Solomon Islands Electricity Authority

Solar System Connection Manual

Policies, Processes and Forms

This manual is intended for the guidance of SIEA's Customer Service and Engineering personnel who are involved in receiving, considering and approving the connection of solar systems to the SIEA grid.

Contents

Customer Guides

Solomon Islands Electricity Authority

Solar PV Arrangements

Technical Arrangements for Grid Connection of Photovoltaic Systems via Inverters

This document explains the technical requirements to connect a photovoltaic (PV) inverter system to the supply system (the grid) of the Solomon Islands Electricity Authority (SIEA).

Contents

1 Introduction

This document explains the technical requirements to connect a photovoltaic (PV) inverter system to the supply system (the grid) of the Solomon Islands Electricity Authority (herein referred to as SIEA).

The PV inverter system will usually consist of a photovoltaic array on the roof of the building and a suitable grid-connect inverter connected to the metering box. This arrangement allows solar energy to be supplied to meet the customer's installation load and be backed up by the SIEA electricity grid at night and during bad weather.

The guidelines are broken into the following sections:

- Section 2: Describes the situations this document applies to.
- Section 3: Lists the technical requirements that must be satisfied as part of the installation and ongoing operation of the PV inverter system.
- Section 4: Gives information on the metering arrangements.

This document is to be read in conjunction with the following document:

- SIEA, draft 2013, "*Electricity Connection and Metering Manual*", www.siea.com.sb, in particular Chapter 10: *METERING ARRANGEMENTS FOR INVERTER ENERGY SYSTEMS CONNECTED TO THE DISTRIBUTION NETWORK*.

Other related documents are:

- *Photovoltaic Inverter Network Connection Agreement* draft 2013
- *Going Solar? The process of installing a photovoltaic (PV) system in your home*

2 Scope

These technical requirements are limited to the following situations:

- Inverter energy systems that have a continuous rating of no more than 10kVA for single-phase systems or 30kVA for three-phase systems.
- Connections to the SIEA grid only.
- Systems without battery storage, although these can be considered for special applications.

3 Installation Requirements

This section details the technical requirements to connect a photovoltaic inverter system to the SIEA grid.

3.1 General

These requirements are valid for the following network voltages and maximum power generation capacities (continuous rating):

Voltage	Maximum Capacity
230V single-phase	10kVA
400 V three-phase	30kVA

Higher rated installations may be allowed, but will require a special agreement with SIEA.

3.2 Australian Standards

These requirements pertain to SIEA specific matters. The installation should as a minimum comply with Australian Standards AS3000, AS4777 and AS5033 and all other relevant Australian Standards and Solomon Islands statutory requirements. Installations are exempted from complying with these standards only where stated (for example some clauses of AS4777.1).

The inverter to be used shall be of a model that has passed testing in accordance with the Australian Standard AS4777 guidelines. For a list of approved inverters see the website of the Australian Clean Energy Council, and follow the link to the 'Approved PV Inverters' (www.cleanenergycouncil.org.au)

3.3 Safety

In the event of loss of network supply, the PV inverter system shall be designed to disconnect from the network via its on-board protection systems. Under certain undesirable circumstances, it is possible that PV Inverter systems could continue to provide energy to the network, resulting in a hazardous situation. This situation is known as "islanding" and the Australian Standards are designed to prevent this from occurring.

3.3.1 Applicable Equipment

The permission to operate the installation is restricted to the equipment listed on the application form and approved by SIEA. The installation shall not have settings changed from those approved, or be upgraded, or be replaced, or be modified or be tampered with in any way. Systems found to be operating in such a manner will be disconnected from the grid until the matter is resolved.

Should it be necessary to change any parameter of the equipment as installed and contracted, SIEA shall be notified for re-approval. Subsequently SIEA will determine whether a new application is required.

3.3.2 Competent Designer

The PV Inverter system must be designed or approved by a person competent in this field prior to lodging an application with SIEA. For a list of approved designers/suppliers, see the website of the Australian Clean Energy Council (www.cleanenergycouncil.org.au)

3.3.3 Operating Personnel - Operation and Maintenance

The customer is responsible for the operation and maintenance of the PV inverter system. Adequately qualified and licensed persons must carry out all work.

The customer shall maintain the PV Inverter system to Australian Standard AS5033 and AS4777. Equipment directly involved with protecting and controlling the connection to the electricity system must be maintained to the equipment manufacturer's specification or the installer’s recommendation.

3.3.4 Installation and Inspections

Installations may be routinely inspected by SIEA once construction is completed.

An SI licensed electrician/electrical contractor shall carry out all installation and maintenance work.

3.3.5 Logbooks

For safety reasons all customers are required to maintain a logbook detailing inspections and operating activities. This log is an important document and it must be kept in a secure place (typically in the meter box) and be available for inspection by SIEA staff.

Further, any change/modifications done in the PV system will need a Certificate of Compliance. An example of logbook pages is shown below.

INVERTER	**Make/Model:**	**Serial No.**	**Rating: W**
Service provider		**Service details**	**Date**

PV PANELS	**Make/Model:**	**Serial No.**	**Rating: W**
Service provider		**Service details**	**Date**

3.4 Signage

Care must be taken to label switchboards and relevant equipment as per the Australian Standards.

3.4.1 Signage for Type 1 Connections

Main switchboard and distribution board(s).

Quantity: 1
Lettering height:
"WARNING" 8mm
Other text 4mm
Colour: Red, white letters
Size: 120 x 60 mm

WARNING
DUAL SUPPLY
ISOLATE NORMAL SUPPLY TO THIS SWITCHBOARD AND "*SOLAR*" SUPPLY AT MAIN METER BOX BEFORE WORKING ON THIS SWITCHBOARD

Main meter box where the private generation plant is connected.

Quantity: 1
Lettering height:
"WARNING" 8mm
other text 4mm
Colour: Red, white letters
Size: 120 x 60 mm

WARNING
DUAL SUPPLY
ISOLATE BOTH SERVICE FUSES AND "*SOLAR*" SUPPLY BEFORE WORKING ON THIS METER BOX

3.4.2 Signage for Type 2 Connections

Consumer switchboard or distribution boards connected to Solar Meter Box where private generation plant is connected.

Quantity: 1
Lettering height:
"WARNING" 8mm
other text 4mm
Colour: Red, white letters
Size: 120 x 60 mm

WARNING
DUAL SUPPLY
ISOLATE BOTH NORMAL AND *SOLAR* SUPPLIES BEFORE WORKING ON THIS SWITCHBOARD

Main switchboard and distribution board(s) upstream of distribution board connected to Solar Meter Box where the private generation plant is connected.

Quantity: 1
Lettering height:
"WARNING" 8mm
other text 4mm
Colour: Red, white letters
Size: 120 x 60 mm

WARNING
DUAL SUPPLY
ISOLATE BOTH NORMAL AND *SOLAR* SUPPLIES BEFORE WORKING ON THIS SWITCHBOARD

Solar meter box where the private generation is connected.

Quantity: 1
Lettering height:
"WARNING" 8mm
other text 4mm
Colour: Red, white letters
Size: 120 x 60 mm

WARNING
DUAL SUPPLY
ISOLATE BOTH NORMAL AND "*SOLAR*" SUPPLIES BEFORE WORKING ON THIS METER BOX

Main Meter Box

Quantity: 1
Lettering height:
"WARNING" 8mm
other text 4mm
Colour: Red, white letters
Size: 120 x 60 mm

WARNING
DUAL SUPPLY
ISOLATE BOTH SERVICE FUSES TO THIS METER BOX AND *SOLAR* SUPPLY AT *SOLAR* METER BOX BEFORE WORKING ON THIS METER BOX

3.5 Protection Arrangements and Settings

SIEA requires protection equipment to achieve the following safety objectives:

- to disconnect the inverter from the SIEA system in the event of loss of SIEA supply to the installation; and
- to prevent the inverter from back-energising a de-energised SIEA circuit.

The protection arrangements should be as per AS4777 guidelines. The following specific voltage and frequency settings must be programmed into the inverter. **Note** These settings may need to be changed in “off the shelf” inverters.

For a single-phase system:

- Maximum voltage trip point will be 255V phase to neutral;
- Minimum voltage trip point will be 210V phase to neutral;
- FreqMAX will be 54Hz; and
- FreqMIN will be 46Hz.

For a three-phase system:

- Maximum voltage trip point will be 440V phase to phase;
- Minimum voltage trip point will be 370V phase to phase;
- FreqMAX will be 54Hz; and
- FreqMIN will be 46Hz.

In addition to any protection integrated into the inverter design, short circuit and/or over-current protection must be provided by fuses or circuit breakers. This back up over-current protection function can be provided by the metering fuses or by a circuit breaker located at the connection point of the inverter within the meter box.

All protection settings shall be such that satisfactory coordination is achieved with SIEA's protective system for the network.

In certain circumstances, SIEA may require the new exported energy to be limited to a specified amount. Any such limit will be advised to the Customer before a Network Connection Agreement is signed.

3.6 Surge Protection

The SIEA supply system may experience surges during such storms and at other times. The inverter contains many electronic parts and is directly connected to the SIEA supply system and may not be able to cope successfully with the surges. The inverter is also directly connected to the PV panels. Being usually mounted on top of the roof, these are directly exposed to the elements and storms and provide an alternative path for surges.

It is the customer's responsibility to include sufficient surge protection for the PV Inverter system. In case of failure of the PV Inverter system, SIEA shall not be liable in any way.

4 Network Connection Types and Metering Arrangements

This section details the types of connection arrangement which enable SIEA to meter the net electrical energy that SIEA supplies to the customer. Billing arrangements are detailed in the Network Connection Agreement.

The customer will meet the cost of installing the additional metering and any modifications to the existing metering arrangement. The meters will remain the property of SIEA.

The customer's licensed contractor will complete the wiring for the meter. When the work is complete and certified, SIEA will install and commission the meter and connect the PV system to the SIEA Grid.

Replacement of an existing Meter Panel containing Asbestos:

For all PV installations, if the existing meter panel contains asbestos, the panel must be replaced with a meter panel without asbestos before any work on the panel.

Replacement of the Meter Panel:

There may not be enough space on the existing meter panel for the additional meter. In this case, the customer shall provide and meet the cost of an additional meter box or relocation of fuses/circuit breakers within the existing meter box to accommodate the new meter.

4.1 Standard (Type 1) scenario

In this scenario, the inverter generation cable is connected at the existing meter box. All energy consumed from the grid at the premises will be metered by an import-only meter and billed to the customer under the applicable tariff(s). It is only any 'excess' energy will be exported to the SIEA grid. This energy will be metered, but will NOT be paid for by SIEA. This is a "*net metering*' scheme as shown in Figure 1.

This dual element (dual register) meter must be installed before any grid connection is made with a new PV array.

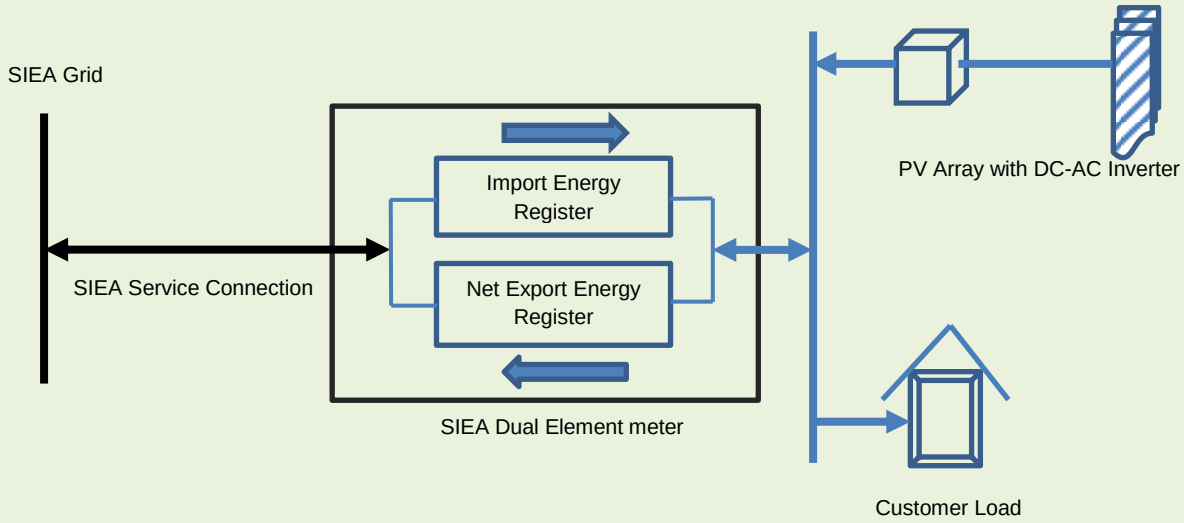


Figure 1 - Schematic Type 1 Single-Phase Metering; Dual-Element Meter

4.1.1 Single-phase customers with single phase PV

The customer must make a provision for installation of a single-phase, bottom-connect, dual-element meter; element 1 for energy consumed from the grid and element 2 for net energy supplied back into the SIEA grid.

4.1.2 three-phase customers with single-phase or three-phase PV

The customer must make provision for installation of a dual register three-phase, bottom connect meter for “energy supplied from the grid” metering and for “net energy exported” metering.

If the existing metering arrangement consists of three single-phase meters, they will be replaced by a single dual register three-phase meter (upgrade) with one element for the “energy supplied from the grid” metering, and one element for the “net energy exported” metering.

Connection Essentials for Designers/Installers

With the increasing popularity of solar photovoltaic (PV) systems, SIEA is keen to work closely with the solar PV industry to manage impacts to customers and SIEA's network. As an installer or electrical contractor in the solar PV industry, you play an important role in guiding our customers through the purchase, installation and connection process.

Lodging an application to connect a solar PV system

All Inverter Energy Systems (IES) systems **must be approved by SIEA before installation**. We ask that you ensure your customers are aware of this requirement.

To begin, you'll need to submit a completed *Application for network Connection of a grid-connected solar array* form to SIEA. However, if you're planning to install a solar PV system larger than 5kW in size, you'll need to make your enquiries directly with SIEA engineering.

Please ensure you submit the fully filled-in form to SIEA. Incorrect forms will not be considered and a new application will be required. Installers submitting applications on behalf of customers must ensure they have the customer's consent or the application will not be considered.

Assessing applications

SIEA will conduct a preliminary evaluation of the application based on the size of inverter and the nature of the local network serving the premises. A technical assessment will be required to check for any potential adverse impacts to the network, the customer's premises, or their neighbours' premises.

SIEA may require up to five weeks to technically assessing applications for systems that require connection to the Honiara network or to an outstation network. Ask SIEA for the *Outline of Solar Assessment criteria* document. Find out more from SIEA's *Outline of Technical Assessment Criteria* document.

Approving, downsizing or declining applications

Applications may be downsized or declined if:

- The transformer serving the premises is too small to support the volume of electricity that could be generated by the system
- The connection is a relatively long distance away from the transformer, which may cause significant voltage fluctuations
- There are already a number of solar PV system connections that share the same transformer. This may even be the case if there is only one other solar PV system.

If the application is downsized or declined, customers can re-apply for an inverter up to a maximum size we advise, withdraw their application or explore alternative options to:

- Install a small-scale system with an inverter of a lower capacity
- Upgrade the number of phases to the premises to accommodate the desired inverter size
- Pay for an upgrade to the network to accommodate the inverter originally requested.

If no adverse impacts are identified, SIEA will approve the solar PV system connection and send the customer two copies of an IES Network Agreement. For details on the terms and conditions of connecting to the SIEA network under this agreement, look at the *Solar Network Agreement* form.

Installing and connecting solar PV systems

Once the application has been approved and the customer has returned the IES Agreement, you can proceed to install the customer's solar PV system.

As an installer, you are responsible for ensuring the system and equipment installed at the customer's premises complies with:

- Australian Standard AS/NZS 3000:2007 - SAA Wiring Rules;
- Australian Standard AS/NZS 4777:2005 Grid Connection of Energy Systems;

  Note*:* Voltage ranges in inverters are generally factory-set to AS4777 standards. However, SIEA requires a narrower voltage range of 225V to 255V (240V +/-6%). Inverters must be set to this range in order to comply with the terms of the SIEA IES Network Agreement.

- Any other applicable Australian Standards, current as at the date of installation; and
- The relevant requirements of the *SIEA Electricity Connection and Metering Manual.*

If the customer has been approved to install a three-phase inverter system, then the output power must be distributed evenly across the three phases (unless indicated otherwise). Accordingly, if approved for a two-phase inverter system, the output power must be distributed evenly across two phases (unless indicated otherwise).

After connection, you'll need to submit Form A to SIEA requesting a meter change.

Resolving non-compliance

If SIEA receives a Form A for a system we have not approved, we will contact the customer to arrange completion of an application and conduct an assessment of the application before the connection can be approved and an appropriate meter installed.

If the inverter installed is of a different capacity to what has been approved in the application, SIEA may not be able to install the required meter. If a different inverter is required, please check with us to ensure the inverter is compliant with the customer's IES Network Agreement.

Non-compliance with SIEA's requirements may generate a Fault Notice to the customer to rectify any issues, and the new meter may not be installed. In addition, if SIEA deems the electrical installation to have a major defect, a Fault Notice will be raised and the premises may be disconnected. A Fault Notice may also be raised for minor defects. If we identify any adverse impacts to the network, the system may need to be disconnected until alternative solutions are explored. In some cases, the connection application may be declined.

Solar PV Connection Process

Solar PV systems, along with wind and hydro systems for example, are collectively referred to as Inverter Energy Systems (IES). When connected to the network, these systems can supply your power needs, and feed electricity back onto the grid.

Follow these simple steps to purchasing and connecting your solar PV system:

1. Choose the right system for your needs

If you're looking to install a solar PV system at your home, you'll need to contact a supplier to find a system that suits your needs.

2. Lodge an application to connect your system

Before having your solar PV system installed, you will need to secure approval from SIEA for your system to be installed and connected to the grid.

To begin, you'll need to submit an *Application for Network Connection of an Inverter Energy System* to SIEA.

This application process only applies to systems under 10kW in size. Applications for systems larger than 30kW must be made through SIEA directly

While the application is usually made by your system retailer or installer, as the electricity account holder you must provide your consent. Forms must be completed in full as relevant. Incomplete forms may be rejected.

3. Assess application

SIEA will conduct a preliminary evaluation of your application based on the size of inverter and the nature of the local network serving the premises. A technical assessment may be required to check for any potential adverse impacts to the network, your premises, or your neighbours' premises.

SIEA may require up to five weeks to technically assessing applications for systems that require connection to an SIEA isolated generation system in Honiara or in a remote area or community.

Find out more about SIEA's assessment on *Outline of Solar Assessment Criteria*.

4. Approve, downsize or decline application

SIEA will downsize or decline an application if it presents risks to the network or to individual premises. In some areas, even a small number of solar PV systems in the same area or a single large system could impact on the local electricity network.

Find out more about your options if your system application is downsized or declined.

If no adverse impacts are identified SIEA will approve the connection of your solar PV system and issue two copies of an *IES Network Agreement*. For details on the terms and conditions of connecting to the SIEA network under this agreement, view a sample IES Network Agreement.

This agreement outlines the terms and conditions for the connection of the solar PV system to the SIEA distribution network. It is a legally binding agreement between SIEA and the electricity account holder/s. Please read the terms and conditions carefully and seek legal advice where necessary.

You will need to sign both copies of the IES Agreement front page and return one to SIEA. You will then be free to arrange installation.

5. Install and connect the solar PV system

Once you have returned your IES Agreement, your system can be installed, and connected to the grid by an electrical contractor. Most installers are also electrical contractors.

SIEA strongly encourages the use of an installer accredited with the Australian Clean Energy Council or equivalent.

6. Request to connect electricity meter

Your installer or electrical contractor will notify SIEA of the new solar PV system connection and lodge a request for an appropriate electricity meter to be installed at your premises.

SIEA will endeavour to install new meters as quickly as possible. However, there may be delays in installing new meters in some areas.

7. Install electricity meter

To complete the process, SIEA will inspect your new solar PV system connection and install the appropriate electricity meter.

This meter allows SIEA to measure how much electricity you draw in from the grid and how much your solar PV system exports into the grid. **NOTE**: SIEA does not purchase any exported energy.

Your electricity meter will not measure the total amount of electricity generated by your solar PV system.

SIEA will then alter your Electricity Account as per the Network Agreement.

Application for Grid Connection of Solar Array

This form is to be completed and delivered to SIEA Head Office at Ranadi.
NOTE: All fields in Parts 1, 2 and 3 must be completed. Incomplete forms may be rejected.

PART 1: APPLICANT	
Name: *(As per electricity account – individual/s or company*	
Contact Person: *(if different to above)*	**Phone No:**
Address of proposed generation system:	**Postal address:** *(write 'as on left' if relevant)*
Email address:	
Registered Plan No: *(Found on rates notice)*	**Lot No:** *(found on rates notice)*
Upgrading existing approved system: ☐ No ☐ Yes, panels only ☐ Yes, panels and inverter	
Is this a revised application for these premises? ☐ No ☐ Yes	

PART 2A: SYSTEM SALES CONSULTANT	
Name:	**Business name:**
Postal address:	
Email address:	**Phone No:**

PART 2B: ELECTRICAL CONTRACTOR/INSTALLER *(if different entities, list electrical contractor only)*	
Name:	**Phone No:**
Email address:	**Electrical Contractor No:**

PART 3 SYSTEM CHARACTERISTICS		
Type: ☐ Solar		
PV array/generator rated output (kW):	**Inverter rated AC power (kW):**	
Inverter brand:	**Inverter series:**	**Inverter model:**
No of phases of applicant's connection: ☐ Single ☐ Two ☐ Three ☐ Unsure		
Other aspects of applicant's electricity service of potential relevance to technical assessment, *e.g. length and size of consumer and service mains, approximate distance to nearest transformer, etc.:*		

NOTES:
1. Network approval must be obtained before installation.
2. Inverter maximum voltage trip point must be set to 255V (single phase) or 440V (three phase). Failure to adhere may lead to disconnection of the inverter energy system.
3. If the proposed inverter is not on the list of inverters compliant with AS4777: Grid Connection of Energy Systems Using Inverters published at www.solaraccreditation.com.au, compliance evidence must be supplied with this application.

All Applicants' signatures:

_____

_____

PART 4 INSPECTION DETAILS (TO BE COMPLETED BY SIEA)		
System compliant: ☐ Yes ☐ No	**Examination report Fault Notice No:**	**Connection Date:**
Name of SIEA assessment officer: *(print)*	**Signature:**	

PART 5: STANDBY CHARGE FEE

The amount of this standby charge will be calculated in terms of the Electricity Act. The relevant extract is shown in Appendix 1. The key calculation is that of estimating the "value of electricity that would have been consumed had the standby plant not been operated".

SIEA will then apply a charge based on up to 50% of this estimate. The value of electricity that needs to be calculated under the Regulation will be based on an estimation of the daily output from a modern solar system, and then relating this to the rating of the solar system. The expected kWh power production from a solar PV array in the high tropics can be expected to be 4.4 times the kW rating of the system (*Australian Clean Energy Council for Darwin City).* The kW rating of a solar system is defined by the kW rating of the inverter, so the kWh output can be estimated as 4.4 times the kW rating of the inverter.

As an example for a 4kW solar system, SIEA would then apply a daily standby charge:
Daily Standby Charge = 50% of [$4.4 x (4kW inverter rating) x (SIEA Domestic or Commercial Tariff)]

Connection Type	Act req 50%	kW rating in Times	Inverter Rating (kW)	Rates- Tariff	Daily Standby Charge=
Domestic Customer	50%	4.4	4	6.4685	$56.92
Commercial Customer	50%	4.4	4	6.9530	$61.19
Industrial Customer	50%	4.4	4	6.7719	$59.59

PART 6: AUTHORISATION FOR THIRD PARTY TO LIAISE WITH SIEA

If you wish to authorise any representative of your system sales company or your electrical contractor/installer (one of the parties listed on this form), to liaise on your behalf with SIEA during the course of the Solar Grid Connect System application and connection process, please complete this section.

Your authorisation will allow that person to:

- Contact SIEA to enquire, and be provided with information, regarding the status of your application and/or meter installation.

However, SIEA will at no time divulge any personal or account information to this third party. That party will not Receive copies of correspondence sent to you. Only basic information related to the Solar Grid Connect System application and approval will be released to the person or company listed below. The first page of this Application and the Solar Grid Connect System Network Agreement Forms applicants receive must still be signed by the electricity account holder/s.

I/We (all applicants listed as electricity account holder/s) _____

hereby provide permission for (name, if you wish to specify a single person) _____

of (company) _____

To liaise with SIEA on my/our behalf with regard to my/our Solar Grid Connect System application and connection. I/We understand that once the new meter is installed; or upon advising SIEA in writing of a change of system sales company or electrical contractor/installer; or upon withdrawal, in writing, of this application, this permission ceases immediately.

Signed (all applicants) _____

Date ____ / ____ / ____

Privacy Notice
SIEA is collecting your personal information on this form for the purpose of assessing your Application for Network Connection of Solar Grid Connect System (IES). If you do not provide all of the information requested we will not be able to assess your application. Your personal information will not be disclosed to third parties unless you consent or it is authorised or required by law.

Inverter Energy System Network Agreement Form

Deliver to SIEA at its Head Office Ranadi when signed by all account holders		
CUSTOMER DETAILS		
Name: *(Electricity account holder – individual or company)*		*("you" or "your")*
Postal address:		
Address of proposed generation system: *(Write 'As above' if relevant)*		
Type: ☐ **Solar**		
Contact person: *(If different to name above)*		
Email address:		
Phone No:	**Fax No:**	**Mobile:**
Registered Plan No: *(Found on rates notice)*		
Lot No: *(Found on rates notice)*		
SIEA DETAILS		
Name:		*("we", "our" or "us")*
Postal address:		
Contact person:		
Email address:		
Phone No:	**Fax No: :**	**Mobile:**
GENERAL DETAILS		
Start date – The date the IES is installed at your Premises and capable of exporting energy to the Network. **Expiry date –** When this Agreement is terminated under clause 4. **IES Exported Energy –** You must ensure that the IES meets the following requirements: • Inverter rated output _____kW • The maximum voltage variation measured at the point of connection to the Network will be: 240V+/- 6%		
ACCEPTANCE BY THE CUSTOMER		
Executed by the Customer (or an authorised representative if the Customer is a company).		
PRINT NAME	**POSITION** *(COMPANIES ONLY)*	
SIGNATURE	**DATE**	
ACCEPTANCE BY SIEA		
Executed for and on behalf of SIEA by its authorised representative.		
SIGNATURE	**DATE**	
PRINT NAME	**POSITION**	

1 PARTIES

This contract is between:

(a) SIEA (in this contract referred to as “we”, “our” or “us”); and
(b) you, the customer to whom this contract is expressed to apply (in this contract referred to as “you” or “your”).

2 DEFINITIONS AND INTERPRETATION

The definitions of capitalised terms are given in Schedule 1 of this Agreement

3 DO THESE TERMS AND CONDITIONS APPLY TO YOU?

This agreement applies to you if an IES is installed at your Premises that can, at times, result in electrical energy being exported to our Supply Network.
This Agreement applies in addition to the Connection Contract between you and us. Nothing in this Agreement affects your or our rights and obligations under the Connection Contract between you and us.

4 WHAT IS THE TERM OF THIS CONTRACT?

This Agreement takes effect from:

(a) if you install the IES, the date the IES is installed at your Premises and becomes capable of exporting energy to our Supply Network; or
(b) if you move into Premises where an IES is installed and is capable of exporting energy to our Supply Network, the date you move into the Premises.

This Agreement may be terminated:

(a) at any time at your request, by notifying us that the IES is no longer connected at the Premises;
(b) at the time that the Connection Contract between you and us, or your contract with your Electricity Retailer is terminated; or
(c) by us at any time if you fail to comply with the terms and condition of this Agreement or if you fail to remedy any situation where the IES represents a hazard or risk to our Supply Network, our officers and agents or the general public.

Where a breach of this Agreement is considered by us to be capable of being remedied, we may allow a reasonable amount of time for you to take measures necessary to eliminate, to our satisfaction, the matters identified.

If this Agreement is terminated, you must ensure that the IES is no longer capable of exporting energy to our Supply Network.

5 CONDITIONS FOR IES EXPORTING ENERGY TO OUR SUPPLY NETWORK

5.1 Consent for exportation of energy to our Supply Network

We consent to allow the connection of an IES at your Premises that is capable of exporting energy at times to our Supply Network on and subject to the terms of this Agreement.

5.2 Conditions of Consent

Our consent under this Agreement is at all times conditional upon:

(a) the IES complying with the “Technical Conditions for the Connection of Small Scale Photovoltaic Inverter Energy Systems” (Schedule 2);
(b) the IES complying with all relevant Australian Standards and Regulations; and
(c) you complying with the terms and conditions of this Agreement.

5.3 Discretion to specify additional conditions
We retain a right in our discretion to specify additional requirements for an IES system. In exercising our discretion we will consider the conditions of the specific network that the IES is connected to.

5.4 Design, Installation and Testing
You must:

(a) engage an Accredited Installer (full or provisional) for design and installation of the IES as specified on the Clean Energy Council website: **www.cleanenergycouncil.org.au** under 'Accreditation'; and
(b) consent to us, our officers and agents entering the Premises at any reasonable time and date to test the IES for the purpose of establishing that the IES and the installation complies with this Agreement.

You acknowledge that we are not responsible for ensuring that you comply with the relevant standards.

5.5 Operating Procedure
You must comply with any request from us for the IES to be taken off-line and disconnected for operational reasons or for planned maintenance.

In the event that our Supply Network is unable to accept energy generated by you for any reason, no compensation will be payable by us.

5.6 Request to cease energy export
We may request that you cease to export energy to our Supply Network if:

(a) exportation would result in a breach of technical or safety requirements under the Act, the Electrical Safety Act or this Agreement;
(b) exportation would unreasonably interfere with the connection or Supply of electricity to other users of the network;
(c) it is required to do so under any applicable law.

Such a request to cease exporting energy will be in writing to the customer. Other than for safety requirements, you are required to comply with this request within three business days. Where a safety risk is determined, you must comply with the request immediately. If you do not action such a request within the appropriate timeframe, we may disconnect you pursuant to our rights under the Connection Contract between you and us.

This clause does not alter any rights or obligations for disconnection of the premises under the Electricity Act. For the avoidance of doubt, we have rights and/or obligations for disconnection under the Electricity Act regulations.

6 METERING

You acknowledge that electricity metering relevant to the IES at the Premises is owned by us, will be installed in compliance with the "DNSP Metering Manual", and will be operated by us. We will have the discretion to determine the meter type.

You must supply us with safe access to allow us to install, test, maintain or remove the meter installation of the IES.

You consent to us, our officers and agents entering the Premises for the purposes of installing, testing, reading, maintaining or removing the meter installation.

7 SAFETY

You must:

(a) install and maintain the IES and associated equipment in safe working order at all times and in accordance with the requirements of this Agreement;
(b) have an IES isolation procedure displayed prominently and effectively secured at the main switchboard and keep a copy of the IES operations manual in or near the main switchboard at all times;
(c) comply with our reasonable directions in order to secure the safety and stable parallel operation of our Supply Network and the IES; and
(a) comply with the requirements of the Electricity Act, the Safety at Work Act, and Electricity Regulations for the installation, inspection, operation and maintenance of the IES.

8 MAINTENANCE

You must:

(b) ensure the IES is inspected and maintained in accordance with the manufacturer's recommendations by an appropriately qualified person;
(c) where there are no manufacturer's recommendations, ensure inspection and condition based maintenance is performed by an appropriately qualified person;
(d) provide, at our request, the results of any inspections carried out in accordance with the requirements of this Agreement; and
(a) ensure that any component of the IES replaced during maintenance is compliant with the requirements of this Agreement.

9 YOUR OBLIGATIONS

In return for our consent to export energy to our Supply Network, you agree to:

(b) pay all of our costs associated with any system reinforcement, system modification, additional protection and control equipment required to accommodate the IES;
(c) not mislead or deceive us in relation to any information provided;
(d) undertake, if necessary, any changes to the wiring at the Premises necessary for the installation of our metering equipment;
(e) advise us of any proposed material operational changes of the IES, including the installation of any additional IES;
(f) obtain our prior consent in writing to any material increase in capacity of the IES prior to any such increase;
(e) maintain the IES in accordance with Section 8 of this Agreement;
(g) advise any subsequent occupant of the Premises of the existence of this Agreement and the requirement for the new occupant to enter into a new Agreement with us; and
(h) consent to us, our officers and agents entering the Premises at any reasonable time and date to test or inspect the IES for the purpose of establishing that the IES and the installation complies with this Agreement; and

10 ASSIGNMENT

You may not assign your rights or novate your obligations under this Agreement without the prior written consent of us, which will not be unreasonably withheld.

SCHEDULE 1

GENERAL TERMS AND CONDITIONS

1 DEFINITIONS AND INTERPRETATION

1.1 Definitions

In this Agreement:

"**Accredited Installer**" means a person who has demonstrated their competence to design and install renewable energy systems and holds appropriate accreditation as acknowledgement of their competence.

"**Act**" means the Electricity Act.

"**Agreement**" means this Inverter Energy System Network Agreement.

"**Connection Contract**" has the meaning given in the Act.

"**Customer**" refers to the person (or persons) residing at the Premises where IES is installed.

"**Electrical Safety Act**" means the Electricity Act.

"**Electricity Industry Code**" means any Electricity Industry Codes made under the Act.

"**Electricity Regulations**" means the Electricity Regulations.

"**Export**" or "**Exported energy**" means the quantity of energy generated by the IES equipment and delivered to our Supply Network.

"**Inverter**" means a device that uses semiconductor devices to transfer power between a DC source or load and an AC source or load.

"**IES**" means an Inverter Energy System and represents a system comprising one or more inverters together with one or more energy sources (which may include batteries for energy storage), controls and one or more grid protection devices. In the context of this document, the energy source shall be a Photovoltaic Array.

"**Negotiated Connection Contract**" has the meaning given to that term in Electricity Act.

"**Photovoltaic Array**" or "**PV**" means an electrically integrated assembly of PV modules, and other necessary components, to form a DC power supply unit. A PV array may consist of a single PV module, a single PV string, or several parallel-connected strings, or several parallel-connected PV sub-arrays and their associated electrical components.

"**Premises**" means the premises (as that term is defined in the Act), at which you propose to install the IES.

"**Standard Connection Contract**" has the meaning given to that term in the Electricity Act.

"**Supply**" means the supply of electricity from our Supply Network to the Premises.

"**Supply Network**" has the meaning given to that term in the Electricity Act.

"**WHS Act**" means the Safety At Work Act.

1.2 Interpretation

In this Agreement, unless the contrary intention appears:

(a) headings are for ease of reference only and do not affect the meaning of this Agreement;

(b) the singular includes the plural and vice versa, words importing a gender include other genders and words and expressions importing natural persons include partnerships, bodies corporate, associations, governments and governmental and local authorities and agencies;

(c) other grammatical forms of defined words or expressions have corresponding meanings;

(d) a reference to a clause, paragraph, schedule or annexure is a reference to a clause or paragraph of or schedule or annexure to this Agreement and a reference to this Agreement includes its recitals and any schedules and annexures;

(e) a reference to a document or agreement, including this Agreement includes a reference to that document or agreement as novated, altered or replaced from time to time; and
(f) a reference to a party includes its executors, administrators, successors and permitted assigns.

2 GENERAL PROVISIONS

2.1 Inconsistency between clauses and schedules
If there is any inconsistency between a clause of this Agreement and the Schedules to this Agreement, then the clause of the Agreement will prevail.
2.2 Relationship with Connection Contract
This Agreement does not change the conditions of the Standard Connection Contract or Negotiated Connection Contract (whichever is applicable).
2.3 Effect of this Agreement
This Agreement covers the exporting of energy to our Supply Network only and does not relieve you of any obligations at law or the requirements of another authority in relation to the installation, operation or maintenance of the IES.
2.4 Joint and Several Liability
If you are more than one person:

(a) an obligation of those persons is joint and several; and
(b) a right of those persons is held by each of them severally.

2.5 Liability for Damage
You acknowledge that we will not be liable for any loss, damage or injury suffered or claimed by you or any other person that may occur or be attributable to the installation and operation of the IES at the Premises.

The parties acknowledge that you are responsible for any insurance costs associated with your obligations or possible liability under this Agreement.

SCHEDULE 2

TECHNICAL CONDITIONS FOR THE CONNECTION OF SMALL SCALE PHOTOVOLTAIC INVERTER ENERGY SYSTEMS

1 INTRODUCTION

The technical conditions hereafter refer to the mandatory requirements for the IES.

2 SCOPE

This Agreement covers installations up to a maximum of 30 kVA (3-phase) or 10 kVA (single phase) that may export electrical energy to our Supply Network regardless of the length of time that parallel operation would normally occur.

3 DESIGN AND INSTALLATION

The design and installation of the IES must comply with:

(a) AS 4777 – Grid Connection of Energy Systems via Inverters, Parts 1, 2 and 3;
(b) AS/NZS 3000 – SAA Wiring Rules;
(c) AS/NZS 3008 – Electrical installations—Selection of cables;
(d) AS/NZS 5033 - Installation of Photovoltaic (PV) Arrays;
(e) all other applicable Australian Standards/Codes of Practice, current as at the date of installation;
(f) the Technical Conditions as set out in this document;
(g) the SIEA Metering and Connection Manual.

4 METERING

The metering of the IES must:

(a) comply with the requirements of the Electricity Connection and Metering Manual; and
(b) be located adjacent to the existing revenue metering for the Premises.

5 GRID PROTECTION REQUIREMENTS

The IES output voltage, frequency and waveform must match that of our Supply Network such that any distortion of these parameters shall be within acceptable limits. There shall be no significant reduction in quality of Supply to other network users or risk of damage to apparatus belonging to other network users or us.

The Inverter protection elements must comply with AS 4777.3 “Grid Connection of Energy Systems via Inverters Part 3: Grid Protection Requirements” to ensure the following requirements are met:

(a) disconnection of the Inverter from our Supply Network in the event of a loss of Supply;
(b) to ensure the Inverter is operating within acceptable operating parameters;
(c) to prevent the Inverter from energising a de-energised circuit.

Passive protection arrangements shall comply with AS 4777.3 “Grid Connection of Energy Systems via Inverters Part 3: Grid Protection Requirements”.

In addition, the following specific voltage and frequency settings shall be programmed into the Inverter:

(a) Voltage: Maximum voltage trip point (Vmax) shall be 255V for a single phase system or 440V for a three phase system.
(b) Frequency:
    i. Minimum frequency trip point (Fmin) shall be 48Hz
    ii. Maximum frequency trip point (Fmax) shall be 52Hz

If voltage and/or frequency fall outside the set limits, the IES must be automatically disconnected from the Network. Reconnection procedure shall comply with AS 4777.3 “Grid Connection of Energy Systems via Inverters Part 3: Grid Protection Requirements.

Without limiting our discretion in Clause 5.3 of this Agreement, the IES must have any additional functionality specified by us regarding variable voltage and Volt-Amperes Reactive controls in accordance with the particular network conditions relevant to the IES.

6 IES TESTING

Upon completion of the installation of the IES, we may conduct a test of the IES equipment at a mutually agreed time and date for the purpose of establishing that the IES complies with this Agreement.
The test will consist of:

(a) disconnection of the Premises from the Supply Network;
(b) reconnection of the Premises to the Supply Network; and
(c) inspection and such testing of the IES as we consider necessary for compliance with this Agreement.

7 TYPE/CAPACITY CONSTRAINTS

At some locations, technical requirements may limit the type or capacity of IES that may be installed. Where required by us, you shall pay for any technical studies required to ensure the suitability of the IES interaction under normal and fault conditions. These studies shall be undertaken to our satisfaction regarding technical content. Should the studies require the Supply Network to be reinforced or modified you will be required to bear the costs associated with this work.

Standards for Grid-Connected Photovoltaic (PV) Arrays

Area		Title	Outline
Installation	AS/NZ 5033:2012	Installation and safety requirements for photovoltaic (PV) arrays	Sets out general installation and safety requirements for photovoltaic (PV) arrays, including DC array wiring, electrical protection devices, switching and earthing up to but not including energy storage devices, power conversion equipment or loads. The safety requirements of this Standard are critically dependent on the inverters associated with PV arrays complying with the requirements of IEC 62109-1 and IEC 62109-2 and all power conditioning equipment complying with IEC 62109 series standards. PV arrays of less than 240 W and less than 50 V open circuit voltage at Standard Test Condition (STC) are not covered by this Standard.
Installation	AS4777.1:2005	Grid connection of energy systems via inverters - Installation requirements	Specifies requirements for the installation of inverter energy systems with ratings up to 10 kVA for single-phase systems, or 30 kVA for three-phase systems, onto the low-voltage electricity distribution network (grid).
Inverter Req'ts	AS4777.2:2005	Grid connection of energy systems via inverters - Inverter requirements	Specifies requirements for inverters with ratings of up to 10 kVA for single-phase systems, or 30 kVA for three-phase systems, and intended for connection to the low-voltage electricity distribution network (grid).
Grid Protection Req'ts	AS4077.3:2005	Grid connection of energy systems via inverters - Grid protection requirements	Specifies grid protection requirements for inverter energy systems with ratings up to 10 kVA for single-phase or 30 kVA for three-phase, systems and intended for connection to the low-voltage electricity distribution network (grid).
General Wiring Standards	AS/NZS3000:2007/Amdt 2:2012	Electrical installations	Known as the Australian/New Zealand Wiring Rules

Outline of Solar Assessment Criteria

All applications to connect a solar PV system to an SIEA network require a technical assessment to be undertaken. This is because SIEA has an obligation to operate, maintain (including repair and replace as necessary), and protect its supply network to ensure the adequate, economic, reliable and safe connection and supply of electricity to its customers.

These assessments can also help customers avoid over-investing in systems that are too large to operate effectively at their point in the network.

Why applications need to be technically assessed

Solar PV systems have the potential to compromise the efficiency of the electricity network and cause voltage levels to fall outside the statutory ranges.

An inverter that is too large will trip off when the voltage rises above the set limit, and the system will not generate or export to the grid until the voltage comes back into an acceptable range.

Assessment thresholds

SIEA will undertake technical assessments of any application (regardless of rating) to connect to its Honiara network, or to any of the outstation networks.

SIEA reserves the right to assess any application and to change these thresholds at any time.

The technical assessment process

Our assessment process considers both the size of the inverter, the number of electrical phases of the premises, and the attributes of the local network servicing the premises.

The assessment references information including:

- The Registered Plan (RP) number and Lot number of the premises
- The capacity of the solar PV system inverter
- The capacity of the distribution transformer and local network that supply the premises
- The total capacity of solar PV systems already connected to the same transformer.

Assessment exclusions

The assessment does not consider:

- The condition of the household wiring.
- The number of solar PV panels that are planned for installation. The assessment only considers the size of the inverter.

- The amount of electricity that is typically used by the occupants of the premises during the day.

Installation and commissioning

General

These check lists are to be filled out for each installation.

> **WARNING:** Where short circuit currents are required, follow AS/NZS 5033 Appendix D for the steps that shall be undertaken to measure the short circuit current safely.
>
> **NOTE:** Some projects require that short circuit currents are recorded as part of the contractual commissioning; otherwise a record of the actual operating current of each string is sufficient. This could be done by using the meter on the inverter or by using a clamp meter when the system is operational.

Insulation resistance measurement

> **WARNING:** PV array dc circuits are live during daylight and, unlike a conventional ac circuit, cannot be isolated before performing this test. Follow AS/NZS 5033 Appendix D4 for the steps that shall be undertaken to measure the insulation resistance safely.

Installation and commissioning sample

See

Appendix 1 **Checks and Certification**

Appendix 2 **Signage**

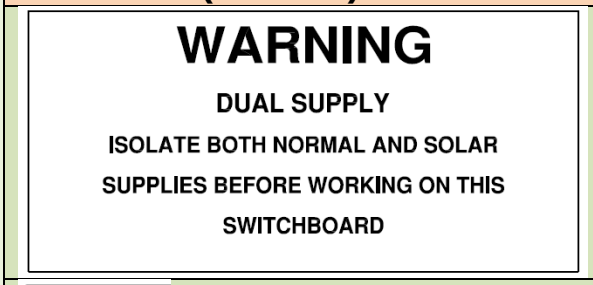
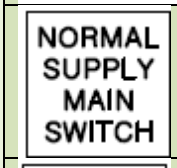
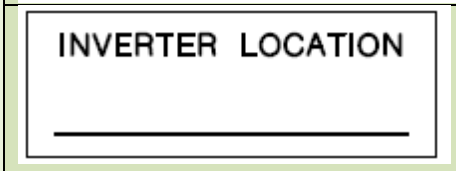
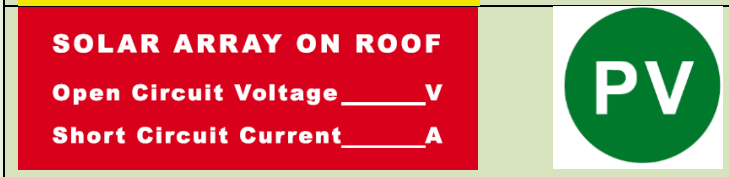
Appendix 3 **Insulation**

Appendix 1 Checks and Certification

INSTALLATION DETAILS			
Address of installation:			
PV module manufacturer and model number:			
Number of modules in series in a string:		Number of strings in parallel in PV array:	
Inverter manufacturer and model number:			
Number of inverters:		Number of MPPTs:	
PV ARRAY			
PV array tilt	……°	PV array orientation	……°
Array frame is certified to AS1170.2 for installation location	**Yes / No**	Array frame is installed to manufacturer's instructions	**Yes / No**
No galvanically dissimilar metals are in contact with the array frames or supports	**Yes / No**	Roof penetrations are suitably sealed and weatherproofed	**Yes / No**
PV wiring losses are less than 3% at the maximum current output of the array	**Yes / No**	Where PV array comprises multiple strings, string protection has been provided	**Yes / No**
Wiring is protected from mechanical damage and is appropriately supported	**Yes / No**	Weatherproof PV array isolator mounted adjacent to the array	**Yes / No**
LV DC and AC INSTALLATION			
All low voltage wiring has been installed by a licensed electrical tradesperson	**Yes / No**	All wiring has been tested and approved by qualified electrical tradesperson	**Yes / No**
INVERTER			
PV array isolator mounted adjacent to the inverter	**Yes / No** (Rating: ……..Vdc, …….Adc)	Isolator is mounted on output of the inverter (where required)	**Yes / No**
Lockable AC circuit breaker mounted within the switchboard to act as the inverter main switch for the PV/inverter system	**Yes / No** (Rating …….. A)	Inverter is installed as per manufacturer's specification	**Yes / No**
Inverter ceases supplying power within two seconds of a loss of AC mains	**Yes / No**	Inverter does not resume supplying power until mains have been present for more than 60 seconds.	**Yes / No**

CONTINUITY CHECK				
Circuit checked (record a description of the circuit checked in this column)	_____ **Yes / No**			
Continuity of all string, sub-array and array cables	**Yes / No**			
Continuity of all earth connections (including module frame)	**Yes / No**			
SYSTEM CHECK WARNING: · IF A STRING IS REVERSED AND CONNECTED TO OTHERS, FIRE MAY RESULT. · IF POLARITY IS REVERSED AT THE INVERTER DAMAGE MAY OCCUR TO THE INVERTER.				
	Polarity	Voltage	Short Circuit Current	Operating Current
String 1		V	A	A
String 2		V	A	A
String 3		V	A	A
String 4		V	A	A
Sub-arrays where required		V	A	A
PV array at PV array switch-disconnector		V	A	A
Irradiance at time of recording the current			W/m2	W/m2
INSULATION RESISTANCE MEASUREMENTS **(see table 12.3.1 for minimum values of insulation resistance)**				
Array positive to earth	MΩ			
Array negative to earth	MΩ			
INSTALLER INFORMATION				
CEC Accredited installer's name:				
CEC Accreditation number:				
I verify that the above system has been installed to all relevant standards				
Signed:		Date:		
CEC Accredited Designer's name:				
Licensed electrician's name: (where applicable, e.g. LV work)				
Electrician's licence number:				
Signed:		Date:		

Appendix 2 Signage

SIGNAGE (AS4777)		
	On switchboard to which inverter is directly connected	**Yes / No**
	is permanently fixed at the main switch	**Yes / No**
	is permanently fixed at the solar main switch	**Yes / No**
	If the solar system is connected to a distribution board then the following sign is located on main switchboard and all intermediate distribution boards	**Yes / No**
	Where the inverter is not adjacent to the main switchboard, location information is provided	**Yes / No**
SIGNAGE (AS/NZS 5033)		
	Is permanently fixed on array junction boxes (black on yellow)	**Yes / No**
	Fire emergency information is permanently fixed on the main switchboard and/or meter box (if not installed together)	**Yes / No**
	PV DC isolation is clearly identified	**Yes / No**

	Is placed adjacent to the inverter when multiple isolation/ disconnection devices are used that are not ganged together	**Yes / No**
SOLAR	Exterior surface of wiring enclosures labelled 'SOLAR'	**Yes / No**
Shutdown procedure is permanently fixed at inverter and/or on main switchboard	Any other signage as required by the local electricity distributor	**Yes / No**

Appendix 3 Insulation

Minimum insulation resistance

System voltage (Vdc x1.25)	Test Voltage	Minimum insulation resistance MΩ
<120	250	0.5
120-500	500	1
>500	1000	1

Downsized or Declined Applications

If your application is downsized or declined, SIEA can assist you with further advice and options. The term downsized, means that while SIEA cannot approve the size of inverter you originally applied for, you are able to re-apply for an inverter up to a maximum size we advise or to explore one of the other options presented.

Reasons to downsize or decline an application

Applications may be downsized or declined if:

- The transformer serving the premises is too small to support the volume of electricity that could be generated by the system.
- The connection is a relatively long distance away from the transformer, which may cause significant voltage fluctuations or cause voltage levels to fall outside the statutory ranges.
- There are already a number of solar PV system connections that share the same transformer. This may even be the case if there is only one other connected solar PV system.

Alternative options

SIEA supports renewable energy and will work with you to explore alternative options including:

- **Installing a small-scale system with an inverter of a lower capacity.** SIEA will advise the maximum capacity that can be re-applied for at the premises to ensure effective operation of the system and to protect the electricity supply in the local area. Customers will need to lodge an updated application form.
- **Exploring the option of upgrading the number of electrical phases of the premises to accommodate the desired inverter size.**
- **Paying for an upgrade to the network to accommodate the inverter originally requested**. SIEA allows individual customers to pay for upgrades to the network, where those upgrades are for the benefit of an individual premise. To obtain a quote from SIEA for the necessary upgrades, please contact SIEA. Fees may apply to lodge an application, but will be credited against the total cost of the upgrade if you choose to proceed.
- **Withdrawing application.** Customers may choose not to install a system, in which case they should contact SIEA to withdraw the application.

Assessment Tests for Parallel Embedded Generation via Inverters

NETWORK TESTS

SIEA will initially assess all proposals for connection of inverter energy systems based on the following five network criteria being met:

Test 1 - 11kV Feeder Penetration Test for HV Voltage Regulation
That the addition of the proposed inverter system will not cause the total installed PV capacity on the 11kV feeder to exceed 15% of the 50% minimum feeder load (50% of the assumed minimum daytime load), such that the feeder does not enter export mode back to the 11kV zone substation bus.

Test 2 - Transformer Penetration Test for LV Voltage Regulation
That the addition of the proposed inverter system will not cause the total installed PV capacity off a **shared** transformer to exceed 25% of the transformer nameplate rating, reducing the probability of the transformer entering net export mode back onto the 11kV feeder.

Test 3 - Maximum Single Phase Inverter Test (Unbalance)
That the maximum single phase inverter size does not exceed 10% of the transformer nameplate rating (single phase transformers), or 8% of the nameplate rating (three phase transformers). This test is not applicable to three phase balanced inverters.

Test 4 - 11kV Feeder Voltage Fluctuation & Distortion Test
That the ratio S_i / S_{schv} is ≤0.1%

Where: S_i Three phase inverter rating (kVA)
S_{schv} Three phase fault level at point of common coupling – 11kV (kVA)

(To minimise voltage disturbance to customers on same 11kV network.)

Test 5 - LV Feeder Voltage Regulation, Fluctuation & Distortion Test
That the ratio $S_i / S_{sclv\ is}$ ≤ 1.0%

Where: S_i Three phase inverter rating (kVA)
S_{sclv} Three phase fault level at point of common coupling – LV (kVA)

(To minimise voltage disturbance to customers on same low voltage network.)

GENERATION TESTS

SIEA will then assess all proposals for connection of inverter energy systems based on the following criteria:

Test 1 – Minimum Generator Load Test
Minimum load test to ensure that no diesel engine operates at less than 40% of its nameplate loading while any solar system is operating.

Test 2 – Stability Test
Stability test to ensure that the sum total of solar inverter ratings connected to a system does not exceed 15% of the ratings of the diesel engines that are operating while any solar systems are operating. This test will be assessed at (G-1) operating conditions i.e. with the highest rating diesel engine out of service.

ASSESSMENT

Each application for connection of a solar PV array will be assessed against EACH of these criteria, and must pass ALL tests satisfactorily before approval.

Consideration can be given to reducing the approved inverter rating in marginal cases. See *Downsized or Declined Applications*.

Guide to buying household solar panels (photovoltaic panels)

Solar power systems are now an affordable option for households looking to reduce their power bills and generate their own electricity. There is an increasing number of products and suppliers on the market, most of which will be able to be connected to the Solomon Islands grid.

SIEA follows the Australian/ New Zealand standards for connection of solar panels to its electricity grid. This is to ensure the safety of its staff and customers, as well as ensuring that customers can be comfortable with their investments.

This guide is intended to provide an introduction to solar PV systems so you are better equipped to make choices about a product that is right for you.

Towards the back of this guide there are a series of questions you can ask your installer, and the Solomon Islands Electricity Authority (SIEA) to ensure you have all the information you need to make smart decisions.

This guide is only intended for people who will be connecting their system to the SIEA electricity grid.

Contents

Installation checklist

A Step-by-Step Process to having your Solar PV System installed:

1. You conduct your own research into the benefits of having a solar PV system installed. In particular, you should ensure that you understand what will happen to your meter, your electricity tariff and your electricity bill before you agree to have a PV system installed.

2. You contact several Designers/Installers to arrange for a quote. They should preferably be CEC-accredited Designers/Installers. A list of Australian ones can be found at *solaraccreditation.com.au*

3. By asking informed questions, (see '*Questions to ask your Designer/Installer*'), you then select a Designer/Installer.

4. The Designer/Installer designs a PV system to meet your requirements (see '*What does the Design and Specification of my Solar PV System involve?*')

5. You, or your Designer/Installer, complete the connection and approval process for SIEA. See SIEA document: '*Solar PV Connection Process'*.

6. The Designer/Installer completes the installation of your solar PV system

7. The Designer/Installer contacts SIEA to arrange for your new meter to be installed (see '*Questions to ask SIEA'* below).

8. SIEA installs your new meter.

9. Your solar PV system is now ready to produce electricity.

10. SIEA will conduct a safety inspection of your solar PV system.

How does solar PV work?

Solar Photovoltaic (PV) panels are generally fitted on the roof in a northerly direction and at an angle to maximise the amount of sunlight that hits the panels.

Solar PV panels on the roofs of homes and businesses generate clean electricity by converting the energy from sunlight. This conversion takes place within modules of specially fabricated materials that make up the solar panels. It is a straightforward process that requires no moving parts. Solar panels are then connected to the mains power supply through a device called an inverter.

Solar panels have been installed on the rooftops of houses and other buildings countries such as Australia since the 1970s. Currently there are many solar panel systems safely and reliably delivering electricity to households and businesses across Australia.

Grid-connected solar PV systems

Most suburban homes in Honiara are connected to the electricity grid, which uses alternating current electricity (AC). However the electricity generated by solar panels is direct current

(DC). That means grid-connected (GC) solar PV systems need an inverter to transform the DC electricity into AC electricity that is suitable for ordinary household needs. Houses with solar systems use solar power first before sourcing electricity from the grid.

When the panels are not producing any electricity at night or producing at reduced levels during cloudy days, electricity is supplied from the existing SIEA electricity grid (back-up). The grid also supplies the heavier currents needed to start electric motors etc even when the solar panels are in use.

How much power do they generate?

The output of a solar PV system depends on its size. The most common household systems are either 1 kilowatt (kW) or 1.5 kilowatts, although some property owners have installed systems of up to 10 kilowatts.

A Darwin house (at similar latitude to Honiara) consumes around 18 kilowatt hours (kWh) per day so a 1-2kW system displaces an average of 25-40% of your average electricity bill. Solar panels produce more energy in summer than they do in winter.

Average Daily Production					
Location	**1 kW system**	**1.5 kW system**	**2.0 kW system**	**3.0 kW system**	**4.0 kW system**
Darwin	4.4 kWh	6.6 kWh	8.8 kWh	13.2 kWh	17.6 kWh

How much do solar panels cost?

The cost of solar panels has continued to reduce with an increased diversity in the panels, inverters and suppliers on the market.

You need to ensure that having a grid-connected PV system makes sense for you by meeting your needs at a sensible price.

It is important to understand on what you want from your solar PV system. Are you after a system that will partially offset your energy consumption for 5-10 years before requiring a system upgrade? Or do you want a system that will completely offset your household's electricity use for the next 25 years? Like buying a second-hand car as opposed to a brand-new sports car, these two solar PV systems are both sound investments depending on your needs, but will vary significantly in price.

The price of your solar PV system can also be affected by variables including:

- Location
- Number of panels
- Orientation of panels
- Type of panels
- Type of inverter
- System design and configuration
- Shipping costs for equipment and parts
- Structural engineering, architectural, and other professional services (for commercial systems)
- Contractor installation costs
- Removal of trees or other shading
- Type of roofing (for example, tiled or tin)
- Height of roof
- Site preparation needs (for example, condition of roof or ground)

Australian Standards

It is important you ask your accredited installer to provide proof that your panels meet Australian standards.

The Clean Energy Council has a frequently updated list of all solar panel and inverter models that meet Australian standards. To see the list, https://www.solaraccreditation.com.au/solar-products/inverters/approved-inverters.html

Solar PV systems must also comply with The CEC Design and Installation Guidelines.

Warranties and Guarantees

Solar PV panels generally come with a performance warranty that can last up to 25 years and a guarantee lasting five to ten years. Additionally, panel material warranties and workmanship guarantees generally span 5-10 years.

It is important to know who is providing the warranty – the manufacturer or the importer. In the absence of a manufacturer, the importer is responsible for the warranty. However, if the importer changes their business name or sells their business, their warranty obligations towards you cease. Ask your installer who is providing the warranty.

A system manual that provides operation, maintenance and safety information should be provided by your installer. This must also include a system energy output (kWh) estimate. It is important to ensure you obtain written confirmation of statements made by your installer, including performance claims, guarantees and warranties. Documentation will be essential if you need to make warranty or insurance claims.

What Solomon Islands government schemes are in place to lower the cost of purchasing a solar PV system?

There are currently NO government assistance schemes in the Solomon Islands for the installation and operation of solar PV arrays

Renewable Energy Certificates

The Solomon Islands does NOT have a Renewable Energy Certificate Scheme.

Feed-in tariffs

SIEA does NOT purchase excess energy from a domestic or commercial photovoltaic system.

Standby Charges

SIEA DOES apply a daily standby charge for the operation of solar PV arrays that are connected to its network. This is 50% of the power that is generated by the array and consumed internally by the customer. The power generated by the array (in kWhs) is assessed as being 4.4 times the nominal kW rating of the inverter.

What does the design and specification of my Solar PV System involve?

Accredited Designers / Installers

SIEA recommends that the designer and installer of your solar PV system should be accredited by the Clean Energy Council. The Clean Energy Council's accreditation scheme ensures that accredited designers and installers of solar PV power systems:

- Have undergone the necessary professional training

- Follow industry best practice
- Adhere to Australian standards
- Routinely update their skills and product knowledge.

For a list of accredited professionals, please see *solaraccreditation.com.au*.

An accredited Designer/Installer will provide you with a solar PV system design and specification. This will include things such as:

- Establishing your electrical loads over an average day using a load analysis
- Determining the type of panels
- Determining the size of your solar PV system
- Deciding the type of inverter
- Establishing the location of solar panels in relation to angles, available sunlight, shading and temperature.

What size solar PV system should I install?

The size of your solar PV system will depend on:

- the physical unshaded area available for the installation of your panels
- how much you are prepared to spend
- what portion of your electrical consumption you wish to generate.

To work out what size solar PV system you require, you need to analyse your household's daily electricity consumption. Your monthly or quarterly electricity bill measures your household's electricity consumption in kilowatt hours (kWhs). From this figure, you can calculate your average daily electricity consumption, and the average amount of electricity your solar PV system needs to produce to cover your electricity needs.

This process will be completed by your accredited designer during the design and specification stage, as part of their load analysis.

What size panels should I buy?

Solar PV panels come in different wattages. The main issues are your budget and whether the solar panels will physically fit in the space you want to install them.

Each solar panel is approximately 1.6 metres long and 0.8 metres wide. A 1kW solar panel system will require around 8-10m² of roof space, and a 1.5kW solar panel system requires around 12 m². This will vary depending on the type of panel installed on your roof.

What sort of panels should I buy?

There are four main types of solar panel available, each with their own benefits. During the design and specification stage, your accredited designer will help you choose which type is the best to suit your needs:

1. **Mono Crystalline (monocrystalline c-Si)**

These panels are a proven technology that has been in use for over 50 years. They are commonly used where space is limited, or where there are high costs associated with installing large panels. They have a very slow degradation, generally losing 0.25 - 0.5% per year.

2. **Poly Crystalline (polycrystalline c-Si)**

These panels are similar to Mono Crystalline panels, but the silicon used is Multi-Crystalline which is easier to make. They are comparable to Mono Crystalline in performance and durability. Slightly more panels are required to produce a given amount of electricity.

3. **Thin Film**

These panels are typically nearly double the size than the other panel varieties. Research is continuing to improve the performance of Thin Film panels and to refine the manufacturing process. They respond well to slightly diffuse light and their efficiency does not drop on hot days.

The most common varieties of Thin Film panels are:

- Cadmium Telluride Thin-Film panels (CdTe)
- Copper Indium Gallium Selenide Thin-Film panels (CIGS)
- Amorphous silicon Thin-Film panels(a-Si)

What angle should the solar panels be on?

Solar PV panels produce most power when they are pointed directly at the sun. In the Solomon Islands, solar modules should face north for optimum electricity production. The orientation of the panels will often have a greater effect on annual energy production than the angle they are tilted at. A minimum tilt of 10° is recommended to ensure self-cleaning by rainfall.

For grid-connected solar PV power systems, the solar panels should be positioned at the angle of latitude to maximise the amount of energy produced annually. Most Solomon Islands homes have a roof pitch of 20° to 30°.

If your roof's slope is not ideal, your accredited designer can create an appropriate mounting frame to correct the orientation and elevation of your panel. Failing this, the designer can advise you on the difference in energy output for different tilt and orientation.

How much sunlight should the panels receive?

The amount of energy in sunlight that a solar PV panel receives over a day is expressed in peak sun hours. As the amount of energy generated by a panel is directly proportional to the amount of energy it receives from sunlight, it is important to install panels so they receive maximum sunlight.

Your accredited designer will calculate the amount of energy generated by the solar PV panel from the peak sun hours available. Peak sun hours vary throughout the year.

Shading / Dirt

Solar PV panels should ideally be in full sun from at least 9am to 3pm. They should not be placed in shaded areas and should be kept free from dust and dirt. Even a small amount of shade - from things like trees, roof ventilators or antennas - will have a large impact on the output of a panel, as it changes the flow of electricity through the panel. Shading or dirt on just one of the cells in a solar panel results in a loss of power from many cells, not just the one that is shaded.

Temperature

The amount of electricity a solar PV panel can generate is reduced as temperatures increase. Solar panels operate best at ambient temperatures up to 25°C. If the ambient temperature is higher than this, the panel's output declines.

What is an inverter? What sort should I buy?

Solar PV panels produce low voltage DC electricity. The inverter converts this into the AC electricity needed to supply power for standard appliances.

The efficiency of an inverter is measured by how well it converts the DC electricity into AC electricity. This usually ranges from 95% to 97.5% for most models. Check the inverter's specifications before you purchase.

Inverters are sized according to the power (kilowatts) they can supply.

Australian Standards

It is important to ensure that your grid connect inverter complies with Australian Standards. This is necessary to ensure that SIEA will allow it to be connected to the grid. Your accredited installer to provide proof that your inverter meets Australian standards. The Clean Energy Council has published a list of all grid connect inverters that meet Australian standards. https://www.solaraccreditation.com.au/solar-products/inverters/approved-inverters.html

What will happen to my meter at home?

When your solar PV system is installed, you will need to have a new meter installed.

If you have a post-pay meter (with a spinning disk) or a pre-paid CashPower meter, this will need to be replaced with a new import/export meter. This is to ensure that it records only the power imported from the grid. Note that SIEA does NOT have a tariff for power exported back into the grid. While this export may be recorded by the new meter, it will not generate any credit for you.

If you are presently on a pre-paid metering arrangement (CashPower), then you will be transferred to a Post-Pay Account. You should consider this and carefully weigh up the advantages and disadvantages before making a decision. This should be understood before you commit to install your solar PV panels.

Your new meter will be a "net meter". On a net feed-in tariff scheme, your "net meter" measures your household's electricity and the electricity generated by your solar PV system together. SIEA reads the meter and calculates the electricity that you have consumed from the grid. Note again that SIEA does NOT have a feed-in tariff for any electricity that you might export.

Your new meter must be installed by SIEA. This will be organised by your accredited Designer/Installer.

The new meters will be provided by SIEA, and you will be charged up-front for the cost of providing and installing them.

Quotation / Contract

The following information is offered as general information only.

Following the design and specification you may request a quotation for the design and installation of the system.

The quotation could provide specifications, quantity, size, capacity and output for the major components, including:

- solar PV modules
- mounting frames
- structure
- inverter
- any additional metering
- data-logging
- travel and transport requirements
- other equipment needed
- any trench digging
- a system user manual.

The quotation should also specify a total price, together with proposed start and completion dates. The quotation should form a basis for your contract with the Designer/Installer.

In addition, a contract for the supply and installation of the power system should be included with the quotation.

The contract should include:

- an estimate of the average daily electricity output (in kWh)
- the estimated annual production
- the estimated production in the best and worst months
- the responsibilities of each party
- warranties and guarantees, including installer workmanship schedule of deposit and progress payments.
- who is responsible for connecting your solar PV system to the SIEA electricity grid

Questions to ask your Designer / Installer

The following information is offered as general information only.

When signing a contract with your Designer/Installer, you need to be informed. Important questions to ask include:

Accreditation

- Is the designer accredited?
- Is the installer accredited?
- What are their accreditation numbers? Will your system be designed and installed by an accredited individual?
- Check the list of accredited installers on the Clean Energy Council website to confirm www.solaraccreditation.com.au
- Contact the Designer/Installer's former customers to find out if the they were knowledgeable, easy to work with, and took the time to explain the systems operation. Also find out if their systems are working well, if there have been any problems, and, if so, if they returned to fix them. Ask for the Designer/Installer business references, and check them, especially if the company's reputation is unknown.

Experience

- How many systems has the Designer/Installer completed?
- How many systems similar to your system has the Designer/Installer completed?
- When was the last time the Designer/Installer completed a system? New products are constantly entering the market. A Designer/Installer who has completed several recent installations will probably be up-to-date on the newest products and the latest regulatory issues.

Quality of Products – Australian Standards

- Do the modules you use meet the Australian Standards? Check the Module List on the Clean Energy Council website to confirm - www.solaraccreditation.com.au
- Do the inverters you use meet the Australian Standards? Check the Inverter List on the Clean Energy Council website to confirm - www.solaraccreditation.com.au
- Do some research on the other balance of system components that your Designer/Installer suggests, such as the mounting hardware. Do the products meet industry standards?
- If you know of other people who have used these products, ask for their feedback: Are they satisfied? Have they had problems?

Warranties

- What kinds of warranties come with the products?
- Which warranties are your responsibility and which are the manufacturer's?
- How long have the equipment manufacturers been in the PV industry? Long warranties are meaningless if the manufacturers aren't around in five years.
- If you have to deal with the panel or inverter manufacturer in the future, do they have a Honiara office?

Service Agreements & Performance Guarantees

- What performance guarantees do you get for the system as a whole?
- How will you know if your system is performing to its maximum potential on a day to day basis?
- Does the Designer/Installer provide some kind of optional service agreement?
- If problems arise with your system, what services will the Designer/Installer provide and for how long?
- Will the Designer/Installer be readily available to troubleshoot and fix problems?
- If something goes wrong, who is responsible for repair or replacement costs?
- Who is responsible for maintaining the system?
- If you are responsible, what kind of training will the Designer/Installer provide?
- Will basic system safety issues be explained?

Paperwork

- Does the Designer/Installer handle organising all the necessary metering changes?

References

- Contact the Designer/Installer's former customers to find out if the they were knowledgeable, easy to work with, and took the time to explain the systems operation. Also find out if their systems are working well, if there have been any problems, and, if so, if they returned to fix them. Ask for the Designer/Installer business references, and check them, especially if the company's reputation is unknown.

Quote

- Does the price quoted include all the necessary metering changes and paperwork for SIEA?
- Does the quote include all labour, transportation and inspection charges?
- Does the Designer/Installer give an accurate estimation of system production with their quotes?

Payment Terms

- What are the payment terms?
- Is there a deposit? When is it required? Is it refundable?

Time Frames

- What is the lead time from your payment to getting electricity from your solar PV system?

The Final Decision

- By installing a solar PV system, you need to take responsibility for it and learn the basic safe operation and proper maintenance of your systems. You should think carefully before selecting a Designer/Installer. Online and mail-order solar PV system suppliers who never visit your home may have difficulty recommending the most appropriate equipment. A comprehensive, on-site solar and load analysis and two-way interview can help ensure a thoughtfully designed and well-planned installation.

What happens after my solar PV system has been installed?

Entering into agreement with SIEA

After your solar PV system has been installed, you will need to enter into an agreement with SIEA. A copy of this can be downloaded from the SIEA website: www.siea.com.sb

Questions to ask SIEA

- What is the cost of the electricity you purchase from SIEA (in cents per kWh)?
- What is the standby charge for solar panels and how will it be applied?
- Penalty clauses (termination costs)
- Billing / payment periods
- Are there any other administration fees?
- Do you organise all the necessary metering changes? If “yes”, the following questions apply:
  - What is the cost of your meter?
  - What is the cost of installing your meter?

Safety Inspections

Following the installation of your solar PV system, safety inspections will be carried out by SIEA. It is the responsibility of either you or your installer to organise these inspections with SIEA.

Dispute resolution

Disputes about the design, installation, operation and maintenance of your solar system are a matter between you and your Designer/Installer. SIEA will not be a party to any dispute over such matters.

Appendix

1. Clean Energy Council - *cleanenergycouncil.org.au/cec/resourcecentre/Consumer-Info/connecting-to-the-grid*
2. Clean Energy Council - *solaraccreditation.com.au/acccec/approvedproducts*
3. Office of the Renewable Energy Regulator - www.orer.gov.au
4. Office of the Renewable Energy Regulator - *www.orer.gov.au/sgu/index*
5. Office of the Renewable Energy Regulator - *www.orer.gov.au*
6. Department of Climate Change and Energy Efficiency
4. *www.climatechange.gov.au/government/initiatives/renewable-target/needret/solar-credits-faq.aspx*
7. Office of the Renewable Energy Regulator - *www.orer.gov.au*
8. Clean Energy Council - *solaraccreditation.com.au/acccec/approvedproducts/inverters*

Solar Power Consumer Guide

Some guidance in selecting a domestic solar power system.

Why Go Solar?

Solar energy can help save you money on your electricity bill by replacing some of you consumption from the SIEA power grid.

Solar power systems have no moving parts, are extremely reliable, and have a long expected life span. They are self-cleaning, easy to install and require very little in the way of maintenance.

Types of Solar Power Systems

There are two main types of solar power systems – grid-connect, and off-grid (or standalone).

A grid-connect system ensures that you have the electricity that you need whenever you need it automatically and regardless of weather conditions. This is because your property remains connected to the SIEA electricity grid which can then provide back-up at night and during poor daytime weather. SIEA charges for this standby backup service since it must reserve capacity on the grid for such occurrences.

An off-grid solar power system is completely separated from mains power and requires a battery bank for storing electricity that has been generated from the solar panels. This battery can then supply your property at night and during bad weather. It is the more expensive option, but must be used wherever the SIEA grid is not readily available.

This document will concentrate on grid-connected systems.

How a Grid-Connect Solar System Works

Most people in residential areas choose a grid-connect system, usually on the basis of price.

Electricity from the solar panels is converted (via an inverter) into AC power that is suitable for operating domestic appliances. Whenever the system produces more power than is being used, the surplus is fed back (exported) into the SIEA network. In certain circumstances, SIEA may require that there be no exported power into the grid. Note that SIEA does not pay you for any exported energy.

When your solar system is not producing energy (eg at night or in bad weather), your electricity needs are supplied from the SIEA grid.

The process is as follows:

1. Solar panels convert sunlight directly in direct current (DC) power.
2. The inverter converts the solar DC power into 240 volt alternating current (AC) power which is ready to use in your home or to export into the grid.
3. AC power from the inverter goes through your switchboard for use in your home.
4. SIEA's meter records the power supplied from the grid that is consumed in your home, and any power exported.
5. Any surplus power from your solar panels flows back into the SIEA grid.

Solar Power System Components

Solar panels

Solar panels come in different outputs and sizes. Normally solar panels are about one metre wide and 1.7 metres long. So a 3 kW system requires about 24 m^2 of roof space, and a 5 kW system needs around 40 m^2.

There are three types of solar cells used in panels.

Monocrystalline silicon offers high efficiency and good heat tolerance in a relatively small panel.

Polycrystalline (or multi-crystalline) silicon cell based panels are presently the most popular for residential systems. Technology improvements have meant that they can match the performance of mono-crystalline cells.

Amorphous (or thin film) cells use the least amount of silicon and are usually less efficient that other types.

Performance will vary between brands, even for the same technology used. For example, some perform better on hot days.

The cost of a solar panel is usually determined by its output capacity (watts), physical size, brand, durability, warranty period etc. As usual, you get what you pay for.

Solar inverters

Solar panels each produce low voltage DC power. The inverter converts this into the AC power needed for normal appliances.

The efficiency of an inverter is measured by how well it converts the DC into AC. This efficiency generally ranges from 95% to 97.5%. Inverters are sized according to the power that they supply (usually in kilowatts – kW).

Not all inverters are equal and efficiency has a significant impact on the time that your system will take to pay for itself. So, the more efficient the better as less power will be wasted as heat during the conversion process.

Inverters must comply with the relevant Australian Standards, or SIEA will not allow them to be connected to the grid.

Mounting systems

The mounting system is a crucial aspect of a solar array as it must withstand wind stresses from cyclones, and torsional stresses from earthquakes. Ask your supplier about certification and warranty periods.

Cables and connectors

Cabling is usually exposed to strong sunlight, and should be certified to PV1-F and the cable connectors should meet EN50521 standard. Ask your supplier.

Electricity meters

SIEA will install, at your cost, a bi-directional meter. This allows the measurement of power that is consumed from the grid, as well as separately measuring an exported power back into the grid. You will not be able to use any existing pre-pay meters or spinning disk meters.

Solar Panel Installation Factors

Your installer will make sure that the solar panels are positioned on your roof for maximum efficiency and safety, and are correctly wired to the inverter. They will take the following aspects into consideration.

Orientation

As Solomon Islands is in the southern hemisphere, solar panels should be facing as close to true north as possible. However north-west and west-north-west orientation can work if you use most of your power in the afternoon.

Tilting

Depending on location, the angle of panels should be between 20 degrees. This is not as important a consideration as orientation of the panels.

Shading

Your installer should position the panels for full sun between 9am and 3pm and not in shady areas. Shading from trees for example can cause a major reduction in production.

Mounting

The mounting system should be certified by an engineer for the Solomon Islands conditions. The system and brackets should be cyclone rated and wind certified. Ask you supplier for information on certification, warranty and documentation.

Grid-Connect Solar Power System Lifespan

Tests have shown that solar panels show output reductions in power output as the glass dulls, maybe after 20 years or so. Ask for the warranty period. Inverters are more sensitive and may only last 10 to 15 years in ideal conditions before needing refurbishment.

How Big a Solar System Will You need?

The size will depend on:

- Physical unshaded area for the panels
- The power that you want to generate
- Your budget

In general terms the more that the power generated matches what you will consume, the better the benefit. Remember that SIEA does not pay for exported power.

In Australia, the most common household system is rated at 1.5kW output. If you consume about 18 kWh (or units) per day, then a 1 to 2 kW system would reduce your power bill by 25-40% per day.

Remember that you can also have a positive effect on bill by conserving energy by using energy efficiency lights and appliances.

Solar Rebates

There are no solar rebates available in the Solomon Islands for the installation of these systems

Feed-In Tariffs

There is no feed-in tariff in the Solomon Islands. SIEA may require that no power be exported back into the grid in some circumstances.

Standby Tariffs

SIEA charges a daily fee for the connection of solar arrays to the grid. This is to ensure that there is adequate capacity reserved in the grid for providing backup supply for you in the event of bad weather or other similar situation when your solar system does not generate power.

Choosing a Solar Installer

You need to ensure that your system is installed by a suitably qualified person. Such people should have adequate training, follow industry best practice, adhere to the SIEA standards, and regularly update their skills and understanding.

Quotations and contracts

You should ask for a full system quotation including specifications, quantity, size, capacity and output of major components including:

- Solar panels
- Mounting system
- Inverter
- Travel and transport requirements
- Other equipment needed
- System user manual

The quotation should specify a total price which, with the other relevant documentation, should form the basis of your contract with the designer/ installer. Your should ask for the following to be included:

- Average daily electricity output estimate in kilowatt hours (kWh)
- An estimated annual energy production amount in kilowatt hours
- Estimated outputs during the most and least favourable months
- The responsibilities of the installer and the customer, including payment timings
- Warranty and guarantee details

- Who is responsible for connection to the electricity grid
- Who will arrange the meter change-over

Know What Questions to Ask

This system will be a substantial investment and you should find out the facts before committing

Questions for your installer

- Are you accredited in places other than the Solomon Islands
- How many systems have you installed previously
- Can you provide customer testimonials
- Do all of your products meet the Australian standards as required by SIEA

Questions for SIEA

- Will I move to a post-pay account – (normally Yes)
- Are there any other costs for connecting a solar power system
- What contract will I have to sign
- What will I be charged for replacing the meter
- How long will the process take

Some Additional Tips

- Ask around for other people's experience so you can avoid any problems
- Have realistic price expectations. Lower price doesn't always mean lower quality, but it is an indicator. Make sure you are getting the design, installation and the warranties that you expect.
- Shady roof areas don't make for efficient solar generation.
- Compare the components in package deals to make sure you are getting what you expect.
- Beware of hidden costs associated with metering, roof mounting, etc.
- Get a few quotes.
- Remember that warranties may not survive the departure of the installing company.

Shows accumulated exported energy <u>to grid</u> in kWh's

The EM1000 is SIEA's standard accumulation meter for residential properties with a solar PV system, and has the following features:

1 Pulse Indicator The light (LED) will pulse (on & off) when electricity is being consumed, and these pulses get faster as electricity consumed increases.

2 Scroll Button This button is used to scroll the register displays in the sequence that they have been programmed on the meter. Each press of the scroll button will show the next register display.

3 Display Register This is the display which shows the total electricity consumed, and for the smart power tariff, it will also display the electricity consumed for the different tariff rates. The meter is also programmed to display the time, date, and voltage, current and power factor.

4 Optical Port This is the meter's infrared (IR) device, where the authorised Western Power personnel download the data from the meter using an optical probe cable connected to a handheld unit (HHU).

5 Main Cover Seal The meters are sealed on the main cover at the manufacturing plant. This seal prevents unauthorised personnel from accessing the internal components of the meter.

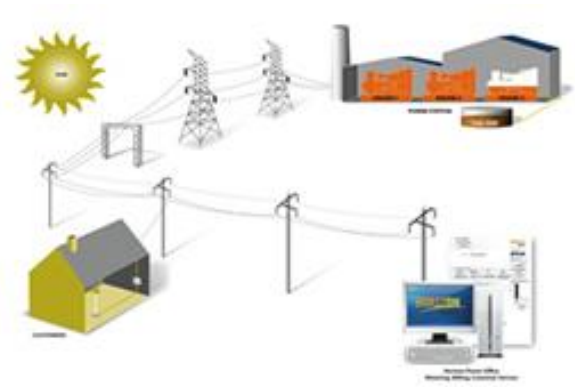
6 Serial Number Each meter is assigned with a unique individual serial number. The first four digits are the meter code followed by a six digit serial number.

7 Terminal Cover Seal The terminal cover is sealed by SIEA authorised personnel after the meter is installed and wired to the network supply.

Shows accumulated imported energy <u>from grid</u> in kWh's

How renewable energy works

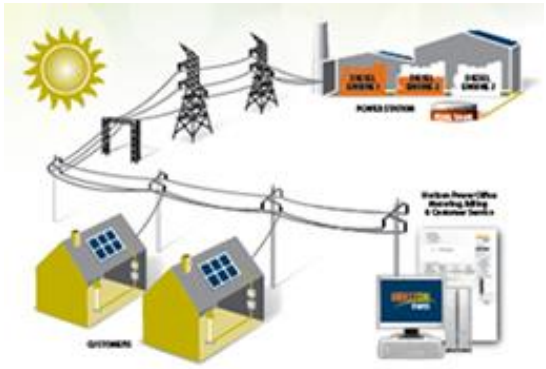
It may be helpful and interesting to have an understanding of how renewable energy works on our electricity system. This will give you an insight to our agreement and buyback price, eligibility rules, technical requirements and the significance of your town's hosting capacity.



Although it seems that electricity is available at the flick of a switch, it takes a lot of work and money to get power to your home or business.

SIEA generates electricity at a power station, distributes this across electricity networks to the meter box, makes sure the network meets safety and reliability standards and then retails this to customers.

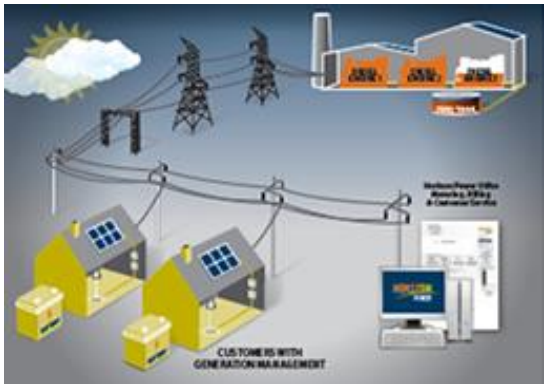
There are costs associated with all of these activities, which are partly recovered through the price customers pay for electricity.



As more homes install renewable energy systems, the demand on the power station decreases.

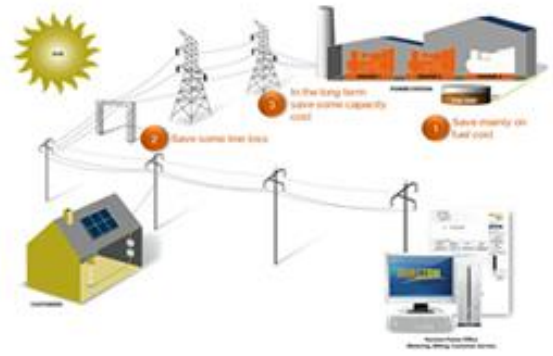
On bright sunny day, solar panels (photo-voltaic) generate electricity that can be used in the home, with any excess fed back to SIEA.

The power station now has to do less work to meet the electricity demand unless the daytime weather changes eg cloud cover.



Generation management devices (such as a battery with a controllable output), reduce the demand on the power station by providing short-term power to the electricity system when renewable energy installations stop generating electricity.

The generation management device will supply electricity for enough time to allow the power station to adjust to the increased electricity demand. The device will recharge from the solar panels until the device has sufficient energy stored to meet the renewable energy generation requirements.



When a cloud covers the sun, the houses with solar panels may reduce the amount of electricity they are generating.

This can place a very sharp demand on the power station which then needs to quickly compensate for the sudden loss in electricity generated by the solar panels. Any engines not operating will need to start generating power again. This takes time though and the power station may be unable to generate enough electricity to meet the demand on the network.

In this situation, the reliability and security of power supplies to all customers may be affected and customers may experience an unplanned power interruption.