

## CITY OF CAPE TOWN ELECTRICITY SERVICES

### Electrical requirements for Embedded Generation (EG)

#### 1. ELECTRICITY SERVICES REQUIREMENTS

##### 1.1 General

Persons wishing to connect renewable electricity generators such as wind turbines or photovoltaic cells to the electrical grid are legally required to obtain written permission from the City of Cape Town Electricity Services Department. An application form is available on the Electricity Services page of City of Cape Town website <http://www.capetown.gov.za>. Electricity Services Customer Support Services East, South and North at Bloemhof, Wynberg or Ndabeni respectively may be contacted for more information.

The parallel connection of any generator to the electrical grid however powered has numerous implications for the local electricity utility which go beyond environmental sustainability. The most pressing are the safety to the Utility's staff, the public and the user of the generator. Further implications include the impact of the physical presence of the generation on neighbours, the quality of electrical supply in the vicinity of the generation, and metering and billing issues. There is therefore a strong need for the practice to be regulated for the general benefit and protection of citizens.

Local specifications, standards, policies and practices in this regard are being developed both nationally and by the City of Cape Town within the context of South African legislation and electricity distribution norms. In this process, widespread reference is being made to the practices of other countries.

The current status of the development of these standards etc. permits the City at this stage to only consider applications from non-residential generators of size not smaller than 100kW who wish to run their generation in parallel with the City's Distribution network on condition that reverse power flow onto the distribution network is not possible. (The City is not able to compensate generators for any net electrical power fed onto the distribution electrical grid, and is also not yet in a position to allow "net metered" connections where excess generation is offset against consumption of electricity on a unit for unit basis). The local electricity grid's ability to absorb the generated power would be one of the factors determining whether the connection of the generator to the grid would be allowed. Aspirant generators complying with the above must apply in writing to the City of Cape Town Electricity Department for permission to connect their embedded generators in parallel with the grid. The Electricity Department will provide its technical requirements (some of which are still in the process of being finalised).

Proof of compliance with National Electricity Regulation Act [Act 4 of 2006] requirements regarding generator licensing will be required before applications to connect in parallel with the City's electrical grid will be processed.

Applications for parallel connection of residential and non-residential small scale embedded generation (SSEG) smaller than 100kW will only be considered once national standards are finalised, once NERSA has provided SSEG policy in terms of Electricity Regulation Act [Act 4 of 2006], once a SSEG prepayment meter is commercially available and once City of Cape Town SSEG policies have been finalised.

The City reserves the right to retrospectively require generators who have been given permission to connect in parallel to the network to comply with new or revised national standards when adopted.

Before applications to connect in parallel with the City's electrical grid will be processed the requirements of other departments of the City of Cape Town regarding the erection/installation of the proposed generators (e.g. wind turbines or PV panels) must be met (e.g. Planning and Building Development Management, City Health Specialised Services, etc.). Statements of compliance and clearance by the respective Departments must be reflected on the City of Cape Town Electricity Services application form for the connection of Embedded Generation (GEN/EMB)

## 1.2 Legislation, Standards and Normative Reference compliance

- Electricity Regulation Act (Act 4 of 2006);
- Occupational Health and Safety Act (Act 85 of 1993);
- NERSA licencing requirements of consistent approach for utilities;
- Distribution Grid Code (all parts);
- The South African Grid Code (all parts);
- City of Cape Town Electricity Supply By-law;
- Eskom DST 34-1765 Distribution standard for the interconnection of embedded generation;
- NRS 097-1 Code of practice for the interconnection of embedded generation to electricity distribution networks Part 1: MV and HV (once published);
- NRS 097-2-1 Grid interconnection of embedded generation Part 2: Small scale embedded generation, Section 1: Utility interface.
- NRS 097-2 Grid interconnection of embedded generation Part 2: Small scale embedded generation, Sections 2 to 4 (once published);
- NRS 048 – Electricity supply – Quality of supply: Part 2: Voltage characteristics, compatibility levels, limits and assessment methods and Part 4: Application guidelines for utilities, Part 7, Application practices for end-customers (once published);
- SANS 10142-1 The wiring of premises;
- SANS 474/NRS 057 Code of practice for electricity metering;
- Compulsory Specifications Act (Act 5 of 2008) wrt SANS 60065/IEC 60065 Audio, video and similar electronic apparatus – Safety requirements and SANS 61558 – 1/IEC 61558 – 1: Safety of power transformers, power supplies, reactors and similar products Part 1: General requirements and tests, together with the appropriate Part(s) 2 of the SANS 61558/IEC 61558 series;
- Energy Networks Association (ENA) Engineering Recommendation (ER) G 83/1-1, ER G59/1 and Engineering Technical Report (ETR) 113
- Regulatory Requirements and Normative References in the City of Cape Town Electricity Services application form for the connection of Embedded Generation (GEN/EMB)

## 1.3 Information required and specific requirements

### 1.3.1 SSEG pilot projects (<100kW)

- Completed application form GEN/EMB;
- ENA ER G 83/1-1 Appendix 3 - SSEG Installation commissioning confirmation;
- ENA ER G 83/1-1 Appendix 4 - Type verification test sheets for SSEG and protection (if not part of SSEG interface);
- Operations & Maintenance procedures and Installation Responsibilities after commissioning;
- Copy of Certificate of Compliance in terms of OHS Act - Electrical Installation Regulations;
- SSEG compatible with utility network fault levels;
- Declaration by ECSA registered professional engineer or professional engineering technologist that installation complies with all requirements (refer also to ENA ER G 83/1-1 Appendix 3);
- SSEG decommissioning confirmation is required once applicable (ENA ER G 83/1-1 Appendix 5);

### 1.3.2 EG (≥100kW)

- Completed application form GEN/EMB;
- Distribution Grid Code (all parts);
- The South African Grid Code (all parts);
- ENA ER G59/1 and ETR 113;

- Eskom DST 34-1765 Distribution standard for the interconnection of embedded generation;
- NRS 097-1 Code of practice for the interconnection of embedded generation to electricity distribution networks Part 1: MV and HV (once published);
- Operations & Maintenance procedures and Installation Responsibilities after commissioning;
- EG compatible with utility network fault levels;
- Declaration by ECSA registered professional engineer or professional engineering technologist that installation complies with all requirements;
- EG decommissioning confirmation is required once applicable;

#### 1.4 Protection requirements

The following non-exhaustive interface protection requirements are required:

##### 1.4.1 SSEG pilot projects (<100kW)

- Over current
- Over and under voltage
- Over and under frequency
- Loss of mains (all phases)
- Reverse power
- Islanding

Special arrangements are required for two series SSEG isolating switches (NRS 097-2-1:2010 Section 4.2) that provides galvanic isolation for the SSEG within 2 seconds from the utility network during an islanding condition. This is required to always prevent reverse power flow into the utility network on loss of mains and to ensure safety at all times.

##### 1.4.2 EG ( $\geq 100$ kW)

Protection requirements as stipulated in specifications mentioned in 1.3.2.

#### 1.5 Quality of Supply

QoS required in compliance with NRS 048 and NRS 097 required at point of common coupling.

#### 1.6 Post commissioning

Liaison with the City of Cape Town after the commissioning will be with Electricity Services Distribution Area North, South and East Engineering Support sections situated at Ndabeni, Wynberg and Bloemhof depots respectively.