CITY OF CAPE TOWN
ISIXEKO SASEKAPA
STAD KAAPSTAD

GUIDELINES FOR EMBEDDED GENERATION

Application process to become an embedded generator in the City of Cape Town

2014-10-31

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Foreword

The purpose of this document is to give guidance regarding the City of Cape Town's requirements and application process for connecting all forms of small-scale sustainable embedded generation such as photovoltaic panels to the City's electricity network, including both renewable energy and cogeneration.

The approval process for a small-scale embedded generation (SSEG) installation in the City 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 process described herein. In addition, for systems over 17.3kVA an initial consultation with the City 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 the City's website:
http://www.capetown.gov.za/en/electricity/Pages/ServiceApplicationForms.aspx

The guideline was part of a British High Commission-funded project run by Sustainable Energy Africa (Not for Profit Company) to facilitate the adoption of small-scale embedded solar PV generation in South Africa.

British High Commission Pretoria

Sustainable Energy Africa NPC

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 kiloVoltAmperes (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) it. over any 12 month period.

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 City of Cape Town'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.

The City

'The City' refers to The City of Cape Town and will be referred to as such throughout this document.

Utility

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

Utility Network (or Utility Grid)

The interconnected network of wires, transformers and other equipment, covering all voltage ranges, and belonging to the City of Cape Town which supply consumers in the City of Cape Town 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
AMI:	Advanced Metering Infrastructure
DC:	Direct Current
DSD:	Distribution System Development (a section within the Electricity Services Department)
ECSA:	Engineering Council of South Africa
EG:	Embedded Generation
ESD:	Electricity Services 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

Temporary conditions relating to SSEG applications

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, the City 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 onto the City's grid than they purchase from the City.

The City will register and authorise grid connection 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 the City may still be required by NERSA to obtain a generating licence. Consumers are responsible directly to NERSA for obtaining a generating license and the City accepts no liability should NERSA refuse a generating license and the City subsequently withdraws registration and authorisation. The City 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 discussed with 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, all embedded generation systems installed on the City of Cape Town grid must be signed off on commissioning by an ECSA registered professional engineer or technologist as complying with the City's requirements.

Testing of Inverters

Until such time as an SABS mark is issued for inverters, the City 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 the City and NRS097-2-2 (see step 6 in the main document)

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

Although the electricity distribution industry is highly regulated, SSEG's have not yet been adequately covered in national policy or legislation. In this void, the City has developed policies and practices which it believes are consistent with broader national policy. In particular, the City does not believe it is allowed to purchase electricity at a greater cost than it would have paid Eskom for the generated electricity. The City also does not believe consumers are permitted by national legislation to sell electricity to the City in excess of what they purchase from the City 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 daily service 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-MegaWatt 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.

An 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 the City'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
- City 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 the City before system installation commences. The City 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 the City as approval is not guaranteed and the City will not be held liable for equipment expenses where approval is denied.

For commercial and industrial systems in particular an initial consultation with the City 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 the City 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 Cape Town, 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 the City's ESD. However, approvals from other City departments are still necessary, such as from the Planning and Building Development Management 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 one year period) purchase more electricity from the utility than they feed back onto the utility grid.
b. "Net generators" on average (over a one year period) purchase less electricity from the utility than they feed back onto the utility grid.

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

As mentioned in the introduction, the City 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 generator is located, or fed onto the utility network for purchase by the City. 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 the city). This is also known as wheeling.

5. SSEG system decommissioning

The City of Cape Town 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 the relevant DSD office (contact details in 'Step 4' of application process described later on in these guidelines).

6. 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.

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***)**
1	40	2.3
1	60	3.5
1	80	4.6
3	40	6.9
3	60	10.4
3	80	13.9
3	100	17.3

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.

** Generation Capacity refers to the total output capacity of the generator. For PV systems in particular, this refers to the maximum output of the inverter. Due to system losses this is typically 10 to 20% lower than the maximum output of the PV panels, which is specified in DC kilo-Watt-peak (kWp). The system designer/installer will provide guidance here.

*** 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. Electricity Generation Licences

Presently, consumers wishing to install an SSEG with a generation capacity of less than 1000 kVA are not required by the City to obtain a generating license from NERSA before consent is given by the City to connect to the electricity grid. Consumers authorized by the City may still be required by NERSA to obtain a generation licence. Such consumers are responsible directly to NERSA for obtaining a generation licence and the City accepts no liability should NERSA refuse a generation license and the City suspends registration and authorisation. The City 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.

1.3. 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. The City 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 Electricity 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.

Tariffs are determined annually by the City and are subject to approval by NERSA. The current tariffs are to be found on the City's website:
http://www.capetown.gov.za/en/electricity/Pages/ElectricityTariffs.aspx

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

- A daily service charge
- An electricity consumption charge per kWh consumed
- A rate per kWh at which the City will purchase residential excess generation

The daily service 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 City services e.g. water and rates).

Example of payments and refunds for a residential SSEG tariff

SSEG Residential Tariffs 2014/15*			
	Units	Tariff excl VAT	Tariff incl VAT
Service charge	R/day	11.43	13.03
Energy charge – consumption	c/kWh	95.76	109.17
Energy charge – generation**	c/kWh	49.72	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
Service charge	days	30	R11.43	R13.03	R342.90	390.91
Purchase for consumption	kWh	500	95.76c	109.17c	R478.80	545.83
Credit for generation**	kWh	100	49.72c	49.72c	-R49.72	-49.72
Total payment						887.02

* - these tariffs are given as an example. Please check the City 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.

1.4. 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 off after sunset. 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.

1.5. 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.

1.6. 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 undervoltage; sudden voltage dips and peaks; voltage change; overfrequency and underfrequency; 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.

1.7. How to apply for permission to install SSEG

The GEN/EMB 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 form for new or modified connections must also be completed. The forms are available on the City's website[1], 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 the City'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 for a new electricity supply should be submitted simultaneously as a separate document to the SSEG application form. This application form can be found at: https://www.capetown.gov.za/en/electricity/Pages/ServiceApplicationForms.aspx

Where the SSEG installation requires a tariff or metering change: Should a tariff or metering change be required for the SSEG installation, the general application form for new or modified connections 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

[1] https://www.capetown.gov.za/en/electricity/Pages/ServiceApplicationForms.aspx

completed GEN/EMB 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 the City'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

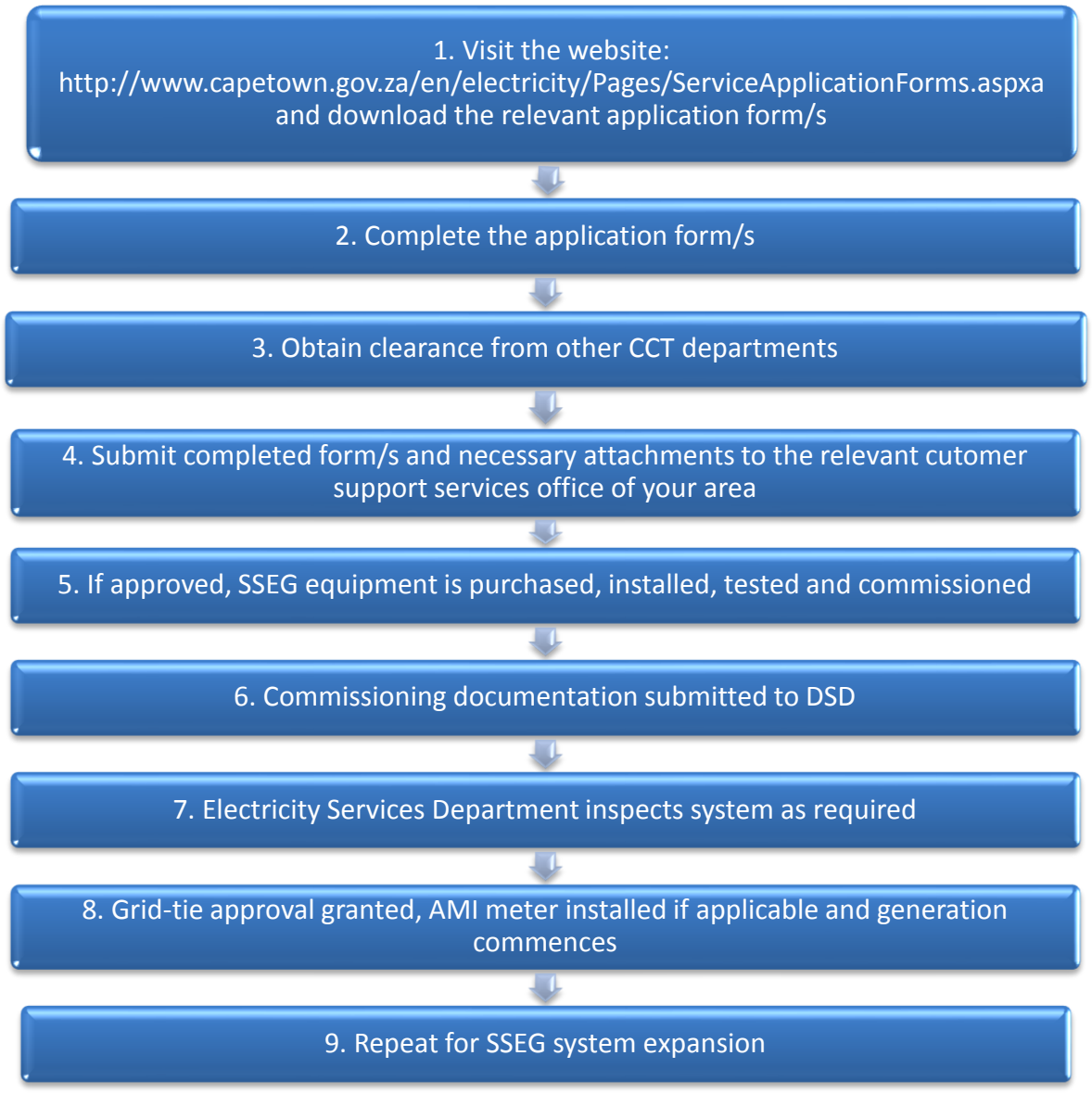

Figure 1: Summary of SSEG application and approval process.

STEP 1: VISIT CITY WEBSITE

Visit the City's website and download the relevant application form/s as noted above.

Alternatively, the forms are obtainable from the Consumer Support Services offices listed lower down in Step 4. The GEN/EMB 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 GEN/EMB APPLICATION FORM AND, IF REQUIRED, THE GENERAL APPLICATION FORM FOR NEW OR MODIFIED CONNECTIONS

The City 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 GEN/EMB 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 GEN/EMB 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 CITY DEPARTMENTS

The Electricity Services Department will require prior approval of the proposed SSEG installation from other City departments such as Planning and Building Development Management, City Health and Specialised Services before it will consider applications to connect to the grid. All applicable approvals must be reflected in the relevant sections of the GEN/EMB application form.

Note that photovoltaic (PV) SSEG applications will require approval from only Planning and Building Development Management in this step.

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 City departments the form/s must be submitted to the relevant ESD area in which the project is located. The table below shows the different area offices.

Consumer Support Services: Area North		
Test & Metering Building Ndabeni Electricity Complex Melck St, Ndabeni, Cape Town	Ndabeni Electricity Complex Melck St, Ndabeni, Maitland 7405	Tel: 021 5064819/20 Fax: 021 5064836
Consumer Support Services: Area East		
Electricity Services Head Office Bloemhof Centre, Bloemhof Street Bellville	Private Bag X44 Bellville 7535	Tel: 021 4448511/2 Fax: 021 4448787
Consumer Support Services: Area South		
1st Floor, Wynberg Electricity Depot, Rosmead Avenue Wynberg, Cape Town	Wynberg Electricity Depot Rosmead Avenue Wynberg 7800	Tel: 021 7635664/5723 Fax: 021 7635687

The Distribution System Development (DSD) section, a unit within the City's ESD, will then process the application.

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 DSD

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 the City. However the SSEG may connect to the utility grid for the commissioning process only, whereafter it must once again be disconnected until written approval is granted by the City.

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 3rd 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 the City be consulted before equipment is purchased to ensure its acceptability by the City.
- 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 the City 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 relevant DSD office.

STEP 7: INSPECTION OF INSTALLATION IF NECESSARY

The City 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, the City will install the necessary meters. Approval to connect SSEG to the grid is provided by the DSD 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.

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

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 the City to obtain a generating license from NERSA before consent is given by the City to connect to the electricity grid. Consumers authorized by the City may still be required by NERSA to obtain a generation licence. Such consumers are responsible directly to NERSA for obtaining a generation licence and the City accepts no liability should NERSA refuse a generation license and the City suspends registration and authorisation. The City 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 bi-directional AMI credit meter. This includes consumers currently using prepayment meters. The City 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 is does not currently exist.

2.4. Tariffs

Consumers on tariffs which have a daily service 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 the City and are subject to approval by NERSA. SSEG applicants should check the City's website for the latest tariffs - the applicable tariff is the *commercial and industrial small-scale embedded generation tariff* and can be found here: http://www.capetown.gov.za/en/electricity/Pages/ElectricityTariffs.aspx

Note that commercial consumers with a prepayment meter on the SPU 2 tariff will be changed to SPU 1 tariff and will require a bi-directional AMI credit meter unless they install reverse power flow blocking protection.

VAT will only be payable by the City on the purchase by the City 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 the City for payment by the City 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 undervoltage; sudden voltage dips and peaks; voltage change; overfrequency and underfrequency; 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 GEN/EMB 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 form for new or modified connections must also be completed. The forms are available on the City's website[2],. 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 the City'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 for a new electricity supply should be submitted simultaneously as a separate document to the SSEG application form. This application form can be found here: https://www.capetown.gov.za/en/electricity/Pages/ServiceApplicationForms.aspx

Where the SSEG installation require a tariff or metering change: Should a tariff or metering change be required for the SSEG installation, the general application form for new or modified connections 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 GEN/EMB 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

[2] https://www.capetown.gov.za/en/electricity/Pages/ServiceApplicationForms.aspx

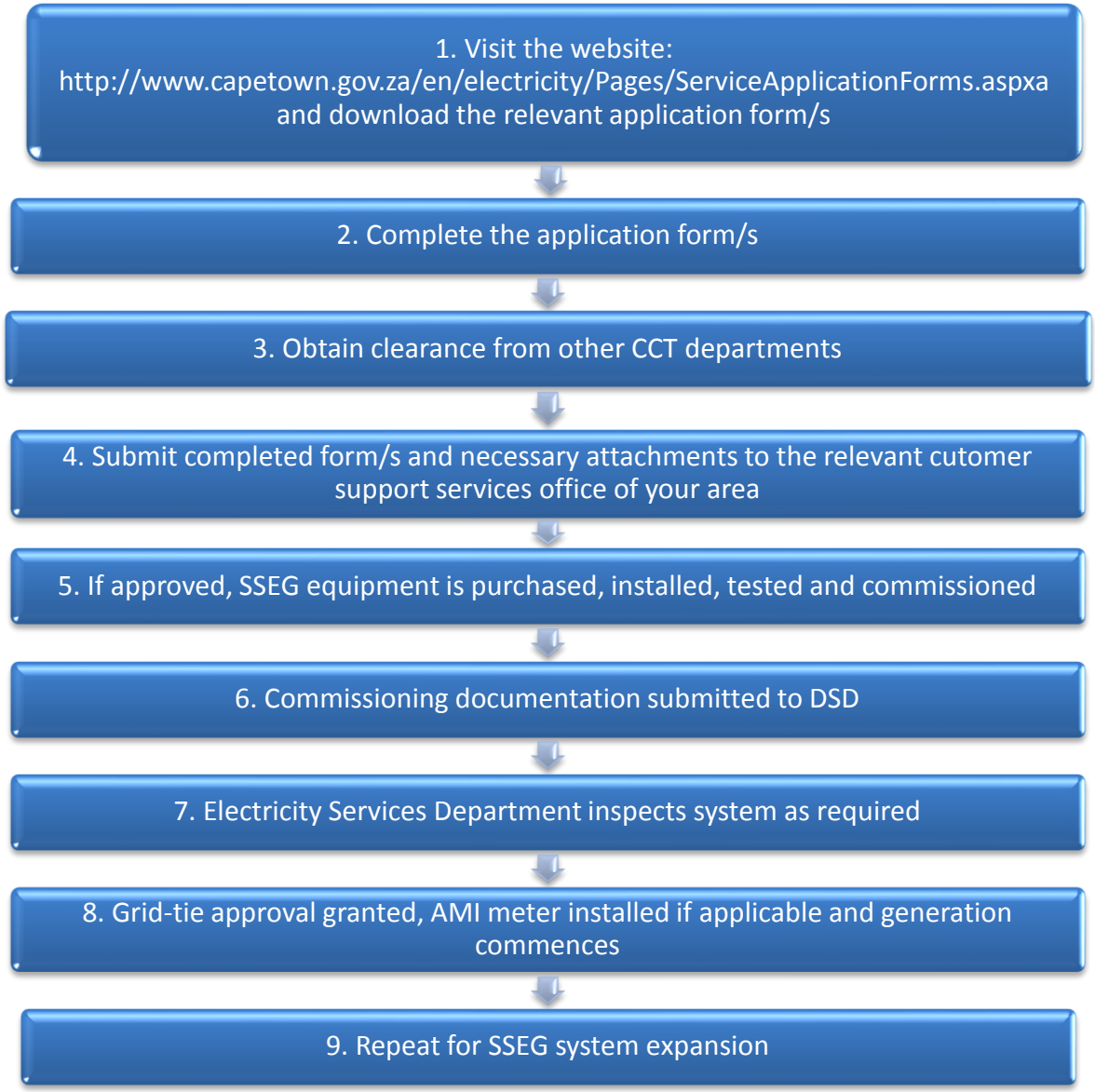

Figure 2: Summary of SSEG application and approval process

Figure 2: Summary of SSEG application and approval process. Green = City of Cape Town; Blue = SSEG

STEP 1: VISIT CITY WEBSITE

Visit the City's website and download the relevant[3] application form/s as noted above. Alternatively, the forms are obtainable from the Consumer Support Services offices listed lower down. The GEN/EMB 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 GEN/EMB APPLICATION FORM AND, IF REQUIRED, THE GENERAL APPLICATION FORM FOR NEW OR MODIFIED CONNECTIONS.

The City 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 GEN/EMB application form.

Details in the GEN/EMB 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 GEN/EMB 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 CITY DEPARTMENTS

SSEG installations will require prior approval from other municipal departments such as Planning and Building Development Management, City Health Specialised Services. Note that photovoltaic (PV) SSEG applications will require approval from only Planning and Building Development Management in this step. Applications to connect to the grid will not

[3] http://www.capetown.gov.za/en/electricity/Pages/ServiceApplicationForms.aspx

be considered until all relevant approvals have been obtained. All applicable approvals must be reflected in the relevant sections of the GEN/EMB 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 GEN/EMB form has been completed and consent has been obtained from the other relevant City departments the form must be submitted to the relevant ESD area in which the project is located. The table below shows the different area offices.

Consumer Support Services: Area North		
Test & Metering Building Ndabeni Electricity Complex Melck St, Ndabeni, Cape Town	Ndabeni Electricity Complex Melck St, Ndabeni, Maitland 7405	Tel: 021 5064819/20 Fax: 021 5064836
Consumer Support Services: Area East		
Electricity Services Head Office Bloemhof Centre, Bloemhof Street Bellville	Private Bag X44 Bellville 7535	Tel: 021 4448511/2 Fax: 021 4448787
Consumer Support Services: Area South		
1st Floor, Wynberg Electricity Depot, Rosmead Avenue Wynberg, Cape Town	Wynberg Electricity Depot Rosmead Avenue Wynberg 7800	Tel: 021 7635664/5723 Fax: 021 7635687

The Distribution System Development (DSD) section, a unit within the City's ESD, will then process the application.

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 DSD

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 the City. However the SSEG may connect to the utility grid for the commissioning process only, whereafter it must once again be disconnected until written approval is granted by the City.

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 3rd 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 the City be consulted before equipment is purchased to ensure its acceptability by the City.
- 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 the City 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 relevant DSD office.

STEP 7: INSPECTION OF INSTALLATION IF NECESSARY

The City 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, the City will install the necessary meters if required, SSEG approval to connect to the grid is provided by the DSD 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 DSD area office as listed in STEP 4 above

Appendix 1: Relevant Standards and Regulations

The City 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
- ✓ City of Cape Town 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 the City 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. 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.

City of Cape Town 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 the City 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: City Department Approvals

Planning and Building Development Management

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 City Health.

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.

The Cape Town International Airport would count as inside an urban area.

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

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

The following SSEG Commissioning Report must be submitted for each installation, confirming compliance with the City's requirements.

Site Details	
Property address (incl. post code)	
Business Partner & Contract account numbers	
Contact Details	
SSEG property owner	
Contact person	
Contact telephone number	
SSEG Details	
Manufacturer and model type	
Serial number/s of inverter/s and independent disconnection switching unit/s (if not integrated into one of the components of the embedded generator)	
Serial number / version numbers of software (where appropriate)	
SSEG rating (kVA) and power factor (under normal running conditions)	
Single or three phase	
Maximum peak AC short circuit current (A)	
Type of prime mover (e.g. inverter or rotating machine) and fuel source (e.g. sun, biomass, wind)	
Location of SSEG within the installation	

Installer Details		
Installer		
Accreditation/Qualification		
Address (incl. post code)		
Contact person		
Telephone number		
Fax number		
E-mail address		
Information to be Enclosed		
Final copy of circuit diagram		
Inverter type test Certificate of Compliance and Test Report according to NRS 097-2-1, issued by accredited 3rd party test house (not necessary if already provided).		
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.		
Signed contract for SSEG		
Operation and maintenance procedure		
Compulsory declaration – to be completed by ECSA registered Pr Eng or Pr Tech Eng		
The SSEG installation complies with the relevant sections of NRS 097-2-1.		
The loss of mains protection has been proved by a functional test carried out as part of the on-site commissioning, e.g. a momentary disconnection of the supply to the SSEG in order to prove that the loss of mains protection operates as expected.		
Protection settings have been set to comply with NRS 097-2-1		
Safety labels have been fitted in accordance with NRS 097-2-1.		
The SSEG installation complies with the relevant sections of SANS 10142-1 and an installation certificate of compliance is attached.		
Reverse power blocking protection system installed and commissioned to prevent reverse power flow onto the distribution electricity network (where applicable)		
Comments (continue on separate sheet if necessary)		
Name:	Signature:	Date:
ECSA Professional Category:	Reg. No.	

Appendix 4: SSEG Decommissioning Report

Site Details	
Property address (incl. post code)	
Business Partner account number	
Contract account number	
Telephone number	
SSEG details	
Manufacturer and model type	
Serial number/s of inverter/s and independent disconnection switching unit/s (if not integrated into one of the components of the embedded generator)	
SSEG rating (A)	
Type or prime mover and fuel source	

Decommissioning Agent Details		
Name		
Accreditation/Qualification		
Address (incl. post code)		
Certificate of Compliance Number (provide certified copy of the CoC which confirms that the SSEG has been disconnected effectively from the City's electricity distribution network).		
Contact person		
Telephone number		
Fax number		
E-mail address		
Name:	Signature:	Date: