APPLICATION FOR THE CONNECTION OF EMBEDDED GENERATOR



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Project Name:	

Property Owner details

Name:	
ID number (if an individual):	
Telephone Number:	
Email Address:	

Applicant details (if different from Property Owner)

Name:	
ID number (if an individual):	
Telephone Number:	
Email Address:	

Property Details

Erf number: Portion number (if applicable):		
Electricity/Municipal Account Number: (indicate if new connection still being applied for and no account yet)		
Physical address: *Street Address / Pole Number, Township / Suburb / Farm, Postal Code*		
Property type (tick appropriate):	Residential	
	Business	
	Commercial/Industrial	
	Agricultural	

Current connection capacity	Circuit breaker size	Notified Maximum Demand (NMD)
Single phase - 1ϕ		
Three phase - 3ϕ		

Current tariff	
Meter nr	

Installer Details*

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Installer (Company name):		
Address:	Physical:	Postal:
Website:		
Contact Person Name:		
Telephone:		
Cell:		
Email address:		
PV Green Card Accreditation Number		

Site and initial design details

Site GPS coordinates: Degrees and decimal minutes (DMM):	Latitude)	S °
	Longitude	E °
Site Plan:	Show location and dimensions of intended installation infrastructure in relation to the existing buildings and property point of connection.	
Site land use zoning:		
Detailed design:	Attach circuit diagram and design showing major components, proposed point of common coupling, isolating and interfacing devices with City of Tshwane electrical network, protection schemes, customer electrical installation, operating characteristics, earthing arrangements, etc.	

Embedded Generator (EG) details

Fuel Source for Embedded Generator	**Solar**	**Hydro**	**Gas**	**Coal**	**Bagasse**	**Other**
Total Capacity of Embedded Generator system (kVA and PF):						
Type of energy conversion: Synchronous Generator, Asynchronous/Induction Generator, Inverter, Fuel Cells.						

Mode of Embedded Generation: (Tick appropriate box)	Energy from Embedded Generation to be used within a consumer's electricity network.	
	Energy from Embedded Generation to be used within a consumer's electricity network and excess to be exported to City of Tshwane Electricity's distribution network.	
	Energy from Embedded Generation to be used solely for exporting to City of Tshwane's Electricity's distribution network	
	Energy from Embedded Generation to be used solely for wheeling to third party through City of Tshwane's Electricity's distribution network.	
Embedded Generation system with storage capacity (batteries). Provide detail.		

Construction Schedule

Anticipated Construction Start Date:	
Anticipated Commissioning Date:	

Earthing arrangement (tick appropriate)	TN-C-S	
	TN-S	
	TT	
	IT	
	TN-C	

Electrical Parameters of Embedded Generation:	Positive Sequence Impedance	Negative Sequence Impedance	Zero Sequence Impedance
(All units in parallel, to be use for fault-level studies) Attach all generator and transformer data sheets for modeling analysis.			
Three phase symmetrical fault level contribution from the embedded generators		MVA	

Generator Transformer Parameters (if generator transformer is used to step up the voltage level prior to export)	
Rating in kVA	
Voltage Ratio(s) (kV/kV)	**400V/11kV**
Transformer Impedance	**4,5 %**
Tap Change range +/- in percentage	**-5 % and 5 %**
Tap Change step size in percentage	**2,5 %**
Tap Changer type, eg on-load, off load	**Off load**
Tap Changer location (HV or LV side)	**HV**
Winding Vector Group	**Dyn11**
Method of HV Winding earthing	**None**
Method of LV winding earthing	**None**
NER/NEC/NECR size	**None**

Point of Common Coupling: (Isolation point to be used to connect/disconnect embedded generation from the Distribution Network, attach single-line diagram showing arrangement including consumer network)	

Network Connection Point: (In the case of applicant not being an existing consumer only, attach single-line diagram showing arrangement)	

Protection Details: (Attach data sheets)	
Method of synchronizing: (Auto/Manual, make and type of relay etc)	
Method of anti-islanding: (Details of scheme, relays to be used etc)	
Method of generator control: (AVR, speed, power, PF etc , relays to be used)	

Other protection to be Applied: (O/C,E/F, over/under voltage, over/under frequency, reverse power etc)	

List of Regulatory Approvals:	**See Annexure: C**

Estimated Proposed Consumption and Generation Levels

Month	Estimated Energy Production (kWh)	Estimated Energy Consumption (kWh)	Estimated monthly kWh Export to Grid (Production less Consumption)	Estimated daily maximum exported power (kVA)
January				
February				
March				
April				
May				
June				
July				
August				
September				
October				
November				
December				
Total:				-

NERSA license

Does the system require a license from NERSA? (tick)	No	
	Yes	

Clearance by other City of Tshwane Departments

DEPARTMENT	SECTION	COMMENTS	NAME	SIGNATURE	DATE

Attachments checklist (tick)

Site Plan (commercial and industrial only)	
Detailed circuit diagram	
Inverter type test Certificate of Compliance and Test Report according to NRS 097-2-1, issued by accredited 3rd party test house	
Certificate of Compliance (COC) for the existing Connection/ Premises or the SANS 10142 letter of compliance for the back-up generator.	
Control philosophy with a short statement of what happens: when power is normal, power fails and power returns.	
An internal 11kV Single line Diagram on all 11kV connections and photos of the clients City of Tshwane connection.	

Declaration

I request the City of Tshwane to proceed with a preliminary review of this embedded generation interconnection application and I agree to pay the cost associated with completing this review and obtaining written consent of the City of Tshwane.

I further consent to the City of Tshwane providing this information to the National Electricity Regulator of SA (NERSA) and other Distributors as required.

I declare that this installation has been designed such that it complies with the National standards and laid out in the latest version of City of Tshwane's *Embedded Generation* Policy document.

APPLICATION FOR THE CONNECTION OF EMBEDDED GENERATOR

Property Owner Signoff

Name	Date	Signature
_____	_____	_____

Applicant Signoff (if different from property owner)

Name	Date	Signature
_____	_____	_____

Installer sign-off

Organisation name:

Person:

Name	Date	Signature
_____	_____	_____

Note: It is recommended that this form is filled in by a PV installer familiar with the technical details of the intended generation technology. ECSA-registered professional sign-off of the Commissioning Report is however mandatory.

FOR OFFICE USE

Date Application Received:		Application Reference No.	
Further Information Required	YES / NO	Date Received:	
More detailed studies Required	YES / NO	Date Complete:	
Initial Inspection Required	YES / NO	Date Undertaken:	
Approved in Principle:	YES / NO	Date Applicant Advised:	
COMMISSIONING:			
Commissioning Report received:	YES / NO	Date received:	
Further information required:	YES / NO	Date Received:	
Installation inspection:	YES / NO	Date inspected:	
Bi-directional meter installed:	YES / NO	Date installed:	
Approved for connection:	YES / NO	Date Applicant Advised:	

Annexure A: Installation of Embedded Generation Categories

Category	Size	Legislation	Applicable Standards
Category A	$A_0(0 < X \leq 13.8kVA)$ $A_1(13.8kVA \leq X < 100kVA)$ $A_2(100kVA \leq X < 1000kVA)$	•No license •By-laws •ERA 2006	NRS 048-2: Electricity supply - Quality of supply Part 2: Voltage characteristics, compatibility levels, limits and assessment methods NRS 048-4: Electricity supply - Quality of supply Part 4: Application guidelines for utilities NRS 097 – 2-1: Grid Interconnection of Embedded Generation – Part 2: Small Scale Embedded Generation, Section 1 – Utility Interface NRS 097 – 2-2: Grid Interconnection of Embedded Generation – Part 2: Small Scale Embedded Generation, Section 2 – Embedded Generator Requirements NRS 097 – 2-3: Grid Interconnection of Embedded Generation – Part 2: Small Scale Embedded Generation, Section 3– Utility framework (To be developed in the future) NRS 097 – 2-4: Grid Interconnection of Embedded Generation – Part 2: Small Scale Embedded Generation, Section 4–Procedures for implementation or application (To be developed in the future) SANS 10142-1
Category B	$B_1(1MVA \leq X < 10MVA)$	• Nersa license • ERA 2006 • By-laws • MFMA	SA Grid Code RSA Distribution Metering Code RSA Distribution Network Code RSA Distribution System Operating Code SANS 10142-1 NRS 048-2: Electricity supply - Quality of supply Part 2: Voltage characteristics, compatibility levels, limits and assessment methods NRS 048-4: Electricity supply - Quality of supply Part 4: Application guidelines for utilities NRS 054: Rationalized user specification - Power transformers NRS 057-4: Electricity metering part 4: Code of practice SANS 1019: Standard voltages, currents and insulation for electricity supply.
	$B_2(10MVA \leq X < 20MVA)$	• Nersa license • ERA 2006 • By-laws • MFMA • Ministerial Approval	
Category C	$X \geq 20MVA$	• Nersa license • ERA 2006 • By-laws • MFMA Ministerial Approval	SA Grid Code RSA Distribution Metering Code RSA Distribution Network Code RSA Distribution System Operating Code NRS 029: Current transformers for rated a.c voltages from 3.6kV up to and including 420kV NRS 030: Alternating current disconnectors and earthing switches (above 1000V) NRS 037-1: Telecontrol protocol for stand alone remote terminal units NRS 048-2: Electricity supply - Quality of supply Part 2: Voltage characteristics, compatibility levels, limits and assessment methods NRS 048-4: Electricity supply - Quality of supply Part 4: Application guidelines for utilities NRS 054: Rationalized user specification - Power transformers NRS 057-4: Electricity metering part 4: Code of practice SANS 1019: Standard voltages, currents and insulation for electricity supply SANS 10142-1 International and National Standards (Protective Relay) IEC 60255-30: Electrical relays Part 3: Single input energizing quantity measuring relays with dependant and independent time IEC 60255-6: Electrical relays Part : Measuring relays and protection equipment IEC 60255-21: Electrical relays Part 21 Vibration, shock, bump and seismic tests on measuring relays and protection equipment (All sections) IEC 60255-22 Electricity relays Part22 Electrical disturbance tests for measuring relays and protection equipment (All sections) SANS IEC 60529: degrees of protection provided by enclosures (IP code) SANS IEC 6100-4: Electromagnetic compatibility (EMC): Test and measurement techniques (All sections).

Annexure B: List of requirements for Photovoltaic (PV) installations

Inverter / Details

Manufacturer:		
Model:		
Inverter AC rating:		
Number of Phases (tick appropriate):	Single Phase	
	Three Phase	
Number of Inverters:		
Inverter manufacturer guarantee period:		
NRS 097-2-1 Certification:	Inverters are required to be certified according to NRS 097-2-1. Approved third party inverter type test certification must be attached to this application form (tick).	

PV Panel Details

Manufacturer:	
Model:	
Total number of panels:	
Power output per panel (kWp):	
Manufacturer guarantee period:	

Inverter type test Certificate of Compliance and Test Report according to NRS 097-2-1, issued by accredited 3rd party test house	

ANNEXURE C: Additional information for Embedded Generation Applicants.

Responsibilities of Embedded Generators to Energy & Electricity (Distributor)	
1	The Embedded Generator shall enter into a connection agreement with Tshwane Electricity (Distributor) before connecting onto the Distribution System.
2	The Embedded Generators shall ensure that the reliability and Quality of Supply complies with the terms of the connection agreement.
3	The Embedded Generator shall comply with the Distributor's protection requirement as well as protection of own plant against abnormalities, which could arise on the Distribution System.
4	The Embedded Generator shall be responsible for any dedicated connection costs incurred on the Transmission System or Distribution System as a result of connection of the Embedded Generation facility to the Distribution System.
5	The Embedded Generator shall be responsible for synchronizing the generating facility to the Distribution System within pre-agreed settings.
Connection Point Technical Requirements	
1	The Embedded Generator shall be responsible for the design, construction, maintenance and operation of the equipment on the generation side of the connection point.
2	The Embedded Generator shall be responsible for the provision of the site required for the installation of the Distributor's equipment required for connecting the generating facility.
3	The technical specifications of the connection shall be agreed upon by the participants based on the Distribution System Impact Assessment Studies.
4	A circuit breaker and visible isolation shall be installed at the connection point to provide the means of electrically isolating the Distribution System from the generating facility.
5	The Embedded Generator shall be responsible for the circuit breaker to connect and disconnect the generator plant.
6	The location of the circuit breaker and visible isolation shall be decided upon by the participants.
Protection Requirement for Embedded Generators **General Protection Requirements**	
1	The Embedded Generator's protection shall comply with the requirements of Tshwane Electricity.
2	Additional features including inter-tripping and generator plant status to be agreed upon by the participants.
3	The protection schemes used by the Embedded Generator shall incorporate adequate facilities for testing and maintenance.
4	The protection scheme shall be submitted by the Embedded Generator for approval by Tshwane Electricity.
Specific Protection Requirements	
1	**Phase and Earth Fault Protection** (a) The protection system of the Embedded Generator shall fully coordinate with the protective relays of the Distribution System. (b) The Embedded Generator shall be responsible for the installation and maintenance of all protection relays at the connection point.
2	**Over/under Voltage and over/under Frequency Protection** (a) The Embedded Generator shall install over/under voltage and over/under frequency protection to disconnect the generating facility under abnormal network conditions as agreed between the Distributor and the Embedded Generator.
3	**Faults on the Distribution System** (a) The Embedded Generator shall be responsible for protecting its generation facility in the event of faults and other disturbances arising on the Distribution System.
4	**Islanding** (b) The Embedded Generation facility shall be equipped with loss of mains detection protection system to prevent the generator from being connected to a de-energised Distribution System. The Distributor shall take reasonable steps to prevent closing circuit breakers onto an islanded network.

	(c) For unintentional network islanding, the Embedded Generator and the Distributor shall agree on methodology for disconnecting and connecting the Embedded Generator.
Quality of Supply Requirements	
1	**Frequency Variations** The Embedded Generation facility shall remain synchronized to the Distribution System while the network frequency remains within the agreed frequency limitations at all time.
2	**Power Factor** (a) The power factor at the connection point shall be maintained within the limits agreed upon by eThekwini Electricity.
3	**Fault Levels** (a) The Embedded Generator shall ensure that the contractually agreed fault level contribution from the generation facility shall not be exceeded at any time.
Telemetry	
1	The Embedded Generator shall have the means to remotely report any status change of any critical function that may negatively impact on the Quality of Supply of the Distribution System.
Operational Responsibilities of Embedded Generators	
1	The Embedded Generator shall ensure that its generating units are operated within the capabilities defined in the Connection Agreement entered into with the Distributor.
2	The Embedded Generator shall reasonably cooperate with the Distributor in executing all the operational activities during an emergency generation condition.
3	The Embedded Generator shall assist the Distributors in correcting Quality of Supply problems caused by its equipment connected to the Distribution System.
4	All customers must declare any co-generating plant (whether licensed or not) and specify the interlocking mechanism to prevent inadvertent parallel operation with the Distributor's network.
5	Embedded Generators shall have the required protection to trip in the event of a momentary supply loss causing an island condition to prevent paralleling out of synchronism due to auto-reclose functionality on the Distributor's Network.
Fault Reporting and Analysis/Incident Investigation	
1	The Embedded Generators shall report the loss of generation (as agreed by the participants) to the Distributor within 15 minutes of the event occurring. Notice of the intention to reconnect such shall be given with at least 15 minutes advance notice to enable the Distributor to take any necessary action required.
Outage Scheduling and co-ordination	
1	Embedded Generators with the maximum capacity greater than 1MW shall furnish the Distributor with information on planned outages in order for the Distributor to properly plan, and coordinate its control, maintenance and operation activities.
Standards to abide by	
1	NRS 097 :GRID INTERCONNECTION FOR EMBEDDED GENERATION
2	NRS 048 :ELECTRICITY SUPPLY: QUALITY OF SUPPLY
Additional Requirements	
1	Where the 11 kV side of the generator transformer is Star, an NER must be fitted.
2	Where the 11 kV side of the generator transformer is Delta, an NECR must be fitted.