



Small-Scale Embedded Generation

A Guide for South African Municipal Distributors

Small-Scale Embedded Generation (SSEG)

Guide for South African Municipal Distributors

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Contents

1. Introduction	1
1.1. SSEG installations in municipal distributor areas are accelerating	1
1.2. Installed capacity of SSEG	1
1.3. Municipal distributor response to SSEG to date	1
1.4. Technical and revenue impact considerations for distributors	2
1.5. Ready-to-use standards, specifications and approaches	2
1.6. Purpose of this guide	2
2.1. Establishing the basics	3
A Institutional readiness	3
B Operational readiness	3
C Staff readiness	4
2.2. How to proceed?	4
2.3. Step-by-step guide	7
Develop an SSEG policy, including the technical 'requirements' document	7
How to develop a process to assess and approve SSEG applications	10
Establishing the necessary legal framework	12
Develop tariffs for SSEG	14
Specifying and evaluating grid impact studies	16
Procure suitable bi-directional meters	18
Communicate with your customers	20
Establish an SSEG record keeping system	20

Questions municipal distributors typically ask regarding SSEG	22
Questions municipal distributors typically ask regarding SSEG	23
Questions municipal distributors typically ask regarding SSEG	24
Questions municipal distributors typically ask regarding SSEG	25
3. Where to find resources and support	26
3.1. National Municipal Distributor SSEG Support Programme	26
How to join the Municipal SSEG Support Programme?	26
Municipal SSEG Resource Portal	27
Online SSEG Training Courses	27
Summary of the SSEG Support Resources	28
4. References	30
5. Appendices	31

List of figures

Figure 2: Overview of National SSEG Uptake in Municipalities (SALGA 2020)	1
Figure 3. Municipal Distributor Small-Scale Embedded Generation Readiness	5
Figure 4: Overarching SSEG Policy	7
Figure 6: Develop a process to assess and approve SSEG applications	11
Figure 7: How to ensure the necessary Legal Framework is in place	13
Figure 8. Setting tariffs for SSEG	15
Figure 11: Communicating with your customers, and installers	21
Figure 12: Record keeping of SSEG system details and locations	21

1. Introduction

1.1. SSEG installations in municipal distributor areas are accelerating

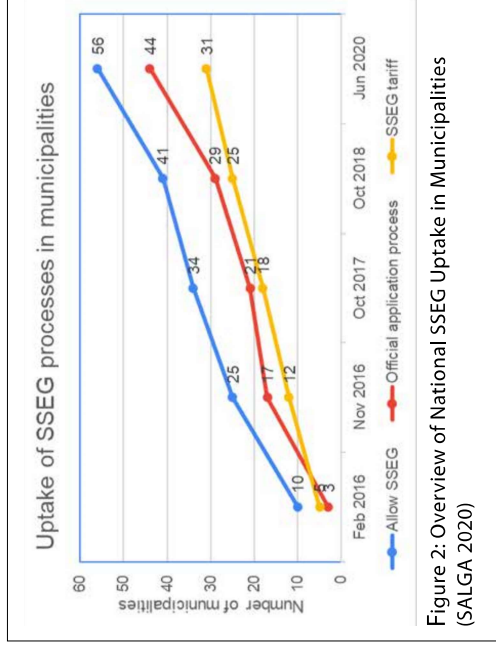
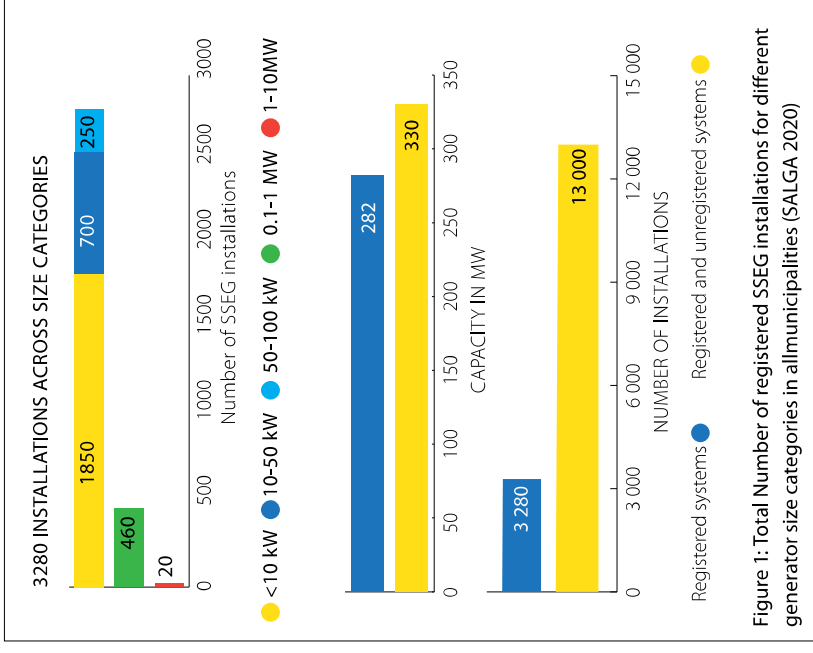
The acceleration of embedded generator installations, particularly solar photovoltaics (PV), is a trend municipal distributors across the country are having to adjust to. Much of this is small-scale embedded generation (SSEG), which is up to 1 MW in capacity. This trend is expected to continue as solar PV prices decrease and Eskom power prices rise steadily, which corresponds with a global acceleration of such installations. Some distributors are reporting as much as a doubling of numbers of SSEG systems each year. While these developments have many benefits, accelerating SSEG connections can bring a range of challenges to municipal distributors, including technical, financial and staff capacity issues.

1.2. Installed capacity of SSEG

The South African Local Government Association (SALGA) recently conducted a survey to estimate total installed SSEG capacity in municipal distributor areas, and whether such distributors have processes in place to assess and accept suitable systems onto their networks. The report, *Status of Small-Scale Embedded Generation (SSEG) In South African Municipalities – November 2020 (SALGA)*, estimates total official registered SSEG installation numbers at 3 280 as of November 2020 (Figure 1), with an estimated capacity of 282 MW. However, the actual number of systems installed – registered (legal) and unregistered (illegal) – is likely to be much higher than this. Considering data uncertainties, the SALGA report estimates conservatively the total number of SSEG systems to be about 13 000, amounting to about 330 MW installed capacity in municipal distribution areas. It also acknowledges that these figures could be much higher – for example, one study in the City of Johannesburg suggest over 30 000 systems in this metro alone (PEETS 2020), and some industry experts estimates indicate totals of as much as 700 MW across the country.

1.3. Municipal distributor response to SSEG to date

The SALGA report shows that some municipal distributors have responded to the increasing presence of SSEGs as of November 2020, having formal SSEG application processes in place or otherwise accommodating SSEG, but 66% (109 out of 165 licensed distributors) had not (Figure 2). For more information on SSEG in municipalities, refer to: SALGA 2020. Status of Small-Scale Embedded Generation (SSEG) In South African Municipalities – November 2020. South African Local Government Association, Tshwane.





SMALL SCALE EMBEDDED GENERATION

VIDEO for a quick overview of SSEG in

Municipal Distributor Areas.
Produced specifically for use by
South African Municipal Distributors –
covers all key aspects of SSEG trends,
technologies, revenue impact and
customer business case, including
how distributors can respond.

https://youtu.be/_HQdd6Qh31o



1.4. Technical and revenue impact considerations for distributors

Municipal distributors clearly need to respond to the growing presence of SSEG on their networks. Indeed, distributors are obliged to provide “open and non-discriminatory access” to the network for such generators (Distribution Network Code para 4(1)). On the one hand, responding positively to these developments has the potential to be of benefit to the municipality, the customer and the local economy if handled properly. On the other hand, having generators at the customer end of the network is new to many municipal distributors, and there may be concerns around safety, power quality and revenue impact from the increased presence of SSEG on their networks, amongst other things.

It has been found that the worst approach for a distributor is to do nothing – to have no application process or SSEG tariff in place. In these situations, illegal systems tend to flourish, there is no control of important technical aspects, and revenue impact is worsened – sometimes through illegally reversing meters.

1.5. Ready-to-use standards, specifications and approaches

Significant work has been undertaken in recent years to ensure that the necessary standards, specifications and approaches are available to enable SSEG connections in a responsible, technically sound and legal manner. In addition, SSEG tariff setting approaches have been developed which recover network costs for the distributor yet are fair to the customer and are in keeping with NERSA tariff setting principles. These approaches and documents are described later in this document.

1.6. Purpose of this guide

This document describes how municipal distributors can adjust to a future where SSEG is a more significant part of their network. It starts by outlining the high-level institutional and operational changes that are necessary, and then moves to the practicalities of the processes, requirements, documents, and capacity needed to accommodate SSEG onto the network without negative technical or financial impacts. It describes the documents endorsed by SALGA and the AMEU for this purpose, as well as noting the capacity building support available.

2. Becoming an SSEG-ready municipal distributor: Process of change

2.1. Establishing the basics (first steps) and the move to full municipal SSEG readiness

There are a number of steps which can be implemented in the short term for a municipal distributor to respond to the current SSEG installation trends. These are relatively easy to do, and documentation and other support is available for this. Other measures to become fully SSEG-ready such as changes to the organogram, generally take longer. Given that the rollout of SSEG is not waiting for municipal distributor readiness, it is advisable to start with the first steps without delay. Overall, municipal readiness can be described in these categories:



A Institutional readiness

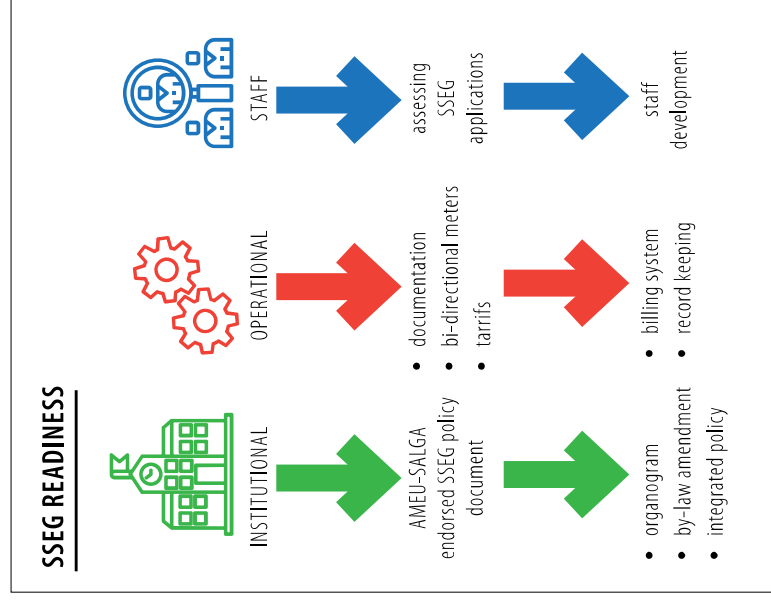
A key **first step** is to develop an SSEG policy which specifies what the distributor allows, does not allow, and the application process for customers to seek permission to install. An existing **AMEU-SALGA endorsed SSEG policy document** can be customised for this purpose. This policy can be communicated to customers and installers as an informal guide even before it has formal approval from Council (remember that SSEG installations are usually not waiting for the distributor to be formally ready).

In the **longer term**, the **municipal organogram should reflect SSEG** (and other sustainable energy) needs, relevant key performance indicators (KPIs) may be introduced for senior staff, and an **SSEG by-law amendment** should be passed to make the policy legally binding on customers. SSEG policy should also be integrated with broader municipal policies, such as around **climate change and the green economy**.



B Operational readiness

As a **first step**, the necessary **documentation** can relatively quickly be put in place – such a set has been developed and endorsed by AMEU and SALGA for use, including an *SSEG Application Form*, *Technical Requirements for SSEG* document (which notes all standards and specifications to be complied with), and a *Commissioning Report*, amongst others. In order to accept reverse feed from SSEG customers (which is recommended), **bi-directional meters** should be procured. Suitable **SSEG tariffs** should also be developed for submission to the National Energy Regulator of South Africa (NERSA).



“Establishing a basic, functioning SSEG application process can relatively easily be done by the Electricity (or Energy) Department, and is generally within their mandate.”

In the **longer term**, in addition to the above, full **billing system integration** of SSEG metering and tariffs is necessary, and an **SSEG record keeping system** should be in place. The record keeping is both to collect data on SSEG capacity, etc., which will also be required by NERSA periodically, and to note where the SSEG is on the network to ensure local hosting capacity is not exceeded (note that some municipalities use their Enterprise Management System software for such record keeping purposes).



As a first step, staff need to be trained in **assessing SSEG applications** for permission to connect using the AMEU-SALGA endorsed SSEG Application form, Requirements document, etc.

In the longer term, staff should be capacitated on all aspects of SSEG, including knowing how to deal with complex, non-standard applications; specifying and assessing grid impact studies etc.

2.2. How to proceed?

In general, most of the first steps noted can relatively easily be mandated and achieved within the Electricity (or Energy) Department. It is beneficial however, to have full municipal buy-in for the process early on so that when policies and by-laws are presented to the Management Committee (Mancom), Portfolio Committees or Mayoral Committees, the members of these bodies are informed and are supportive. A sensible approach may therefore be:

Start implementing the First Steps noted above, such as:

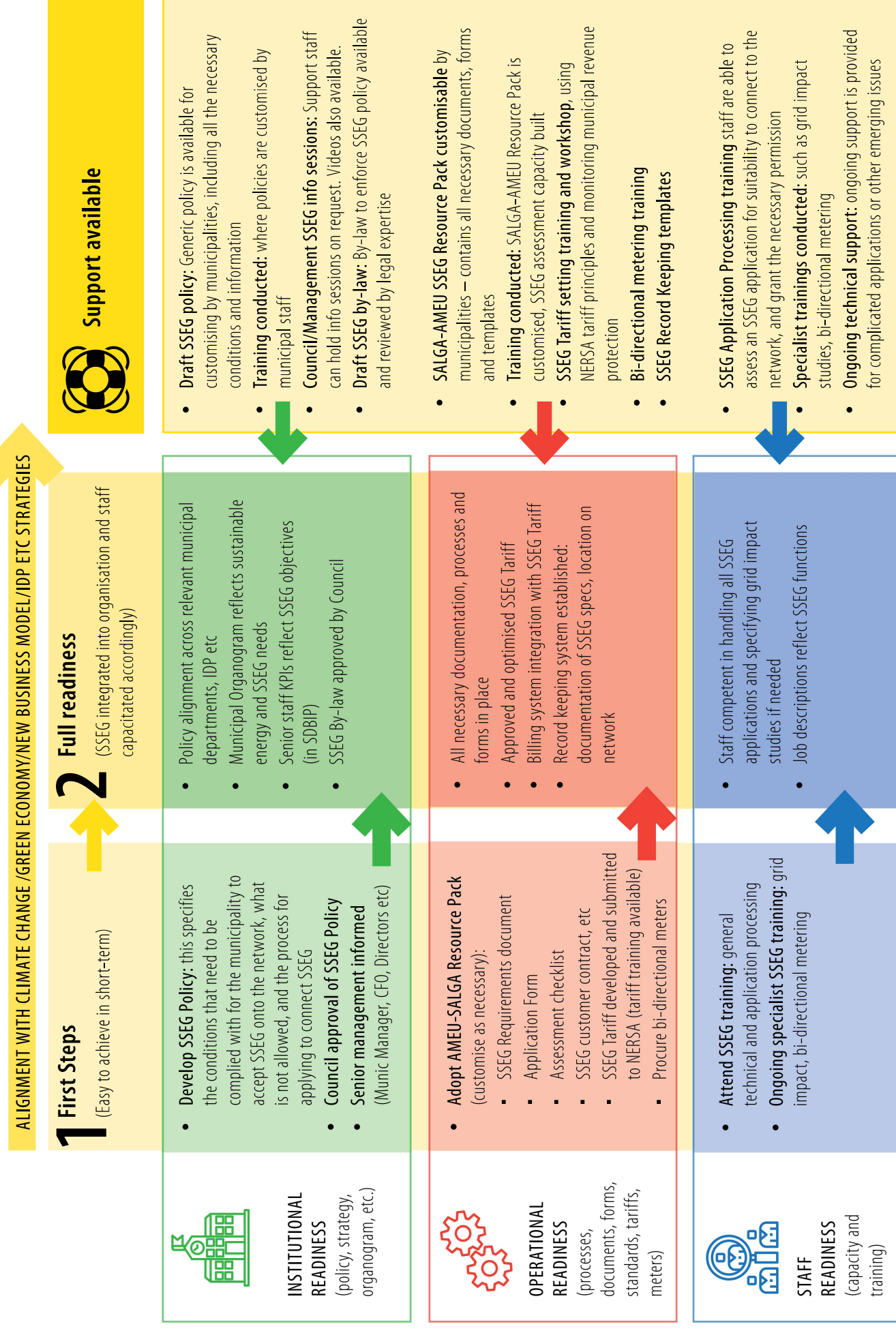
- Identify relevant staff to send on SSEG training which is available:
 - SSEG technical training and SSEG application processing
 - SSEG tariff development training - for tariff submission to NERSA
- Customise and adopt the AMEU-SALGA endorsed SSEG documentation and forms

Submit an item for noting to Council on the Electricity (or Energy) Departmental SSEG intentions, to prepare them for future submissions.

Proceed with council submission of SSEG Policy and by-law when appropriate.

The flowchart below (Figure 3) provides more detail on the action areas in the three categories of municipal distributor readiness, together with available support resources. Step-by-step implementation information is provided in the following sections.

Figure 3. Municipal Distributor Small-Scale Embedded Generation Readiness (implementation support in following pages)



2.3. Step-by-step guide

This section provides more detail on implementing both the first steps and longer-term actions discussed earlier and notes the support available in these areas.

Develop an SSEG policy, including the technical 'requirements' document

This is a good starting point for a municipal distributor. It clarifies what SSEG sizes and parameters the distributor will and will not allow, as well as the process of applying for permission to connect. It is usually in two parts:

1. **Overarching SSEG Policy**, setting the distributor SSEG intentions and policy principles.
2. **Requirements for SSEG document**, which is an appendix to the overarching policy and contains all technical parameters, standards and specifications that are to be complied, including the NRS097 series, SANS10142 and others. This document needs to be comprehensive yet clear for customers and installers. It is one of the most important documents in a municipal distributor's SSEG process



Notes:

- The 'Requirements' document forms an appendix to the overarching policy because it is then easy to update as technology or legislation changes, without going through a council process.
- To make the policy legally binding for customers, a by-law amendment is necessary (see later).

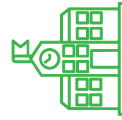


Figure 4: Overarching SSEG Policy

SSEG POLICY TYPICALLY HAS 2 COMPONENTS:

1

Overarching SSEG Policy:
Clarifies municipal intentions regarding SSEG, in keeping with national regulatory frameworks, and states municipal SSEG policy principles



<https://www.sseg.org.za/small-scale-embedded-generation-policy/>



2

Requirements for SSEG Document
(Appendix to overarching policy): this is an integral part of the policy and contains all of the technical and other detailed requirements relating to SSEG. It should be an Appendix to the Policy because then it can be updated as national legislation and other technical aspects change without a full council and public participation process.



<https://www.sseg.org.za/ameu-salga-sseg-requirements-for-embedded-generation/>



Customisable templates and support available

SALGA-AMEU Template available can be easily customised and adopted



Endorsed by SALGA-AMEU



<https://www.sseg.org.za/small-scale-embedded-generation-policy/>

SALGA-AMEU Template available can be easily customised and adopted



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<https://www.sseg.org.za/ameu-salga-sseg-requirements-for-embedded-generation/>

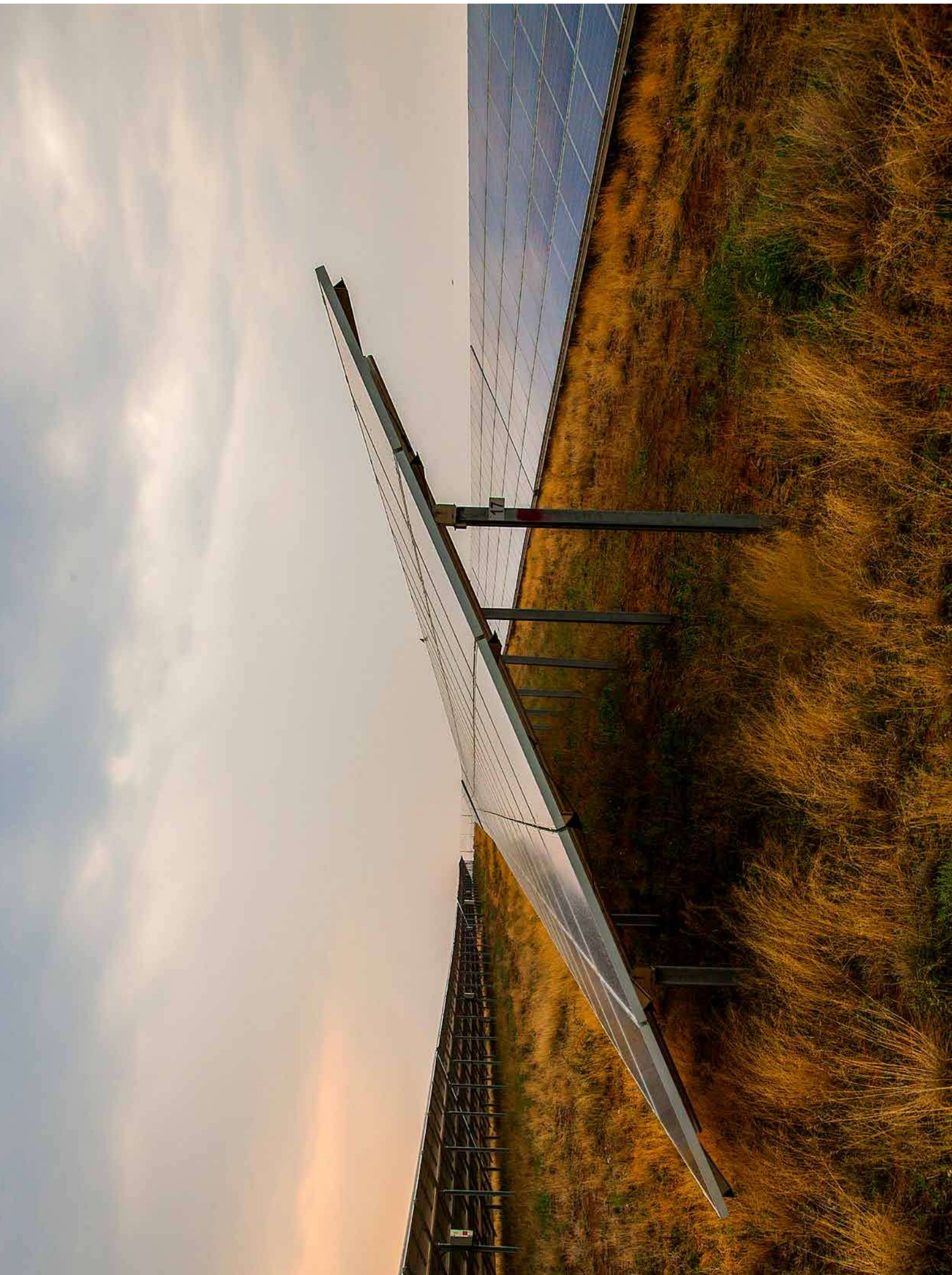




Figure 5: Requirements for SSEG document

The Requirements for SSEG Document draws on a range of technical specifications and standards. The key ones are described here.



Note that the NRS 097-2 documents are industry specifications, not national standards, and thus are not automatically mandatory. The distributor makes them mandatory through their inclusion in policy, and enforcement of the policy via a by-law.

NRS 097-2-1: SSEG UTILITY INTERFACE

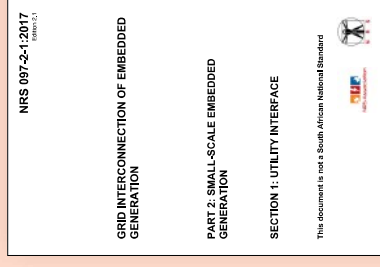
This specification covers the power quality and safety aspects of the SSEG at the point of utility connection. For PV systems, all inverters are required to be certified for compliance with this specification

Content:

- **Power quality** (parameters in accordance with NRS048), including
 - Voltage ranges, unbalance, harmonics, fault levels, DC injection, flicker etc
- Synchronisation with the utility power
- **Safety** disconnect, in particular **anti-islanding**
- Labelling requirements



<https://www.sseg.org.za/grid-interconnection-of-embedded-generation-nrs-097-2-12017/>



NRS 097-2-3: SIMPLIFIED UTILITY CONNECTION CRITERIA FOR LOW VOLTAGE GENERATORS

This specification details generation sizes (individual and cumulative) that can be installed without negative grid impacts (and without having to do detailed grid studies)

Content:

- Shared feeder SSEG size limitations
- Dedicated feeder SSEG size limitations
- Flowchart to aid decision on ability to connect



Note: If an SSEG fails outside of these parameters, this does not mean it should be refused, but rather that more detailed studies need to be done.



<https://www.sseg.org.za/grid-interconnection-of-embedded-generation/>

OTHER RELEVANT STANDARDS

Grid Connection Code Requirements For Renewable Power Plants: the NRS 097 documents reflect the provisions of the Grid Code (in case of conflict, the Grid Code takes precedence, as it is a mandatory document)

NRS 048 – Power Quality: The NRS 097-2-1 reflects the provisions in this document



<https://www.sseg.org.za/ameu-salga-sseg-requirements-for-embedded-generation/>



<https://www.sseg.org.za/ameu-salga-sseg-requirements-for-embedded-generation/>

SANS 10142-1-2 THE WIRING OF PREMISES: Specific requirements for embedded generation installations connected to the low voltage distribution network
(DRAFT – not yet released as of end 2020)

This standard ensures safe operation of embedded generators under normal and fault conditions. It covers the installation and wiring of all aspects of embedded generators, including storage, up to the point of utility connection

How to develop a process to assess and approve SSEG applications from customers

The following three documents are important in this regard:

1. **SSEG Application Form** – the customer and/or installer fills this in. It contains enough information for the distributor to determine if the SSEG can be connected without any negative impact.
2. **Application Assessment Control Document (Checklist)** – used by the municipal distributor to check all important parameters of the proposed SSEG for compliance and undertake the necessary calculations regarding potential impact on the local network. A **spreadsheet version** is also available, which performs these calculations automatically.
3. **SSEG Commissioning Report** – filled in by the customer or installer after installation is complete and signed off by a ‘Competent Person’ to verify that the as-built system complies with the applicable requirements, standards and specifications. Municipalities define a ‘Competent Person’ differently, with some requiring a Pr.Eng or Pr.Tech.Eng to sign off, for example, and others allowing a suitably certified installer to do this. From a legal standpoint, both of these approaches are acceptable (see *Municipal Legal Framework Applicable to Small-Scale Embedded Generation*, [Cliffe Dekker Hofmeyr, SALGA, 2018](#)).



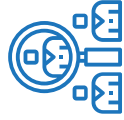


Figure 6: Develop a process to assess and approve SSEG applications

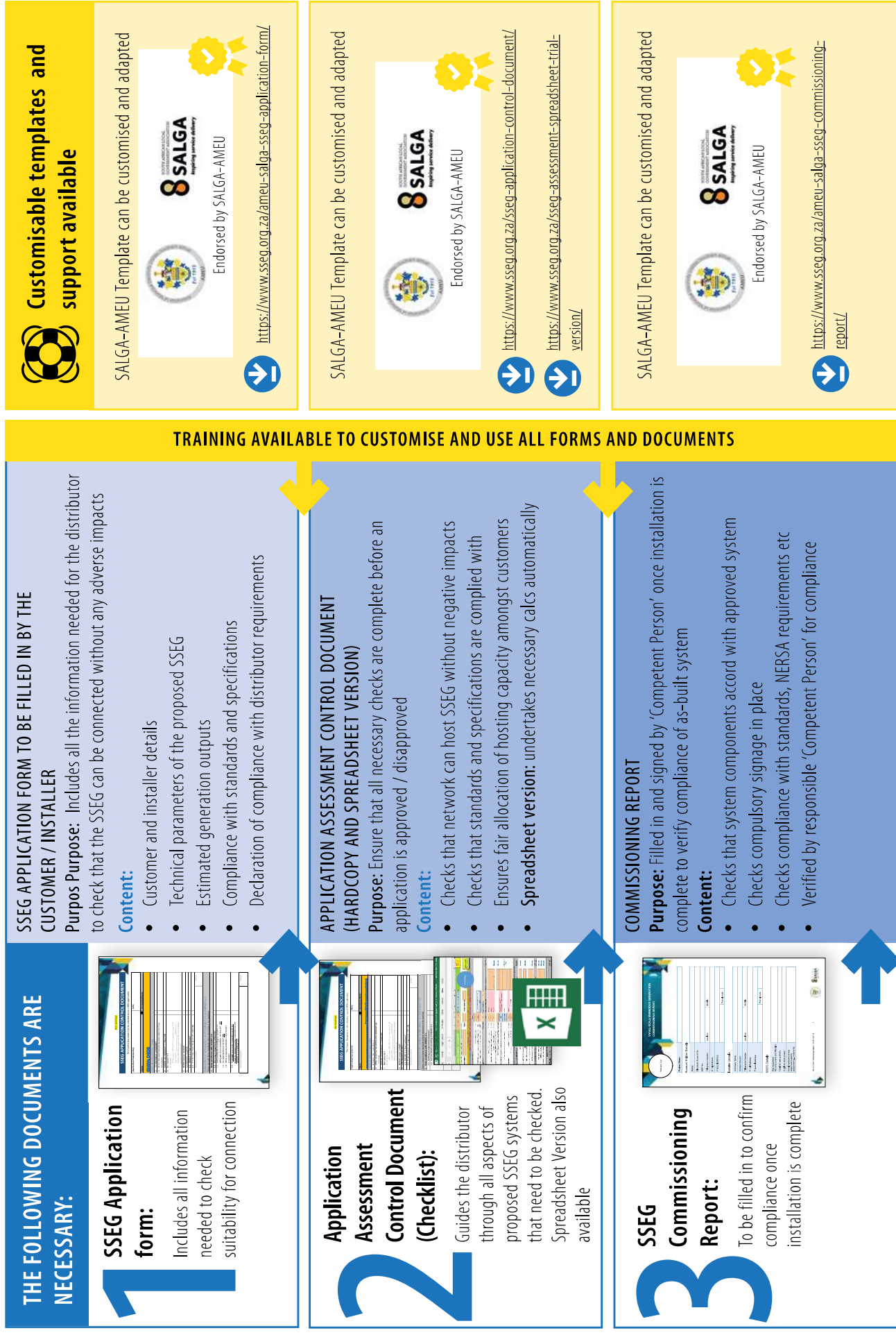
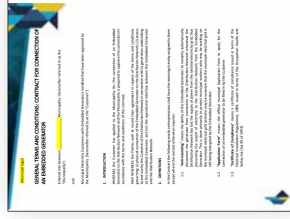




Figure 7: How to ensure the necessary Legal Framework is in place

THE FOLLOWING DOCUMENTS ARE NECESSARY:

1 Contract for Connection of SSEG
Between the customer and the distributor:
Covers the requirements of both a Connection Agreement and a Supplemental Contract



CONTRACT FOR CONNECTION OF SSEG TO BE SIGNED BY THE CUSTOMER AND DISTRIBUTOR

Purpose: Specifies and makes binding the rights and obligations of both the customer and the distributor.

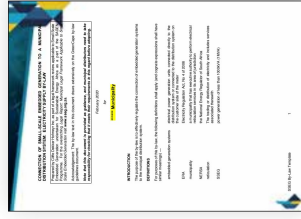
Content:

- Includes both the requirements of a **Connection Agreement** and **Supplemental Contract** in one document.

Developed for distributors by *Cliffe Dekker Hofmeyr*.

2 SSEG By-Law:

Provides Electricity By-law amendment text that makes compliance with distributor SSEG policy legally binding on the customer



SSEG BY-LAW (AMENDMENT)

Purpose: Makes the provisions in the distributors SSEG Policy legally binding upon customers

Content:

- Asserts that customers are not allowed to connect SSEG without express permission of the distributor
- Requires that the distributors policy regarding SSEG be complied with

Developed for distributors by *Cliffe Dekker Hofmeyr*.

INFORMATION DOCUMENT:

Legal Framework Applicable to SSEG:
Covers all relevant national and local legislative frameworks that apply to SSEG



MUNICIPAL LEGAL FRAMEWORK APPLICABLE TO SMALL-SCALE EMBEDDED GENERATION

Purpose: Contextualises all SSEG by-law and policy guidelines within relevant national and local legislative frameworks.

Content:

- Clarifies the purpose of policies and by-laws around SSEG
- Reviews key aspects of national and local legislation (Constitution, OHS Act, ERA, MSA etc), and notes their relevance to SSEG

Developed for distributors by *Cliffe Dekker Hofmeyr (SALGA 2018b)*.



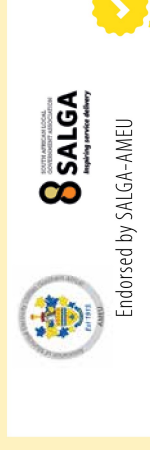
Customisable templates and support available



Endorsed by SALGA-AMEU



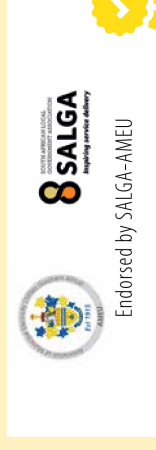
<https://www.sseg.org.za/contract-for-connection-of-an-embedded-generator/>



Endorsed by SALGA-AMEU



<https://www.sseg.org.za/sseg-electricity-supply-by-law-amendment-guide/>



Endorsed by SALGA-AMEU



<https://www.sseg.org.za/municipal-legal-framework-applicable-to-small-scale-embedded-generation/>



Develop tariffs for SSEG

A sensible SSEG tariff will ensure that customers with SSEG continue to contribute their share of network fixed and variable costs. A balanced tariff also considers the interests of the customer and their SSEG business case. An SSEG tariff typically includes a fixed charge, variable charge, and export credit. It is recommended that export is accepted and credited by municipal distributors, as this has advantages for both the distributor (who on-sells this power at a profit) and the customer, whose business case is improved by such credit. Training on SSEG tariff setting is available, supported by a spreadsheet tool developed for this purpose. SSEG tariffs need to comply with NERSA tariff principles and rules.

Refer to Figure 8 for schematic and more information.

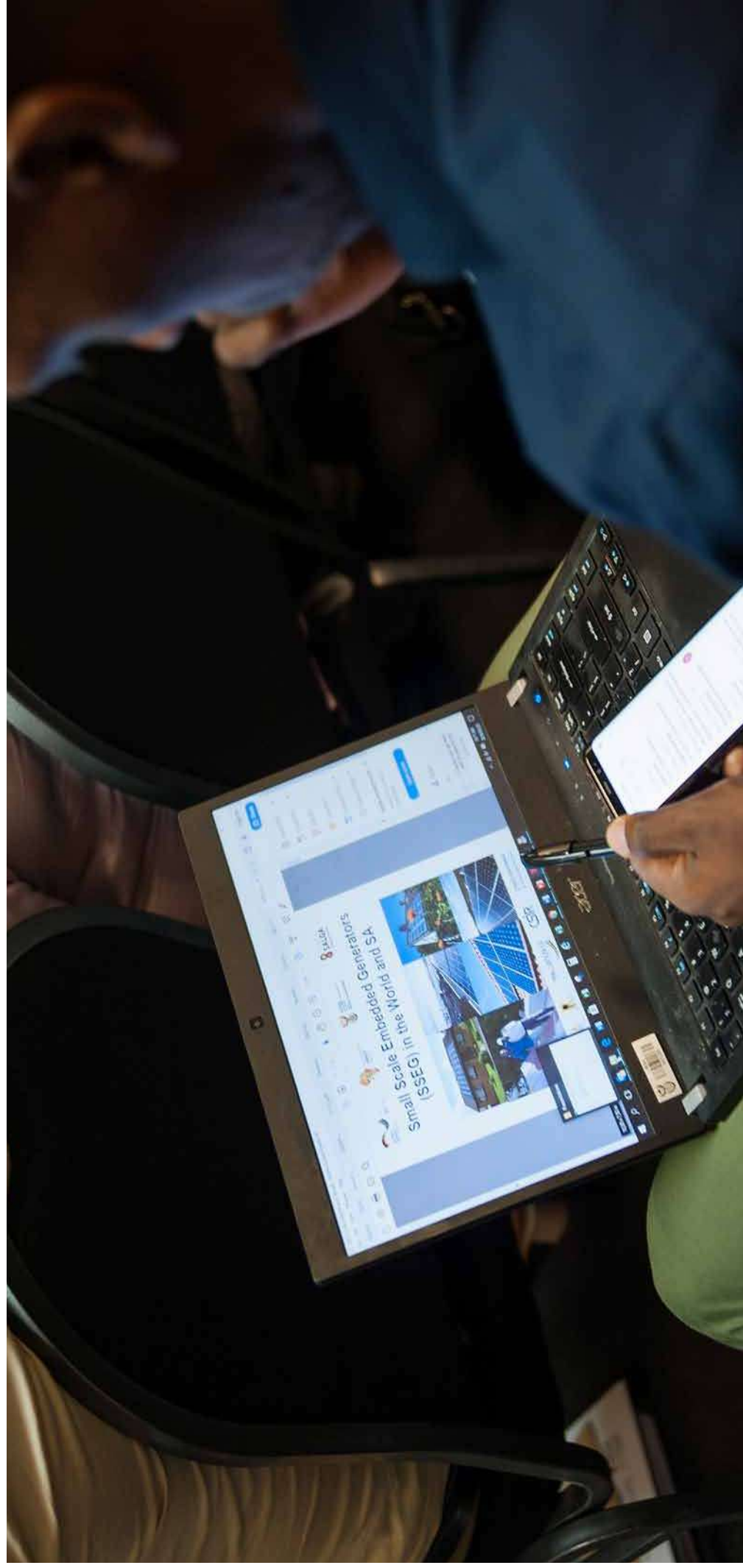


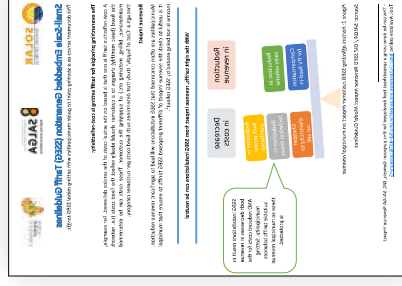


Figure 8. Setting tariffs for SSEG

Information document:

SSEG Tariff Setting Guidelines:

An overview of setting appropriate tariffs for SSEG



SSEG Tariff Setting Guidelines

Purpose: Explain how suitable SSEG tariffs can be set:

- To be cost reflective
- To protect municipal revenue
- To be fair to the customer

Content:

- Tariff structures suitable for SSEG
- The use of fixed and variable charges
- Revenue impact case studies



Customisable templates and support available

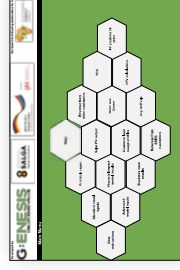


<https://www.sseg.org.za/tariffs/>

Tariff setting model:

SSEG tariff modelling spreadsheet:

Enables distributors to assess the suitability of different tariffs for their customer base



SSEG tariff modelling spreadsheet

Purpose: Support tariff setting by modelling impact of different tariffs on distributor and customer

Method:

- Uses actual customer data from distributor
- Checks revenue impact for different tariffs
- Allows different tariff structures
- Cost-of-supply data included if available
- Allows advanced load and financial inputs

Training available to develop suitable tariffs using the spreadsheet model

Tariff setting accords with NERSA tariff principles

<https://www.sseg.org.za/municipal-revenue-impacts/revenue-impact-tool/>



Video:

How to Set Solar PV SSEG Tariffs (10min)



VIDEO: How to set Solar PV SSEG Tariffs

Produced specifically for South African Municipal Distributors to cover the basic principles of SSEG tariff setting



<https://youtube/v0ta-NFq8yY>





Specifying and evaluating grid impact studies

Grid impact studies need to be conducted (usually by the customer) if the SSEG application assessment reveals that the parameters of the NRS097-2-3 Simplified Connection Criteria specification (which is referred to in the Requirements for SSEG policy document) have been exceeded, and therefore the potential for negative grid impact exists. Useful tools available for this are:

1. Grid Impact Study Specification Guide – allows a municipal distributor to specify the parameters and acceptable ranges to be used in such a study (such as voltages, thermal ratings, fault levels, generator rejection etc.).
2. Grid Study Check sheet – provides distributors a systematic way of assessing a grid impact study presented to them.
3. Recommended practice for assessing connection of SSEG – describes a simple hand calculation and lookup table grid study methodology for SSEG up to 600kVA (beyond this a full study using simulation software will be necessary). Developed by MPE (2018).

Refer to Figure 9 for schematic and more information.

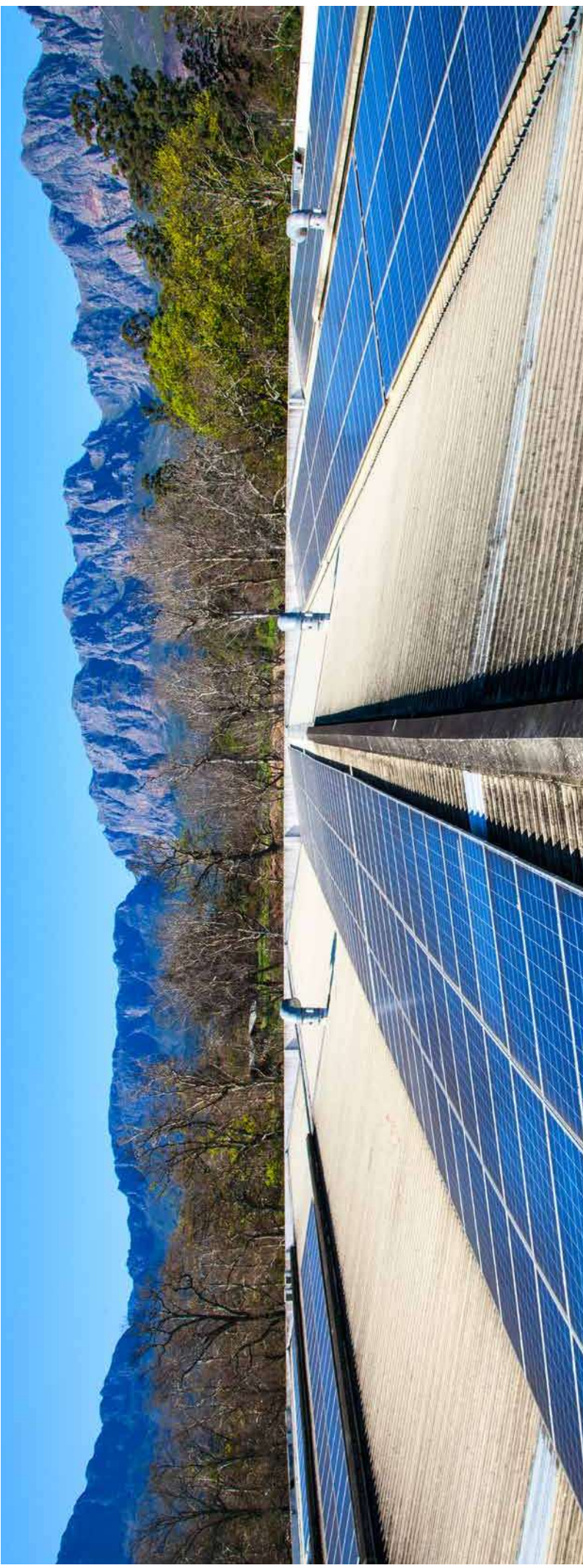


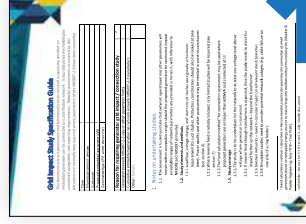


Figure 9. Undertaking Grid Impact Studies for SSEG where more detailed assessments are required

The following documents are useful:

1 Grid Impact Study Specification Guide:

To instruct customers on parameters to be checked in the study



SSEG GRID IMPACT STUDY SPECIFICATION GUIDE

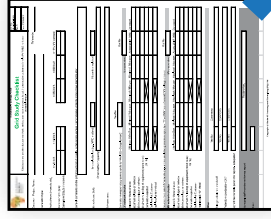
Purpose: Clarifies what parameters are to be checked in a grid impact study – a distributor provides this document (and necessary network data) to the customer where grid impact needs to be assessed before an SSEG can be approved

Content:

- Parameters to be checked in a grid impact study
- Acceptable ranges for these parameters (based on NRS048, NRS097 etc)
- Data that the distributor will need to provide to the customer

2 Grid Study Checklist:

For use in assessing studies submitted by customers



GRID STUDY CHECKSHEET

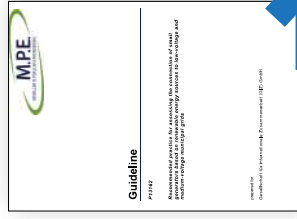
Purpose: To check that relevant parameters in the specification have been assessed and are in range

Content:

- List of all key parameters and other important checks relevant to an acceptable study

3 Recommended practice for assessing connection of SSEG:

A hand-calculation method of assessing impact of SSEG connection



RECOMMENDED PRACTICE FOR ASSESSING THE CONNECTION OF SMALL GENERATORS BASED ON RENEWABLE ENERGY SOURCES TO LOW-VOLTAGE AND MEDIUM-VOLTAGE MUNICIPAL GRIDS (MPE, 2018)

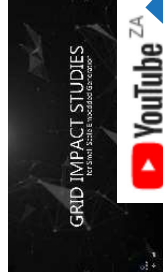
Purpose: Enables an impact study via simple hand calculations and lookup tables (as opposed to a full grid simulation study)

Content:

- Explains the parameters to be checked
- Steps through a simple impact study methodology, with illustrations

Video:

Introduction to the Grid Impact Studies (10 min)



VIDEO: GRID IMPACT STUDIES FOR SSEG

Produced specifically for South African Municipal Distributors, introducing what a grid impact study is, when it is needed, and what should be assessed



Customisable templates and support available

Training available on Grid Impact Studies



<https://www.sseg.org.za/grid-impact-study-specification-guide/>

Specification available (can be customised)



<https://www.sseg.org.za/grid-impact-study-specification-guide/>

Checksheet available for use



<https://www.sseg.org.za/grid-impact-study-specification-guide/>

Downloadable



<https://www.sseg.org.za/recommended-practice-for-assessing-the-connection-of-small-generators-based-on-renewable-energy-sources-to-low-voltage-and-medium-voltage-municipal-grids/>



<https://www.youtube.com/watch?v=IsCQbTQgU&t=3s>



Procure suitable bi-directional meters

It is generally advisable for municipal distributors to accept SSEG export onto their networks, as this has financial benefits for both the municipality and customer. Bi-directional meters are necessary for this to take place. These meters may be relatively simple and cheap or have significant 'smart' capabilities which can integrate with existing or planned municipal distributor smart metering (or Advanced Metering Infrastructure) functionality. Choice of meter will in part depend on the municipality's intentions in this regard.

Refer to Figure 10 for schematic and more information.



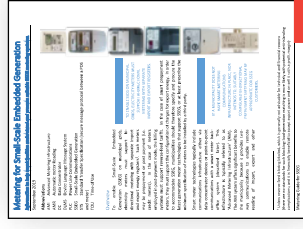


Figure 10. Procuring bi-directional meters for SSEG

Information document:

Metering for Small-Scale Embedded Generation

Information to help municipalities understand and procure suitable SSEG metering systems.



METERING FOR SSEG - GUIDELINE

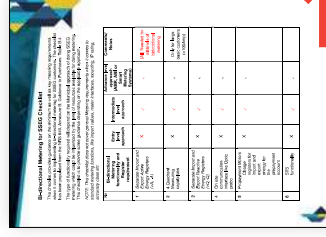
Purpose: Provide an overview of bi-directional metering characteristics and options

Content:

- Types of bi-directional meters
- Integration with Smart Metering/Advanced Metering Infrastructure (AMI)
- Configuring registers in meters
- Specifications and procurement of bi-directional meters

Checklist and Specification:

Bi-Directional Metering for SSEG Checklist
Technical functionality checklist and specification information to help with procurement.



Video:

Bi-directional metering
(10min)



VIDEO: BI-DIRECTIONAL METERING FOR SSEG
Produced specifically for South African Municipal Distributors – introducing the purpose of bi-directional metering, types of meters, and the interface with Advanced Metering Infrastructure (Smart metering)



Customisable templates and support available

Guide available for use

Training available on bi-directional metering



<https://www.sseg.org.za/metering-for-small-scale-embedded-generation/>

Spec available for use

Training available on bi-directional metering



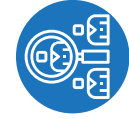
<https://www.sseg.org.za/metering-for-small-scale-embedded-generation/>



<https://www.youtube.com/watch?v=eU5Z-3Zoo5s>



Communicate with your customers



Keeping customers informed about the municipal distributor's mandatory application process, and what key requirements for SSEG are, helps with compliance. Communication should not feel 'top down' for the customer, but it is important to consider their perspective. Information dissemination can be through flyers with the rates bill, newspaper notices or even radio interviews, for example.

Refer to Figure 11: for schematic and more information.

Establish an SSEG record keeping system



Municipal distributors need to establish a record keeping system for SSEG. Key SSEG parameters should be recorded such as size, type, voltage, expected energy output etc. (this information will also periodically be requested by NERSA), as well as their location on the network so that the local hosting capacity of the network can be monitored (there are limits to the amount of SSEG that can be accommodated in any one part of the network without potential negative impacts). Larger cities may use their Enterprise Management System for such record keeping (e.g. SAP). Others may adapt and use a simple spreadsheet which is available for this purpose.

Refer to Figure 12: for schematic and more information.



Figure 11: Communicating with your customers, and installers

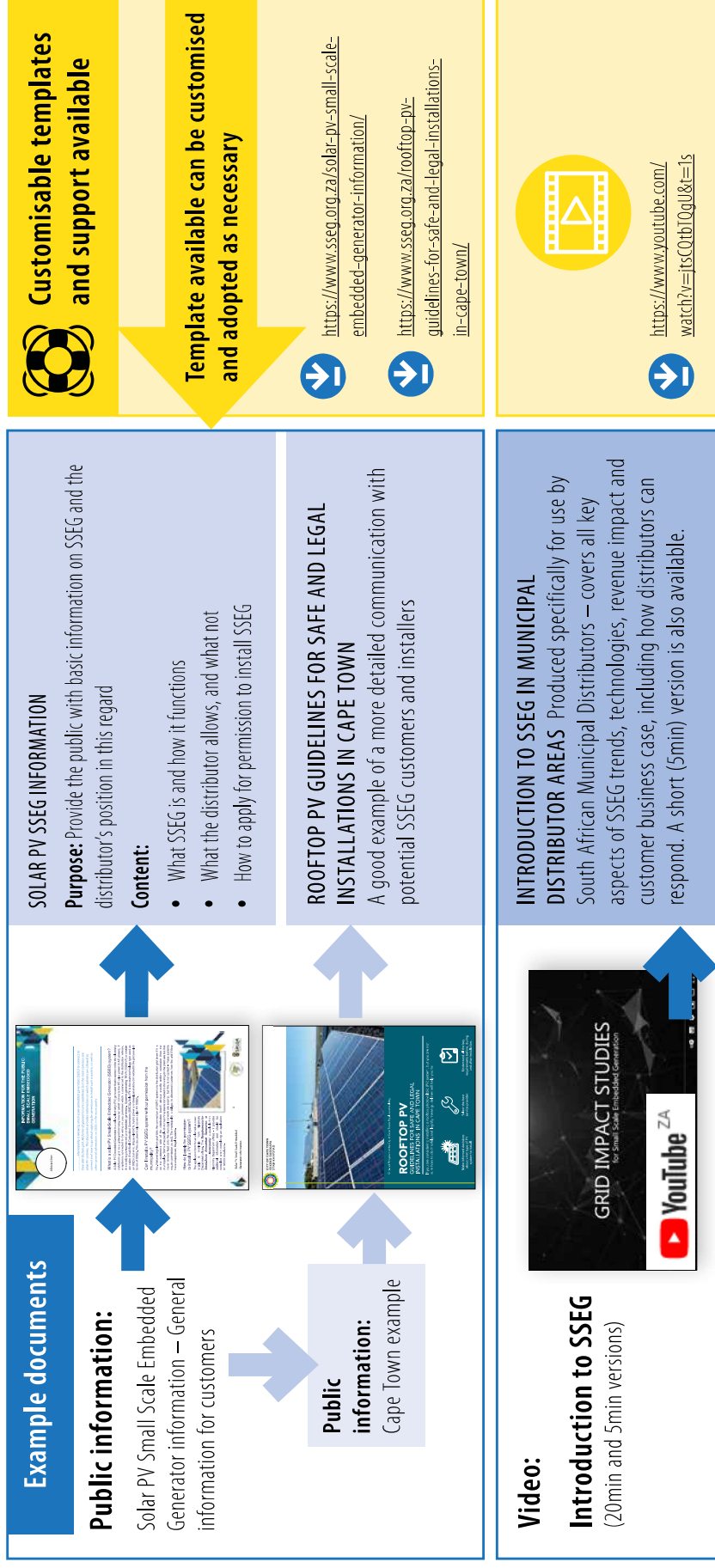


Figure 12: Record keeping of SSEG system details and locations



Questions municipal distributors ask regarding SSEG

Typical questions by municipal distributors

Should I allow
SSEG to connect
to my network?



- Yes. Distributors are **obliged to provide open and non-discriminatory access** for embedded generators to connect to the network (Distribution Network Code 4(1)).
- Accommodating SSEG onto the network, if done properly, can be **beneficial for the distributor, the customer, and the local economy**.
- SSEG is part of a growing trend to install renewable, affordable energy, which is likely to continue. Distributors aren't in control of it and should work with this trend.
- Not formally accepting SSEG onto the network has been found to result in more illegal installations. Trying to stop it increases the risk of grid defection.

What conditions
should I put in place
for SSEG wanting
to connect to my
network, so safety
and power quality is
assured?



- There are a range of technical conditions that SSEG systems should comply with, including anti-islanding, maximum size limits, phase balancing etc. These are all clarified in the **NRS097-2-3 and NRS097-2-1 specifications** (based on the Grid Code, NRS048 etc).
Requiring compliance with these specifications will ensure safety and power quality adherence.

How do I make the
conditions I put
in place legally
binding on SSEG
customers?



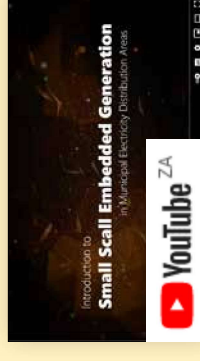
- First, the municipality should formally adopt an SSEG Policy (e.g. the AMEU-SALGA **Requirements for SSEG** document)
- Second, to make the Policy legally binding on customers, an **SSEG Electricity By-law amendment** is necessary.



Resources for more
information or support



Introductory SSEG
video provides
information on the
trends and potential
advantages of SSEG



<https://www.youtube.com/watch?v=H0dd6Qh3To&t=14s>

The AMEU-SALGA

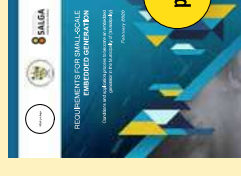
Requirements for SSEG

document includes reference to
the NRS097 specifications and
other necessary compliances

Training available



<https://www.sseg.org.za/ameu-salga-sseg-requirements-for-embedded-generation/>

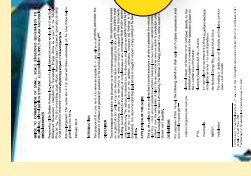


p 7

By-law amendment
guidance and text is
provided in a legally
reviewed SSEG by-law
document



<https://www.sseg.org.za/sseg-electricity-supply-by-law-amendment-guide/>



p 13

Typical questions by municipal distributors

How do I make sure SSEG will not have a negative impact on my network, especially when there are many of them?

- As long as conditions in the NRS097-2-3 specification (Simplified Connection Criteria) are followed, SSEG can generally be connected without fear of negative network impact. This also considers the cumulative impact of many SSEGs in one area.
- For systems beyond limits of the NRS097-2-3, **grid impact studies** will be required before permission to connect can be given.

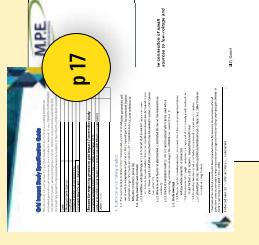


Training available

<https://www.sseg.org.za/grid-impact-study-specification-guide/>



<https://www.sseg.org.za/recommended-practice-for-assessing-the-connection-of-small-generators-based-on-renewable-energy-sources-to-low-voltage-and-medium-voltage-municipal-grids/>



A specification for grid impact studies has been developed, and a simplified study methodology is available, as well as a video



Resources for more information or support

Should I accept reverse feed from SSEG systems onto my network?

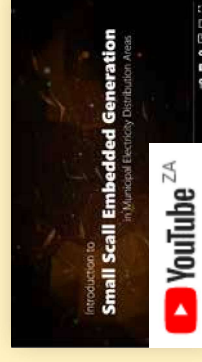
- It is best to accept reverse feed (export), and credit it on the customer's bill, as it is usually beneficial for both the distributor (they on-sell this energy at a profit) and helps the customer business case (they are credited for energy exported).
- The necessary bi-directional meters need to be in place to accept reverse feed.



Introductory SSEG video provides information on the trends and potential advantages of SSEG



https://www.youtube.com/watch?v=_H0dd6Qh31o&t=560s



What sort of metering changes are necessary for SSEG?

- To accept reverse feed, it is necessary to procure and install bi-directional meters.
- These may be simple, or more complex and have 'Smart' capabilities.



Training available



<https://www.sseg.org.za/metering-for-small-scale-embedded-generation/>



Information document on bi-directional meters is available, and a video. NRS049 provides procurement guidance

Typical questions by municipal distributors

What can I do about SSEG impact on municipal revenue?

- **Revenue loss is only a problem if inappropriate tariffs are applied** to SSEG customers.
- Appropriate SSEG tariffs, informed by a Cost of Supply study, will avoid revenue loss, and at the same time be fair on the customer.

How do I set up a process to accept SSEG applications?

- The quickest way to set up an SSEG application process is to adopt the **AMEU-SALGA Resource Pack**, which contains all the necessary documentation for such a process. It can be customised as necessary.
- **Staff training** is also important to be able to assess SSEG applications.

How do I evaluate SSEG applications in accordance with the necessary standards and requirements?

- All the relevant standards and requirements to be checked are specified in the AMEU-SALGA endorsed **Requirements for SSEG document**.
- The AMEU-SALGA **Control Document** (Checklist) steps through all the necessary checks to be performed on SSEG applications before approval.



Resources for more information or support

Training available

Tariff setting information and tariff modelling tool supports SSEG tariff setting. Tariff video also available.

<https://www.sseg.org.za/wp-content/uploads/2019/07/SSEG-Tariff-Guidelines.pdf>

<https://www.sseg.org.za/municipal-revenue-impacts/revenue-impact-tool/>

AMEU-SALGA Resource Pack is available

Training available

<https://www.sseg.org.za/category/ameu-salga-pack/ameu-salga-resource-pack/sseg-resource-pack/>

<https://www.sseg.org.za/category/ameu-salga-resource-pack/ameu-salga-sseg-resource-pack/>

Control Document to assess

SSEG applications is available

<https://www.sseg.org.za/sseg-application-control-document/>

<https://www.sseg.org.za/sseg-assessment-spreadsheet-trial-version/>

Typical questions by municipal distributors

How do I get my council and/or senior management on board?

- Remind them of the **SALGA Energy Summit Declaration** (SALGA 2018a) which includes clear local government commitments to enable SSEG.
- The SSEG introductory video can help them understand the importance of SSEG and how distributors should respond to the growing numbers of installations.



 SALGA Energy Summit Declaration, and SSEG video available
<https://www.youtube.com/watch?v=H0dd6Qh3To&t=145>
 <https://www.salga.org.za/Documents/Documents%20and%20Publications/Final-Energy-Summit-Declaration-2018.pdf>

 **YouTube**



How do I communicate to the public around SSEG?

- Generic SSEG information for the public can be customised for distribution
- Leaflets can be distributed with rates bills, and notices in newspapers and radio interviews can be explored for effective communication



Generic Public information on SSEG available
<https://www.sseg.org.za/solar-pv-small-scale-embedded-generator-information/>



 p 21

Where can I get training and other technical support regarding SSEG?

- The SALGA-DMRE-GIZ **Municipal Distributor SSEG Support Program** provides training and technical support around SSEG.
- Email support@sseg.org.za to apply to participate or for more information.
- GreenCape also supports Western Cape municipalities with SSEG.



SSEG Support Programme

Training available
<https://www.sseg.org.za/>





3. Where to find resources and support

3.1. National Municipal Distributor SSEG Support Programme

The Municipal SSEG Support Programme has been in existence since 2017, and is a partnership between SALGA, the Department of Mineral Resources and Energy (DMRE), and GLZ. It is implemented by Sustainable Energy Africa (SEA) NPC, with the Solar Training Centre and CSIR.

Objective: To capacitate municipalities to allow SSEG onto their networks in a technically sound and safe manner, and to support SSEG tariff setting to protect both the interests of the municipality and SSEG investors.

Training provided: Training for municipal distributors, as well as a comprehensive set of documentation which can be used in municipal SSEG processes. The following support is offered to municipal distributors:

- Annual 5-day training courses on SSEG, enabling municipalities to develop the necessary documentation and start accepting and processing SSEG applications from customers
- Specialist trainings, including:
 - grid impact studies,
 - tariff setting, and
 - bi-directional metering.

Technical support provided: An ongoing technical support help desk is available when problems or queries arise here: www.sseg.org.za.

How to join the Municipal SSEG Support Programme?

Annual invitations to join the programme are circulated to all municipalities. To apply to join and receive SSEG capacity building support, send an email to support@sseg.org.za. **Support is subject to the availability of resources.** In addition, GreenCape supports Western Cape municipalities with SSEG.



Municipal SSEG Resource Portal

This website hosts all of the resources described in this document, in particular the AMEU-SALGA endorsed set of documentation that can be used to rapidly establish a sound SSEG application assessment and approval process.

www.sseg.org.za



<http://www.sseg.org.za/>

Online SSEG Training Courses

This website hosts a growing set of courses relevant to SSEG in municipal distributor areas. Facilitated courses are run periodically, but they are also freely accessible to individuals at any time, although you will need to register and login.

www.training.sseg.org.za



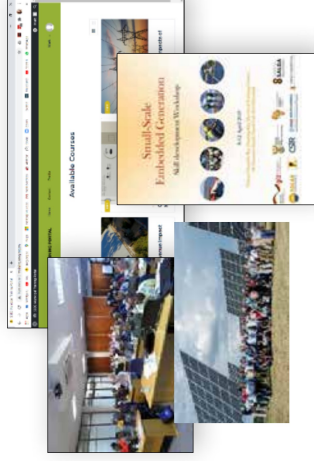
<http://www.training.sseg.org.za/>

Summary of the SSEG Support Resources

Overview & process



Training (in person and online)



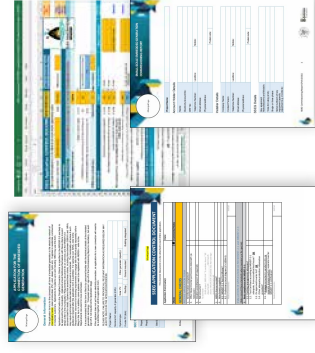
Policy & Requirements



Legal – contracts, bylaws etc.



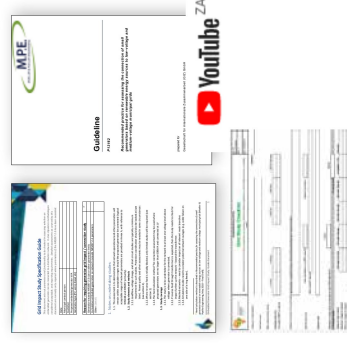
Application assess & Commissioning



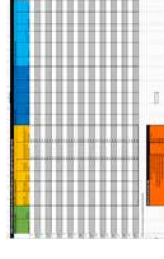
Procurement



Grid impact studies



Record keeping



Support website



Public information



SSEG metering

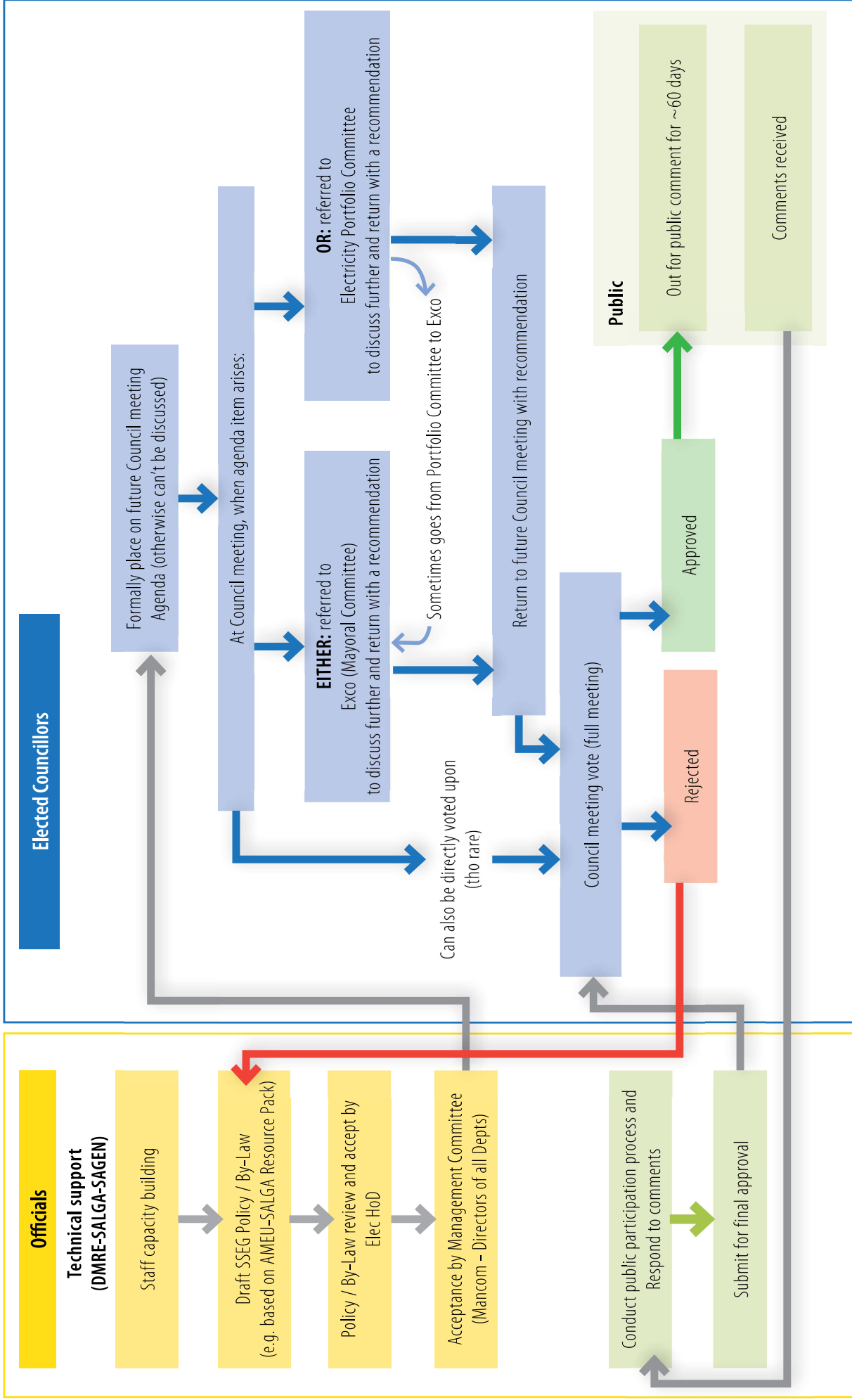


4. References

- DoE 2020. Schedule 2 of the Electricity Regulation Act 2006: Licensing Exemption and Registration Notice. Department of Energy, March 2020.
- NERSA 2018. Registration Procedure for Small-Scale Embedded Generators. Version 1, National Energy Regulator. 20 August 2018.
- MPE 2018. Recommended practice for assessing the connection of small generators based on renewable energy sources to low-voltage and medium-voltage municipal grids. Moeller & Poeller Engineering, 2018.
- NRS 097-2-1 2017 (Edition 2.1). Grid Interconnection of Embedded Generation: Part 2: Small-scale Embedded Generation – Section 1: Utility Interface. Technical Governance, Eskom.
- NRS 097-2-3 2014 (Edition 1). Grid Interconnection of Embedded Generation: Part 2: Small-scale Embedded Generation – Section 3: Simplified Utility Connection Criteria for low-voltage connected generators. Technical Governance, Eskom.
- PEETS 2020. C40 – Enabling Cities with Data: Artificial Intelligence Technology Demonstration for Online Verification and Installed System Orientation. Process, Energy and Environmental Technology Station (PEETS), Faculty of Engineering and the Built Environment, University of Johannesburg, South Africa, June 2020.
- SALGA 2018a. SALGA Energy Summit: Defining the Energy Future of Local Government – Final Declaration. Sandton Convention Centre, March 2018.
- SALGA 2018b. Municipal Legal Framework Applicable to Small-Scale Embedded Generation. Cliffe Dekker Hofmeyr. South African Local Government Association 2018.
- SALGA 2020. Status of Small-Scale Embedded Generation (SSEG) In South African Municipalities – July 2020. South African Local Government Association, Tshwane, 2020.

5. Appendices

a) Municipal Policy and By-Law approval process flowchart



b) Typical Municipal distributor SSEG action plan template (used in training)

'GET MOVING' (essential steps to start receiving applications)

	ACTIVITY	NOTES
1	Communicate to Industry / Customers that DRAFT Requirements document exists, and SSEG Application forms should be submitted  Endorsed by SALGA-NMEU	
	 Accept and process Application forms submitted	
	 Approve upon Commissioning, subject to "Right to adapt rules..."	
	Bi-directional meters or Reverse feed blocking required	
2	Record approved SSEG on spreadsheet	
	Source / specify bidirectional meters	

POLICY and REGULATORY		NOTES
1 ACTIVITY Departmental workshop etc. approval for Policy		
2 LEGAL: Approval for by-law amendment process		
3 Submit to PORTFOLIO COMMITTEE and COUNCIL PROCESS for approval		
Technical inputs as needed		
Public participation		
		APPROVAL

SSEG TARIFFS	
ACTIVITY 1 Draft tariffs approved by CFO (workshop, present etc)	NOTES
2 NERSA tariff submission	NERSA APPROVAL Tariffs on municipal financial software
FURTHER TRAINING NEEDS (e.g. grid impact, metering, application assessment etc.) 	



This document describes how municipal distributors can adjust to a future where SSEG is a more significant part of their network. It starts by outlining the high-level institutional and operational changes that are necessary, and then moves to the practicalities of the processes, requirements, documents, and capacity needed to accommodate SSEG onto the network. It refers to documents endorsed by SALGA and the AMEU for this purpose, as well as noting the capacity building support available.

