

ANNEXURE E

SHONA LANGA HOME OWNERS ASSOCIATION NPC



ELECTRICITY GENERATION POLICY

Introduction

Many private households and residential estates are resorting to the installation of small-scale electric power generation arrangements ("SSEGs") such as photovoltaic power supply systems, wind turbines and stand-by generators for the purposes of generating back-up electrical power to alleviate the inconvenience of frequent Eskom load shedding and other power outages, and the ever escalating costs of Eskom electricity. Shona Langa is no exception. Certain members of Shona Langa Home Owners' Association NPC ("SLNPC") have expressed the desire to install such alternative power systems in their houses. Such systems are not without health and safety hazard, and raise various concerns. The formulation of a formal policy for the consideration and approval of such installations by SLNPC is, therefore, necessary.

Considerations relevant to the installation of SSEGs

SSEGs vary in size from small units capable of powering a couple of lights through units capable of powering lights and refrigerators to large, whole-house stand-by units that supply power to a complete home. Small units are generally powered up manually whereas the larger stand-by units are, in the event of a utility outage, automatically activated by means of a transfer switch that senses a power loss. Such large units comprise sophisticated equipment with complex circuitry; require professional installation and regular maintenance, particularly if these units are intended to be embedded in the electrical circuitry of a house and, therefore, are also indirectly embedded in the Shona Langa electrical power supply and distribution grid ("SLEDG").

The installation and operation of SSEGs have not yet been adequately or even specifically covered in, and regulated by South African national and local legislation. (Cities such as, for example, Cape Town and Tshwane are in the process of preparing by-laws and policies.) Nevertheless, there are a myriad of national and local statutes, regulations, by-laws and standards that generally apply directly or indirectly to SSEG installations. These legislative and regulatory instruments include, for example, some or more of the following:

- The Electricity Regulation Act, Act 4 of 2006;
- Occupational Health and Safety Act, 1993;
- The Electricity Regulation Act, 4 of 2006;
- The National Building Regulations and Building Standards Act, 103 of 1977;
- The Regulations under the National Building Regulations and Building Standards Act, 1977, GN R711, G. 34586;
- The Electrical Installation Regulations, GN R242, G. 31975, published under the Occupational Health and Safety Act;
- The Thabazimbi Electricity Supply By-Laws;
- The Thabazimbi Emergency Services By-law, Part C, Fire Prevention, Chapter 4, Storage and accumulation of combustible material prohibited;

- The NERSA Rules for Registration of Small-Scale Embedded Generation (when implemented);
- SANS 10142-1 The Wiring of Premises - Low-voltage installations;
- SANS 10103;
- NRS 097-2-1 (Part , Section 1);
- NRS 097-2-3 (Part 2, Section 3);
- Eskom Standard 240-61268576/DST 34-1765;
- South African Renewable Power Plants Grid Code;
- South African Grid Code;
- South African Distribution Code;
- NRS 048; etc.

In this legislative maze, SLNPC has resolved to develop policies and practices which it believes are consistent with broader national policies and with its own Rules and Regulations. It is important to bear in mind that all proposed SSEG installations on Shona Langa must, in terms of these Rules and Regulations, in any event comply with national and local legislative and regulatory instruments and national standards. Supplementary and additional to that specific obligation, the Rules and Regulations also stipulate generally that a member shall not use his/her property, or permit it to be used, in such a manner or for such a purpose as to cause a nuisance to another, and he/she shall not store any hazardous or flammable material, or do or permit or allow to be done any other dangerous act which will or may pose a risk to any person. Moreover, a member who installs and operates a SSEG bears full responsibility for that installation and would also be delictually liable for any and all injury caused by and/or damages arising from such an installation and its operation. The installation and operation of a SSEG could also precipitate a substantial increase in the fire and third party insurance premiums payable by a home owner (and possibly also by the SLNPC).

For the purposes of this policy, however, SLNPC need not concern itself with the legislative, regulatory and standards requirements for such installations. SLNPC does, however, endeavour by this policy to ensure that the SSEG installations and operation meets certain minimum standards to secure in so far as possible the health and safety of home owners and residents, as well as SLNPC employees and service providers.

This policy is, therefore, not intended to be all-encompassing. Power generation technology in any event evolves at such a rapid rate that no policy could remain relevant indefinitely. Regular review of this policy would, therefore, be necessary.

From a SLNPC perspective, SSEGs, particularly when embedded directly or indirectly to the SLEDG, raise various concerns which this policy seeks to address. The principal concerns include the following:

- Poisonous gasses:
 - Wind turbine and photovoltaic power supply systems commonly include, for example, vented or valve regulated, lead-acid, deep-cycle batteries as energy reserve storage. Such batteries could, and often do, discharge hydrogen and hydrogen sulphide gasses. Hydrogen sulphide, produced by the charging of a defective battery, or by heat production during overcharging, is poisonous, corrosive, and flammable. It can irritate the eyes, nose, throat, and lungs. Acute exposure causes nausea, headaches, delirium, disturbed equilibrium, tremors and convulsions. High concentrations can impair the breathing centre in the brain and cause death. Even a short exposure to a high concentration would inhibit the absorption of oxygen and could lead to death from asphyxiation.

- Wind turbine and photovoltaic power supply systems, therefore, require a dedicated battery storage facility with adequate ventilation and which is preferably separate from the living quarters of a building served by the installation.
- Exhaust emissions by fuel burning generators (e.g., diesel and petrol) contain carbon monoxide (CO), a colourless, odourless and tasteless gas. Exposure to even a low CO concentration could result in decreased cognitive abilities, disorientation, confusion, dizziness, headaches, nausea, blurred vision, chest pains and cause irregular heartbeat, a loss of consciousness and an irreversible impairment of health. A CO concentration of 200 parts per million (ppm) is generally considered to be potentially lethal. A typical 5.5kW home generator running at full power can produce exhaust gas emissions at a rate of 176L/s (litres per second) – the equivalent of six simultaneously idling motorcars. In a 3m³ store room, a CO concentration of 200 ppm would be reached in about one second and that concentration would be reached in about 3 seconds in a typical 6m³ living room. Even with average ventilation rates of 20 air changes per hour in a 6m³ living room, a lethal CO concentration as high as 1,200 ppm could rapidly accumulate. Various government bodies (such as the Cities of Cape Town and Tshwane) are, therefore, in the process of formulating for promulgation, minimum standards for the use of SSEGs.
- According to guidelines published by the USA CDC on generator related health and safety issues, the CO concentration in an indoor environment should be limited to less than 25 ppm in any 1 hour cycle and less than 15 ppm in an 8-hour cycle. The recommended outdoor CO air quality standard is 25 ppm for any 1-hr cycle and 9 ppm in an 8-hour cycle. The CDC also recommends the installation of CO monitors in living quarters that sound a loud, audible alarm when CO concentrations exceed 200ppm.
- Noise pollution:
 - Noise is measured in dB(A) (A-weighted decibels). Wind turbine and fuel burning generator manufacturers usually give their equipment a dB(A) rating which is measured at a set distance - for example 77 dB(A) @ 1 meter. It is important to bear in mind that the dB standard of measurement is not linear; it is logarithmic - a sound 10 times more powerful than 0dB is 10 dB; a sound 100 times more powerful than 0dB is 20 dB; a sound 1,000 times more powerful than 0dB is 30 dB, and so on. Accordingly, the sound energy in an 80dB sound would be about 300 times as high as a 55 dB sound. (In Table A2 of the City of Tshwane Noise Management Policy, 25dB is categorised equivalent to the slight rustling of leaves and 65dB as equivalent to busy traffic. The human pain threshold is generally considered to be 120dB, at which permanent hearing damage is likely.)
 - Wind turbines produce a swishing sound in rate with the rotation of the blades, as well as noise from the turbine machinery. Wind turbines are typically erected about 300 meters or more from a residence. Measured at a distance of 300 meters, a medium sized turbine will produce a sound pressure level of 43dB. Measured at a distance of about 100 m, sound levels are typically about 55dB. The noise is, therefore, not considered as intolerable, but the frequency of the noise causes considerable inconvenience. According to research by the acoustician Howard Quinn of Maine Rural Partners, the annoying character of wind turbine sound is primarily due to amplitude modulation which causes the sound level to go up and down continually. He found that, unlike continuously occurring sound produced by, for example, fans, busy highways, etc., it is very difficult to become accustomed to uneven sounds.
 - Generators are generally categorised as “open skid” conventional generators and so-called “silent” (“super-silent” and “ultra-silent”) generators. “Open skid” generators are just that – they are open, sit on a skid or in a frame, and are generally portable. “Silent” generators, usually permanently installed, are fully enclosed in a sound proof enclosure, referred to as an acoustic cabinet. “Silent”, however, is grossly misleading as it suggests that the generator makes no noise at all. Most super-silent generators operating at normal load produce 69dB(A) measured at 7 meters. Even ultra-silent generators at

normal load produce 59dB(A) measured at 7 meters. At full power, the sound pressure produced by such generators can range from 75-85dB(A) and higher. Open skid generators generally have no sound attenuation and they are, therefore, significantly louder than silent generators. A typical portable 5.5kW generator running at normal full load produces a sound pressure of between 80 -120dB measured at 7 meters – which is the equivalent of the sound production in, for example, a discotheque or at a so-called rave. Accordingly, generator policies in various residential, agricultural and eco estates, stipulate that the maximum noise level produced by generators, measured indoors in neighbouring homes with their windows open, may not exceed 25dB. Installed silent generators must be completely enclosed, of the ultra-silent type, and noise level production operating under full power may not exceed 67dB measured at 7 meters from the generator. (Because of numerous generator noise related complaints, the City of Tshwane has, for example, already designated single family homes; multifamily homes; retirement homes/villages; parks; wilderness areas; etc., as “noise sensitive areas” in which special noise reduction measures apply, such as hours of operation, maximum sound pressure production, maximum emissions, etc.)

- Fire and explosion:

- Explosive mixtures of hydrogen and oxygen can be produced during the charging cycle of energy reserve storage batteries.
- The exhaust temperature of even a 5.5 kW, portable generator exhaust could reach temperatures of over 600°C.
- Generators and energy reserve storage batteries, therefore, require housing in dedicated, access controlled and well-ventilated facilities. Generator fuel requires storage in specialised, fire- and tamperproof containers (for small volumes of less than 20 litres) or bunkers (for volumes of over 20 litres).
- Fuel storage poses an obvious fire hazard (spontaneous, deliberate or accidental ignition of fuel as a result of arson; failure to maintain; incorrect bunkering; negligent generator operation; unsafe storage; etc.)

Safety:

- The incorrect installation and connection of SSEGs to a Shona Langa home wiring system can result in the SLEDG and downstream circuits in neighbouring homes being powered up by SSEGs that are activated when the Shona Langa power supply fails. That powering-up could, therefore, pose a serious risk, for example, of potential electrical shock or electrocution to Shona Langa maintenance personnel working on the SLEDG when the SSEG is activated. Moreover, such activation in the course of a power outage could also cause voltage spikes and synchronisation problems in downstream circuits in neighbouring homes harmful to both the Shona Langa mains distribution equipment and appliances in neighbouring homes.
- The mounting of wind turbines and solar panels (photovoltaic cells) on roofs requires professional construction and installation, and special mounting techniques and structural assembly to prevent structural and mounting failures.
- Wind turbines notoriously kill huge numbers of bats and birds. According to a USA Today review, wind turbines yearly cause an estimated 6.8 million winged animal deaths in the USA. Wind turbines could, therefore, have a very deleterious impact on Shona Langa's bird and bat population. (Many species of bats are either listed as critically endangered; endangered; vulnerable; or threatened.)

- Aesthetics:

The physical presence of wind turbines; solar panels on roofs; generators and energy reserve storage batteries housing structures, and fuel bunkers on a stand could detract significantly from the Shona Langa aesthetics standard. (Whole house generators may have weatherproof acoustic cabinets, but have a dry weight of 800kg or more and, therefore, require dedicated exterior seating construction on, for example, reinforced foundations and concrete slabs.)

In consequence of these concerns, the Annual General Meeting has resolved to formulate and implement this Policy, which shall be applicable to the installation and operation of all electricity generating systems on Shona Langa.

It is not permitted for any homeowner to install any electricity generating system that distributes or pushes back electricity on the Shona Langa electricity network.

Wind turbines

Currently, SLNPC will not approve the installation of wind turbines.

Generators

General requirements

1. No member may connect a SSEG directly to the SLEDG.
2. **Members are urged to also investigate the suitability of installing an inverter and battery pack which is charged by Eskom electricity and is a silent and cost-effective alternative to noisy generators. On condition that any such inverter and battery pack is installed indoors by a certified electrician and a certificate of compliance is obtained no specific approval is required from the SLNPC.**
3. The installation of residential, off-grid generators is permitted. However, the installation must be physically separated and electrically isolated from the SLEDG – either directly or through internal wiring – and the export of energy onto the SLEDG must not be possible. A generator connected to a house's electrical installation with a reverse power flow blocking relay shall be considered to be off-grid, i.e., as isolated from the SLEDG.
4. Open skid generators shall be placed and operated only in SLNPC approved, designated areas, such that they will not pose a noise and/or an exhaust emission hazard and/or nuisance to home occupants and other Shona Langa residents.
5. Should an open-skid generator be connected to the electrical circuit of a house on Shona Langa the system must be isolated with the required switchgear to ensure that no electricity is exported to the Shona Langa electricity network. Any such installation must be conducted by a qualified electrician and a valid certificate of compliance must at all times be available.
6. Open skid generators may also be used without connection to any house circuitry only to deliver power to light sources and/or refrigerators/freezers and/or televisions, radios, internet equipment and so forth.
7. Permanently installed, ultra-silent stand-by generators intended to be connected to the electrical circuit of a house ("an installed generator") shall be allowed with prior written approval being obtained from the board of SLNPC. Members are required to submit a formal written application for its installation to SLNPC for approval. The approval application must include at least the following:
 - the full specifications of the generator to be installed;
 - the generator noise level output measured in decibel;

- the generator exhaust emission in liters per second;
 - an electricity wiring diagram and lay-out plan prepared and signed by a duly qualified electrical engineer or electrician which clearly depicts the detail of the connections to and from the generator;
 - a drawing of the generator housing and foundation structure (and, where applicable, a back-up battery housing structure) and its (their) proposed location on a stand;
 - if applicable, a written Thabazimbi Municipality approval for the installation and construction;
 - a ventilation and security strategy;
 - a fire prevention and protection plan;
 - a written indemnity which indemnifies SLNPC and its members for all and any injury and damage arising from such generator installation and operation; and
 - Any other information or documentation required by the board of directors of SLNPC.
8. The design, installation and operation of all generators on Shona Langa shall comply with all relevant and applicable national and local statutory and regulatory requirements and standards.
9. No house may be connected simultaneously to a generator load and to the SLEDG load.
10. The installation of an installed generator shall be carried out by a duly qualified and accredited electrical engineer and/or electrician, and in accordance with the Electrical Contractors Association of South Africa (ECASA) document "GUIDELINES FOR THE SAFE USE OF PORTABLE GENERATORS ON UTILITIES' NETWORKS". The engineer and/or electrician shall furnish the member and SLNPC with a Certificate of Compliance and a written confirmation that the installation is safe; that it complies in all respects with the ECASA document referred to above; and that it complies with all relevant and applicable national and local statutory and regulatory requirements, and standards.

Specific requirements

1. Only one generator set may be installed on any one stand.
2. Generators shall only be operated during Eskom load shedding and Shona Langa mains power failures, and then only between the hours of 07:00 and 22:00. No generator may be operated between the hours of 22:00 to 07:00.
3. No open skid generator shall be operated in the absence of a supervising adult present on the stand whilst the generator is in operation.
4. An open skid generator shall be placed in a location where it is not exposed to inclement weather and/or accessible by children.
5. Installed generators that start automatically in the event of an outage shall be disabled when a house is not occupied by a member, his/her family and/or visitors.
6. The maximum noise level of a generator when measured indoors in neighbouring homes with its windows open shall not exceed 25dB.
7. Installed generators shall be of the totally enclosed, ultra-silent, water cooled and preferably diesel fuelled design not exceeding a 13,9kVA generating capacity, and with a noise level under full power not exceeding 67dB measured at 7 meters from the installation. These generators shall be installed in and on dedicated structures suitable for such equipment, and with adequate ventilation and secure access control.

8. The cost of expert advisors in the event of a dispute regarding generator location; noise levels; and/or exhaust emission levels shall be for the account of the member operating the generator. Any dispute between a member and the SLNPC shall be determined by the board of SLNPC, and their decision shall be final.
9. SLNPC will not approve permanent generators which :
 - a. create noise levels exceeding those stipulated herein above;
 - b. are not equipped with suitable noise attenuating exhaust pipes;
 - c. are not equipped with emission control mechanisms to minimize the potential for emission concentrations in the nearby vicinity and in neighbouring homes.
10. No installed generator exhaust pipe may discharge at a point closer than 50 meters from any neighbouring house.
11. Generator fuel shall be stored in containers designed for such purpose. Fuel with a volume of less than 20 litres shall be kept in a sealed fuel container, in a locked garage or storeroom. Fuel with a volume of over 20 litres shall be stored in a dedicated fuel bunker approved by SLNPC, and which complies with the all statutory and regulatory provisions relating to the bunkering of fuel.
12. Portable fire extinguishers shall be mounted against a wall in close proximity to a generator; a fuel storage location; a refuelling area; and a battery storage facility.
13. Generators shall be maintained as required by the relevant manufacturer/supplier, and a written record of such maintenance shall be kept.
14. SLNPC shall at all reasonable times be entitled to inspect a generator installation, among others, to verify statutory and regulatory compliance; to inspect maintenance records; to inspect and verify compliance with safety measures; and for whatever other purpose deemed necessary by SLNPC Directors. Should the installation or generator not comply with any of these rules or manufacturer specifications the SLNPC may direct the member to comply within a specific timeframe failing which a fine not exceeding R5000,00 may be imposed. Should the member thereafter again fail to comply or contravene these rules or the manufacturer's specifications the SLNPC may impose further fines not exceeding R10 000 per occurrence, on condition that the member is in each instance granted at least 14 days to rectify the position before any fine is imposed.
15. A new Certificate of Compliance shall be lodged with SLNPC after any and every modification or alteration to an installed generator installation, or as required by the manufacturer, if any, and in any event whenever a house served by such installation is sold.

Shona Langa NPC Policy for the installation and operation of solar power generation systems

1. No member may connect a solar power generation system directly to the SLEDG.
2. The installation of residential, solar power generation systems is permitted. However, the installation must be physically separated and electrically isolated from the SLEDG – either directly or through internal wiring – and the export of energy onto the SLEDG must not be possible. A solar power generation system connected to a house's electrical installation with a reverse power flow blocking relay shall be considered to be off-grid, i.e., as isolated from the SLEDG.
3. A member who intends to install a solar power generation system is required to submit a formal written application for its installation to SLNPC for approval. The approval application must include at least the following:
 - the full specifications of the system to be installed;

- an electricity wiring diagram and lay-out plan prepared and signed by a duly qualified electrical engineer or electrician which clearly depicts the detail of the connections to and from the generator;
 - a drawing of the proposed location of, and number of solar panels proposed to be installed;
 - a drawing of the battery housing structure and its proposed location on a stand;
 - if applicable, a written Thabazimbi Municipality approval for the installation and construction;
 - a ventilation and security strategy for the energy reserve storage battery system;
 - a fire prevention and protection plan;
 - a written indemnity which indemnifies SLNPC and its members for all and any injury and damage arising from such generator installation and operation;
 - Any other information or documentation required by the board of directors of SLNPC.
4. SLNPC will not approve:
- a. solar panels mounted on areas of a roof which may be to the detriment of neighbours and passers-by;
 - b. the installation of solar panels on thatch or reed roofs.
5. Solar panels shall be mounted flush on sloping roofs in the most unobtrusive section of the house roof. Solar panels installed on flat roofs shall be suitably screened by a parapet wall such that they are not visible from any point when facing the installation from ground level.
6. Should a member wish to erect a permanent carport with the solar panels as the roof, such member must obtain prior written approval from the SLNPC and Thabazimbi Municipality as prescribed by the SLNPC architectural rules and guidelines, as well as relevant legislation and applicable regulations.
7. Solar panels shall be mounted by means of a reputable commercial rack mounting system. The mounting contractor shall furnish SLNPC with a written certification that the mounting system complies with the supplier's installation instructions.
8. An energy reserve storage battery system shall be housed in a dedicated, secure and well ventilated storage facility.
9. The design, installation and operation of all solar power generation systems shall comply with all relevant and applicable national and local statutory and regulatory requirements and standards.
10. No house may be connected simultaneously to a solar power generation load and to the SLEDG load.
11. The installation of a solar power generation system shall be carried out by a duly qualified and accredited electrical engineer and/or electrician who shall furnish the member and SLNPC with a Certificate of Compliance and a written confirmation that the installation is safe; that it complies in all respects with all relevant and applicable national and local statutory and regulatory requirements, and national standards.
12. A portable fire extinguisher shall be mounted in close proximity to the energy reserve storage battery system.
16. SLNPC shall at all reasonable times be entitled to inspect the solar power generation system, among others, to verify statutory and regulatory compliance; to inspect maintenance records; to inspect and verify compliance with safety measures; and for whatever other

purpose deemed necessary by SLNPC Directors. Should the installation not comply with any of these rules or manufacturer specifications the SLNPC may direct the member to comply within a specific timeframe failing which a fine not exceeding R5000,00 may be imposed. Should the member thereafter again fail to comply or contravene these rules or the manufacturer's specifications the SLNPC may impose further fines not exceeding R10 000 per occurrence, on condition that the member is in each instance granted at least 14 days to rectify the position before any fine is imposed.

13. A new Certificate of Compliance shall be lodged with SLNPC after any and every modification or alteration to the solar power generation system, and in any event whenever a house served by such installation is sold.