



GEORGE MUNICIPALITY

SMALL-SCALE EMBEDDED GENERATION POLICY

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1. OBJECTIVES

This policy facilitates the inclusion of Small-Scale Embedded Generation (SSEG) onto the electricity distribution network (grid) of George Municipality (George), so that safety, power quality, grid operation and municipal revenue issues are adequately addressed, and that the local renewable energy industry and green economy is promoted at the same time, supporting job creation.

2. BACKGROUND

Steep increases in the price of electricity, elevated environmental awareness, rapidly decreasing costs of photovoltaic (PV) panels, and the high risk of national power blackouts have all resulted in electricity distributors around the country receiving numerous requests to allow electricity consumers to connect PV and other Small-Scale Embedded Generators (SSEGs) to the grid. Such SSEGs are intended to be connected to the wiring on the consumer's premises which is in turn connected to, the grid. Such generators are hence considered to be 'embedded' in the local municipal electricity grid.

The parallel (or embedded) connection of any generator to the grid, however powered, has numerous implications for the local electricity utility. The most significant implications are the safety of the utility staff, the public and the user of the generator. Further implications include the impact on the quality of the local electrical supply, and metering and billing issues. In terms of the Municipal Structures Act, No. 117 of 1998, municipalities are therefore obliged to regulate the installation of SSEGs to uphold responsible management of the distribution network, as well as for the general benefit and protection of citizens.

Although the electricity distribution industry is highly regulated, SSEG's have not yet been adequately covered in national policy or legislation. The AMEU has developed standardized approaches and documentation to support municipalities in this regard, aligned with national policies and regulation, and this Guideline is consistent with the AMEU approach and recommendations.

3. SCOPE OF THE POLICY

This policy document features the following:

- A framework for the approval and registration of SSEGs as well as the regulation thereof relative to the requirements of the Municipality and all other Policies, By-laws and Legislation applicable thereto.
- It is applicable to all customers wishing to install systems categorised as SSEGs.
- It covers:
 - The conditions under which SSEG will be accepted onto the grid
 - The Application and Commissioning process
 - Contractual arrangements between the SSEG customer and the Municipality
 - Metering and tariffs for SSEG
- It covers all prospective SSEG customers in the municipal distribution area connected to the grid.

4. CONSTITUTIONAL, REGULATORY AND POLICY CONTEXT

Section 156 (1) and Schedules 4B and 5B of the Constitution assign municipalities authority and administration over 'Electricity and gas reticulation'. The municipality has legislative and executive authority in this area, and thus must develop a regulatory environment which ensures the safe and proper functioning of their electricity grid in terms of the Municipal Structures Act, No. 117 of 1998. This environment must not contradict the national regulatory framework. Since embedded generators are connected to, and impact on the local distribution grid, municipalities must develop an appropriate regulatory framework for such generators. The electricity reticulation function extends to providing open and non-discriminatory access to the municipal distribution system and to permit the connection of embedded generation systems .

Section 74 of the Municipal Systems Act requires the municipality to set appropriate tariffs for municipal services. The use of the municipal distribution grid by embedded generators therefore requires that the municipality sets a suitable tariff for such generators.

The National Energy Regulatory of South Africa issues electricity generation licenses in terms of the Electricity Regulation Act. Schedule 2 of this act specifies that only systems over 100 MW capacity require licensing. This also applies to embedded generators.

Technical specifications and standards have been developed to guide the implementation of embedded generation such that safety, power quality, and grid operational parameters are not negatively impacted, complying with NRS097-2 The wiring of premises; and SANS 10142-1-2: Specific requirements for embedded generation installations connected to the low voltage distribution Network in South Africa.

Local government is given a key role in implementation within the following documents:

- The White Paper on Energy Policy (1998)
- The National Climate Change Response White Paper (2011)
- In addition, the Integrated Resource Plan directing electricity supply in the country increasingly recognizes the role of local government and of embedded generation.

In addition to the above obligations, local government should align with:

- White Paper on the Promotion of Renewable Energy and Clean Energy Development (2003)
- The transition to a green economy
- National carbon mitigation intentions

5. AMEU / SALGA STANDARD DOCUMENTATION

The Association of Municipal Electricity Utilities and SALGA has developed a set of Standard documents which provide a sound approach for engaging with SSEG by municipalities. The documents have been reviewed by a municipal SSEG Working Group and provide a framework to facilitate the establishment of systems to process and integrate SSEG into municipal operations. This Guideline is in accord with this SALGA/AMEU framework.

6. SMALL SCALE EMBEDDED GENERATION DEFINITION

Small-scale embedded generation (SSEG) refers to power generation up to 1MVA peak output capacity, 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-MW range. Most of the electricity generated by an SSEG is consumed directly at the site but times arise when generation exceeds consumption and a limited amount of power is allowed to flow in reverse - from the consumer onto the grid.

An SSEG therefore generates electricity that is “embedded” in the local electricity distribution network in that it is connected to the consumers wiring, typically behind the consumers meter, which is in turn connected to the grid. When a customer wants to feed-in more energy into the network than that which it consumes for this part will not be classified as a SSEG.

7. APPLICATION / REGISTRATION REQUIREMENTS

Consumers are not allowed to connect SSEG to the grid without the written consent of the Municipality. 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. Should the consumer fail to have the SSEG disconnected from the grid, the Electricity department reserves the right to disconnect the electricity supply as stipulated within the Electricity By-laws.

The document ‘REQUIREMENTS FOR SMALL-SCALE EMBEDDED GENERATION: Conditions and application process to become an embedded generator in George (hereinafter ‘REQUIREMENTS document’) specifies detailed technical, procedural and other conditions and parameters that must be adhered to. The latest version of this ‘REQUIREMENTS’ document must be consulted, and adherence to the provisions therein complied with.

Consumers who wish to connect SSEG to the municipal grid are required to follow the application procedure as detailed in the REQUIREMENTS document.

Any existing SSEG systems or applications submitted prior to the adoption of this Policy will have to demonstrate compliance with this Policy through following the application procedure specified herein.

- Existing legislation requires that systems greater than 100 MVA need a NERSA license. Anyone wanting to connect greater than 100 MVA must produce a generating license or exemption letter from NERSA with their application.
- Existing legislation requires that systems greater than 100 kVA and 100 MVA need to register with NERSA. Anyone wanting to connect greater than 100 kVA must produce a copy of the registration with NERSA.
- The Municipality will process applications for SSEG systems up to 100 kVA without evidence of a generating license / registration with NERSA.

Should the licensing regulations change, SSEG customers will be required to comply with the new regulations at their own cost.

All embedded generation systems installed within the Municipality’s grid must be signed off on commissioning by appropriate personnel as defined in the REQUIREMENTS document.

8. COMPLIANCE IMPLICATIONS

The connection criteria for SSEGs are described in in the NRS097-2-3. This section stipulates what need to be monitored and what corrective action can be taken in cases of non-compliance. George Municipality may at the discretion of the Electrotechnical department take the following action.

TECHNICAL REQUIREMENT	MONITORING	CORRECTIVE ACTION
EG capacity exceeds approved limits.	Monitor monthly ½ hourly readings	Notification to rectify in 30 days, disconnect supply
Phase unbalance.	Monitor monthly ½ hourly readings	Notification to rectify in 30 days, disconnect supply
Harmonics. < 5 % at rated generator output	Quality of supply meters, customer complaints	Notification to rectify in 30 days, disconnect supply
Power factor. Usage < 0.9, No Feed-in of vars, No negative.	From monthly ½ hourly readings	Notification to rectify in 30 days, disconnect supply
Voltage limits.	4 quadrant meters to monitor	Upgrade network or limit feed-in.
Voltage rise: LV feeders < 1 %	Quality of supply meters	Upgrade network or limit feed-in.
Synchronisation	Circuit breaker trips, customer complaints,	Notification to rectify in 30 days, disconnect supply
Flicker	Quality of supply meters, customer complaints	Notification to rectify in 30 days, disconnect supply
Fault levels: > 210 A / minimum generator rating.	Quality of supply meters, customer complaints	Upgrade network or limit feed-in.
Islanding on grid	From monthly ½ hourly readings	Notification to rectify in 30 days, disconnect supply
DC injection < 1% of rated NMD.	Network problems. Investigation	Notification to rectify in 30 days, disconnect supply
EG not applied or approved / registered.	Investigation	Notification to rectify in 30 days, charge tamper fine (per month for contravention), disconnect EG after 30 days if not comply, if not disconnect the supply.

Various of these parameters cannot be measured easily. In evaluating the systems to be installed compliance by specification will be ensured. In cases where either the system goes faulty or the set-up was changed, the actual performance could change. In some cases, it is possible to detect in others not so. In cases where contravention:

- could cause short term serious problems, the supply to the consumer can be disconnected.
- could cause longer problems the consumer can be notified to rectify
- of not complied with within 30 days, the consumer be required to disconnect the SSEG plant
- if the consumer fails to do so the supply can be disconnected.

9. RESPONSIBILITY

The Municipal Manager is responsible and accountable for the implementation and enforcement of the provisions of this Guideline and must take the necessary steps to do so.

The Municipal Manager shall from time-to-time report to the Executive Mayor on matters relating to this Guideline, the efficacy of the tariffs set by the Council in terms hereof, the administrative mechanisms, resources, processes and procedures related to its implementation and the extent to which the Guideline is achieving the objectives of the Council.

All the necessary power and authority is hereby delegated to the Municipal Manager to enable him/her to fulfil his/her functions, responsibilities and obligations in terms hereof, including appropriate revisions of the REQUIREMENTS document to keep up to date with this fast-changing field, with full authority to further delegate any specific responsibility.

10. IMPLEMENTATION

Application process

The Municipality requires that all prospective SSEG customers fill in the Municipality's SSEG application form and submit it to the relevant office for assessment. The Municipality will evaluate the application according to criteria in the NRS097-2-3 and other criteria as noted in the REQUIREMENTS document and inform the applicant of the success or otherwise of the application.

Should the application not be successful, the Municipality will advise the applicant regarding necessary measures to enable compliance with the criteria and SSEG connection. Further information or technical studies may be requested by the Municipality before a conclusion can be reached.

Commissioning

Approved SSEG systems, once installed, must be commissioned and signed off by suitable personnel as specified in the REQUIREMENTS document. A Commissioning Report must be provided to the Municipality on the prescribed form.

Metering

All SSEG systems must have approved four quadrant, four wire meters installed, as clarified in the REQUIREMENTS document.

Contractual agreements

All new SSEG customers must agree to the Municipality's GENERAL TERMS AND CONDITIONS: CONTRACT FOR CONNECTION OF AN EMBEDDED GENERATOR before generation may commence. This contract clarifies the legal responsibilities of both the customer and the Municipality.

Organisation requirements

The implementation of SSEG in George will require the increase organisation capacity within the Electricity / Energy department. This needs to cater for the following services:

- Handling of the application, analysis, contracting of new SSEGs.
- Monitoring of the installation and issuing of compliance certificates.
- Monitoring of the consumption, feed-in, maximum capacity, power factor, quality of supply and network stability.
- Corrective actions in case of non-compliance.
- Profile data analysis and provision of billing data.
- Periodic reporting and network and financial impact analysis.
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11.SSEG TARIFFS

Details relating to the charges are set out in the Generation Pricing Policy document. A SSEG customer must be on standard cost reflective TOU tariff if the customer wants to feed excess energy into the George grid. Feed-in energy will be credited at a % of Eskom TOU energy rates not exceeding the value of energy consumed in a calendar month.

12.STANDARDS

All SSEGs are to comply with the following standards:

1. NRS 097-2-1: Grid interconnection of embedded generation: Part 2 Small Scale Embedded Generation, Section 1: Utility interface
2. NRS 097-2-3: Grid interconnection of embedded generation: Part 2 Small Scale Embedded Generation, Section 3: Simplified utility connection criteria for low voltage connected generators

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

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

The REQUIREMENTS document has specific information regarding compliance with the above standards or specifications.

13.EFFECTIVE DATE OF POLICY

This policy will become effective from the date of approval by the Municipal Council. Tariffs contemplated within this Guideline will be formulated as part of the annual budget approval process and will become effective pursuant to the dates stipulated therein. Tariffs are subject to NERSA approval.

14.DEFINITIONS:

“Four Quadrant meter” A meter that independently measure and record the electricity consumption and demand in all 4 quadrants. In other word kWh and kvarh flow in the forward and reverse direction.

“Consumer”In the context of this document, consumers who also generate will be referred to as “consumers” although in actual fact they are “consumer/generators”.

“Embedded Generator” An entity that operates one or more generation sources that include energy conversion device(s), static power converter(s), if applicable and the control and protection gear within customer’s network that operates in synchronism with the utility’s network.

“Export tariff” A payment for every kilowatt-hour (kWh) of surplus electricity a customer system exports (Feed-in) to the grid.

“Import tariff” A payment for every kilowatt-hour (kWh) of electricity imported by a customer from the grid.

“Municipality” George Municipality

“Reverse power flow” The flow of energy from the consumer electricity installation onto the grid as a result of the instantaneous generation exceeding the instantaneous consumption at the generation site in question.

“SSEG” Small Scale Embedded Generation. For the purpose of this policy; an embedded generator with a generation capacity of up to 100 000kVA (100MVA) (definition further elaborated below).

“Tariff” A combination of charges to recover measured quantities such as consumption and capacity costs as well as service costs.

15.ACRONYMS AND ABBREVIATION

EG:	Embedded Generation
ESD:	Electrical Services Department
IRP:	Integrated Resource Plan

kVA: kilo-Volt Ampere (unit of electrical apparent power)
kW: kilo-Watt (unit of electrical real power)
kWp: kilo-Watt peak (the rated peak output of solar PV panels)
MVA: Mega-Volt Amperes (1000kVA)
MW: Mega-Watts (1000kW)
NERSA: National Energy Regulator of South Africa
PV: Photovoltaic
SSEG: Small Scale Embedded Generation/Generator

16. ANNEX:

REQUIREMENTS FOR SMALL-SCALE EMBEDDED GENERATION: Conditions and application process to become an embedded generator in Municipality