

Interim requirements for Small Scale Embedded Generation (SSEG)

Effective 1 July 2016

Scope

NERSA now allows embedded generation below 100kVA without a generating licence. This document will serve as an interim guideline for Small Scale Embedded Generation (SSEG) installations (< 100kW) until such time as national standards are finalised and NERSA has provided an SSEG policy (Grid Code) in terms of Electricity Regulation Act [Act 4 of 2006]. The NMBM 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. This document only deals with the requirements for the electrical connection. Requirements of other departments of the NMBM regarding the erection and/or installation of the proposed generators (e.g. wind turbines or PV panels) must be cleared with the relevant departments, e.g. Land & Housing, Building Plans, City Health, etc.

The parallel connection of any generator to the electrical grid has numerous implications for the local utility which go beyond environmental sustainability. The most important 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, metering and billing issues. Local specifications, standards, policies and practices in this regard are being developed nationally. In the meantime however, widespread reference is being made to the practices of other countries. All LV grid connected generator interconnection equipment shall be type-test certified to comply with the minimum technical requirements of NRS 097-2-1.

General

At this time the NMBM will only consider applications from LV supplied customers who buy electricity directly from NMBM. Applications from consumers buying electricity from resellers can not be considered as they are provided with metering from their respective facilities agencies.

As most domestic, commercial and small industrial LV supplies are fed from a shared LV feeder, the maximum individual generation will be limited to approximately 25 % of the customer's NMD. Note that the maximum allowable sizing for a single phase generator is 4.6kW. Generation larger than this shall be of the three-phase balanced load type which implies that the customer will have to convert to a three phase supply.

Domestic, Commercial and Industrial LV supplies

No of Phases	Service Circuit Breaker Size (A)	Notified Maximum Demand (kVA)	Maximum Individual Generation Capacity (kVA)	Type of metering required	Applicable Tariffs
1	80	18.5	4.6	1 ph meter + modem	31/36/32/37
3	80	55.4	13.9	3 ph meter + modem	31/36/33/38
3	100	69.3	17.3	3 ph meter + modem	33/38/60/61
3	150	103.5	25.8	3 ph CT metering + modem	33/38/60/61
3	300	207	51.8	3 ph CT metering + modem	33/38/60/61
3	400	276	69	3 ph CT metering + modem	34/39/34T/39T
3	600	414	100	3 ph CT metering + modem	34/39/34T/39T
3	601 to 1200	414 to 800	100	3 ph CT metering + modem	34/39/34T/39T

The Process

1. Client fills out and submits application form
2. Metering Services staff do site inspection with customer electrician and instruct on changes required
3. Metering Services provide a detailed quotation
4. Client pay applicable fees
5. Client submit COC and other compliance forms on completion of installation

6. Metering Services install metering, initiate billing and enable web access

Information Required

Information required and specific requirements:

- Completed application form for Embedded Generation;
- SSEG Installation commissioning confirmation;
- Type verification test sheets for SSEG and protection (if not part of SSEG interface);
- Copy of Certificate of Compliance in terms of OHS Act - Electrical Installation Regulations;
- Declaration by professional technologist/engineer registered with ECSA or another professional institution for the installation of embedded generation.

NERSA requires municipalities to register and maintain a database of all SSEG installations in its area, therefore, clients shall provide the information below as a minimum:

- The technology of the generation
- The capacity of the installation
- Its location, both on the network and GPS co-ordinates
- The capacity of energy storage if installed
- The customer name and account number

Metering

Where EG (embedded generation) is grid connected, the grid may be used as energy “bank” whereby the EG producer would bank credits for own use at times when the EG source cannot be used, e.g. PV during night time. It shall be noted that banked energy remaining at the end of the billing cycle will be forfeited as it may not be transferred to future billing cycles.

STS compliant prepayment meters used in SA do not allow for the deduction of reverse energy and until such time as prepayment meters become available that can allow for this, bi-directional four quadrant credit meters that record both forward and reverse energy will be used. A meter and modem shall be installed, owned and maintained by NMBM. Uploaded metering data will be made available to the client on the NMBM's metering web site.

At this time no special tariff for SSEG business customers exist. Thus customers currently billed on business tariffs will remain on their current tariffs. Domestic customers will be billed on the Domestic Time-of-Use tariff. With this tariff reverse and “banked” energy will be offset in the same time slot in which it was produced.

Cost of the Metering Equipment

In order to comply with NERSA regulations, bi-directional net-metering will be installed where imported as well as exported energy is recorded and downloaded to a central server on a daily basis. The customer will only pay 50% of the cost of the metering equipment. Programming, installation and admin costs however will be charged at standard rates.

Metering Services staff will do a site inspection, prepare a formal quotation and advise the customer on preparing the site for the metering installation.

Billing, Administration and other Charges

Example 1: Billing calculation where Imported Energy exceeds Exported Energy

Period:	1 to 30 August 2016	Consumption	Unit	Rate (c/kWh)		
	Imported Energy					
	Energy : Peak	400.00	kWh			
	Energy : Standard	1000.00	kWh			
	Energy : Off-peak	300.00	kWh			
Less:	Exported Energy					
	Energy : Peak	0.00	kWh			
	Energy : Standard	500.00	kWh			
	Energy : Off-peak	0.00	kWh			
Balance	Domestic TOU, Scale 31T					
	Energy : Peak	400.00	kWh	175.00	R	700.00
	Energy : Standard	500.00	kWh	170.00	R	850.00
	Energy : Off-peak	300.00	kWh	125.00	R	375.00
					Basic Charge	R 60.00
					TOTAL	R 1 985.00
					VAT	R 277.90
					TOTAL	R 2 262.90

In the example above, the consumer consumes more energy from the NMBM grid than what was exported back into the grid and is billed accordingly

Example 2: Billing calculation where Exported Energy exceeds Imported Energy

Period:	1 to 30 August 2016			Rate		
	Municipal Supplied Energy	500.00	kWh			
Less:	Exported Energy	-1,450.00	kWh			
Balance	Small Business, Scale 33 (Winter)	-950.00	kWh	204.06 c/kWh	R	00.00
	Small Business, Scale 33 (Summer)		kWh	129.36 c/kWh	R	00.00
					Basic Charge	R 720.00
					TOTAL	R 720.00
					VAT	R 100.80
					TOTAL	R 820.80

As can be seen from example 2 above, no monetary benefit can be derived if more energy is generated than can be consumed by the client within a billing period.

Example 3: Billing calculation where excess Exported Energy is sold to PowerX

Period:	1 to 30 August 2016			Rate		
	Municipal Supplied Energy	1 000.00	kWh			
Less:	Exported Energy	1,450.00	kWh			
Balance	Excess Exported Energy	-450.00	kWh			
	Excess Energy sold to PowerX	450.00	kWh			
Billing	Small Business, Scale 33 (Winter)	00.00	kWh	204.06 c/kWh	R	00.00
					Basic Charge	R 720.00
					Total	R 720.00
					VAT	R 100.80
					TOTAL	R 820.80

In the example above, the excess exported energy which may not be re-purchased by NMBM, is sold to a third party license holder.

Legislation, Standards and Normative Reference compliance

- Electricity Regulation Act (Act 4 of 2006);
- Occupational Health and Safety Act (Act 85 of 1993);
- Distribution Grid Code (all parts);
- The South African Grid Code (all parts);
- Nelson Mandela Bay Municipality Electricity Supply By-law;
- Eskom DST 34-1765 Distribution standard for the interconnection of embedded generation;
- 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 – 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;

In addition the following European and American standards may be considered:

- Energy Networks Association (ENA) Engineering Recommendation (ER) G 83/1-1, ER G59/1 and Engineering Technical Report (ETR) 113
- Services application form for the connection of Embedded Generation (IEC 61727
- prIEC/EN 62109-1 (IEC 60730, EN 50178, PV Inverter Safety)
- IEC 61727 (NRS 097) Utility Interface – current quality
- IEC 62116 (Avoiding the unwanted island operation)
- VDE 0126-1-1 (German Grid Tie inverter Standard)
- IEC 61683, prEN 50530 (Efficiency measurements)
- UL 1741 (USA inverter standards)

Test Certification will be acceptable from internationally reputable test laboratory eg. UL or TUV

COC	Certificate of Compliance
EG	Embedded Generation
LV	Low Voltage, Nominal voltage levels up to and including 1 kV. For this standard it is defined as 230 V AC for single phase, 460 V AC line-to-line for dual phase and 400V AC line-to-line three phase
NERSA	National Electricity Regulator of South Africa
NMBM	Nelson Mandela Bay Municipality
PV	Photo Voltaic
SSEG	Small Scale Embedded Generators
PowerX	A contracted independent power purchaser

Contact Persons

Customer Services	- 041 392 4162
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