



CENTRE FOR RENEWABLE AND SUSTAINABLE ENERGY STUDIES

Workshop Report

Peer Sharing Workshop on Renewable Energy and Energy Efficiency: Small Scale Embedded Energy Generation

25 November 2014

09h00 – 16h00

Victoria Hall, Caledon



The usage of renewable energy and energy efficiency technologies is widely recognised, especially for their climate change mitigation potential. However, private installation of these technologies is often seen as a threat to municipal revenue and concerns are raised regarding the impact on electricity supply and safety and the possible administration burden to the municipalities.

As an endeavour to support municipalities, SALGA in collaboration with Stellenbosch University, Centre for Renewable and Sustainable Energy Studies (CRSES) convened a workshop on Renewable Energy and Energy Efficiency with a focus on Small Scale Embedded Energy Generation. The targeted participants were Technical Officials and Councillors.

The workshop included presentations on the International and Local government Perspectives, Status of National Standards and was followed by an interactive discussion session on Institutional, Financial and Technical challenges with regards to small scale embedded energy generation and possible solutions.

Presentations can be accessed here: <http://www.crses.sun.ac.za/events/workshops>

Main messages from the workshop:

Challenges identified:

- Capacity of municipalities:
 - o Municipal engineers usually do not have time to look in details at all different standards and ways of proceeding => it must be driven nationally
 - o Administration capacity to adapt billing procedures
- Lack of standards
- Lack of national leadership (both regulatory and technically)
- Loss of revenue might not be so much of an issue for SSEG, however municipalities notice more and more loss of revenue on higher income houses, which raise issues to cross-subsidisation of lower income houses (first block)

Enablers and proposed solutions:

- While waiting for standards: Why not adopting existing international standards? Municipalities could do it individually through by-laws, as long as it doesn't contradict existing national standards/policy.
- To reduce loss of revenue:
 - o There is a need for assistance to design appropriate tariffs to cover the network costs
 - o SALGA should engage with national government to relook at financial models of municipalities, to rely less on revenue from basic services (including both water and electricity) and still be able to subsidise service delivery to the poor
 - o The NetFit scheme proposed by Tobias is ideal from a municipality point of view (it solves both financial and administrative burden)
 - o The demand for electricity is already way lower than expected in CCT. Electricity will not be subsidising other departments in the future and at this pace, rates might even have to subsidise electricity (the question was raised that, in the long term, the network might have to be funded like roads, through rates/taxes).
 - o If a farmer installs a borehole, he has to pay the government ("tax on natural resources"). Could this be implemented for energy?
 - o In Hessequa: they have a specific tariff for holiday's resident with a higher monthly charge, because the electricity usage is very low over a year. There might be links between such a scheme and SSEG. Coastal areas are encouraged to design specific tariffs for holiday homes.
- Regulatory: Clarify own generation / need for licenses: Outstanding: what is "generation for own use"? For the moment, the CCT transfers this risk to the installer. What CCT (and SALGA /AMEU) proposes: if you are a net-consumer over a year, it is own use (you use the grid as a storage system).
- Technical: Encourage local production (inverters, meters) and develop local testing/certifying capacity (at the moment certification against NRS097-2 can be done only abroad)
- Municipalities need to understand who will do EG? Why? They need to have an understanding of the energy resources within the municipal area (it has an impact on tariffs / ToU / profile, for example biomass can provide base load, while PV has a specific load profile)

- Application process: municipalities need to know where the systems are and as such need to put in place an incentive for people to register (otherwise they will do it but hide it), tariffs or simple registration processes are thus important. There is a role for the municipality to bring together all parties (including installers and private sector) to encourage registration and make everyone understand the risks in not registering and the advantages to register: awareness campaign.
- There are views that net-metering refers to a scheme where import tariff = export tariff (internationally, this is not the case) and a proposal to call the scheme a bi-directional metering scheme instead.

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Agenda

Registration and Coffee

Welcome and Overview

Aurelie Ferry, SALGA

Introductions

International Perspective

Setting the scene – Small scale embedded generation and net-metering concept
Aurelie Ferry, SALGA/GIZ, with inputs from Dr Markus Poller (GIZ consultant)

National Standard Status

Current status of South African national standards
Dr Bernard Bekker, Stellenbosch University

Impact of embedded generation

Impact of embedded generation, what will PV installations cost the municipality?
Karin Kritzingler, Stellenbosch University CRSES

Tea/coffee break

Perspectives from a Metro

Small Scale Embedded Generation: The Road to Approved Grid Connection in Cape Town:
Brian Jones, City of Cape Town

Perspectives from a regional municipality

Rooftop Solar, Industrial Installations, Embedded Generation
Kobus Engelbrecht on behalf of Witzenberg Municipality

Facilitated discussion

Institutional, financial and technical challenges and possible solutions discussed in three
breakaway groups

Feedback from Groups

Wrap up and way forward

Perspectives from NERSA

Moefi Moroeng and Dennis Seemela, Nersa

Abbreviations

AC:	Alternating Current
AMEU:	Association of Municipal Electricity Utilities of Southern Africa
CCT:	City of Cape Town
CRSES:	Centre for Renewable and Sustainable Energy Studies (Stellenbosch University)
DC:	Direct Current
DU:	Distribution Utility
EG:	Embedded Generation
ESI:	Electricity Supply Industry
ESLC:	Electricity Suppliers Liaison Committee
FIT:	Feed in Tariff
GIZ:	Deutsche Gesellschaft für Internationale Zusammenarbeit GmbH (German technical cooperation)
IBT:	Inclining Block Tariff
ICLEI:	International Council for Local Environmental Initiatives
kW:	Kilowatt
LM:	Local Municipality
LV:	Low voltage
MFMA:	Municipal Finance Management Act No. 56 of 2003
MV:	Medium Voltage
MW:	Megawatt
NERSA:	National Energy Regulator of South Africa
PV:	Photovoltaic
SALGA:	South African Local Government Association
SANS:	South African National Standard
SAPVIA:	South African Photovoltaic Industry Association
SEA:	Sustainable Energy Africa
SSEG:	Small Scale Embedded Generation
TOU:	Time of Use
UPS:	Uninterrupted Power Supply

Presentations

1. International Perspective

Setting the scene – Small scale embedded generation and net-metering concept

Aurelie Ferry, SALGA/GIZ, with inputs from Dr Markus Poeller (GIZ consultant)

Aurelie Ferry is the Technical Advisor for Renewable Energy at SALGA, seconded from GIZ. She holds a masters degree in engineering from the Ecole Centrale de Paris.



Aurelie Ferry

Main messages from the presentation;

SALGA / AMEU and ESKOM with support from GIZ organised several workshops to discuss comments on the NERSA conditions for SSEG published in 2011. A final position was reached in June 2014 (there was consensus from all participating municipalities) and the concept was subsequently presented to NERSA in July 2014 with the following points;

1. Maximum size: 100 kW / LV (while recommending to extend it to 1MW)
2. Applicable to both ESKOM and municipalities' customers
3. No licenses required
4. Net-metering customers are net-consumers and not net-generators
5. Metering using two single-directional meters or one bi-directional meter. No obligation to install Smart-Meters.
6. Primarily for own consumption (with possible remuneration for net-electricity exchanged)
7. Individual tariffs for export and import
8. The tariffs to be determined individually by each municipality which will apply to NERSA for approval
9. Tariff scheme contains:
 - i. A fixed monthly rate based on installed kVA of customer
 - ii. A set tariff for net-import of electricity or optionally a Time of Use (TOU) tariff.
 - iii. A set tariff for net-export of electricity

10. The application of suitable Time-of-Use-Tariffs shall be possible but not be mandatory
11. Obligation of the distribution utility (DU) to take the exported energy under normal operating conditions.
12. No obligation to the DU to give consent to any application for the connection of SSEG with immediate effect. However, applications shall not be rejected or withheld unreasonably and shall be subject to the capability of the DU's network and resources (technical and financial).
13. Reference to NRS 097-2-3 or any other appropriate technical standard shall be included (for technical compliance and safety)

SALGA wants to encourage peer-to-peer learning between municipalities on the topic and is in the process of developing case studies on SSEG in partnership with ICLEI and GIZ (ICLEI's initiative).

2. National Standard Status

Current status of South African national standards

Dr Bernard Bekker, Stellenbosch University

Dr Bernard Bekker is a consultant in the renewable energy field, specialising in PV system design, and holds a BEng (Electronic Engineering) and an MSc (Electrical Engineering), both from Stellenbosch University and a PhD in Electrical Engineering from the University of Cape Town. He is actively involved in the development process of national embedded generation standards, including NRS097-2.



Dr Bernard Bekker

Main messages from the presentation;

Bernard Bekker presented the view from the NRS perspective.

The NRS Project Management Agency (PMA) produces NRS specifications for the Electricity Supply Industry (ESI) in South Africa in collaboration with the South African Bureau of Standards (SABS) on behalf of the Electricity Suppliers Liaison Committee (ESLC). The NRS specifications are intended to service the ESI covering a range of electro-technical topics as well as guidelines for sound business practice/s.

NRS 097 deals with EG, NRS 097-2 addresses LV connections and contains 4 components: 1 published, 1 in draft, 1 being reviewed and 1 not yet drafted. NRS097-2-3 published in April 2014 includes simplified connection criteria, which might be very useful for municipalities.

There is a concern from Eskom for the safety of their workers servicing “dead” distribution lines when anti-islanding does not function (e.g. when the load matches that of the generator) or when a transformer-less inverter is broken and high voltage DC is connected to the dead lines as inverters are not covered by a Certificate of Compliance under SANS10142-1 (this only includes AC and DC wiring). A representative from SAPVIA (Frank Spencer) indicated from the floor that they feel there is an over-concern for safety as inverters with standards are generally safer than UPS’s for which there is little concern.

SANS standards are applicable after public participation process while NRS is voluntary. SANS 10142-1: in place but does not include SSEG; SANS 10142-3: in development process to include EG.

In general, the process to approve the standards is slow (both from the NRS and SANS) and there seems to be a lack of capacity and resources. At the moment, the SSEG is driven by municipalities, because they are facing the problems of residents knocking at their doors.

NRS097-2-1

Local manufacturers of embedded generation devices like inverters have a serious problem when municipalities insist on having the inverters tested against NRS097-2-1 using a SANAS-equivalent test facility. Such facilities don't exist in South Africa, and probably won't in the foreseeable future due to lack of demand. This means that these local manufacturers need to use overseas test houses which cost hundreds of thousands of rands, which many can't afford, effectively closing the local market to these local manufacturers.

We have asked NERSA to issue a clarification on what is considered acceptable NRS097-2-1 testing for these local manufacturers:

“In NERSA’s Standard Conditions for SSEG within Municipal Boundaries, released in Sept 2011, NERSA requires that municipalities ensure compliance at least to NRS097-2-1. Given that local SANAS accredited test houses do not yet exist with the capability to test against this standard, the following applies to local embedded generation equipment manufacturers until such local test houses are available:

- Local manufacturers are allowed to self-certify against NRS097-2-1, as long as full test results are made available on request, and the tests have been witnessed by a professional engineer with relevant experience in the field of power electronics. “

3. Impact of embedded generation

Impact of embedded generation, what will PV installations cost the municipality?

Karin Kritzinger, Stellenbosch University CRSES

Karin Kritzinger is a researcher at Stellenbosch University Centre for Renewable and Sustainable Energy Studies. She holds a BCom and an MPhil degree in renewable and sustainable energy, both from the University of Stellenbosch.



Karin Kritzinger

Main messages from the presentation;

There is quite a lot of press about SSEG and this more often than not put the role of municipalities in a bad light. SSEG is happening and municipalities should focus on policies that encourage installers and customers to stay within the law and not install anyway.

There are many existing studies on the impact of SSEG on municipalities:

- Eskom / Tobias Bischof-Niemz on Net-FIT
- SEA: revenue impact model (which concludes that PV will not have such a huge impact)
- SEA: PV financial feasibility model
- GreenCape: A Perspective on Distributed Generation in Municipal Networks: The revenue impact of Solar Generation
- Mott MacDonald: Small scale on-grid PV embedded generation methodologies in South Africa
- CCT: Potential impact on municipal revenue of small scale own generation and energy efficiency
- CRSES: Unlocking the Rooftop PV Market in South Africa

Installations of PV will have a low impact on municipal revenue, especially in the residential sector. The impact of energy efficiency and energy saving is potentially much higher than that of EG and these are actively encouraged by most municipalities. The cost of policing illegal installations and the administrative cost when a utility is ill-prepared for applications will be much higher than the revenue loss from legal installations.

Utilities should also take care of what is incentivised with a specific tariff structure.

4. Perspectives from a Metro

Small Scale Embedded Generation: The Road to Approved Grid Connection in Cape Town:

Brian Jones, City of Cape Town

Brian Jones is the Head: Green Energy at the City of Cape Town and holds a BSc in electrical engineering from the University of the Witwatersrand and a Masters in Business Administration and Management from the University of Cape Town.



Brian Jones

Main messages from the presentation;

CCT signed their first agreement for PV to feed back on the grid in September 2014. More information is available on line (Webinar conducted by Brian Jones: <http://www.ameu.co.za/Webinars.aspx> and the detailed CCT guidelines are available on the City's website and on www.cityenergy.org.za).

Brian Jones gave a compelling message: "Grid connection of SSEG is happening! – It seems that PV will reach grid parity in 2015 (tomorrow). -> Municipalities need to be ready and manage it". This is however difficult because national standards are not in place and because there is a vacuum in the regulations.

Tariff structure: it is important to recover the network cost and for that the fix network charge and the energy costs must be split. The export tariff has been set by the city at "what we would have paid Eskom" on average over a year. CCT has since done a cost of supply studies and they might consider including IBT for EG.

The billing must be automated. CCT envisages that the fixed daily service charge for network will go on the rates account as in their experience it becomes confusing for the customer to be billed a fixed charge on a prepaid system. This confusion from the customers' side leads to high volumes of call centre complaints and queries.

Metering: For industrial and commercial customers, the metering of SSEG is straight forward. However, for residential customers there is no readily available solution for bi-directional metering with prepayment system. CCT decided that the residents EG have to use industrial meters (at the resident's cost). These meters are quite expensive, especially for a residential customer.

Safety: the risks are there already with other generators fuelled with fossil fuels. CCT is reviewing low voltage practises to ensure safety of staff during operations.

Standards: in the absence of standards, CCT requires that a certified professional engineer certifies the installation. This requirement should fall away when standards are in place.

CCT recognises that overhead costs are quite high at the moment but hopes that this will fall away once standard, technologies and regulation is in place at national level.

Storage is going to be the next revolution (next 10 years?) and cannot be ignored for planning.

The SALGA/AMEU proposal is the best we can do at the moment; the NET-FIT proposal would be ideal, however, it might require high administration costs to manage this.

5. Perspectives from a regional municipality

Rooftop Solar, Industrial Installations, Embedded Generation

Kobus Engelbrecht on behalf of Witzenberg Municipality

Kobus Engelbrecht is the managing director of African Technical Innovations (Pty) Ltd, an installer of large photovoltaic installations in the Witzenberg area. He spoke on behalf of Witzenberg municipality.

Main messages from the presentation;

The Witzenberg LM didn't present but it was understood that they are allowing EG to connect to the grid. SALGA will engage with the municipalities and share more information on it as and when possible.

Kobus Engelbrecht presented on large industrial installations done in the Witzenberg area. In most of these cases, there is electricity fed back into the grid over weekends and other times of low production.

Facilitated discussion

Interactive discussions in breakaway groups

Participants were divided into three groups and asked to discuss the institutional, financial and technical challenges as well as possible solutions for SSEG in the context of municipal utilities.

The specific questions asked to the participants were:

- Grid technical operational challenges and alleviation:
 - Meters / Standards – what can municipalities do, while waiting for the standards?
- SSEG tariffs determination and sustainability
 - Impact on revenue: not that much?
 - How to design tariffs?
 - Problem with FBE, IBT and cross-subsidisation
 - How to cover the cost of the network?
 - Need cost of supply studies
- SSEG municipal institutional and regulatory requirements:
 - Streamlining application procedures? How to use existing processes (CCT)?

The groups then presented their outcomes to the larger group



Group 1 Feedback from Discussions



Constraints:

Capacity of municipalities / administrative

Lack of Standards

National Leadership

NERSA

Eskom is failing – who will take over the technical leadership?

Liability aspect: rather stop any EG, because it is the easiest way to protect yourself from liability

Block tariff structure needs to be looked at to lower consumption from customers

Solutions / Suggestions

Municipality adopt overseas standards in the interim

Different tariff structure for coastal towns with many holiday houses

SALGA to take financial viability discussions further

Keep in mind: not all municipalities buy at ToU (in full)

Appoint a central off-taker for the purchase of electricity fed into the grid, as this will benefit municipalities by decreasing costs as well as the administrative burden

Group 2 Feedback from Discussions



- Changes are needed to the MFMA
- Change the municipal finance system to remove / reduce subsidisation from electricity income
- Clarity on definitions are needed – What is own-generation
- Local certification / accreditation of local components (e.g. inverters) – SABS stamp – for safety
- Need for enabling smart-meter technology for EG
- There are legislative barriers for municipalities wanting to participate in the REIPPPP themselves or to purchase from generators

Group 3 Feedback from Discussions



Enablers:

1. Tariffs

Clarity is needed on the governance in terms of tariffs and how much municipalities are able to develop individual tariffs and to what point and how this affects the shared / communal service business case.

Clarity is needed on the privatisation of communal services - how does this affect the tariffs / or rates charged for the remaining services offered / rendered.

How does an outsourced "trade service model" operate here?

If all trade services are privatised how do you finance the social component or remaining infrastructure?

2. Policy

Municipalities need to know who are installing generators, why they are doing this and what they are doing. (what is the motivation behind installations)

3. Sustainability:

If there isn't a move to sustainable sources of energy, the economy won't be sustainable in 30 years from now. There is a desperate need for the adoption of cleaner generation technologies. Juxtaposition this to tariff sustainability as well.

4. Safety and standards

How do you approach this?

What are you incentivising? (Is the municipality incentivising for people to tell where it is there or to hide it?)

How do you incentivise legal installations?

Work towards a situation where it is desirable to register all installations. (look at tariffs and at simple administration)

Perspectives from NERSA

Ongoing NERSA processes

Moefi Moroeng and **Dennis Seemela**, NERSA

Moefi Moroeng is the Specialist: Electricity Wholesale Trading at NERSA. He holds an MBL from UNISA and a BPA from North-West University.

Dennis Seemela is the HOD-Electricity, Licensing and Compliance at NERSA.



Dennis Seemela



Moefi Moroeng



Velly Malaza (NERSA) and Moefi Moroeng

Main messages from the presentation;

NERSA has done some modelling and came to the conclusion that solar electricity can have a 14% impact on peak demand.

NERSA is in the process of collecting information from various stakeholders on on-going initiatives. NERSA acknowledges that EG is happening and that there is a need for a regulatory framework to ensure an orderly electricity industry development. This is also NERSA's mandate.

NERSA aims to publish 3 papers at the same time: on embedded generation, on electricity resellers and on wheeling.

Planned process for the paper on embedded generation:

- December 2014: NERSA will share a discussion document on embedded generation with targeted stakeholders. They have based this on information received from different stakeholders, including amongst others the SALGA / AMEU / ESKOM comments and concept and the NET-Fit scheme proposed by Tobias Bischof-Niemz.
- January / February 2015: based on the feedback received from targeted stakeholders, NERSA will publish a consultation paper for everyone to comment
- April 2015: public hearings on the consultation paper
- May 2015: final framework / regulation is approved

NERSA encouraged everyone to participate in the planned public hearings.

Attendance list

NAME AND SURNAME	LOCAL AUTHORITY	Designation
AE Franken	Overberg District Municipality	Mayco
Alan Brent	Stellenbosch University	Associate Director: CRSES
André van Niekerk	Stellenbosch	Director: Engineering Services
Aurelie Ferry	SALGA	Renewable Energy Technical Advisor
Bernard Bekker	Stellenbosch University	CRSES
Brian Jones	City of Cape Town	Head: Green Energy
C. Thomas	City of Cape Town	Councillor
Carla Nel	Stellenbosch University	Admin Officer
Christo Swart	Cape Winelands	Deputy Manager: Projects
Danie Maree	Overstrand	Snr Manager: Electrical Services
Dennis Seemela	NERSA	HOD: Licencing and Compliance
Deon Carinus	Cape Winelands	councillor
Frank Mbanze	Saldanha Bay	Councillor
Frank Spencer	SAPVIA	
G De Bruyn	Saldanha Bay	
Helmut Hertzog	GreenCape	Sector Manager: EE
Isak van der Westhuizen	Langeberg Municipality	Director Engineering Services
J Kriel	Langeberg	Councillor
Jevon Pekeur	Matzikama	Director Technical Services
Johan du Plessis Johan	Saldanha Bay	Manager: Electrical Services
Johan Moller	George	Senior Manager: Planning
Johannes Coetzee	Stellenbosch	Act. manager electrical services
Karin Kritzingier	Stellenbosch University	Researcher
Kobus du Plessis	Cape Winelands	Councillor
Leon Swanepoel	Witzenberg	
Lize Jennings-Boom	DEADP	Control EO: Climate Change
Louise Scholtz	WWF	Manager: Special Projects, living plant
Malcolm Booysen	WC Provincial Treasury	SM LGBD
Maloba Tshehla	Green Cape	Sector Manager:RE
Mark Kleinsmidt	COCT	Councillor
Matthew Kempthorne	City of Cape Town	Councillor - PC Chairperson: Energy
Moefi Moroeng	NERSA	Specialist: Electrical Trading
Moses Mlangeni	WC Provincial Treasury: LGBO	Economist
Patrick Ngqu	City of Cape Town	Councillor
Piet Everson	Cape Agulhas	
Ryan van Zyl	Mossel bay	Electricity Department
Schalk van Eeden	Langeberg Municipality	Councillor
Shantal Harigobin	SALGA	PM: MIS
Shaun August	City of Cape Town	Councillor

NAME AND SURNAME	LOCAL AUTHORITY	Designation
Shaun August	City of Cape Town	Councillor
Shireen de Visser	WC Provincial Treasury: LGBO	
Stephen Muller	Overstrand	Director Infrastructure and Planning
Theodore Godden	Witzenberg	Speaker
Valanceo Scheepers	Saldanha Bay	Technical: Electrotechnical Services
Velly Malaza	NERSA	SM Eng Dx Complaine
Wikus van Niekerk	Stellenbosch University	Director: CRSES
Willie Albertyn	Drakenstein	Deputy Exec manager Electrical