



CITY OF CAPE TOWN
ISIXEKO SASEKAPA
STAD KAAPSTAD



Photo credit: Bruce Sutherland, City of Cape Town.

Grid-tied PV system at the City of Cape Town's Royal Ascot building.

ROOFTOP PV

GUIDELINES FOR SAFE AND LEGAL INSTALLATIONS IN CAPE TOWN

If you are considering installing a rooftop 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.



Select the best
service provider.



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 Photovoltaic (PV) systems. This document provides important information for installing a safe and legal rooftop PV system.

- For more information about the SSEG application process in Cape Town, go to <http://www.capetown.gov.za/solarPV>
- For information about electricity saving PV and FAQs, go to 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

The banner features a red background with a white triangle containing a black hand with red sparks at the fingertips, set against a blue solar panel background.

THINGS TO CONSIDER:

1. SAFETY

Poorly installed rooftop PV systems and illegal grid connections 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 PV installations.

While there are compulsory wiring standards for general electrical installations, there is no dedicated national standard for PV installations yet.

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.

For quality installations, make use of an installer accredited by SAPVIA who can issue a GreenCard for your installation.

See www.pvgreencard.co.za

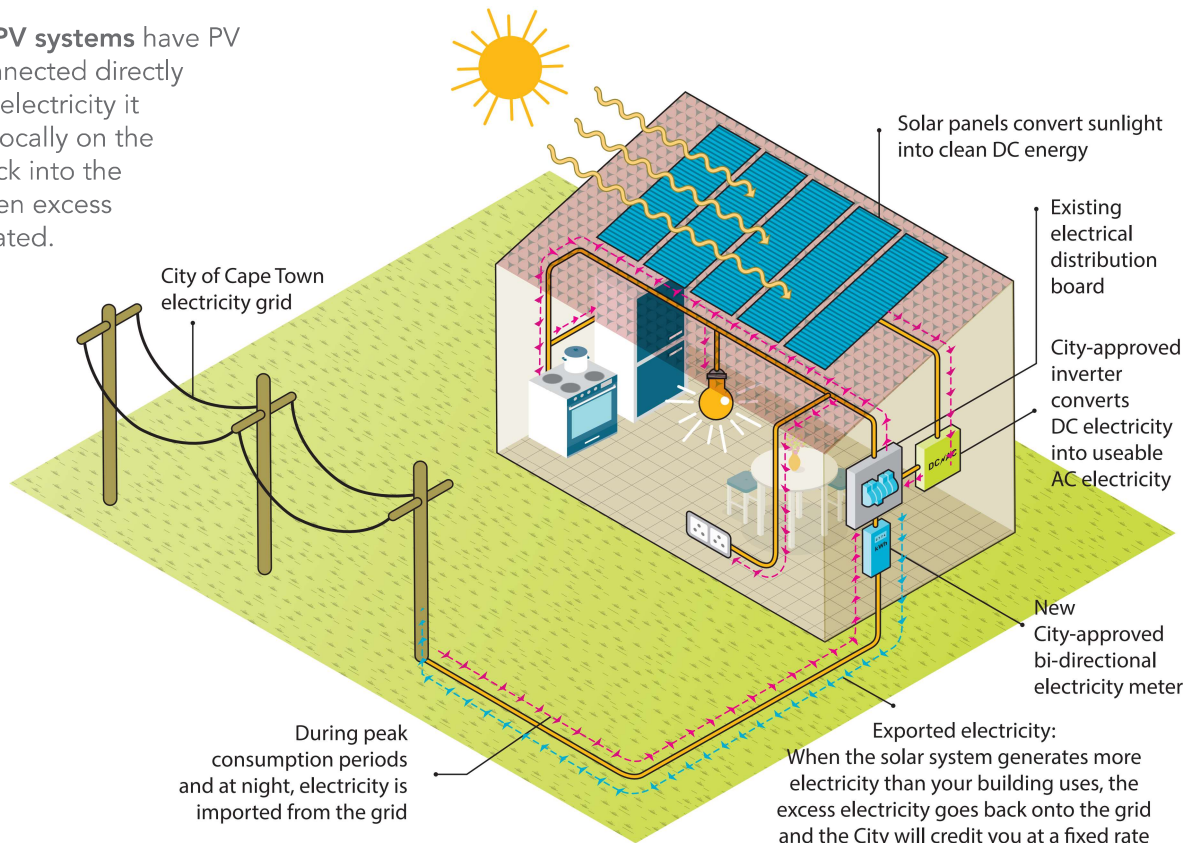
2. TYPES OF PV SYSTEMS

THERE ARE FOUR 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

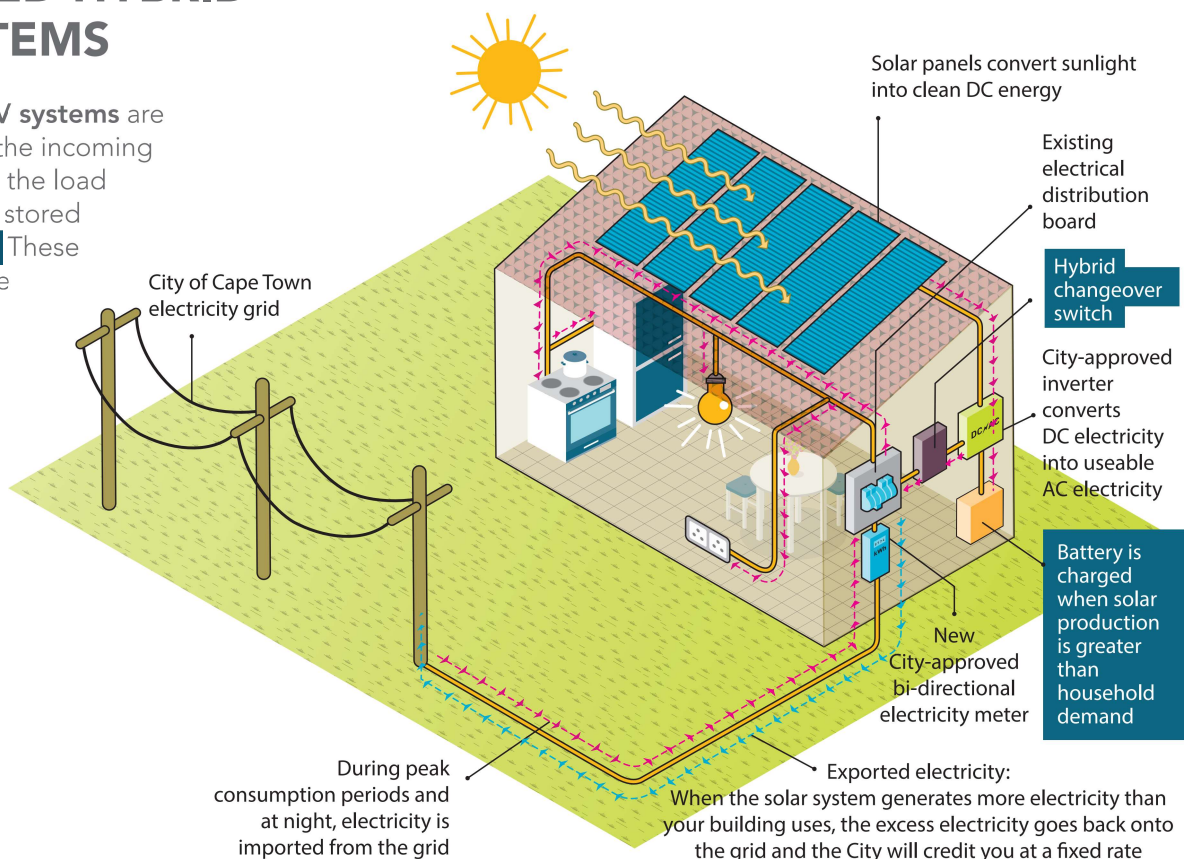
A. GRID-TIED FEED IN PV SYSTEMS

Grid-tied feed in PV systems have PV panels that are connected directly to an inverter. The electricity it generates is used locally on the property or fed back into the electricity grid, when excess electricity is generated.



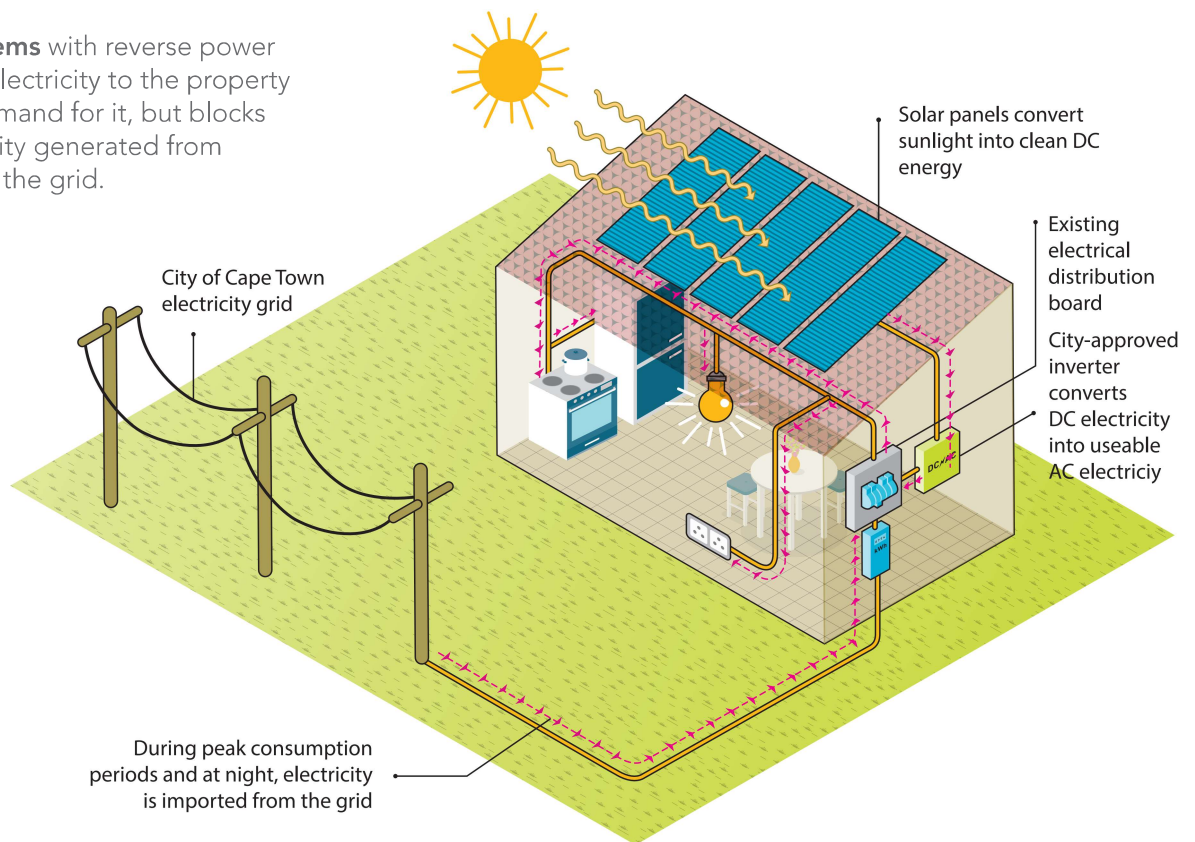
B. GRID-TIED HYBRID PV SYSTEMS

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.



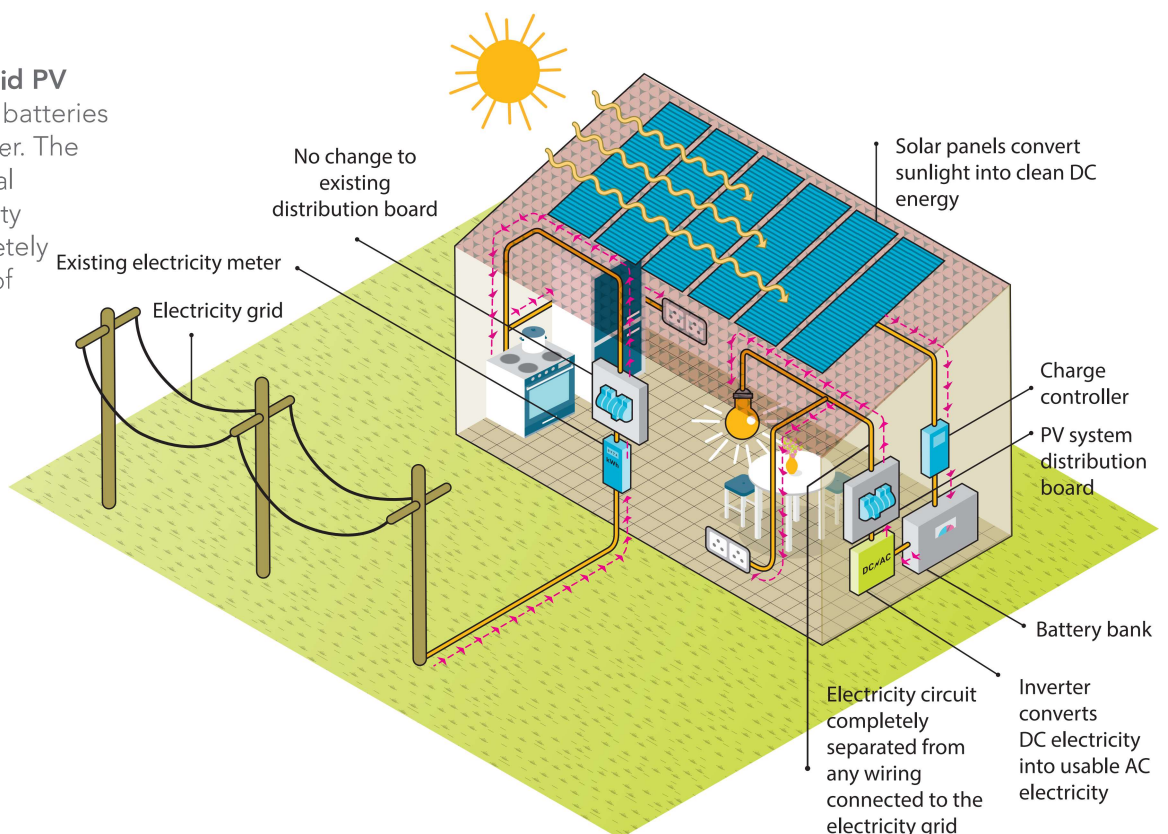
C. GRID-TIED PV SYSTEMS WITH REVERSE POWER FLOW BLOCKING

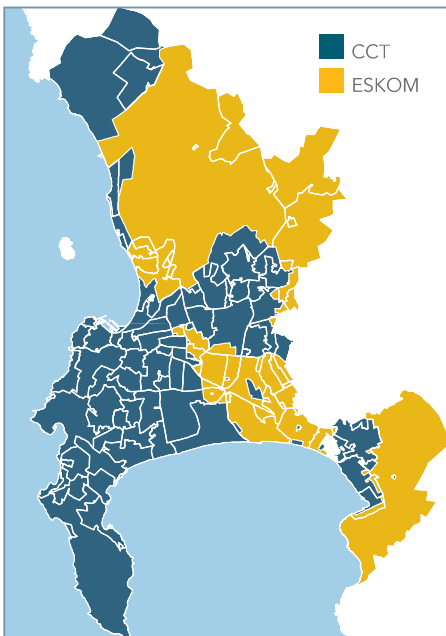
Grid-tied PV systems with reverse power blocking provide electricity to the property when there is a demand for it, but blocks any excess electricity generated from feeding back onto the grid.



D. STANDALONE (OFF GRID) PV SYSTEMS

Standalone or off grid PV systems usually have batteries and a charge controller. The system feeds electrical circuits on the property that are wired completely electrically separate of the electricity service provider's grid.





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.

Standalone PV installations are permitted in both areas. In addition the City allows you to connect your PV system to the grid and feed excess power back onto the grid. However, if you are in an Eskom area, your system may only be allowed to connect to the grid in certain cases. These regulations are currently changing so check with Eskom for the latest requirements.

TYPE OF INSTALLATION	PERMITTED IN CCT AREA?	PERMITTED IN ESKOM AREA?
Grid-tied	Yes	Enquire with Eskom
Standalone	Yes	Yes

NOTE:



If you live in a City of Cape Town distribution area, you may install a grid-tied system, but you will require prior written authorisation from the City of Cape Town's Electricity Generation and Distribution Department. If you connect without notifying the City, you will be 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, consult the City's Small-Scale Embedded Generation Requirements online: www.capetown.gov.za/SolarPV, under 'Reference documents'.



Standalone (off-grid) PV installations do not require authorisation from the City or Eskom. However, the City requires off-grid PV installations to register before generating, verifying that the installation is connected and operated off-grid, as defined.



Grid tied hybrid PV installations must be installed with 'break before make' grid connection switch system approved by the City.



Grid-tied PV system at Black River Park.



3. CHECKLISTS FOR SAFE AND LEGAL ROOFTOP PV INSTALLATIONS

3.1. ENSURING A QUALITY INSTALLATION SERVICE

There are many PV service providers currently operating in Cape Town. This checklist will reduce 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 SAPVIA (South African Photovoltaic Association) 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.

✓ **STAFF QUALIFICATIONS ARE VERY IMPORTANT**

Find out if the PV service provider employs or subcontracts qualified staff to design and install systems. If your installation's maximum supply voltage is less than 1 000 volts (most rooftop systems are), the system's design and installation can be done by a person deemed competent as an

electrical contractor by the Department of Labour. Ask for proof of registration (also called a wireman's licence), and check that it is up-to-date.

This registration is critical because it means that:

- the electrician is proficient in the national wiring codes SANS 10142-1:1200, 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 system is signed off by a professional electrical engineer or technologist who is registered with the Engineering Council of South Africa (ECSA). Check that the PV service provider has such a person available.

✓ **REGISTRATION WITH THE SOUTH AFRICAN PHOTOVOLTAIC ASSOCIATION (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 AUTHORISATION FROM THE CITY

If you are planning to install a grid-tied system, you need to obtain authorisation in writing from the City. You will find all the necessary documentation at www.capetown.gov.za/SolarPV, under 'Application form and supplemental contract for installation of small scale embedded generation'.

Do not go ahead with the installation until you get written authorisation. Standalone systems must be registered with the City but are not required to go through the full authorisation process.

✓ 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 metres above the natural/finished ground level.

✓ BUY THE CORRECT INVERTER

If you are planning to install a grid-tied system, 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 'Reference Documents'.

✓ CHECK PV PANEL STANDARDS

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

EC 61215 – Crystalline silicon 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

✓ 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.

✓ DON'T CONNECT TO THE GRID

If grid-tied, the system cannot be connected to the grid before the City grants permission in writing.

✓ 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 3m, 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-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 grid-tied rooftop 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 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.

If the PV installation is off-grid and the voltage is higher than 50V, the Department of Labour also requires a CoC for the installations.

✓ 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). 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.