



CITY OF CAPE TOWN
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STAD KAAPSTAD



Photo credit: Bruce Sutherland, City of Cape Town.

Solar PV system at the City of Cape Town's Royal Ascot building.

ROOFTOP SOLAR PV

GUIDELINES FOR SAFE AND LEGAL INSTALLATIONS IN CAPE TOWN

If you are considering installing a rooftop solar photovoltaic (PV) system, but you are not sure how to do it safely and legally, these guidelines will help you to:



Make informed decisions about what type of PV system to install.



Evaluate your prospective service providers.



Understand all the key requirements before, during and after installation.

The City of Cape Town is encouraging the installation of private Small Scale Embedded Generation (SSEG) systems, particularly rooftop solar PV systems. This document provides important information for installing a safe and legal solar PV system.

- For more information about the SSEG application process in the City of Cape Town's licensed supply areas, go to <http://www.capetown.gov.za/solarPV> and <http://www.capetown.gov.za/elecseviceforms>
- For information about electricity saving, solar PV and FAQs, go to <http://www.savingelectricity.org.za>



CONNECTING WITHOUT APPROVAL IS ILLEGAL AND DANGEROUS

Illegally connected systems could compromise the safety of your family, our family and the electricity grid.

All new and existing PV systems must be authorised by the City of Cape Town

Go to www.capetown.gov.za/solarPV to find out how to register your system

THINGS TO CONSIDER:

1. SAFETY

Poorly installed and illegally connected solar PV systems are a safety concern:



The household may be exposed to the risk of electrical fires and electric shock



The safety and the power quality of the electricity grid may be compromised by connections that use the wrong equipment or by adding unplanned generation capacity to a part of the network not designed to carry it.



The safety of electricity staff working on the reticulation network could be compromised by electricity feeding into the grid from the illegally connected solar PV installations.

The compulsory wiring standards for general electrical installations includes requirements for solar PV installations however the additional wiring standards for SSEG connected in parallel to the normal electrical supply are still to be published.

This does not mean that you are not allowed to install a PV system. But without these quality reference points, you need to know how to ensure a safe installation and a good quality product that complies with the law.

This brochure focuses on SSEG systems with a generation capacity smaller than 1MVA however the authorisation process is the same for embedded generation (EG) installations with a generation capacity of more than 1 MVA and less than 100MVA. These system sizes do not require a licence from NERSA.

For EG systems, larger than 1MVA, the City of Cape Town should be contacted directly for additional authorisation requirements

2. TYPES OF PV SYSTEMS

THERE ARE THREE TYPICAL CONFIGURATIONS FOR RESIDENTIAL AND COMMERCIAL PV SYSTEMS:

The most common installation types are options A and B: Grid-tied feed-in and grid-tied hybrid systems

A. GRID-TIED PV SYSTEMS

Grid-tied PV systems

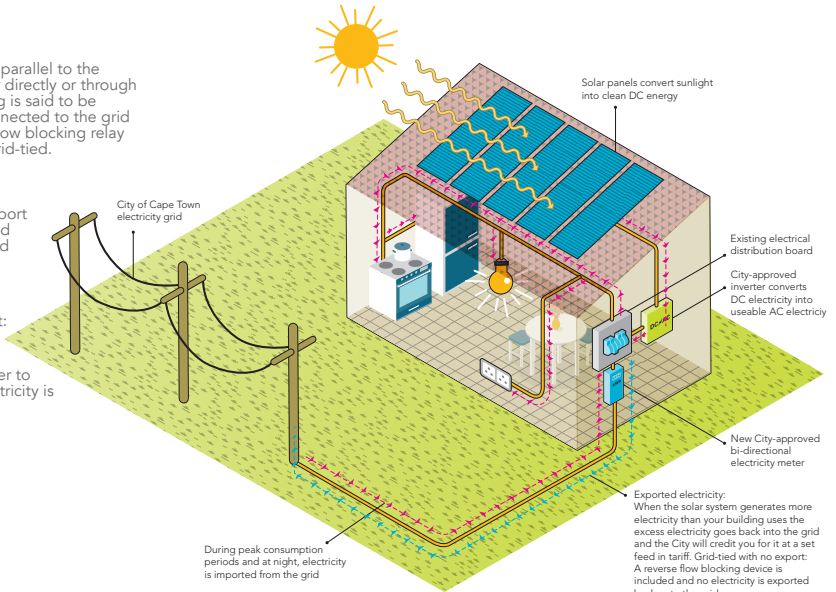
SSEG that is connected in parallel to the distribution network either directly or through a customer's internal wiring is said to be grid-tied. SSEG that is connected to the grid through a reverse power flow blocking relay is also considered to be grid-tied.

a) Grid-tied with export

Customer is allowed to export excess electricity generated by the system onto the grid but needs to remain a Net Consumer.

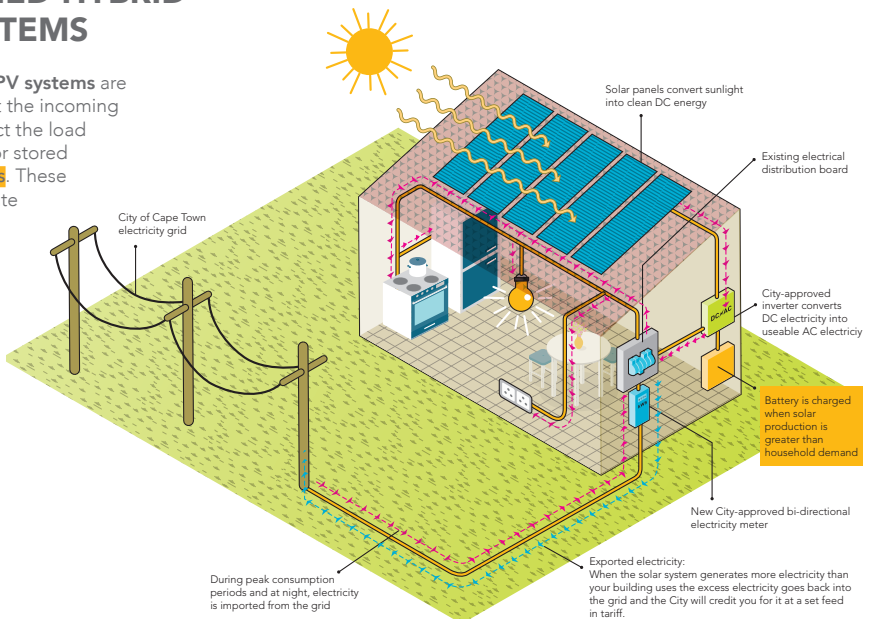
b) Grid-tied with no export:

Customer needs to install reverse power flow blocking protection in order to ensure that no excess electricity is exported to the grid.



B. GRID-TIED HYBRID PV SYSTEMS

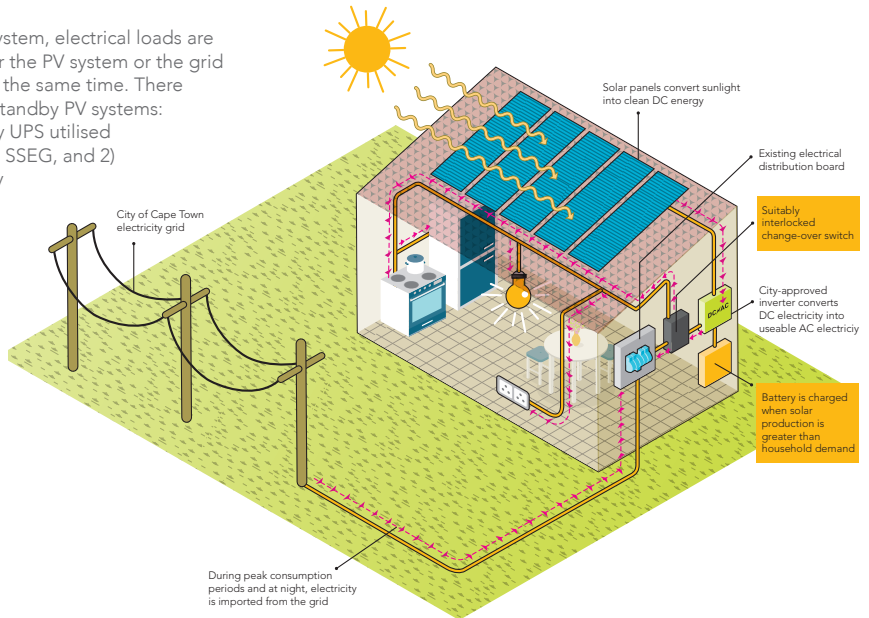
Grid-tied hybrid PV systems are able to disconnect the incoming supply and connect the load to the PV system or stored energy in **batteries**. These systems can operate in load-shedding scenarios.

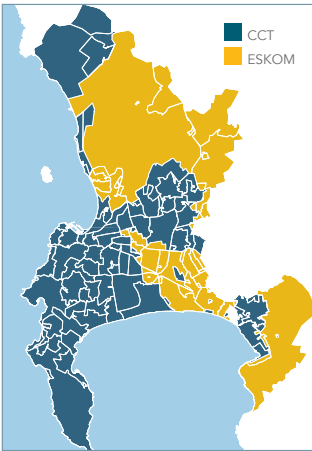


C. STANDBY PV SYSTEMS (INTERCONNECTED WITH ELECTRICAL INSTALLATION)

In a standby PV system, electrical loads are supplied by either the PV system or the grid but never both at the same time. There are two types of standby PV systems:

- 1) Passive standby UPS utilised as standby hybrid SSEG, and 2) Alternative supply





The City distributes electricity to 75% of Cape Town, while Eskom distributes electricity directly to the remaining 25%.

Make sure you know who distributes electricity to your area: it will be on your electricity bill.

The type of PV systems that are permitted to be connected to the network may differ between City and Eskom supply areas. Furthermore the process of authorisation will be different.

For more information on the application processes: City of Cape Town Customers: <https://www.capetown.gov.za/solarPV> for options and <http://www.capetown.gov.za/electserviceforms> for application forms and documents.

Eskom customers: <https://www.eskom.co.za/distribution/small-scale-embedded-generators/>

NOTE:



If your property is in the City's licensed area of supply, you will require written permission from the City's Electricity Generation and Distribution Department prior to installing your system, irrespective of the type of system. If you install a grid-tied system without the City's permission, you are doing so illegally. To grid-tie and feed-in, you will require a specialised meter and you will be placed on a new tariff. To grid tie with reverse power flow blocking, you must have a prepayment meter and will remain on your existing tariff. For details on how to grid tie and register your grid-tied or standby system for authorisation, consult the City's Requirements for Small Scale Embedded Generation at:

www.capetown.gov.za/ElecServiceForms, under 'Document downloads'.



Standby solar PV installations must also follow the application process and you will have to verify that the system is in fact standby.



Standby PV installations must make use of an external automatic change-over switch between grid supply and storage supply. For more details on the specifications, consult the City's Requirements Document for Small-Scale Embedded Generation.



SSEG customers are required to be net consumers and import (purchase) more electricity than they export (feed-in to the network) over a rolling 12-month period, however the City is currently investigating relaxing this restriction.



Grid-tied PV system at Black River Park.



3. CHECKLISTS FOR SAFE AND LEGAL ROOFTOP SOLAR PV INSTALLATIONS

3.1. ENSURING A QUALITY INSTALLATION SERVICE

There are many PV service providers currently operating in Cape Town. This checklist may assist you with reducing the risk of a poor or illegal installation.

BUSINESS PERFORMANCE

Verify if the PV service provider has substantial prior experience in PV installations and ask for references with contact details. Establish whether the PV service provider designed, supplied and installed the systems or only carried out one or two of these steps.

It is recommended that the PV service provider is an accredited service provider under a third party quality assurance programme such as:

- PV Green Card: A South African Photovoltaic Industry Association (SAPVIA) endorsed programme to ensure the quality and safety of PV installations. www.pvgreencard.co.za
- P4 Platform quality assurance program: An independent system that scores contractors on performance, knowledge and best practice to promote good practice in the PV sector. www.pqrs.co.za/the-pv-quality-assurance-program

Also request to see proof of electrical Certificates of Compliance (CoCs) and/or professional engineer sign offs of previous installations. Ask for proof of previous installations that have been authorised by the City of Cape Town.

STAFF QUALIFICATIONS ARE VERY IMPORTANT

Find out if the PV service provider employs or subcontracts qualified staff to design and install systems. Your installation may not exceed 1000 volts DC in terms of NRS 097-2-1: 2017 Ed2.1.

The system's design and installation can be done by a person deemed competent as an electrical contractor by the Department of Labour and Employment (DoLE). Ask for proof of registration (also called a wireman's licence and DoLE registration), and check that it is up-to-date.

This registration is critical because it means that:

- the electrician is proficient in the national wiring code SANS 10142-1 latest publication (currently 2021 Ed 3.1)', and can install your PV system safely.
- the electrician is permitted to issue a CoC for the installation, which will confirm that the installation has been performed in compliance with the national wiring codes.

If you are planning to install a grid-tied system, the City also requires that your grid-tied system is signed off by an Engineering Council of South Africa (ECSA) registered professional. Check that the PV service provider has such a person available.

REGISTRATION WITH SAPVIA AND WITH THE ELECTRICAL CONTRACTORS BOARD (ECB)

Find out if your PV service provider is a member of SAPVIA and the ECB. Although SAPVIA and ECB membership is not compulsory, it should be a good indication how committed the service provider is towards keeping abreast of industry best practice and complying with legislative requirements and standards in the PV and broader electrical sectors.

3.2. BEFORE APPROVING THE DESIGN AND PURCHASING A SYSTEM

Once you are satisfied that your PV service provider has the skills and experience to perform the work, you may go ahead with planning the installation. Here are the key points to follow at this stage:

✔ BEFORE INSTALLING A PV SYSTEM, BECOME MORE ELECTRICITY-EFFICIENT

Before installing a PV system, it makes economic sense to become more electricity-efficient. By doing so, you will reduce the size and cost of the PV system you need. Consider installing an efficient water heater (solar water heater or heat pump), installing efficient lighting and switching to gas for cooking and heating. **For tips go to www.savingelectricity.org.za.**

✔ OBTAIN APPROVAL FROM THE CITY

Regardless of the type of solar PV system you are installing, you need to obtain authorisation in writing from the City prior to installation. You will find all the necessary documentation at **www.capetown.gov.za/SolarPV**, under 'Register your solar PV system'.

All generation facilities and equipment must be registered with the City.

✔ OBTAIN A STRUCTURAL ASSESSMENT

Generally roofs can withstand the weight and wind load of PV panels. However, it is advisable to obtain a structural assessment of the roof to determine whether it can withstand these loads. Structural engineers can provide this service.

✔ NO NEED TO SUBMIT BUILDING PLANS

There is no need to submit building plans to the City for PV systems - unless the panels protrude more than 600 mm above the highest point of the roof, or

they are raised more than 1.5 m above any point on the roof, or if ground mounted, the panels in their installed position project more than 2.1 m above the natural/finished ground level.

✔ BUY THE CORRECT INVERTER

Ensure that you are using an inverter approved by the City. You can find the list of approved inverters at **www.capetown.gov.za/SolarPV** under 'Document Downloads'.

✔ CHECK PV PANEL STANDARDS

At the very least, ensure that the PV panels you will use have a Certificate of Compliance with the SANS/ IEC standards:

SANS/IEC 61215: 2015 – Crystalline silicon terrestrial PV modules.

SANS/IEC 61646: 2016 - Thin film terrestrial PV modules

IEC standards are the international version of the SABS, and are a good indication of panel quality. Ask your service provider for proof.

✔ STORE BATTERIES SAFELY

If you are installing batteries, make sure that they are stored in a properly racked, well ventilated, dry room, in accordance with the Occupational Health and Safety (OHS) Act, Act 85 of 1993.

3.3. DURING INSTALLATION

✔ DON'T INSTALL WITHOUT AUTHORISATION

All rooftop solar PV systems require permission in writing from the City prior to installation.

✔ ENSURE EFFECTIVE CONTROL

Ensure that the electrician who will be signing off the electrical CoC is in control on site and carries out or supervises the work effectively.

✔ CHECK PLACEMENT ON THE ROOF

Ask the PV installer to demonstrate that the placement of the panels on the roof allows adequately for cleaning and also provides access for the Fire Department.

✔ ENSURE SPECIALISED DC CIRCUIT BREAKERS ARE BEING USED

DC current from your PV panels requires specialised circuit breakers. Ensure that your service provider is using these.

✔ MANAGE HEALTH AND SAFETY ON SITE

Ensure installers work according to national health and safety codes, and hold Working at Height training certificates. If working at heights above 3 m, they must use some form of fall arrest system. Personal protection equipment (hard hats etc.) must be used at all times.

3.4. POST-INSTALLATION

✓ REQUEST AN ORIGINAL ELECTRICAL CERTIFICATE OF COMPLIANCE (CoC)

The Department of Labour and Employment-registered installation electrician who performs the installation must supply you with a CoC after s/he has carried out the installation and completed the required tests and checks. All PV systems installed in the City of Cape Town grid must be certified. Commercial and industrial installations must be certified by an ECSA-registered professional engineer, certified engineer or technologist. Residential installations may be certified as above or by ECSA-registered professional technician.

Remember that as the property owner, you are responsible for the safety of the electrical installation on your property in terms of the OHS Act. Without a valid electrical CoC, you will find it difficult to prove that you have taken reasonable precautions should anything go wrong. Insurance companies might not pay out for damages; and if someone is injured or dies as a result of the installation, you could be held liable as the property owner.

✓ REQUEST QUALITY ASSURANCE CERTIFICATES

Obtain a quality assurance certificate such as a PV GreenCard. These documents include important information on the equipment used and technical details of the installation which will be useful for future reference.

✓ CHECK FOR ROOF LEAKS

Check the installation work has not caused leaks in your roof.

✓ WARRANTIES AND MANUALS

Obtain all warranties and guarantees on offer, both for the installation as a whole and for its components (solar modules, inverters, structural system). Warranties should be for a minimum of 1 year, preferably 5 years. Solar PV panels themselves typically have much longer warranties. Also, check you have all operations and maintenance manuals.

✓ RECOURSE FOR POOR WORK

If you are not satisfied with the work, request an independent inspection of the installation. In Cape Town, an organisation that carries out this work is the Electrical Approved Inspection Authority of Southern Africa (EAIASA). Before it can carry out an inspection, you must have the original CoC and you will need to pay an inspection fee.



Photo credit: Bruce Sutherland, City of Cape Town.

Grid-tied PV system at Bayside Mall.

Produced by the City of Cape Town Energy Directorate

Please note that this document may be updated from time to time, so visit these websites to check for the most recent version:

www.capetown.gov.za/SolarPV and/or www.SavingElectricity.org.za.