the local utility grid whenever there is a power outage in the utility grid, thus preventing the export of electricity to the utility grid from the SSEG. This is done primarily to protect utility workers who may be working on the utility grid and who may be unaware that the grid is still being energized by the SSEG.

Bi-directional meter

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

Cogeneration

The generation of electricity using waste heat.

Consumer

In the context of this document, consumers who also generate will be referred to as "consumers", although in effect they are "consumer/generators".

Dedicated network

Section of the utility grid that exclusively supplies a single consumer.

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.

Generating capacity

The maximum amount of electricity, measured in kilovolt Amperes (kVA), which can flow out of the generation equipment into the consumer's alternating current wiring system. This is therefore the maximum alternating current power flow which can be generated.

Grid-tied

An SSEG that is connected to the utility electricity grid either directly or through a consumer's internal wiring is said to be "grid-tied". The export of energy onto the utility grid is possible when generation exceeds consumption at any point in time. Such consumers would rely on the utility grid to supply them with electricity when their instantaneous generation is insufficient to supply their instantaneous consumption.

Inverter

A power device that converts direct current to alternating current at a voltage and frequency which enables the generator to be connected to the utility grid.

Isolated

A section of an electrical network which is disconnected from all other possible sources of electrical potential is said to be isolated.

Load profile

The variation of the consumers 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 33 kV.

Net consumer

A net consumer is someone who purchases (imports) more kWh of electricity than they export (sell) over any 12 month period.

OM

'OM' refers to Overstrand Municipality and will be referred to as such throughout this document.

Point of Common Coupling

The nearest point on the electrical network where more than one customer is connected.

Point of Connection

An electrical node on a distribution system where the customer's electrical assets are physically connected to the utility's grid (in this case the Overstrand Municipality's grid).

Pr Eng or Pr Tech Eng

This refers to a professional engineer or professional technologist who is registered with the Engineering Council of South Africa (ECSA).

Reverse power flow

The flow of energy from the consumer electricity installation onto the utility grid (i.e. export) as a result of the instantaneous generation exceeding the instantaneous consumption at the generation site in question.

Reverse power flow blocking

A device which prevents power flowing from an embedded generator back onto the utility grid.

Shared network

A section of the utility grid that supplies more than one consumer.

Small-scale embedded generator

A small-scale embedded generator for the purposes of these guidelines is an embedded generator with a generation capacity of less than 1000 kVA (1MVA).

Stand-alone generator

A generator that is not in any way connected to the utility grid. Export of energy onto the utility grid by the generator is therefore not possible.

Utility

The electricity distribution service provider responsible for the electricity grid infrastructure to which the consumer is connected. (Both Overstrand Municipality and Eskom, are responsible for portions of the electricity network within the Overstrand Municipality's boundary.)

Utility Network (or Utility Grid)

The interconnected network of wires, transformers and other equipment, covering all voltage ranges, and belonging to Overstrand Municipality which supply consumers in the Overstrand Municipality's distribution area with electricity.

Wheeling

The deemed transportation of electricity, over a utility's electrical network from an SSEG to a third party electricity consumer.

Abbreviations

ADMD: After Diversity Maximum Demand

AC: Alternating Current

DC: Direct Current

ECSA: Engineering Council of South Africa

EG: Embedded Generation

ETD: Electro Technical Department

kVA: kilo-Volt Ampere (unit of 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

MV: Medium voltage

MVA: Mega-Volt Amperes (1000 kVA)

NERSA: National Energy Regulator of South Africa

NMD: Notified Maximum Demand

PCC: Point of common coupling

PoC: Point of Connection

PV: Photovoltaic

RPP: Renewable Power Plant

SSEG: Small Scale Embedded Generation/Generator

VAT: Value added tax

Important Notices

Compliance with the Law

Paragraph 39(1) of Overstrand Municipality's Electricity Supply By-law, states that no generation equipment may be connected to the grid without the express consent of the Director of the Electrical 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.

Consumers found to have illegally connected SSEG to the grid (either before or after their electricity meter) will be instructed to have the installation disconnected from the grid. A Certificate of Compliance issued by an authorised electrical contractor will be required as proof of such disconnection.

Should the consumer fail to have the SSEG disconnected from the grid, the Electro Technical Department will disconnect the electricity supply to the property (as provisioned for in the Electricity Supply By-law).

Consumers wishing to connect SSEG legally to the OM grid will be required to follow the normal application procedure as detailed in these guidelines.

NO exemption from ANY of OM's requirements will be granted for "retrospective applications".

SSEG Tariff Structure

OM is currently considering introducing a Residential SSEG tariff. The developing of a Regulatory Framework on Small Scale Embedded Generation is in process, but at this stage it is uncertain when it will be completed.

These Regulations may or may not have a material effect on the OM's SSEG scheme as detailed in these Guidelines.

Generating licence

Existing legislation requires that anyone generating electricity "not for own use" must obtain a generating license from the National Energy Regulator of South Africa (NERSA). Clarity is still required whether feeding surplus generation back onto the utility grid and then drawing the same amount of electricity off the grid at a later stage for consumption is regarded as being "generation for own use".

In the absence of this clarity, OM will not require SSEG's smaller than 1 MVA to obtain such a license provided that, over any consecutive 12-month period, they do not feed more electricity into OM's grid than they purchase from OM.

OM will register and authorise grid connections of SSEG's up to 1 MVA without evidence of a generation license. Anyone wanting to connect 1 MVA or greater must produce a generating license or exemption letter from NERSA with their application, failing which the application will not be considered.

Consumers authorized by OM may still be required by NERSA to obtain a generating licence. Consumers are responsible directly to NERSA for obtaining a generating license and OM accepts no liability should NERSA refuse a generating license and OM subsequently withdraws registration and authorisation.

OM is obliged to report to NERSA on a regular basis regarding all grid connected generation. Should NERSA refuse a generating licence the generator must be

disconnected from the grid unless the consumer has received an exemption from NERSA in this regard.

Any queries requiring clarity in this area must be directed to NERSA.

Professional Sign Off

Until such time as SANS 10142-Parts 3 (The Wiring of Premises – Embedded Generators) and 4 (The Wiring of Premises – Direct Current and Photovoltaic) are published and until such time as a SABS mark is issued for inverters, all embedded generation systems installed on the Overstrand Municipality's grid must be signed off on commissioning by an ECSA registered professional engineer or technologist as complying with OM's requirements.

Testing of Inverters

Until such time as an SABS mark is issued for inverters, OM will require proof in the form of test certificates, of type tests having been successfully carried out by a third party test house certifying compliance of the inverters with the requirements of OM and NRS097-2-2.

1. Introduction

Heightened environmental awareness, dramatic increases in the price of electricity, rapidly decreasing costs of photovoltaic (PV) panels, and the risk of national power blackouts have all resulted in electricity distributors around the country being inundated with requests to allow electricity consumers to connect PV and other SSEGs to the electricity grid. Such SSEGs would be connected to the wiring on the consumer's premises which is in turn connected to, and supplied by OM's electricity network – thus these generators are considered to be 'embedded' in the local electricity grid. One of the major advantages of such a grid connected system is obviating the need for backup batteries which stand-alone renewable energy generators usually require.

The parallel connection of any generator to the electrical grid, however powered, has numerous implications for the local electricity utility. The most pressing are the safety of the utility staff, the public and the user of the generator. Further implications include the impact of the physical presence of the generation on neighbours (e.g. visual, noise), the impact on the quality of the local electrical supply, and metering and billing issues. There is therefore a strong need for such practice to be regulated for the general benefit and protection of citizens and manageability of the distribution network.

Consequently OM's Electricity Supply By-law requires that anyone wanting to connect a generator to OM's electricity grid must obtain consent from the Director of the Electrical Services Department (ESD). This document outlines OM's requirements in this regard and lays out the associated application processes.

Although the electricity distribution industry is highly regulated, SSEGs have not yet been adequately covered in national policy or legislation. In this void, OM has developed policies and practices which it believes are consistent with broader national policy. In particular, OM does not believe it is allowed to purchase electricity at a greater cost than it would have paid Eskom for the generated electricity. OM also does not believe consumers are permitted by national legislation to sell electricity to OM in excess of what they purchase from OM over any consecutive 12-month period.

Consumers wishing to install an SSEG and feed power back onto the utility grid are required to move onto the SSEG tariff, which includes a monthly basic- and monthly infrastructure charge in order to cover the operating costs of the utility network.

2. Defining small-scale embedded generation

Small-scale embedded generation (SSEG) refers to power generation under 1MVA, such as PV systems or small wind turbines which are located on residential, commercial or industrial sites where electricity is also consumed. SSEG is in contrast to large-scale wind farms and solar parks that generate large amounts of power, typically in the multi-Mega Watt range. Most of the electricity generated by an SSEG is consumed directly at the site but times arise when generation exceeds consumption and typically a limited amount of power is allowed to flow in reverse - from the consumer onto the utility grid. A SSEG therefore generates electricity that is "embedded" in the local electricity distribution network in that it is connected to the utility network on the consumer's side of the utility's electricity meter.

3. Who the document is for

This Guideline is to assist consumers who wish to connect an SSEG, with generation capacity smaller than 1 MVA (1000 kVA), to OM's electricity grid. It is intended to provide guidance in this regard to:

- SSEG project developers
- Commercial and Industrial building owners
- Residential buildings owners
- SSEG installers
- Energy consultants commissioned to design SSEG systems
- OM officials involved in SSEG generation
- Professional Engineers or Technologists involved in SSEG commissioning

It is essential that all consumers wishing to install an SSEG, regardless of generation capacity, complete the relevant sections of the application process in full, and that written approval is received from OM before system installation commences. OM needs to ensure that, amongst other considerations, the SSEG installation can be accommodated on the electrical network and that the total SSEG generation capacity of the network has not been exceeded. Equipment should therefore not be purchased prior to obtaining written approval from OM as approval is not guaranteed and OM will not be held liable for equipment expenses where approval is denied.

For commercial and industrial systems in particular an initial consultation with OM to determine the full set of requirements is highly recommended prior to submission of the application form.

This document does not apply to those who wish to install a system with generation capacity of greater than 1 MVA (1000 kVA). For such systems a meeting should be arranged with OM in order to establish the necessary requirements and application process. Anyone wanting to connect 1 MVA or greater will not be able to connect under the conditions of these guidelines. In addition a generating licence or exemption letter from NERSA will be required before connection is considered.

Eskom consumers

Consumers residing in Overstrand Municipality's boundary, but located in Eskom's area of supply, need to apply to Eskom for consent to connect SSEG to the electrical grid.

Stand-alone generators

Generators that are not connected to the electricity grid in any way, and are thus 'stand-alone' generators, do not need permission from OM's ESD. However, approvals from other OM departments are still necessary, such as from the Environmental, Planning and Building Development Department. It is the responsibility of the prospective stand-alone generator installer or owner to directly obtain these necessary approvals.

4. SSEG systems not permitted

Net generators are not permitted

- a. SSEGs can either be “net consumers” or “net generators”: “Net consumers” on average (over a consecutive 12-month period,) purchase more electricity from the utility than they feed back onto the utility grid.
- b. “Net generators” on average (over consecutive 12-month period) purchase less electricity from the utility than they feed back onto the utility grid.

SSEGs which are net generators are not permitted by OM, and these guidelines therefore apply only to net consumers.

As mentioned in the introduction, OM does not believe it has a legal mandate to purchase electricity, on average taken over any consecutive 12-month period, in excess of what it sells to the consumer in question.

Transfer of power to a different location is not permitted:

The power produced by the SSEG must be utilised on the property on which the power is generated, or fed onto the utility network for purchase by OM. The following are not permissible:

- Installation on a different property to where the power is used (e.g. installing solar PV panels on a neighbour’s house roof).
- Supplying power from an SSEG on your premises to another premises (e.g. selling power to neighbours or to another premises elsewhere in OM). This is also known as wheeling.

5. Operation of Generators during General Grid Power Outages

Grid-tied inverters are generally not designed to operate in “islanded mode” where the generator supplies power to a portion of the consumer’s network during a general grid power outage. Should the inverter have this facility, it must be effectively isolated from OM’s grid during operation (as is legally required of any back-up generator). SANS 1042-1:2012 Annexure S gives an example of what is required in this regard. The generator may not be reconnected to OM’s grid unless properly synchronised with OM’s grid.

The consumer’s proposed installation must be approved by OM before installation commences. A written description of the proposed scheme supported by drawings must be provided to OM in this regard.

6. SSEG system decommissioning

Overstrand Municipality requires notice of any SSEG system which has been decommissioned. An SSEG system which has been decommissioned must be physically disconnected from the grid at the consumer’s cost by the removal of wiring which connects the inverter/s with the grid.

The Decommissioning Report in Appendix 4 of this document must be completed and submitted to OM’s ESD office.

7. Change of property ownership

When transfer of ownership of a property takes place which has SSEG installed, the new owner will be required to sign a new Supplemental Contract or alternatively the SSEG system must be decommissioned as detailed in paragraph 5 above.

The Certificate of Compliance which is required to be issued as a condition of transfer of ownership of the property must include a statement regarding the state of connection or disconnection.

At the time that the CONSUMER ceases to be on the SSEG tariff, any remaining credit balance will be refunded to the CONSUMER on written request provided that the CONSUMER has no other outstanding municipal debt.

8. Budgetary Estimates of costs for metering changes

Budgetary estimates of costs that OM would charge for metering changes can be obtained from the relevant ESD Section as detailed elsewhere.



SECTION A:
RESIDENTIAL
SMALL-SCALE EMBEDDED
GENERATORS

1. General Requirements: Residential

1.1 Generation size limitations

The generation size limits for residential consumers wishing to install an SSEG are detailed below:

Service connection

No. of Phases*	Service Circuit Breaker Size (A)	Maximum Total Generation Capacity** of SSEG (kVA***) to the grid	Maximum Inverter Capacity (kVA)	Maximum Battery Charging Current Limit (A) per Phase from the Grid
1	40	2.3	9.2	10
1	60	3.5	13.8	15
1	80	4.6	18.4	20
3	40	6.9	27.7	10
3	60	10.4	41.6	15
3	80	13.9	55.4	20
3	100	17.3	69.3	25

Table 1. Residential SSEG size limitations as derived from NRS 097-2-3

* 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 export to the grid. For PV systems in particular, this refers to the maximum output of the inverter to the grid as limited either by hardware, or by software pass-word protected settings. The system designer/installer must provide guidance.

*** kVA and kW ratings for SSEG's are similar in most cases and can be used interchangeably for estimation purposes.

Note: The generation size limits in the table apply to normal residential connections on a shared low-voltage (LV) network. Consumers who wish to apply for an installation with a generation capacity exceeding the limits in the above table must consult with ESD before commencing.

Note: If SSEG generation capacity is 4.6 kVA or less, a single-phase inverter can be installed even if the consumer has a three-phase connection. However, it is the responsibility of the consumer to ensure that their load is balanced across all three phases. A qualified electrician, engineer or technologist should be consulted here.

1.2 Generation Capacity Categories

The residential generation capacity categories are detailed below

A. Grid-tied SSEG:

1. Inverter Maximum Total Generation Capacity for export to the grid in accordance with table 1.
2. Maximum inverter capacity is limited to customer's service connection circuit breaker size as per Table 1.

B. Grid-tied hybrid SSEG:

1. Inverter Maximum Total Generation Capacity for export to the grid is in accordance with Table 1.
2. Maximum inverter capacity is limited to customer's service connection circuit breaker size as per Table 1.
3. Battery capacity is unlimited.
4. Maximum Battery Charging Current Limit is 25% of the customer's service connection circuit breaker size as per Table 1. This limit must be specified on the inverter's serial-plate or if software adjustable, the setting must be password protected.
5. If essential loads are interconnected with the grid, the compulsory change-over switch shall comply with SANS 60947-6-1.

C. Standby SSEG (Interconnected with electrical installation)

- a) Type 1: Passive standby UPS utilised as off-grid hybrid SSEG:
 1. Maximum inverter capacity is limited to customer's service connection circuit breaker size as per Table 1.
 2. Battery capacity is unlimited.
 3. Maximum Battery Charging Current Limit is 25% of the customer's service connection circuit breaker size as per Table 1. This limit must be specified on the inverter's serial-plate or if software adjustable, the setting must be password protected.
 4. No export allowed
 5. Compulsory isolation change-over switch shall comply with SANS 60947-6-1
- b) Type 2: Alternative supply:
 1. Maximum inverter capacity is limited to customer's service connection circuit breaker size as per Table 1.
 2. Battery capacity is unlimited.
 3. No battery charging from the grid is allowed
 4. No export is allowed
 5. Compulsory isolation change-over switch shall comply with SANS 60947-6-1

D. Off-grid (separated and not interconnected with electrical installation):

1. No inverter or battery capacity limit

1.3 Electricity Generation Licences

Presently, consumers wishing to install an SSEG with a generation capacity of less than 1000 kVA are not required by OM to obtain a generating license from NERSA before consent is given by OM to connect to the electricity grid.

Consumers authorized by OM may still be required by NERSA to obtain a generation licence.

Such consumers are responsible directly to NERSA for obtaining a generation licence and OM accepts no liability should NERSA refuse a generation license and OM suspends registration and authorisation. OM is obliged to report to NERSA on a regular

basis regarding all grid connected generation. Should NERSA refuse a generation license the generator must be disconnected from the grid unless the consumer has received an exemption from NERSA in this regard.

1.4 Metering and Tariffs

Residential consumers may adopt one of two approaches to connecting SSEG to the grid:

- i. Consumers wanting to connect SSEG to the grid without being compensated for reverse power flow will be required to install reverse power flow blocking protection to prevent reverse power flow onto the electricity grid. The consumers may then, subject to the ruling policies for tariffs and metering, keep their existing meter and remain on the relevant electricity consumption tariff. In other words, for this option the conventional credit or prepayment meter is NOT allowed to run backwards.
- ii. Residential consumers installing SSEG who wish to participate in the SSEG tariff must have a bi-directional AMI credit meter installed. OM will provide and install the requisite meters at the consumer's cost. The SSEG tariff is only available to consumers who are "net consumers" and it is specifically not available for consumers who are "net generators". In order to qualify for the Residential SSEG tariff consumers must have excess (net) generation to regularly require the facility to feed excess power back onto the municipal grid. It will be at the Electrical Services Department's discretion to decide whether consumers will be allowed on the residential SSEG tariff. Consumers may be moved off the tariff if they do not have sufficient regular excess (net) generation. They will be required at their own cost to install reverse power flow blocking protection and a prepayment meter and they will forfeit any expenditure they incurred on having bi-directional metering installed.

Consumers (with single or three phase supplies) wishing to participate in the SSEG tariff must have a meter box installed on the property boundary if such facility does not currently exist.

Refund of Prepayment meter (PPM) units when a consumer changes to the SSEG tariff and has an AMI (credit) meter installed:

- a) PPM vending unit tokens already loaded on the PPM:
 - The consumer may delay the installation of an AMI meter until the electricity units already loaded on the PPM have been used up. (If the consumer wishes to proceed with grid connected SSEG with a PPM then a reverse power flow blocking protection system must be installed.)
 - Alternatively the consumer may elect to forfeit the units on the PPM and proceed directly with the installation of the AMI meter.
- b) PPM vending unit tokens not yet loaded onto the meter:
 - The consumer may request a refund. The token will be validated to confirm that it has not been used after which the consumer will be refunded at the original tariff rate at which the token was purchased. The refund will be credited to the customer's municipal account and will not be paid out in cash.

Tariffs are determined annually by OM and are subject to approval by NERSA. The current tariffs are to be found on OM's website (www.overstrand.gov.za).

The applicable SSEG tariff is the *small-scale embedded generation tariff* and comprises:

- A monthly basic charge
- A monthly infrastructure charge
- An electricity consumption (IBT) charge per kWh consumed
- A rate per kWh at which OM will purchase residential excess generation

The monthly basic- and monthly infrastructure charge along with charges for consumption and credits for generated electricity fed onto the utility network will be billed monthly (as is done for other OM services e.g. water and rates).

Example of payments and refunds for a residential SSEG tariff.			
Residential Tariffs 2020/2021*			
	Units	Tariff excl VAT	Tariff incl VAT
Basic Monthly Charge per meter	R/month	356.20	409.63
Infrastructure Charge per Meter per month	R/month	16.65	19.15
Energy charge – consumption (0-350 units)	c/kWh	136.67	157.17
Energy charge – consumption (351 – 600 units)	c/kWh	200.72	230.83
Energy charge – consumption (>600 units)	c/kWh	246.62	283.61
Energy charge – generation**	c/kWh	73.22	N/A

Typical monthly account if consuming 500kWh and generating 100kWh excess in a particular month						
	Units	Amount	Applicable tariff (excl)	Applicable tariff (incl)	Rand excl VAT	Rand incl VAT
Basic Charge	Month	1	R 356.20	R 409.63	R 356.20	R409.63
Infrastructure charge	Month	1	R16.65	R19.15	R16.65	R19.15
Purchase for consumption (0-350 units)	kWh	350	136.67c	157.17c	R478.35	R550.10
Purchase for consumption (351-600 units)	kWh	150	200.72c	230.83c	R301.08	R346.25

Credit for generation**	kWh	100	73.22c	N/A	-R73.22	N/A
Total payment						R1251.91

* - these tariffs are given as an example. Please check the OM website for the current tariffs.

** - this amount has no VAT added as residential consumers are not VAT registered.

Note: For residential consumers, payment for excess generation will exclude VAT.

1.5 Load profile management

The SSEG tariff has been structured in such a way that consumers will find it most beneficial, from a financial and practical point of view, to ensure that they utilise as much of the generated electricity as they can and avoid or minimise reverse power flow. For example, where a PV system is installed, loads should be shifted to occur during the middle of the day when generation is typically at its highest – when the sun is shining. This means that consumers should arrange that loads such as pool pumps, geysers etc. are switched on during this time – from mid-morning to mid-afternoon (roughly from 10:00 until 15:00) when PV generation is at a maximum, and are switched off after sunset.

1.6 Grid studies

Under normal circumstances grid studies are not required for the connection of a residential SSEG that is within the limits detailed in Table 1 above.

1.7 Who pays for what?

- The residential consumer is responsible for all the costs involved in the supply and installation of meters.
- The consumer will be responsible for the cost of any specialist grid studies (although such studies are unlikely in the case of residential SSEG installations).
- The consumer will be responsible for any changes required to the utility network upstream of the connection point as a result of the SSEG installation (although the need for such changes is unlikely).
- The consumer will be responsible for all the costs associated with specialist tests that need to be carried out, e.g. Inverter testing, as well as for obtaining the required certification of the design and installation as detailed below.

1.8 Applicable technical standards

Most of the technical requirements for SSEG's are covered in the following standards and guidelines (note that these do not necessarily cover all requirements for SSEG systems - see Appendix 1 for the complete list):

1. NRS 097-2: Grid interconnection of embedded generation: Part 2 Small scale embedded generation
2. South African Renewable Power Plant Grid Code

The above standards cover aspects such as voltage range; flicker; DC injection; frequency operating range; harmonics and waveform distortion; power factor;

synchronization; safe disconnection from the network; over voltage and under voltage; sudden voltage dips and peaks; voltage change; over frequency and under frequency; anti-islanding; DC current injection; network faults; response to utility recovery; isolation; earthing; short-circuit protection; labelling.

The design and installation of all SSEG equipment will need to comply with these requirements. Consult with your supplier and/or installer to ensure that these conditions are met.

1.9 How to apply for permission to install SSEG

The SSEG application form must be completed for all forms of embedded electricity generation, including renewable energy and cogeneration. This form deals with applications for approval to install a small-scale embedded generation plant. Should tariff or metering changes be required for the SSEG installation, the general “Application and Agreement for Municipal Services” form and an “Electrical Supply Agreement” form must also be completed. The forms are available on the OM’s website. Below are some important points to consider prior to applying. Figure 1 that follows outlines the application process:

Purchasing your equipment: SSEG equipment that is to connect to the grid must comply with OM’s requirements. It is therefore important for consumers to be familiar with these requirements **before purchasing the equipment**. This is of particular relevance to the inverter. Specific technical information and certificates are required for submission with the initial application form. It is the responsibility of the consumer to ensure that equipment complies with the required standards. A list of inverters which have been shown to comply with OM’s requirements can be found on OM’s website.

Where there is no existing service connection: Where an SSEG is to be connected at a location where there is currently no connection to the utility network, an “Application and Agreement for Municipal Services” form and an “Electrical Supply Agreement” form should be submitted simultaneously as separate documents to the SSEG application form. These forms can be found on OM’s website.

Where the SSEG installation requires a tariff or metering change: Should a tariff or metering change be required for the SSEG installation, the “Application and Agreement for Municipal Services” form and an “Electrical Supply Agreement” form must also be completed.

Future expansion: Consent to connect the SSEG to the electricity grid is only granted for the declared generation capacity. Consumers wishing to increase the capacity of their generation or make changes to their current installation must obtain approval for the expansion or change. Application must again be made through the submission of a completed SSEG application form. It is important that the consumer remains a ‘net consumer’.

Professional sign off: The final installed SSEG system must be signed off on commissioning as complying with OM’s requirements by a professional engineer or technologist registered with ECSA. For more information regarding professional personnel, visit: <https://www.ecsa.co.za/default.aspx>



Figure 1: Summary of SSEG application and approval process

STEP 1: VISIT OM's WEBSITE

Visit the OM website and download the relevant application form/s as noted above. Alternatively, the forms are obtainable from the Electrical Services Department's offices listed lower down in Step 4. The SSEG form requires both basic and technical information of the proposed SSEG project to ensure that all SSEG connections are made safely and legally and in compliance with all requirements.

STEP 2: COMPLETE SSEG APPLICATION FORM AND, IF REQUIRED, THE GENERAL APPLICATION AND AGREEMENT FOR MUNICIPAL SERVICES FORM

OM requires that the application form/s be signed by the property owner. Details of the proposed installer must also be provided. The property owner may need support from the proposed installer or a professional in completing the SSEG application form (information required includes type of energy conversion, the total generating capacity of the SSEG, electrical parameters, expected consumption, network connection point, synchronising method, anti-islanding method and generator control method amongst others (not all information is relevant for all generation system types).

Details in the SSEG form that will need particular consideration:

Preliminary design: a simple circuit diagram showing major system components and the point of common coupling (PCC) must be provided.

Earthing arrangement: this must be in accordance to SANS 10142-1. Earthing requirements for typical earthing systems are described in NRS 097-2-1.

Various electrical parameters of the system: these sections require information on the electrical specifications of the SSEG system. Not all sections are applicable to all SSEG types.

System protection detail: this includes information about the synchronizing method, anti-islanding, power quality etc.

Proposed peak power generation output: maximum power expected to be generated must be detailed in the application form. This must be within the maximum power limits given earlier in this document.

STEP 3: OBTAIN PERMISSION FROM OTHER OM DEPARTMENTS

SSEG installations will require prior approval from other municipal departments such as Environmental, Planning and Building Development. Note that photovoltaic (PV) SSEG applications will require approval from only Planning and Building Development in this step. Applications to connect to the grid will not be considered until all relevant approvals have been obtained. All applicable approvals must be reflected in the relevant sections of the SSEG application form.

Requirements of these departments are summarised in the Appendix 2: *Approval from other Departments*.

STEP 4: SUBMIT COMPLETED APPLICATION FORM/S AND ATTACHMENTS

Once the form/s have been completed and consent has been obtained from the other relevant OM departments the form/s must be submitted to the ESD as listed below:

Overstrand Municipality Electrical Services Department Molteno Road Onrus	or	Overstrand Municipality Electrical Services Department Main Road Gansbaai
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STEP 5: INSTALLATION COMMENCEMENT UPON APPROVAL

After due consideration of the application, the applicant will be informed in writing whether the application has been successful. Once notified of a successful application, the applicant may commence installation.

STEP 6: COMMISSIONING AND DOCUMENTATION TO BE SUBMITTED TO ESD

Once fully installed, the system is ready for testing and commissioning by the SSEG installer. Note that permanent connection of the SSEG system to the electricity grid is only permitted on receipt of written permission from OM. However the SSEG may connect to the utility grid for the commissioning process only, where after it must once again be disconnected until written approval is granted by OM.

Commissioning of the system must be undertaken by a Pr Eng or Pr Tech Eng, who must complete and sign off the SSEG Installation Commissioning Report (Appendix 3). In addition to the Commissioning Report, the following documentation must also be completed:

- Final copy of circuit diagram
- Inverter Type Test
- The inverter type test certification requirements are specified in the NRS 097-2-1. Type testing is to be undertaken by a third party test house such as Bureau Veritas, KEMA or TÜV Rheinland. Inverter suppliers should be asked to provide the necessary certification before the equipment is purchased. It is strongly recommended that OM be consulted before equipment is purchased to ensure its acceptability by OM.
- Factory setting sheet or other documentation showing that the inverter has been set according to NRS 097-2-1
- An electrical installation Certificate of Compliance as per SANS 10142-1
- A signed Supplemental Contract for Embedded Generation. This is a legally required contract that governs the relationship between OM and the consumer. The contract is valid for as long as the project is in existence.
- Operation and Maintenance Procedure – installation responsibilities after commissioning.

All completed documentation must be submitted to the ESD office.

STEP 7: INSPECTION OF INSTALLATION IF NECESSARY

OM may inspect the installation if required, although this is unlikely in the case of a residential application.

STEP 8: APPROVAL GRANTED TO CONNECT TO THE GRID AND GENERATION COMMENCES

If all of the above is satisfactory, OM will install the necessary meters. Approval to connect SSEG to the grid is provided by the ESD to the consumer, in writing, together with any operation and decommissioning requirements deemed necessary. Once this is done, the change to the tariff will be implemented where 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 must be completed.

<p>Note: Any queries regarding any matter regarding SSEG must be referred to the relevant ESD area office as listed in STEP 4 above.</p>
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SECTION B:
**COMMERCIAL
AND
INDUSTRIAL
SMALL-SCALE EMBEDDED
GENERATORS**

2. General Requirements: Commercial and Industrial

2.1. Generation size limitations

This document does not cover systems over 1MVA (1000kVA).

- All LV commercial and industrial consumers planning to install SSEG systems under 1MVA must comply with the sizing limitations specified in NRS 097-2-3.
- MV commercial and industrial consumers planning to install SSEG systems under 1MVA may require a bespoke engineering study to determine the impact of the proposed SSEG system size on the network.

2.2. Electricity Generation Licences

Presently, consumers wishing to install an SSEG with a generation capacity of less than 1000 kVA are not required by OM to obtain a generating license from NERSA before consent is given by OM to connect to the electricity grid. Consumers authorized by OM may still be required by NERSA to obtain a generation licence. Such consumers are responsible directly to NERSA for obtaining a generation licence and OM accepts no liability should NERSA refuse a generation license and OM suspends registration and authorisation. OM is obliged to report to NERSA on a regular basis regarding all grid connected generation. Should NERSA refuse a generation license the generator must be disconnected from the grid unless the consumer has received an exemption from NERSA in this regard.

2.3. Metering

Commercial and industrial consumers wanting to connect SSEG to the grid and to be compensated for reverse power flow, require a Four Quadrant Energy meter. This includes consumers currently using prepayment meters. OM will provide and install the necessary meters at the consumer's cost.

Consumers wanting to connect SSEG to the grid but not be compensated for reverse power flow will be required to install reverse power flow blocking protection to prevent reverse power flow onto the electricity grid. The consumers may then, subject to the ruling policies for tariffs and metering, keep their existing meter and remain on the relevant electricity consumption tariff. In other words, for this option conventional credit or prepayment meters are NOT allowed to run backwards.

Consumers (with single or three phase supplies) wishing to participate in the SSEG tariff must have a meter box installed on the property boundary if such facility does not currently exist.

Refund of Prepayment meter (PPM) units when a consumer changes to the SSEG tariff and has a Four quadrant energy meter installed:

- a. PPM vending unit tokens already loaded on the PPM:
 - The consumer may delay the installation of an AMI meter until the electricity units already loaded on the PPM have been used up. (If the consumer wishes to proceed with grid connected SSEG with a PPM then a reverse power flow blocking protection system must be installed.
 - Alternatively the consumer may elect to forfeit the units on the PPM and proceed directly with the installation of the AMI meter.

b. PPM vending unit tokens not yet loaded onto the meter:

- The consumer may request a refund. The token will be validated to confirm that it has not been used after which the consumer will be refunded at the original tariff rate at which the token was purchased. The refund will be credited to the customer's municipal account and will not be paid out in cash.

2.4. Tariffs

Consumers on tariffs which have a monthly basic charge will see no difference to the tariff other than the addition of a generation credit component which is simply a rate/kWh exported.

Tariffs are determined annually by OM and are subject to approval by NERSA. SSEG applicants should check OM's website for the latest tariffs - the applicable tariff is the *commercial and industrial small-scale embedded generation tariff* and can be found on OM's website.

VAT will only be payable by OM on the purchase by OM of excess electricity if the consumer is a registered VAT vendor with SARS. In terms of Interpretation Note number 56 (dated 31 March 2010) of the Value-added Tax Act (number 89 of 1991) consumers will not have to submit invoices to OM for payment by OM for excess generation.

2.5. Load Profile Management

The SSEG tariff has been structured in such a way that consumers will find it most beneficial to ensure that they utilise as much of the generated electricity as they can and avoid or minimise reverse power flow. For example, where a PV system is installed, electrical loads should be shifted to occur during the middle of the day when generation is typically at its highest – from mid-morning to mid-afternoon (roughly from 10:00 until 15:00).

2.6. Grid Studies

Should the generation site not meet the criteria for a simplified utility connection for an LV connected SSEG in terms of NRS 097-2-3, grid studies may be necessary and will be carried out at the SSEG applicant's cost.

2.7. Who pays for what

- The commercial and industrial consumer is responsible for all the costs involved in the supply and installation of meters.
- The consumer will be responsible for the cost of any specialist grid studies.
- The consumer will be responsible for any changes required to the utility network upstream of the connection point as a result of the SSEG installation.

- The consumer will be responsible for all the costs associated with specialist tests that need to be carried out, e.g. Inverter testing, as well as for obtaining the required certification of the design and the installation as detailed below.

2.8. Applicable technical standards

Most of the technical requirements for SSEG's are covered in the following standards and guidelines (note that these do not necessarily cover all requirements for SSEG systems - see Appendix 1 for the complete list):

1. NRS 097-2: Grid interconnection of embedded generation: Part 2
Small scale embedded generation
2. South African Renewable Power Plant Grid Code

The above standards cover aspects such as voltage range; flicker; DC injection; frequency operating range; harmonics and waveform distortion; power factor; synchronization; safe disconnection from the network; overvoltage and under voltage; sudden voltage dips and peaks; voltage change; over frequency and under frequency; anti-islanding; DC current injection; network faults; response to utility recovery; isolation; earthing; short-circuit protection; labelling.

The design and installation of all SSEG equipment will need to comply with these requirements. Consult your supplier and/or installer to ensure that these conditions are met.

2.9 How to apply for permission to install SSEG

The SSEG application form must be completed for all forms of embedded electricity generation, including renewable energy and cogeneration. This form deals with applications for approval to install small-scale embedded generation plant. Should tariff or metering changes be required for the SSEG installation, the general "Application and Agreement for Municipal Services" form and an "Electrical Supply Agreement" form must also be completed. The forms are available on OM's website. The text box below highlights some important points to consider prior to applying. Figure 1 that follows outlines the application process:

Purchasing your equipment:

SSEG equipment that is to connect to the grid must comply with OM's requirements. It is therefore important for consumers to be familiar with these requirements **before purchasing the equipment**. This is of particular relevance to the inverter. Specific technical information and certificates are required for submission with the initial application form. It is the responsibility of the consumer to ensure that equipment complies with the required standards.

Where there is no existing electricity service connection:

Where an SSEG is to be connected at a location where there is currently no connection to the utility network, an "Application and Agreement for Municipal Services" form and an "Electrical Supply Agreement" form should be submitted simultaneously as separate documents to the SSEG application form. These forms can be found on OM's website.

Where the SSEG installation require a tariff or metering change:

Should a tariff or metering change be required for the SSEG installation, the “Application and Agreement for Municipal Services” form and an “Electrical Supply Agreement” form must also be completed.

Future expansion:

Consent to connect the SSEG to the electricity grid is only granted for the declared generation capacity. Consumers wishing to increase the capacity of their generation or make changes to their current installation must obtain approval for the expansion or change. Application must again be made through the submission of a completed SSEG application form. It is important that the consumer remains a ‘net consumer’.

Professional sign off:

The final installed SSEG system must be signed off by a professional engineer or technologist registered with ECSA. For more information regarding professional personnel, visit: <https://www.ecsa.co.za/default.aspx>

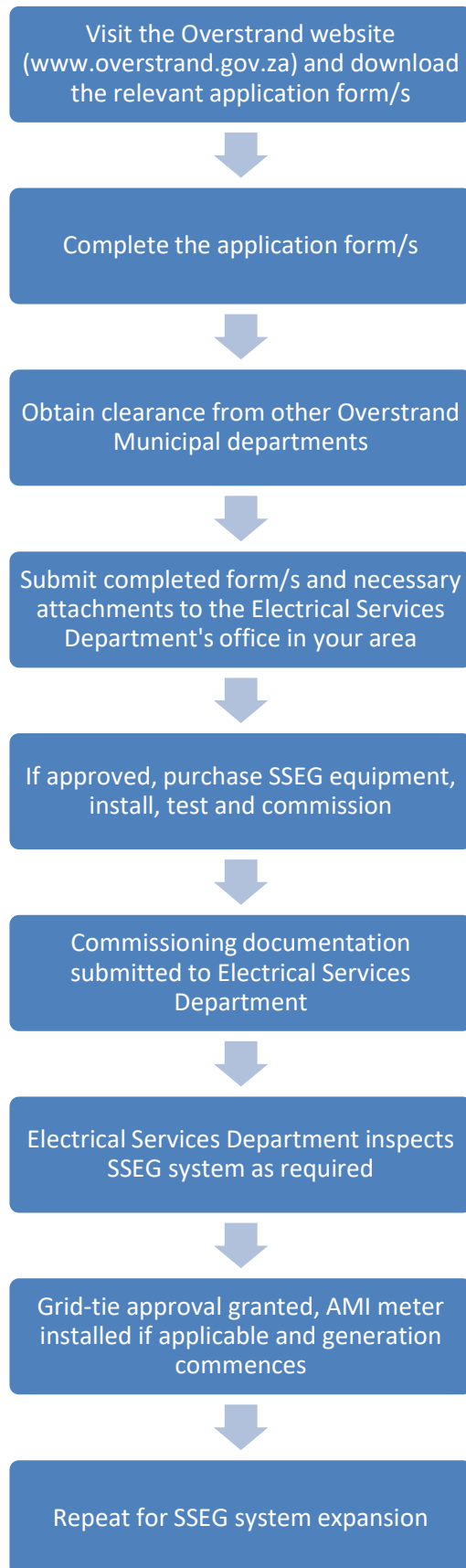


Figure 1: Summary of SSEG application and approval process

STEP 1: VISIT OM WEBSITE

Visit OM's website and download the relevant application form/s as noted above. Alternatively, the forms are obtainable from the Electrical Services Department's offices listed lower down. The SSEG form requires both basic and technical information of the proposed SSEG project to ensure that all SSEG connections are done safely and legally and in compliance with all requirements. Information required includes type of energy conversion, the total generating capacity of the SSEG, electrical parameters, expected consumption, network connection point, synchronising method, anti-islanding method and generator control method amongst others (not all information is relevant for all generation system types).

STEP 2: COMPLETE SSEG APPLICATION FORM AND, IF REQUIRED, THE APPLICATION AND AGREEMENT FOR MUNICIPAL SERVICES FORM.

OM requires that the application form/s be signed by the property owner. Details of the proposed installer must also be provided. The property owner may need support from the proposed installer or a professional in completing the SSEG application form.

Details in the SSEG form that will need particular consideration:

Preliminary design:

A simple circuit diagram showing major system components and point of common coupling (PCC) must be provided.

Site plan:

This includes the exact coordinates of the intended generation site as well as details of connection points, generator transformers and the surrounding buildings.

Earthing arrangement:

This must be in accordance to SANS 10142-1. Earthing requirements for common earthing systems are described in NRS 097-2-1.

Various electrical parameters of the system:

These sections require information on the electrical specifications of the SSEG system. Not all sections of the SSEG application form are applicable to all SSEG types.

System protection detail:

This includes information about the synchronizing method, anti-islanding, power quality, etc.

Proposed peak power generation output:

Maximum power expected to be generated must be detailed in the application form. This must be within the maximum power limits given earlier in this document.

STEP 3: OBTAIN PERMISSION FROM OTHER OM DEPARTMENTS

SSEG installations will require prior approval from other municipal departments such as Environmental, Planning and Building Development. Note that photovoltaic (PV) SSEG applications will require approval from only Planning and Building Development in this step. Applications to connect to the grid will not be considered until all relevant

approvals have been obtained. All applicable approvals must be reflected in the relevant sections of the SSEG application form.

Requirements of these departments are summarised in the Appendix 2: *Approval from other Departments*.

STEP 4: SUBMIT COMPLETED APPLICATION FORM AND ATTACHMENTS

Once the SSEG form has been completed and consent has been obtained from the other relevant OM departments the form must be submitted to the ESD office.

Overstrand Municipality
Electrical Services Department
Molteno Road
Onrus

or

Overstrand Municipality
Electrical Services Department
Main Road
Gansbaai

STEP 5: INSTALLATION COMMENCEMENT UPON APPROVAL

After due consideration of the application, the applicant will be informed in writing whether the application has been successful. Once notified of a successful application, the applicant may commence installation.

STEP 6: COMMISSIONING AND DOCUMENTATION TO BE SUBMITTED TO ESD

Once fully installed, the system is ready for testing and commissioning by the SSEG installer. Note that permanent connection of the SSEG system to the electricity grid is only permitted on receipt of written permission from OM. However the SSEG may connect to the utility grid for the commissioning process only, where after it must once again be disconnected until written approval is granted by OM.

Commissioning of the system must be undertaken by a Pr Eng or Pr Tech Eng, who must complete and sign off the SSEG Installation Commissioning Report (Appendix 3). In addition to the Commissioning Report, the following documentation must also be completed

- Final copy of circuit diagram
- Inverter Type Test
- The inverter type test certification requirements are specified in the NRS 097-2-1. Type testing is to be undertaken by a third party test house such as Bureau Veritas, KEMA or TÜV Rheinland. Inverter suppliers should be asked to provide the necessary certification before the equipment is purchased. It is strongly recommended that OM be consulted before equipment is purchased to ensure its acceptability by OM.
- Factory setting sheet or other documentation showing that the inverter has been set according to NRS 097-2-1
- An electrical installation Certificate of Compliance as per SANS 10142-1.
- A signed Supplemental Contract for Embedded Generation. This is a legally required contract that governs the relationship between OM and the consumer. The contract is valid for as long as the project is in existence.

- Operation and Maintenance Procedure – installation responsibilities after commissioning.

All completed documentation must be submitted to the ESD office.

STEP 7: INSPECTION OF INSTALLATION IF NECESSARY

OM may inspect the installation if deemed necessary.

STEP 8: APPROVAL GRANTED TO CONNECT TO THE GRID AND GENERATION COMMENCES

If all of the above is satisfactory, OM will install the necessary meters if required, SSEG approval to connect to the grid is provided by the ESD to the consumer, in writing, together with any operation and decommissioning requirements. Once this is done, monthly billing will begin.

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 must be completed.

Note: Any queries regarding any matter regarding SSEG must be referred to the relevant ESD area office as listed in STEP 4 above.

Appendix 1: Relevant Standards and Regulations

OM requires that SSEG installations comply with the necessary standards and regulations in order for the system to be approved and put into commission. This section provides an overview of these legislative requirements. The Professional Engineer / Technologist will highlight aspects most applicable to the SSEG system in question.

List of Standards and Regulations

There are a number of standards and regulations that the project developer has to be aware of. The most relevant standards and regulations that must be complied with are:

- ✓ Electricity Regulation Act, Act 4 of 2006 and Electricity Regulation Amendment Act, 28 of 2007 as amended
- ✓ South African Distribution Code (all parts)
- ✓ South African Grid Code (all parts)
- ✓ South African Renewable Power Plants Grid Code
- ✓ Occupational Health and Safety Act 1993 as amended
- ✓ Overstrand Municipality Electricity Supply By-Law
- ✓ SANS 10142- Parts 1 to 4: The Wiring of Premises
- ✓ SANS 474/ NRS 057 Code of Practice for Electricity Metering
- ✓ NRS 048: Electricity Supply – Quality of Supply
- ✓ NRS 097-1: Code of Practice for the interconnection of embedded generation to electricity distribution networks: Part 1 MV and HV (Eskom 240-61268576 / DST 34-1765: Standard for the interconnection of embedded generation, is applicable until published)
- ✓ NRS 097-2: Grid interconnection of embedded generation: Part 2 Small scale embedded generation

Guidance on their applicability and coverage is given below.

Standards of Importance

Of the compliance standards and regulations stated above, two of these standards are the most important for embedded generation, namely:

1. NRS 097-2: Grid interconnection of embedded generation: Part 2 Small scale embedded generation
2. South African Renewable Power Plants Grid Code

These two set the majority of regulatory requirements in order for compliance to be granted by OM for the installation and operation of an SSEG and therefore should be consulted with care. This section will provide an overview of key aspects of both documents. These overviews should be seen only as summaries, and the standards themselves will need to be referred to for a complete picture. Applicants will require assistance from their installer and professional engineer / technologist to ensure full compliance.

NRS 097-2-1 (Part 2: Small Scale Embedded Generation, Section 1)

This document serves as the standard for the interconnection of SSEG's to the utility network and applies to embedded generators smaller than 1000kVA connected to LV networks of type single, dual or three-phase.

NRS 097-2-3 (Part 2: Small Scale Embedded Generation, Section 3)

This document provides simplified utility connection criteria for low-voltage connected generators.

South African Renewable Power Plants Grid Code (SARPPGC)

This document sets out the technical and design grid connection requirements for renewable power plants (RPP) to connect to the transmission or distribution network in South Africa. This guideline is of concern to embedded generators of Category A that are connected to a low-voltage (LV) network.

i) Category A: 0 – 1 MVA (Only LV connected RPPs)

This category includes *RPPs* with *rated power* of less than 1 MVA and connected to the LV voltage (typically called 'small or micro turbines'). This category shall further be divided into 3 sub-categories:

ii) Category A1: 0 - 13.8 kVA

This sub-category includes *RPPs* of *Category A* with *rated power* in the range of 0 to 13.8 kVA.

iii) Category A2: 13.8 kVA – 100 kVA

This sub-category includes *RPPs* of *Category A* with *rated power* in the range greater than 13.8 kVA but less than 100 kVA.

iv) Category A3: 100 kVA – 1 MVA

This sub-category includes *RPPs* of *Category A* with *rated power* in the range 100 kVA but less than 1 MVA. This category also includes *RPPs* of *Category A1* and *A2* with a *rated power* less than 100 kVA that are directly connected to a MV-LV transformer.

Note: *RPPs* with a *rated power* greater than 4.6 kVA must be balanced three-phase.

Other Standards and Legislation

Electricity Regulation Act, Act 4 of 2006 (ERA)

All applicants should familiarize themselves with the ERA. The act states that no person may, without a license issued by the regulator (NERSA), operate any generation facility. The ERA holds that exemption is held for non-grid-tied projects. Note that NERSA has issued a communication giving license exemption to SSEG installations in municipal areas under 100kW.

South African Distribution Code

The South African Distribution Code applies to all entities connected to the distribution network, including EGs. It sets the basic rules for connecting to the distribution network, ensures non-discrimination to all users connected to the distribution network and specifies the technical requirements to ensure the safety and reliability of the distribution network. A more detailed guideline pertaining to the connection of SSEG's to the utility network and the specific requirements involved is found in the NRS 097-2-1.

South African Grid Code

The South African Grid Code contains the connection conditions that are required by all generators, distributors and end-users (consumers) connected to the utility grid, as well as the standards used to plan and develop the transmission system. Page 5 of the Network Code provides a summary of the grid code requirements applicable to specific ratings of non-hydro units, while page 6 provides those for hydro units. For SSEG's the requirements for ratings below 20 MVA should be adhered to accordingly as per the South African Grid Code.

Occupational Health and Safety Act, 1993

The Occupational Health and Safety Act provides for the health and safety of the people by ensuring that all undertakings are conducted in such a manner so that those who are, or who may be, directly affected by such an activity are not negatively harmed as far as possible and are not exposed to dangers to their health and safety.

Overstrand Municipality Electricity Supply By-Law

This document provides the general conditions of supply of electricity, outlines the responsibility of the consumers, systems of supply, measurement of electricity and the electrical contractors responsibilities.

SANS 10142-1 The Wiring of Premises - Low-voltage installations

This document serves as the South African national standard for the wiring of premises in low-voltage networks. The aim of the document is to ensure that people, animals and property are protected from dangers that arise during normal as well as fault conditions, due to the operation of an electrical installation. Compliance to the standards and regulations as laid out SANS 10142-1 is required and proof should be provided via an electrical installation certificate of compliance. The implication is that a qualified electrician is required to sign off on your system.

SANS 10142-2 The Wiring of Premises - Medium-Voltage installations above 1 kV a.c. not exceeding 22 kV a.c. and up to and including 3 000 kW installed capacity

This document serves as the South African national standard for the wiring of premises in medium-voltage networks. The aim of the document is to ensure that people, animals and property are protected from dangers that arise during normal as well as fault conditions, due to the operation of an electrical installation. Compliance to the standards and regulations as laid out SANS 10142-2 is required and proof should be provided via an electrical installation certificate of compliance. The implication is that a qualified electrician is required to sign off on your system.

SANS 10142-3 The Wiring of Premises – LV Embedded Generator Code (once published)

SANS 10142-4 The Wiring of Premises – Direct Current and Photovoltaic wiring guide (once published)

SANS 474 / NRS 057 Code of Practice for Electricity Metering

SANS 474 specifies the metering procedures, standards and other such requirements that must be adhered to by electricity licensees and their agents. It refers specifically to new and existing metering installations for the purpose of billing. It further specifies the initial calibration and certification requirements as well as compliance testing of metering installations and the subsequent procedures to ensure continued compliance. It specifies the procedures for the manipulation and storage of metering data and sets a standard format for the numbering of electricity meters. For more specific details with regard to the metering for SSEG purposes, NRS 097-2-1 should be consulted and the requirements as defined by OM must be adhered to.

NRS 048

The NRS 048 series covers the quality of supply parameters, specifications and practices that must be undertaken to ensure correct and safe operation. The NRS 048-2 and NRS 048-4 have the most relevance to the operation and connection of SSEG's to the utility network:

NRS 048-2: 'Voltage characteristics, compatibility levels, limits and assessment methods' sets the standards and compatibility levels for the quality of supply for utility connections as well as for stand-alone systems. It is intended that generation licensees ensure compliance with the compatibility levels set in this document under normal operating conditions.

NRS 048-4: "Application guidelines for utilities" sets the technical standards and guidelines for the connection of new consumers. It also sets the technical procedures for the evaluation of existing consumers with regards to harmonics, voltage unbalance and voltage flicker.

Appendix 2: Overstrand Municipality Departmental Approvals Environmental, Planning and Building Development

Roof top installations

No building plans are required to be submitted provided the panel(s) in its installed position 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.

Full building plans, including an engineer's endorsement, are required if the panel(s) in its installed position;

- Project more than 1.5 metres in its installed position measured perpendicularly, above the roof and/or;
- Projects more than 600mm above the highest point of the roof.

A relaxation in terms of the Zoning Scheme Regulations is also required under either one or both of the above circumstances.

Installations on the ground

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.

Other installations

Clearance required for other embedded generation such as wind.

Health and Air Quality Approvals

Air Quality and Mechanical Engineering (Noise) Units do not need to be consulted with SSEG applications where diesel fuelled mechanical engine generator are not part of the installation.

Should a mechanical engine which burns fuel or generates noise be incorporated in the installation, such applications should be referred to OM Environmental Department.

Environmental Approvals

Large-scale PV installations would require environmental authorisation (EA) in terms of the NEMA 2010 EIA Regulations if they generate > 10 MW electricity, or <10 MW but cover an area of 1ha or more.

Electrical transmission infrastructure that may be associated with a large scale PV system would require EA if it has a capacity of 275 kV or more within an urban area, or more than 33kV outside urban areas.

Large scale roll-out of SSEG PV would not require EA. There may however be heritage compliance issues in some areas of OM.

Household installation of PV would not require an EA unless it exceeds the electricity generation threshold mentioned above, which is highly unlikely.

Appendix 3: SSEG Installation Commissioning Report

**Appendix 4:
SSEG
Decommissioning
Report**