



# SOLAR

TRAINING CENTER SA

**- Commissioning process and sign off -**



# Commissioning process and sign off

## Agenda

1. **Is commissioning necessary?**
2. **Commissioning part of application process**
3. **Responsibilities and liabilities → PV Green Card**
4. **High level commissioning and sign off process**
5. **Breakdown of commissioning sign off processes**

# Is commissioning necessary?

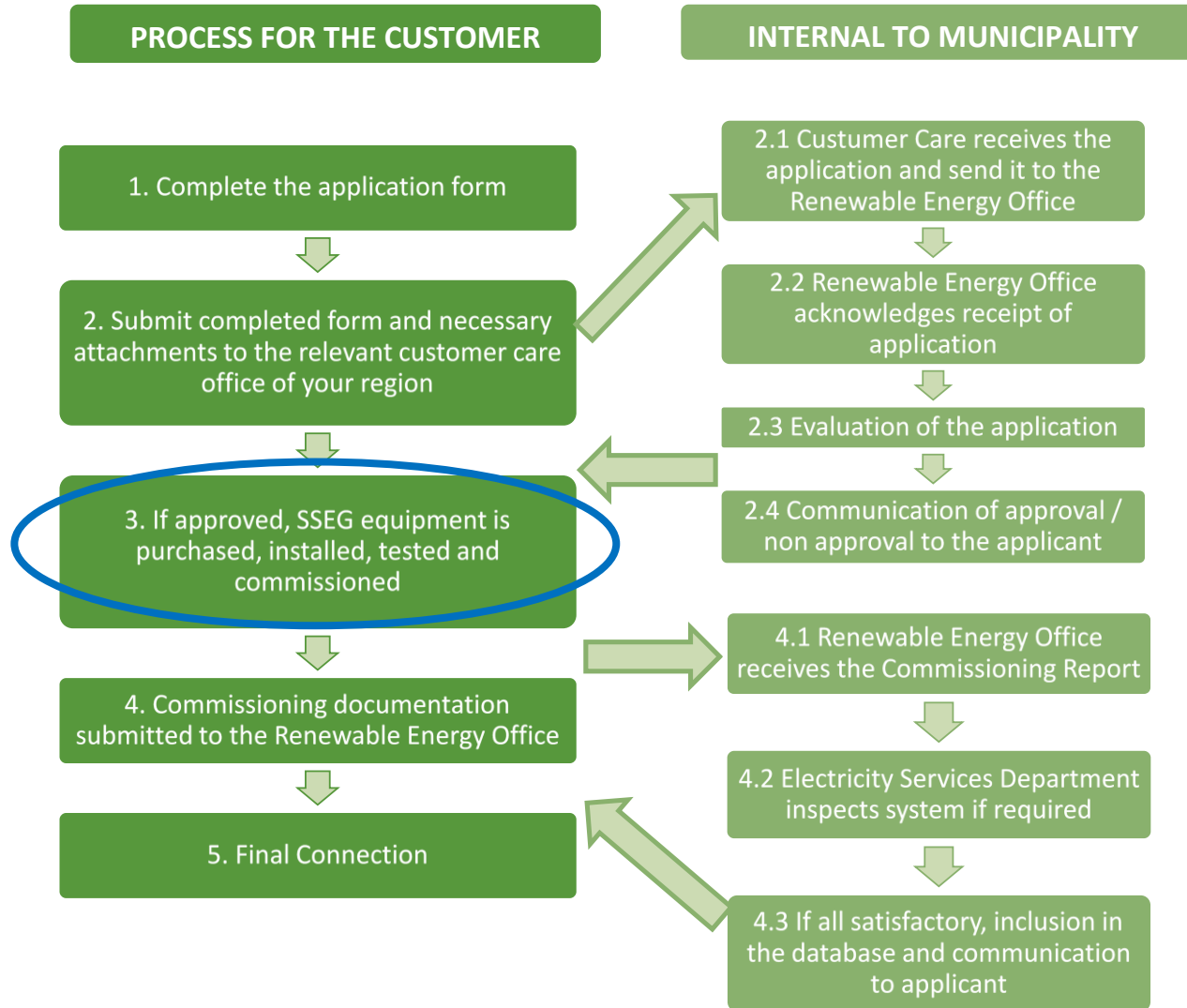
- Oxford definition of commissioning:  
**“Bring (something newly produced) into working condition”**
- Solar PV systems are
  - New products
  - Unique in design; Based on functionality and constraints
  - Has various integration challenges

# Is commissioning necessary?

- The client wants a safe (legal), well working system
- Supplier wants to honour their warrantee(s)
- Most installers wants to build and protect their reputation
- The network operator wants to protect the network, the user(s) and community

**Proper commissioning and reporting will help to address some of the above mentioned requirements.**

# Commissioning part of the application



# AMEU Standard Document – SSEG Commissioning Report

(municipal logo)

## SMALL-SCALE EMBEDDED GENERATION COMMISSIONING REPORT

Project name:	
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### Account Holder Details

Name:		
Electricity/Municipal/Rates Account Number:		
ERF No:		
Telephone Number:	Landline:	Mobile:
Email Address:		
Physical address:		

### Installer Details

Company name:		
Contact Person Name:		
Telephone:	Landline:	Mobile:
Email address:		

### SSEG Details

Inverter manufacturer and model:	
Inverter AC rating (kVA) (total if more than one inverter):	
Single of three phase:	
Serial number/s of inverter/s:	
Reverse power blocking method (or N/A):	

### Attachments Checklist:

Final as-built circuit diagram:	✓
Inverter type test Certificate of Compliance according to NRS 097-2-1, issued by accredited 3 <sup>rd</sup> party test house:	
Electrical installation Certificate of Compliance according to SANS 10142-1 (and SANS10142-3 when published):	
Signed contract for SSEG:	

### Compulsory Declaration (to be completed by ECSA registered Pr Eng or Pr Tech Eng)

The SSEG installation complies with the relevant sections of NRS 097-2-1 and NRS 097-2-3:	
The loss of mains protection (anti-islanding) has been checked to be functional in test carried out as part of the on-site commissioning – i.e. a momentary disconnection of the mains supply to the site:	
Safety labels have been fitted in accordance with NRS 097-2-1:	
The SSEG installation complies with the relevant sections of SANS 10142-1 and SANS 10142-3 'Low voltage embedded generators' standard (as published), and an installation certificate of compliance is attached:	
The SSEG installation complies with licensing requirements of NERSA	
Reverse power blocking protection system installed and commissioned to prevent reverse power flow onto the municipal distribution electricity network (or N/A):	
Comments:	
Date:	Signature:
<b>ECSA registered Pr Eng or Pr Tech Eng Details</b>	
Full Name:	
Company Name:	
Telephone:	Landline: Mobile:
Email address:	
ECSA Reg no.	

# Optional commissioning tests

## OPTIONAL TECHNICAL TEST SHEET for the small scale embedded generation installations

Disclaimer: From a technical point of view the NRS097-2-1 test certificate covers these issues quite thoroughly, so there are no safety concerns that REQUIRE the municipalities to do such tests as described below. Municipalities may perform such tests on selected (few) installations for additional comfort on safety aspects.

<b>Project name:</b>	
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### Commissioning Test:

	✓ Comments/Results
<p><b>1. Anti-islanding test: (multi-meter required)</b>            With the system running (main breaker closed and SSEG producing power), OPEN the main breaker to the SSEG installation.</p> <ul style="list-style-type: none"> <li>- Does the SSEG activate anti-islanding mode?</li> </ul> <p>Measure the voltage at the AC output terminals of the SSEG or at the connection point to the AC mains board.</p>	YES/NO  .....V
<p><b>2. SSEG Re-connection test 1: (stop watch required)</b>            With the main breaker OPEN and the SSEG in island mode, reconnect the mains (close main breaker).            Measure the time the SSEG takes to reconnect to the network/grid.</p>	.....s
<p><b>3. SSEG Re-connection test 2: (stop watch required)</b>            Take note of the reconnection time in test 2.            With the main breaker OPEN and the SSEG OFF, CLOSE the main breaker. In 10 seconds or before the SSEG can reconnect to the grid, open the main breaker.            Does the SSEG activate anti-islanding and disconnect from the grid?</p>	YES/NO
<p><b>4. Inspection of labels:</b>  <u>Client side:</u> Check that there are labels on the distribution board clearly indicating the SSEG infeed and point of connection(s).            Check that there are labels on the outside of the distribution board  <u>Network/Grid Side:</u> Check that there are labels on the feeder and substation, clearly indicating that there is SSEG present on this installation.</p>	

# Responsibility and Liability Assignment

Task/Process	Customer	Installer	Municipality
<b>Quote/Proposal for SSEG system</b>	Approves	<b>Responsible</b>	N/A
<b>Quality of products and installation; NRS 097-2-1, SANS 10142-1 &amp; 1-X</b>	Approves	<b>Responsible and Liable</b>	N/A
<b>Do design of system by competent person</b>	Approves	<b>Responsible and Liable</b>	Define component person
<b>Municipal application done for SSEG</b>	<b>Liable</b>	Facilitate	Approves
<b>Network Capacity investigation and allocation; NRS 097-2-3</b>	N/A	Facilitate	<b>Responsible</b>
<b>Costs for network upgrade/meter changes (if applicable)</b>	Approves and <b>Responsible</b>	N/A	Provide cost implications



# Responsibility and Liability Assignment

Task/Process	Customer	Installer	Municipality
<b>Cost for additional network charges</b> (if applicable)	Approves and <b>Responsible</b>	N/A	Provide cost implications
<b>Install correct meter or do network upgrade</b> (if applicable)	N/A	Facilitate	<b>Responsible</b>
<b>Procure and install EG system</b>	Approves	<b>Responsible and Liabile</b>	N/A
<b>Ensure installation is done according to requirements</b> (SANS -, NRS series, International best practice, By Laws and other.)	N/A	<b>Responsible and Liabile</b>	Provide requirements and Approves
<b>Commission EG system</b>	Approves: Functions	<b>Responsible and Liabile</b>	Approves: Safety

# Responsibility and Liability Assignment

Task/Process	Customer	Installer	Municipality
<b>Provide required documents</b>	Approves	<b>Responsible and Liable</b>	Check and Approves
<b>Register EG system on database</b>	N/A	Facilitate	<b>Responsible</b>
<b>Ensure to uphold arrangements set out in the SSEG contract between customer and municipality.</b>	<b>Liable</b>	N/A	Provides contract
<b>Maintenance of SSEG system</b>	<b>Responsible</b>	Optional	N/A
<b>Resolve/exchange faulty equipment</b> (under warrantee or not)	Approves	<b>Responsible</b>	N/A

*Areas in green: PV GreenCard serve as QA*

## High level commissioning and sign off process

1. Solar PV system needs to be designed by installer and signed off by Pr. Engineer or Pr. Technician Eng.  
(Future: SAPVIA Endorsed Installer)
2. Installation realised under a qualified & registered electrician
3. Electrician provides CoC (Certificate of compliance) for installation
4. Installer provides a signed off as-built drawing to client after system works as specified
5. SSEG Contract to be signed
6. Installer to provide AMEU commissioning report and required attachments.

# Approval process; Pre-installation

- Client approves quote (Client)
  - Supplier/Installer does a detail design
  - Confirmation if roof can handle additional load; could be requested by Pr. Eng before sign off.
  - Supplier/Installer request approval for design and network connection on the client's behalf; using AMEU Application form.
  - Eskom/Municipality gives notice or approval with stipulated requirements
  - In most case the electricity meter needs to be adjusted or replaced and/or network upgrade could be required in some cases.

# Installation requirements

- Installation commences (Installer)
  - Installation to be done according to
    - The approved design
    - Requirements set out by network operator and
    - under the control/supervision of a registered electrician
  - All components should be installed according to the product's specifications; deviations should be documented and confirmed with Pr. Eng.

# Commissioning and sign off process: Grid tied or Island systems

- Commissioning system (Installer)
  1. Check protection and safety aspects
  2. Commission batteries according to installation manual
  3. Check wiring (AC, DC, Communication)
  4. Test Solar PV strings before connecting to grid tied inverter/Charge controller (voltage and Isolation)
  5. Connect batteries

# Commissioning and sign off process: Grid tied or Island systems

- Commissioning system (Installer)
  6. Check/Adjust parameters of inverter/charge controller
  7. Switch on and test battery inverter/charger
  8. Switch on and test Solar PV charger and/or grid tied inverter(s)
  9. Run various scenarios to confirm functionality and proper charging and/or power control

# Commissioning and sign off process: Important for Municipalities

- Attachment checklist
  1. Inverter type test according to NRS 097-2-1 done by accredited 3<sup>rd</sup> party test house
  2. Electrical installation CoC done according to SANS 10142-1 (and 10142-1-X when published)
  3. Final signed as-built diagram to be provided
  4. Supplemental EG contract signed with network operator



# Commissioning and sign off process: Important for Municipalities

- Declaration by ECSA registered person
  5. EG installation complies with relevant sections for NRS 097-2-1 and NRS 097-2-3
  6. Loss of mains protection (Anti-Islanding) has been checked to be functional
  7. Safety labels have been fitted according to NRS 097-2-1

# Commissioning and sign off process: Important for Municipalities

- Declaration by ECSA registered person
  8. The SSEG installation complies with the relevant sections of SANS 10142-1 and other relevant SANS
  9. The SSEG installation complies with licensing requirements of NERSA (when published)
  10. Reverse power blocking protection system (grid limiting) installed and commissioned (Not recommended due to potential revenue loss and safety concerns)

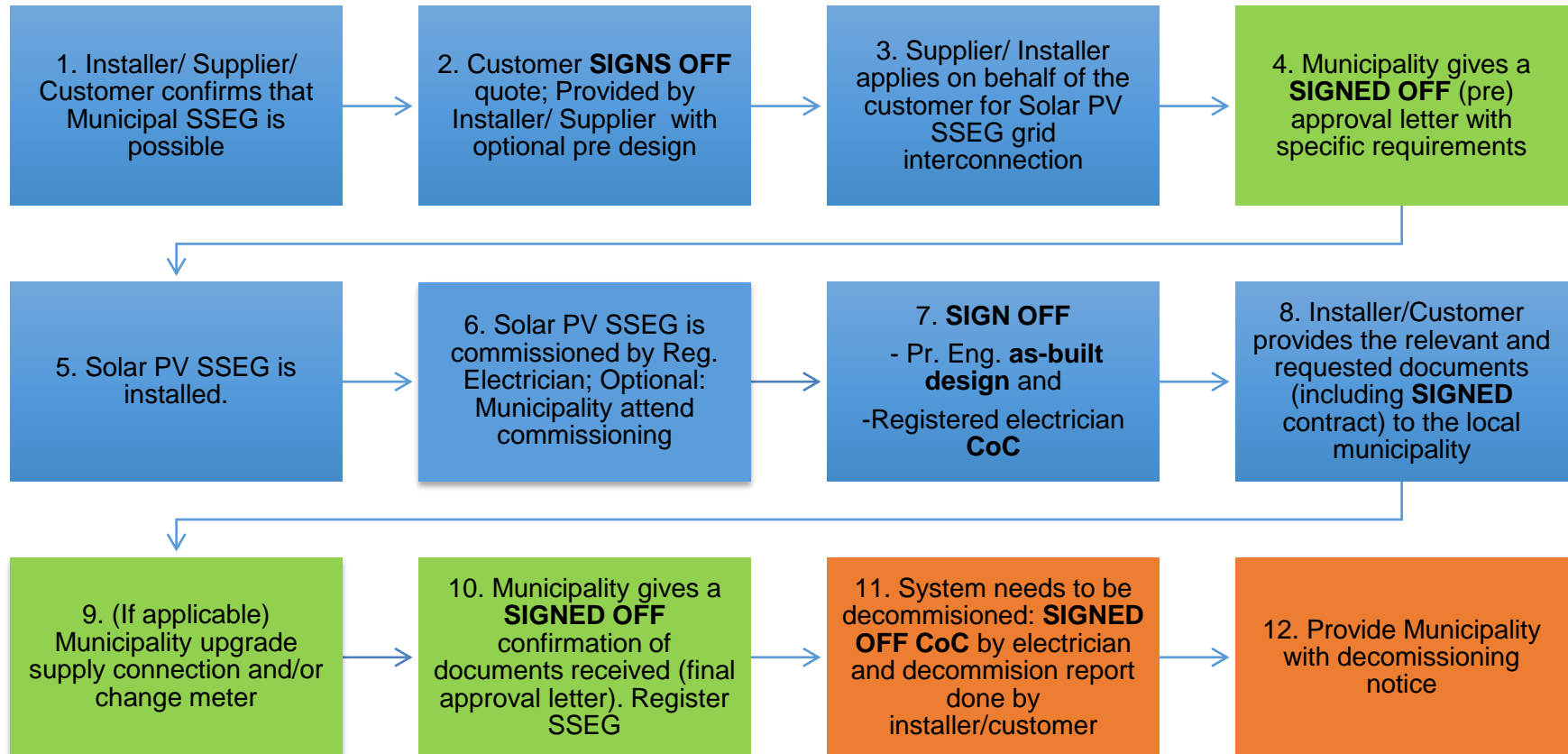
# Client: Handover documentation

- Documentation for the owner: Optional
  - Operator/Owner details
  - Installation site details
  - Document commissioning procedure, measurements, settings and set point values
  - Sign off from client that system worked as agreed

# Client: Handover documentation

- Documentation and signatures: Important
  - Service technician/installer details
  - Sign off Pr.Eng./Competent person as-built drawing
  - Sign off CoC for installation
  - Letter from Municipality that the system and connection was approved
  - Product documentation and manuals(Guarantees & Warrantees)
  - Training of service personnel/operator

# Sign Off Highlights





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## Questions?

