

REQUIREMENTS FOR EMBEDDED GENERATION		
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REQUIREMENTS FOR EMBEDDED GENERATION

Conditions and Application Process for Connection of Grid-Tied Embedded Generation Systems to the Eswatini Electricity Company (EEC) Distribution Network

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SCOPE

The scope of the Eswatini Electricity Company (EEC) Requirements for Embedded Generation is to establish the technical, commercial, operational, safety, metering, and compliance requirements for the connection and operation of Embedded Generation facilities on the EEC distribution network in line with the Embedded Generation Bylaws and applicable regulatory standards.

The Requirements shall govern application procedures, grid interconnection, protection systems, net-billing, metering, commissioning, monitoring, and the responsibilities of both Eswatini Electricity Company and Embedded Generation customers to ensure the safe, reliable, and sustainable integration of Embedded Generation into the national electricity network.

1. GENERAL PROVISIONS

1.1 DEFINITIONS

- a) **“Anti-Islanding”** means the ability of an EG Plant to instantly and automatically disconnect from the EEC electricity grid whenever there is a power outage in the EEC electricity grid.
- b) **“Agreement”** or **“Embedded Generation Connection Agreement (EGCA)”** used interchangeably to mean the terms and conditions between a Customer and the EEC governing the connection of the EG to the EEC’s electricity grid and related billing issues, these *Requirements* and Annexure ‘B’ (*Tariff Schedule*).
- c) **“Approval to Connect Letter”** means a formal document issued by the EEC granting permission, consent, authorization or registration, for the embedded generator to connect onto the electricity grid
- d) **“Authority”** means the Eswatini Energy Regulatory Authority (ESERA) established under the Energy Regulation Act of 2007
- e) **“Business Day”** means any day other than a Saturday, Sunday or any official public holiday within the Kingdom of Eswatini.
- f) **“Commissioning”** means the conducting of tests necessary to confirm that the EG Plant can be brought into operation in a safe and compliant manner in accordance with applicable laws and regulations.
- g) **“Commissioning Form”** means a form reflecting the results of the Commissioning process undertaken on a Embedded Generator according to the EEC’s requirements.
- h) **“Competent Person** or **Competent installer** used interchangeably to mean accredited Installers by the Authority.
- i) **“Dedicated MV/ LV Feeder”** means a section of the Distribution Network that exclusively supplies a single EG customer. A dedicated feeder can be a dedicated MV feeder, or a dedicated MV/LV transformer.
- j) **“Distribution Network”** or **“EEC Network”** used interchangeably to mean an electrical network owned and/or operated by the EEC at voltages below 33kV.

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- k) **“Embedded Generator (EG) Customer”** or **“Customer”** means an electricity customer of the EEC that owns and operates an EG Plant on the customer side of the metering point, primarily intended for its own use.
- l) **“Embedded Generator (EG)”** or **“Embedded Generator Plant”** means a generation facility, often from renewable energy sources, with or without storage systems, owned and operated by a Customer, connected to and synchronized with the Distribution Network, generating power mainly for own use and may or may not inject surplus electricity into the Distribution Network;
- i) with an installed capacity of less than 100kW, that is exempted under the Act and the Electricity Licensing Bylaws from obligation to apply for or hold a licence; or
- ii) with an installed capacity of equal to or more than 100kW, that has on application under the Electricity Licensing Bylaws been exempted by the Authority from the requirement to hold a generation licence.
- m) **“Export”** means electricity supplied or fed-in by a Customer to the distribution network to which it is connected, as metered at the connection point;
- n) **“Financial Year”** means EEC’s financial year starting 1 April in a year and ending on 31 March in the subsequent year
- o) **“Grid Code”** refers to the code or set of codes, approved by the Authority, that together govern the development and operation of the Electricity Grid.
- p) **“Grid Impact Study”** means a technical assessment carried out to evaluate how a proposed Embedded Generator will affect the existing electrical power network.
- q) **“Grid-tied”** means an EG that is connected to the Distribution network either directly or through a customer’s internal wiring is said to be grid-tied.
- r) **“Hosting Capacity”** means the ability of a network to accommodate an amount of Embedded Generation capacity without violation of network operating parameters as specified in relevant standards and Grid Codes.
- s) **“Hybrid Grid-tied System”** means the generation configuration which includes energy storage and where the system can operate in grid-tied mode as well as independently of the grid.
- t) **“Installed capacity”** means the maximum amount of electricity, measured in kilovolt Amperes (kVA), which can flow out of the generation equipment.
- u) **“Load profile”** means the graph or data pattern showing the variation of the Customer’s rate of electricity consumption (or demand) over time.
- v) **“Reverse Power Flow / Reverse Feed-in”** means the of electricity from the Customers electricity installation onto the Distribution network (i.e. export).
- w) **“Simplified Connection Criteria”** means a set of criteria - including Embedded Generator size limits and maximum Embedded Generator penetration on grid feeders - within which Embedded Generators can connect without resulting in adverse grid

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impacts. These criteria are developed by modelling Embedded Generation penetration scenarios on typical network feeders. EG Bylaws Schedule 3.

- x) **“Signed” or “Signature”** means a hand-written signature or any secure electronic signature appended by electronic communication; where “electronic communication” has the meaning assigned to it in the Electronic Communications and Transaction Act No. 3 of 2022.
- y) **“Utility Installed Capacity”** means the Distribution Licensee’s apparent power installed capacity (kVA) and shall be based on either the customer’s main breaker size at the PoC , or transformer size.
- z) **“In Writing”** means communicated or recorded in written form. It includes, for example: mail, e-mail or communication through an electronic system (provided that the electronic system is accessible, secure, ensures integrity and confidentiality, and has sufficient audit trail features).

1.2 ACRONYMS

AC	Alternating current
AESAP	Architects, Engineers, Surveyors and Allied Professionals Council Eswatini
AMI	Advanced Metering Infrastructure
AMR	Automated Meter Reading
DC	Direct current
DIVT	Directorate of Industrial and Vocational Training
ECSA	Engineering Council of South Africa
EEC	Eswatini Electricity Company
EG	Embedded Generator
ESERA	Eswatini Energy Regulatory Authority
ESWASA	Eswatini Standards Authority
HV	High Voltage
kVA	kilo-Volt Ampere
kW	kilo-Watt
kWp	kilo-Watt peak
LV	Low Voltage
MV	Medium Voltage
MVA	Mega-Volt Amperes (1000 kVA)
MW	Mega-Watt (1000 kW)
NPR	Nameplate Power Rating
NMD	Notified Maximum Demand

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PoC	Point of Connection
PV	Photovoltaic
SSEG	Small Scale Embedded Generation/Generator
VAT	Value Added Tax
SANAS	South African National Accreditation System
SABS	South African Bureau of Standards

1.3 CONNECTION OF EMBEDDED GENERATOR

- 1.3.1 The Customer shall not connect the Embedded Generator to the Distribution Network without the prior written consent of the EEC. The consent by the EEC shall not be unreasonably withheld or delayed, provided that such permission shall only be granted upon successful completion of the pre-commissioning tests and compliance with the Requirements.
- 1.3.2 The Customer shall be responsible for the commissioning of the EG facility, including all tests and verification activities required to demonstrate compliance with the applicable EEC technical specifications and connection requirements. The Customer may temporarily connect the EG facility to the Distribution Network for commissioning purposes, subject to prior approval by the EEC. Such commissioning activities shall be undertaken at the Customer's cost and responsibility and shall not require direct supervision by the EEC, provided that all applicable safety, operational, and technical requirements are met.
- 1.3.3 The temporary connection shall be limited to the period reasonably required to complete commissioning activities and shall not exceed 48 hours without the prior written approval of the EEC. Following successful completion of commissioning and submission of the required test results and compliance documentation, the EEC may grant approval for permanent operation of the EG facility.

1.4 TEMPORARY CURTAILING OF GENERATION

- 1.1.1 The EEC has the right to instruct the Customer for reasons of safety and other technical conditions, to disconnect the whole or part of the EG from the Distribution Network or may switch off the Grid Supply. If the Customer is in breach of any provision of these Requirements, the EEC shall be entitled to switch off the Grid Supply to the Customer until it can be proven that the EG is physically and electrically disconnected from the Electrical Installation

1.5 NO SUPPLY TO THIRD PARTY(IES)

For the avoidance of doubt, the EG under these Requirements is approved on the principle that the EG facility is installed primarily to supply electricity for the Customer's own use at the Premises to which it is connected. The Customer shall not supply, sell, wheel, transfer, or otherwise make available any electricity generated by the EG Plant to any third party or to any

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other Premises, whether directly or indirectly, unless expressly authorised under applicable law and approved in writing by the EEC and the relevant Authority.

1.6 RIGHT TO DENY ACCESS

- 1.6.1 The EEC is obliged to grant the Customer non-discriminatory access to the electrical network subject to the Grid Codes, however in some circumstances connection cannot be immediately granted. Upon receipt of a complete application for an EG, the EEC shall check that the EG can be accommodated on the EEC electricity grid and that the total EG Hosting capacity of the EEC electricity grid has not been exceeded according to parameters in the Simplified Connection Criteria and other applicable standards.
- 1.6.2 Where the EEC determines, based on technical studies, network monitoring data, power quality measurements, operational assessments, or other verifiable technical evidence, that an EG facility cannot be accommodated without adversely affecting the safety, reliability, stability, power quality, or regulatory compliance of the distribution network, the EEC reserves the right to deny, limit, or defer the connection of the EG facility until such concerns have been satisfactorily addressed. This provision includes circumstances arising from network conditions or emerging technical phenomena that may not have been identified or fully quantified during pre-connection studies.
- 1.6.3 Where a proposed EG cannot be accommodated on the Distribution Network, EEC may limit or deny access only on the basis of documented technical studies, consistent with regional embedded generation practice. Such studies shall include, where applicable, load flow, voltage rise, fault level, protection coordination, power quality and network stability assessments. Recorded operational experience may be considered only as supporting evidence where it is linked to verifiable network conditions.
- 1.6.4 Equipment should not be purchased prior to obtaining written approval from the EEC to commence, as approval of the EG as proposed by the applicant is not guaranteed and the EEC shall not be held liable for equipment expenses in such cases.

1.7 TRANSFER OF OWNERSHIP OR ASSIGNMENT

- 1.7.1 Neither Party shall cede, assign, transfer, delegate, or otherwise dispose of any of its rights, obligations, or liabilities under the Connection Agreement, whether in whole or in part, without the prior written consent of the other Party, which consent shall not be unreasonably withheld or delayed.
- 1.7.2 Notwithstanding the foregoing, the EEC may on written notice to the Customer, cede, assign, delegate or transfer any of its rights and obligations under the Connection Agreement and these Requirements to any of its subsidiaries or affiliate or any successor entity, division, or operation established pursuant to the

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restructuring, reorganisation, or reform of the electricity supply or distribution industry in Eswatini.

- 1.7.3 The Customer shall notify the EEC in writing without undue delay and, in any event, prior to the effective date of such change in the event of:
- the sale, transfer, lease, or other disposal of the property on which the EG Plant is installed;
 - a change in the electricity account holder;
 - the transfer or sale of the EG plant; or
 - the decommissioning of the EG plant,
- 1.7.4 The new owner, occupier, lessee, or account holder shall, enter into a new Connection Agreement with the EEC and shall comply with all applicable laws, technical requirements, tariffs, and conditions applicable at the time of transfer.
- 1.7.5 Any export credits, feed-in credits, energy offsets, or other amounts standing to the credit of the EG Customer shall not be transferable to any successor owner, occupier, lessee, or account holder; and automatically lapse, be forfeited, and revert to zero upon:
- decommissioning of the EG plant;
 - transfer or sale of the EG plant;
 - termination, cancellation, or amendment of the existing electricity supply or connection agreement; or
 - transfer, sale, or lease of the property resulting in a change of customer or account holder.
- 1.7.6 The continued operation of the EG installation following any change contemplated in this clause shall remain subject to the new signed Connection Agreement with the EEC.

2. LEGAL AND REGULATORY REQUIREMENTS

2.1 APPLICABLE LAW

- 2.1.1 The Customer shall be required to acquaint itself with all the requirements of the laws of the Kingdom of Eswatini that are applicable to the electricity industry sector and must ensure full compliance with the following standards, legislation and By-Laws:
- Electricity Act, 2007
 - Embedded Generation By-Laws
 - Eswatini Grid Codes
 - Applicable technical standards

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- i) SZNS 028: Electricity Supply – Quality of Supply
- ii) SZNS SANS 10142:2017 and 10142-1-2: 2018 The wiring of premises
- iii) SZNS SANS 474 / NRS 057: Code of Practice for Electricity Metering
- iv) SZNS NRS 097-2-1: 2017 Grid Interconnection of Embedded Generation
- e) Other relevant legislation, subordinate legislation and Standards.

2.2 REGULATORY APPROVALS, REGISTRATION AND LICENSING REQUIREMENTS

2.2.1 The Customer must ensure that all approvals required in relation to the generation of electricity and the connection of the Embedded Generator to the Distribution Network are obtained and maintained. Registration with, and approval from, EEC is required before any EG system, irrespective of system size, may be connected to the EEC network.

2.2.2 Registration or exemption requirement are as per the Table Below

Table 1: Registration and Approval Requirements

System size	EEC Requirements	ESERA requirements
<100kVA	Registration & Approval	No registration or license necessary
≥100kVA	Registration & Approval	ESERA license/ exemption necessary

2.3 BREACH AND ENFORCEMENT

2.3.1 If a Party commits a breach of these Requirements or the Connection Agreement, then the aggrieved Party shall give the defaulting Party written notice to rectify such a breach within a period of seven (7) days from the date of receipt of the notice.

2.3.2 If the defaulting Party fails to remedy the breach within seven (7) days of the receipt of such written notice, the aggrieved Party shall be entitled to claim immediate specific performance or to cancel the Connection Agreement by written notice to the defaulting Party. Additionally, the EEC shall be entitled, without prejudice to its rights to recover any amounts due or claim damages, to disconnect the EG.

2.3.3 EEC shall have the right to immediately disconnect the electricity supply without prior notice where, in the opinion of an authorized EEC representative, the EG Customer's installation, Embedded Generator, or associated equipment is defective or poses a risk to life, property, or the integrity of the electrical network. EEC shall notify the EG Customer in writing of such disconnection, and the supply shall only be restored once the identified risk or defect has been rectified to the satisfaction of EEC.

2.3.4 Where an EG system or electricity supply has been disconnected due to non-compliance, EEC shall not reconnect it until the Customer has remedied the non-

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compliance to EEC's satisfaction and paid any administrative, inspection, testing, disconnection, reconnection, or related charges lawfully applicable.

- 2.3.5 Any unauthorized connection shall constitute an offence under applicable laws and subordinate legislation and may result in immediate disconnection of supply, recovery of lost revenue, imposition of financial penalties, and legal action, including prosecution.

2.4 LIABILITY FOR ACCIDENT

- 2.4.1 The Customer shall be responsible for any accident, injury (whether fatal or non-fatal), loss of life, damage to property or equipment, harm to animals, or environmental damage arising from back-feeding from the EG Plant when the grid supply is de-energized. EEC reserves the right to disconnect the EG Customer's installation at any time where it considers such action necessary to prevent accidents, injury, or damage to persons, property, or the Distribution Network.
- 2.4.2 The Customer shall be solely liable for any claims, losses, damages, costs, or liabilities arising from the Customer's failure to obtain or maintain any consent, approval, permit, or authorization required by the Authority or under applicable law for the generation of electricity or connection to the Distribution Network.
- 2.4.3 The Customer shall indemnify, defend, and hold harmless EEC against any and all claims, actions, proceedings, losses, damages, costs, and expenses arising from such failure.
- 2.4.4 Any amendment, clarification or revision to these Requirements issued by the Authority shall be binding on the Customer, without affecting the Customer's obligation to comply with all other applicable legal and regulatory requirements.
- 2.4.5 Where the Customer's non-compliance with these Requirements or any applicable law results in damage to property, disruption of the Distribution Network, injury, or loss of life the customer shall be liable to the full extent of the liability.

3. AMOUNTS PAYABLE

The EG Customer is responsible to pay the following:

- A once-off connection cost is to be paid by EG Customers prior to EG approval to connect to grid. This will be reflected in the applicable tariff and charge schedule.
- Costs involved in the supply and installation of meters where required.
- Any rearrangement of the electrical installation or meter accommodation, including the moving of the metering point.
- Cost of any grid impact studies should these be required.

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- e) Any changes required to the distribution network upstream of the PoC as a result of the EG installation.
- f) All the costs associated with any 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.

4. TECHNICAL REQUIREMENTS

4.1 APPLICABLE TECHNICAL STANDARDS

4.1.1 The technical requirements that EGs are required to comply with are covered in the following standards and specifications:

- a) Embedded Generator Bylaws Schedule 2: Embedded Generator Interconnection Specification.
- b) Embedded Generator Bylaws Schedule 3: Simplified Connection Criteria for Low-Voltage Generators.

4.1.2 The above specifications cover aspects such as power quality, anti-islanding, network faults, response to utility recovery, isolation, earthing, protection and labelling.

4.1.3 The design and installation of EG equipment must comply with these Requirements.

- a) Signal and Control requirements should be as per Embedded Generator Interconnection Specification. EG systems above 1 MW must be Grid Code compliant.
- b) Testing of Inverters - Until such a time as a ESWASA mark is issued for inverters, the **EEC shall require proof in the form of type test certificates**, having been successfully carried out by a third-party testing authority certifying compliance of the inverters with the Interconnection Standard. The use of inverters in EG systems without such certification is not permitted, both in new and existing installations. The **installation of reverse feed blocking does not exempt the Customer** from providing the above certification.

4.1.4 In general, the test certificate must be for the most recent version of SZNS NRS097-2-:2017. The EEC reserves the right not to accept test certificates for old versions of NRS097-2-1.

4.1.5 The Customer should require their inverter supplier to provide the necessary certification before the equipment is purchased.

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4.2 ISLANDING / ANTI-ISLANDING INSTALLATIONS

- 4.2.1 All EG systems are required to have an anti-islanding functionality as stipulated in the EG Interconnection Specification. Certification to this effect is required of inverters.
- 4.2.2 Should the inverter or EG have the capability to comply with the EG Interconnection Specification i.e. operate in “islanded mode” (or “off grid” mode), the system shall be effectively isolated from the EEC distribution network during islanded mode operation.
- 4.2.3 Where an EG system is configured to operate with a standby or alternative supply after isolation from the EEC distribution network, the installation shall incorporate a break-before-make changeover switch or equivalent approved interlocking arrangement to ensure that the standby supply cannot operate in parallel with the EEC network. The installation shall comply with the applicable requirements of SZNS SANS 10142-1.

4.3 BATTERY OR OTHER STORAGE

- 4.3.1 Battery or other storage may be included in the EG system configuration. Where storage is connected such that it can provide power onto the distribution network, it shall do so via an inverter certified according to the Interconnection Standard. If this is achieved via a separate storage/battery inverter (even only to supply the Customer’s wiring which is in turn connected to the EEC grid), the storage/battery inverter shall be certified according to the Interconnection Standard, and evidence of such compliance provided to the EEC.
- 4.3.2 The maximum legally allowable battery charging current is 25% of the UIC, however this is subject to technical studies. If the outcomes of technical studies indicate potential adverse impacts on the distribution network due to battery charging demand, the EEC reserves the right to restrict the permissible maximum battery charging current based on this technical evidence. In this event that EG customer will be required to comply with such limits.

4.4 FIRE SAFETY AND EMERGENCY SHUT-OFF SWITCH

Emergency disconnection switching shall be in accordance with SZNS SANS 10142.

4.5 EMBEDDED GENERATOR SYSTEM PROTECTION

- 4.5.1 The Customer shall, at its own expense, provide, install, maintain and operate a protection system on the Embedded Generator side of the PoC which:
- shall be compatible with the Distribution Network protection system; and
 - shall safeguard the Customer’s connection equipment from any fault condition on the Distribution Network, including but not limited to:
 - phase faults,
 - earth faults,
 - under or over voltage,

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- iv) under or over frequency and
- v) open-phase conditions.

4.5.2 The Customer shall ensure that the protection settings of the EG are coordinated with the EEC's protection settings from time to time.

4.6 GENERATION AND EXPORT CAPACITY LIMITS

4.6.1 Generation and export capacity limitations are dependent on three determining factors:

- a) **Utility Installed Capacity (UIC):** Typically, the service connection circuit breaker rating.
- b) **Type of MV/LV network:** Whether the feeder is shared (serving multiple customers) or dedicated (serving a single customer), which relates to the MV/LV transformer size.
- c) **MV feeder peak load:** Ensures feeder stability.

4.7 CUSTOMER UIC BASED ON CUSTOMER TYPE

4.7.1 Domestic Customers

For domestic customers (S1), the Maximum Inverter Capacity is limited to:

- a) 50% of the UIC for systems without storage
- b) 75% of the UIC for systems with storage.

Guide to determining generation size limits for domestic customers on shared feeder.

- a) Check the main circuit breaker on your distribution board to determine whether you have a single - or three-phase connection. A single-phase connection will generally have a single main circuit breaker, and a three-phase connection will have a triple main circuit breaker. *If in doubt, consult an electrician.*
- b) kVA and kW ratings for Solar PV EG systems are similar and shall be used interchangeably for estimation purposes.
- c) Maximum Battery Storage capacity is not defined.
- d) Maximum Battery Charging Current Limit is 25% of the UIC.
- e) It is the responsibility of the customer to ensure that their load is balanced across all three phases in a case where a single-phase EG is connected to a 3-phase PoC.

4.7.2 Other Customer Classes

Applies to other customer classes from S3 to T4, i.e. (large customer supplied at LV, large customer supplied at MV Small-holder irrigation <100 kVA)

- a) Maximum Inverter Capacity is limited to 75% of the UIC.

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- b) Maximum Battery Storage capacity is not defined.
- c) Maximum Battery Charging Current Limit is 25% of the UIC.

LV customers with EG systems above 350 kVA and all MV connected EG systems will require a grid impact study at the customer's cost.

4.8 TYPES OF MV/LV NETWORK

4.8.1 Shared Feeders/Transformers

The total embedded generation capacity connected to a transformer must not exceed 75% of the MV/LV transformer's rated kVA. Connection will be on a first-come, first-served basis, with capacity reservations limited to six months.

4.8.2 Dedicated Transformer

The total embedded generation capacity connected to a dedicated transformer is limited to 75% of the MV/LV transformer kVA.

4.9 MV FEEDER PEAK LOAD

The total on an MV feeder must be less than 15% of the feeder's peak load.

4.10 CUMULATIVE EG CAPACITY AND IMPACT ON LV AND MV GRIDS

Where the cumulative installed capacity of Embedded Generation (EG) systems on a local LV or MV network is assessed by the EEC as having the potential to adversely affect network performance, reliability, or power quality, the EEC may limit or defer additional EG connections until it can be demonstrated that such connections can be accommodated without unacceptable impacts.

4.11 In such cases, the EEC may undertake or commission specialist grid impact studies to assess the effect of proposed additional EG installations on the network, irrespective of whether the individual EG system complies with the standard size thresholds. The cost of any such grid impact study shall be borne by the EEC. Where the study identifies a need for network reinforcement or hardware upgrades to increase the EG hosting capacity of the affected feeder or network section, the implementation and funding of such upgrades shall be determined in accordance with the EEC's network planning and connection policies.

4.12 EXCEEDANCE OF CONNECTION CRITERIA

4.12.1 Should the EG exceed the thresholds defined in the Simplified Connection Criteria the following alternatives may be suggested:

- a) **A Grid Impact Study:** Should such studies be required the EEC will inform the customer.
- b) **Modification of EG System:** This may be suggested to enable system to fall within the Connection Criteria by reduction of EG system size and/or battery energy storage inclusion.

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- c) **Network upgrade:** Where grid hardware upgrades or network reinforcement are found to be necessary to accommodate the proposed EG system, the allocation of costs between the Customer and EEC shall be determined in accordance with an approved cost allocation methodology. The applicable cost allocation shall be communicated to the Customer by EEC before implementation of the required upgrade or reinforcement.

4.13 MAXIMUM EXPORT CAPACITY

4.13.1 The individual Maximum Export Capacity (MEC) is limited to:

- a) 75% of the customer's UIC if the customer is fed from a dedicated MV feeder.
- b) 25% of the customer's UIC if the customer is fed from a shared MV feeder.

4.13.2 The aggregate Maximum Export Capacity (MEC) of all EG Plants connected to a shared MV/LV transformer shall not exceed 25% of the transformer's rated capacity. Available export capacity shall be allocated on a first-come, first-served basis, and any capacity reserved for an approved connection shall lapse after six months unless otherwise extended in writing by EEC.

4.13.3 The aggregate MEC of all EG Plants connected to an MV feeder, including EG Plants connected downstream of that feeder, shall be less than 15% of the MV feeder's peak load.

4.14 POWER FACTOR

4.14.1 EG systems shall be capable of operating within a power factor range of 0.95 lagging to 0.95 leading at the (PoC), or such narrower operating point as may be directed by EEC for network voltage control, power quality, or system security purposes. This requirement shall apply under normal operating conditions and shall be demonstrated during commissioning, periodic testing, power quality investigation, or whenever reasonably required by EEC.

4.14.2 Where the power factor measured at the PoC is found to be outside the permitted range, whether due to the operation of the EG Plant, the Customer's installation, or the interaction of both with the EEC network, EEC may issue a written instruction requiring the EG Customer, at the EG Customer's cost, to take corrective action within the period specified by EEC. Corrective action may include, without limitation, reconfiguring or operating the inverter to provide reactive power support within the approved operating range, installing or upgrading automatic power factor correction equipment, capacitor banks, static var compensators, static synchronous compensators (STATCOMs), or other dynamic reactive power compensation equipment acceptable to EEC.

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- 4.14.3 The EG Customer shall provide evidence satisfactory to EEC that the corrective measures have restored compliance at the PoC. Until such compliance is achieved, EEC may restrict export, require operation at a specified inverter power factor or reactive power set-point, curtail generation, or disconnect the EG Plant where continued operation may adversely affect voltage regulation, power quality, safety, or the reliability of the EEC network.

4.15 POWER QUALITY

In the event of power quality concerns, including but not limited to voltage variations, flicker, DC injection, frequency deviations, harmonics, power factor issues, overvoltage and undervoltage conditions, voltage dips and swells, or overfrequency and underfrequency events, the EEC may require the customer to install a suitable power quality monitoring device at the EG facility for monitoring, investigation, and compliance verification purposes. Such a requirement shall be determined by the EEC on a case-by-case basis, taking into account the size, technology, location, and operational characteristics of the EG installation.

5. QUALIFIED INSTALLERS

Customers installing EG systems shall use industry accredited installers. A register of accredited installers is available from the Authority.

EG Professional Sign-off on Commissioning

All embedded generation systems installed on the EEC grid must be certified as complying with the EEC's requirements as follows:

Single Phase Installation

- ❖ Level 3 Accredited Eswatini Solar PV Installer
- ❖ Level 4 Accredited Eswatini Solar PV Installer
- ❖ AESAP or ECSA- registered professional engineers, professional technologists and professional technicians.

Three Phase Installation up to 100kVA

- ❖ Level 4 Accredited Eswatini Solar PV Installer
- ❖ AESAP or ECSA- registered professional engineers, professional technologists.

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Three Phase Installation up to 100-350kVA

- ❖ Level 5 Accredited Eswatini Solar PV Installer
- ❖ AESAP or ECSA- registered professional engineers, professional technologists

Installations equal to or larger than 350kVA

- ❖ AESAP or ECSA- registered professional engineers.

Note that the property's Form C (Yellow Form/Electrician Form) signed by a registered electrician is required in addition to signoff above.

5.1 DECOMMISSIONING OF EMBEDDED GENERATOR

The EEC requires notice in writing of any EG which has been decommissioned. The EG system must, at the owners' cost, be disconnected from the EEC distribution network by the removal of the wiring that connects the EG with the EEC distribution network and a decommissioning report filed (on the prescribed form) including the provision of a single line diagram to confirm disconnection. Form C (Electrician Form) or appropriate electrical Certificate of Compliance to confirm disconnection must be provided to the EEC.

Should the customer need to re-install the EG system and connect to the EEC distribution network, the application process is to be followed

6. CLASSIFICATION OF EMBEDDED GENERATION SYSTEMS

DESCRIPTIONS OF SYSTEM TYPES	Do they need to comply with EEC Requirements documents?
Grid Tied Systems	Yes
Hybrid Grid Tied systems	Yes
Off Grid or Stand-Alone systems	Do not need to comply
Back-up or standby (UPS) systems	Do not need to comply

6.1 BATTERY OR OTHER STORAGE

- 6.1.1 Battery or other storage may be included in the EG system configuration. Where storage is connected such that it can provide power onto the electricity grid, it shall do so via an inverter certified according to the Interconnection Standard. If

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this is achieved via a separate storage/battery inverter (even only to feed into the Customers wiring which is in turn connected to the EEC grid), the storage/battery inverter shall be certified according to the Interconnection Standard, and evidence of such compliance provided to the EEC.

6.2 HYBRID INVERTERS OPERATING IN ISLANDED (OFF-GRID) MODE

- 6.2.1 EG system inverters which can be operated in grid-tied or islanded mode, but where physical wiring connections with the grid exist (e.g. via the distribution board), are considered grid-tied EG system and require EEC permission as described in this document. This applies even if they are being operated in off-grid mode.
- 6.2.2 A system shall only fall outside the definition of an Embedded Generator where no direct or indirect physical wiring connection to the electricity grid exists.

6.3 OFF-GRID SYSTEM

- 6.3.1 Stand-alone generators (not connected to the EEC electrical network in any way) do not need permission from the EEC. However, approvals from other entities may still be necessary (e.g. City or Town Council), and it is the responsibility of the system owner to comply with any such requirements and applicable regulatory frameworks.
- 6.3.2 Where there is potential for off-grid systems to be connected to the grid in future, Customers should take care that equipment utilised for off-grid systems – in particular the inverter - is compliant with grid-tied requirements as clarified in this document.

6.4 BACK-UP OR STANDBY (UPS) SYSTEMS

Back-up or standby uninterruptable power supply (UPS) systems store energy in batteries through a charger and then only supply power to the loads from these charged batteries via an inverter during a power outage. Fuel generators can also be used as back-up or stand by power supply. These systems require a suitable change-over switch to select power supply between the EEC and the back-up power supply, as the two supplies shall never be supplied simultaneously.

7. APPLICATION AND APPROVAL PROCESS

This section explains, in simple terms, how a Customer applies for approval to install, connect, and operate an EG system in parallel with the EEC distribution network. The process is designed to help the Customer know what to prepare, what EEC will review, when installation may start, and when the EG system may be legally connected and operated.

7.1 APPLICATION PROCESSING TIMEFRAMES

EEC will assess complete EG applications and issue a final decision within forty-five (45) working days from the date of receiving a complete application. The response may include

- a. a Conditional approval to proceed,

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- b. a requirement for a grid impact study, or
- c. written reasons why the application cannot be approved as submitted.

The grid impact study shall be completed within thirty (30) working days following payment from customer.

Where the application is complex, requires input from other authorities, requires customer-funded network upgrades, or otherwise cannot be finalised within forty-five (45) working days, EEC will notify the Customer within that timeframe and advise on the expected next steps, additional requirements, and indicative timelines where these are known.

The Customer remains responsible for ensuring that all information submitted is accurate and complete, and for responding promptly to any request for additional information, payment, study input, approval from another authority, or design amendment. Delays caused by incomplete submissions, late responses, outstanding payments, pending external approvals, or customer-requested design changes will not count toward EEC's processing timeframe.

- a) **Phase 1: Prepare before applying and apply online** – understand the requirements, ensure appoint an accredited installer and that the equipment meet EEC requirements. Access the online platform, complete all required fields, upload the supporting documents, and submit the application.
- b) **Phase 2: EEC technical assessment** – EEC confirms that the application is complete and assesses the proposed system size, PoC, metering, inverter certification, protection, power quality, safety, and network hosting capacity. EEC advises if a grid impact study, design update, additional information, fees, or a network upgrade is required.
- c) **Phase 3: Conditional approval to install** – if the application is acceptable, EEC issues written Conditional Approval to Install and states the applicable conditions. The Customer must not install, energise, test in parallel with the grid, or export electricity before receiving the relevant written approval.
- d) **Phase 4: Installation and commissioning** – after conditional approval, the Customer installs the system to the approved design, gives EEC at least seven working days' notice before parallel commissioning tests, completes the required tests and professional sign-off, and submits the commissioning form, test records, certificates, and updated drawings where applicable. EEC may inspect, witness tests, verify metering, and confirm compliance.
- e) **Phase 5: Payments, final approval and EG Connection Agreement** – once the installation, commissioning documents, metering requirements, payments, and all other conditions have been completed to EEC's satisfaction, EEC issues the Approval to Connect and provides the EG Connection Agreement for the Customer to sign and return within 14 working days.
- f) **Phase 6: Operate and remain compliant** – the Customer operates the EG system only within the approved conditions, maintains ongoing safety, technical, metering, billing, and power-quality compliance, and submits a new application before any modification, expansion, relocation, recommissioning, or change in operating mode.

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Phase 1: Prepare before applying – Before submitting an application, the Customer should understand the requirements, confirm whether the proposed system is grid-tied, hybrid, off-grid, or standby, ensure that the proposed equipment and installer meet EEC requirements, and consult the current list of required supporting documents on the EEC website.

Step 1: Access the application information and online platform

The Customer shall access the Eswatini EG application online platform using the link provided on the EEC website. The EEC website will also provide the current Embedded Generation Requirements, applicable fees and tariffs, guidance material, and the list of supporting documents required for an online application.

Information available on the EEC website

- *Link to the Eswatini EG application online platform*
- *Current list of required supporting documents*
- *Embedded Generation Requirements, guidance material, and the applicable schedule of fees and tariffs*

Step 2: Complete and submit the online application

- The Customer must complete all required fields on the Eswatini EG application online platform and upload the supporting documents specified in the current document list published on the EEC website, including any applicable technical drawings, equipment information, installer or professional details, and approvals from other authorities.
- Where a third party submits the online application on behalf of the account holder, a signed letter of authority or proxy must be uploaded with the application.
- An online application that is incomplete, contains invalid information, or does not include the required supporting documents will not be treated as complete and may be returned through the platform for correction or additional information.

The online platform will record the date and status of each submission and provide an electronic acknowledgement or reference number. If the applicant does not receive an acknowledgement or reference number after submitting the application, the applicant should contact the EEC to confirm that the submission was successfully received.

Phase 2: EEC technical assessment – EEC reviews the application to confirm that it is complete, technically compliant, and suitable for connection to the distribution network.

Step 3: EEC reviews the application

- EEC checks the proposed system size, PoC, metering requirements, inverter certification, protection requirements, power quality requirements, and available network hosting capacity.
- If a grid impact study, design update, additional information, or network upgrade is required, EEC will notify the Customer and advise on the applicable process, cost, and requirements.
- The Customer remains responsible for all applicable application, study, metering, connection, testing, and upgrade costs as set out in the approved fees and tariff schedule.

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Phase 3: Conditional approval to install – If the application is acceptable, EEC issues written conditional approval setting out what the Customer must do before the system can be finally connected and operated.

Step 4: Receive conditional approval before installation

- If the application is approved to proceed, EEC will issue a written Conditional Approval to Install. This approval is valid for a period stated by the EEC, which shall not exceed six months unless EEC grants an extension in writing.
- The Customer must not install, energise, test in parallel with the grid, or export electricity before receiving the relevant written approval from EEC.
- If the application is not approved, the EEC will provide written reasons. The Customer may revise and resubmit the application where appropriate.
- Any costs associated with accommodating the proposed EG shall be incurred by the customer as per the schedule of fees and tariffs

Phase 4: Installation and commissioning – After conditional approval, the Customer may install the EG system in accordance with the approved design and the EEC conditions. Commissioning tests must be properly planned, witnessed where required, documented, and signed off by the required qualified person.

Step 5: Installation and Commissioning of EG Plant

- The Customer may install the EG Plant only after receiving written Conditional Approval to Install.
- The installation must follow the approved design, applicable standards, EEC requirements, and any specific conditions stated in the conditional approval.
- Before commissioning tests are conducted in parallel with the EEC network, the Customer must notify EEC at least seven working days before the proposed test date.
- Temporary connection to the EEC network for testing may be permitted only for the approved test period and must be used strictly for commissioning purposes.
- After testing, the Customer must submit the completed commissioning form, test records, certificates, updated drawings where applicable, and all required supporting documents to the EEC.
- The EG system must not be operated continuously in parallel with the EEC network until EEC has issued final written approval to connect.

Commissioning must be completed and signed off by the competent installer or registered professional required for the relevant system size and connection type, as specified in these Requirements.

Step 6: Commissioning Verification by the EEC

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The EEC may inspect, witness tests, review commissioning results, verify metering, and confirm that the EG installation complies with these Requirements before final approval is granted.

Phase 5: Payments, Final approval and EG Connection Agreement – EEC issues final approval only after the installation, commissioning documents, metering requirements, payments, and any other conditions have been completed to EEC's satisfaction.

Step 7: Final Approval

- If EEC is satisfied that all requirements have been met, EEC will issue an Approval to Connect and provide the EG Connection Agreement for signature.
- The Customer must sign and return the EG Connection Agreement within 14 working days.
- Once conditions are met, feeding surplus electricity and net billing processes can commence.
- If the EEC is not satisfied that all requirements have been met, EEC will issue written reasons and advise what must be corrected before final approval can be granted.

Phase 6: Operate and remain compliant – The Customer must operate the EG system only within the approved conditions for the life of the installation. The EEC may monitor compliance and may require corrective action where safety, network reliability, metering, billing, or power quality requirements are not met.

Step 8: Application for Modification and/or Expansion

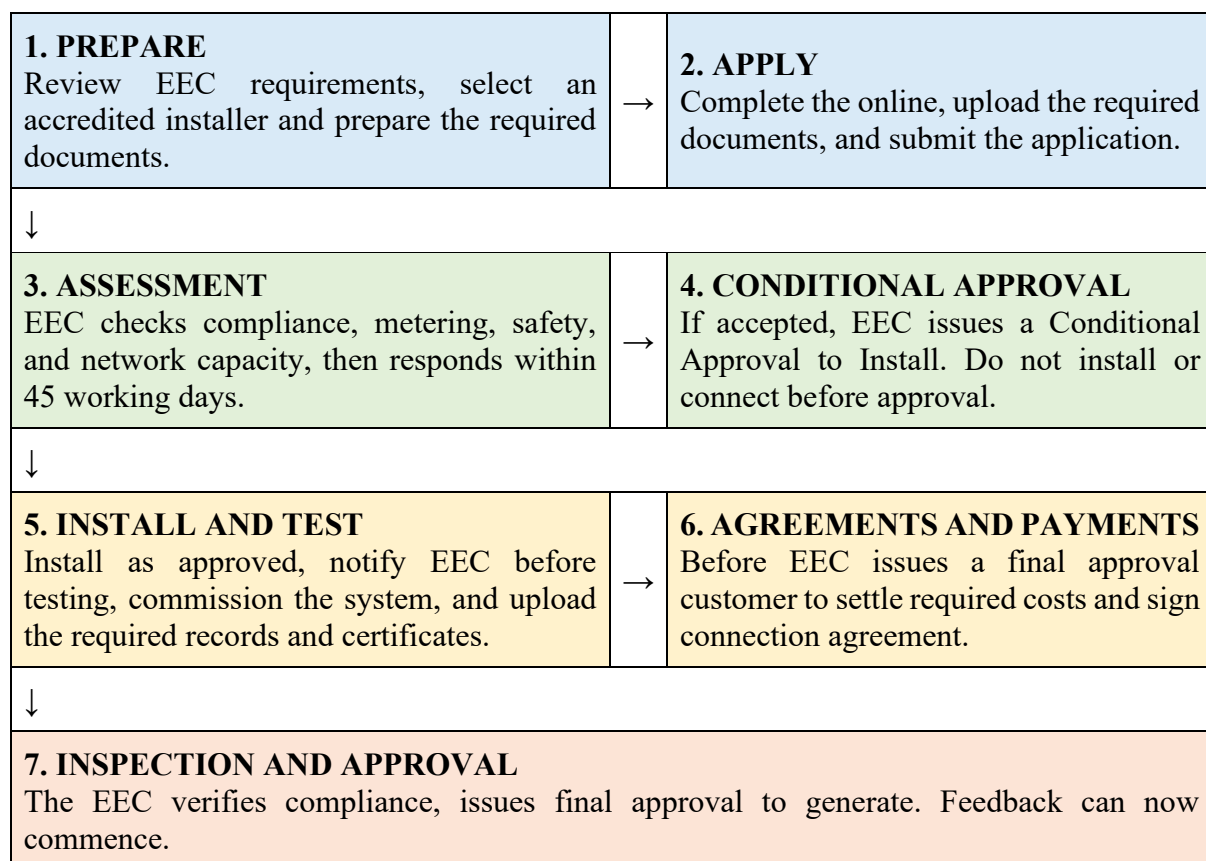
- The Customer must submit a new application before modifying, expanding, relocating, recommissioning, or changing the operating mode of an approved EG system.
- EEC approval is required before any such change is implemented.

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7.2 CUSTOMER FLYER: EG APPLICATION AND APPROVAL PROCESS

Use this simplified process diagram to explain the customer journey through the Eswatini EG application online platform, from preparation and electronic submission to final approval:



Important customer message: The link to the Eswatini EG application online platform and the current list of required supporting documents are available on the EEC website. Written EEC approval is required before installation, testing in parallel with the grid, export, or continuous operation of any grid-tied or hybrid EG system.

Processing timeframe: EEC will assess and respond to a complete online application within forty-five (45) working days. Where an application is complex, requires a grid impact study, external approvals, customer-funded upgrades, or other additional requirements, EEC will notify the Customer and advise on the next steps and indicative timelines where these are known.

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8. METERING

8.1 METERING INSTALLATION AND REVERSE POWER FLOW

All EG Customers installing EG systems, whether feeding back or not, shall have an approved Four Quadrant bi-directional meter. The EEC shall provide and install this meter at the Customer's cost.

8.2 ADAPTATION OF ELECTRICAL METERING INSTALLATION

EG Customers shall where applicable be required to adapt their electrical installations in such a way that the metering is in a lockable kiosk accessible by EEC.

9. FEED- IN TARRIFS AND BILLING

9.1 FEED-IN-TARIFFS

9.1.1 The latest approved Feed-in Tariff schedule for all customer categories will be available on the EEC website.

9.1.2 The EEC will only add Value-Added Tax (VAT) to the Feed-in Tariff if the EG Customer is a registered VAT vendor with the Eswatini Revenue Services (ERS).

9.2 BILLING

9.2.1 The fixed charges (where applicable), energy consumed and compensation for feed-in/exports will be billed monthly. Export compensation will be deducted from the energy component, not the fixed charges. Any excess export compensation after such deduction in a particular month will be rolled over to the following month.

9.2.2 Export credits shall only be recognised and applied through the billing and settlement process as an offset against electricity supplied and shall not be payable in cash or otherwise claimable as a monetary debt.

9.2.3 Any excess export compensation will be zero'd at the end of the financial year.

9.2.4 Export credits shall not form part of the EG Customer's estate, are non-transferable, and shall lapse upon the decommissioning or sale of the EG Plant, any change in ownership or occupation of the property, or the cancellation, termination, or amendment of the connection or supply agreement.

9.2.5 The EG customer shall not be compensated for any deemed generation during Distribution Network outages or EG Meter malfunction.

9.2.6 By the 5th day of each month, EEC will email the Customer the previous month's exported-energy readings for each time-of-use period. The Customer must use these readings and the approved Feed-in Tariff rates published on the EEC website to prepare an invoice. A separate invoice must be prepared for each supply point and emailed to vending.billing@eec.co.sz by the 10th day of the month.

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9.2.7 The EEC will compare the Customer's invoice with the AMR export data and confirm that the approved Feed-in Tariff rates were used. Once approved, the export credit will be applied to the Customer's electricity account and reflected on the following month's bill. From the 20th day of the month in which the invoice was submitted, the Customer may request confirmation of the credit amount. The Customer must continue to pay the normal monthly bill by its stated due date.

10. DISPUTE RESOLUTION

10.1 INTERNAL ESCALATION

10.1.1 The Parties shall use their best efforts to settle amicably all complaints or disputes arising out of or in connection with the EG Connection Agreement or its interpretation.

10.2 EXTERNAL ESCALATION

10.2.1 If the Parties are unable to resolve any complaint or dispute by means of joint co-operation or discussion between them within 30 (thirty) days after a complaint or dispute arises, the Parties hereby agree to subject the resolution of such dispute to Section 40 of the Electricity Act.

10.2.2 This clause will not preclude any Party from access to an appropriate court of law for injunctive relief, for which purpose the Parties irrevocably submit to the jurisdiction of the Court of competent jurisdiction of The Kingdom of Eswatini.

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