

# Guidelines

## On The Connection Of Solar Photovoltaic Installation For Self-Consumption

## Registration Record

<b>Reg. No</b>	<b>Reg. Date</b>	<b>Issuance / Amendments</b>	<b>Date of Approval by Commission</b>

**ELECTRICITY SUPPLY ACT 1990**

**[Act 447]**

**GUIDELINES ON THE CONNECTION OF SOLAR PHOTOVOLTAIC  
INSTALLATION FOR SELF-CONSUMPTION**

**GP/ST/ No. 13/2017**

IN exercise of the power conferred by Section 50C of the Electricity Supply Act 1990 [Act 447], the Commission issues the following guidelines:

**Citation and Commencement**

1. These Guidelines may be cited as the Guidelines on the Connection of Solar Photovoltaic Installation for Self-Consumption.
2. These Guidelines shall come into operation on the date of registration of these Guidelines.

**Interpretation**

3. In these Guidelines, the terms used shall, unless otherwise defined in the Guidelines or the context otherwise requires, have the same meaning as in the Act, Regulation or Codes made under it. In addition, the following words and expressions shall have the meanings hereby assigned to them.

<b>Term</b>	<b>Definition</b>
<b>Act</b>	means the Electricity Supply Act 1990 (Act 447).
<b>Commission</b>	means the Energy Commission established under the Energy Commission Act 2001 (Act 610).
<b>Competent Person</b>	means a person who holds a certificate of competency issued by the Commission to perform work in accordance with the restrictions, if any, stated in the certificate.

<b>Connection point</b>	means the interface point on a consumer's installation with the Distribution Licensee's electricity distribution network.
<b>Consumer</b>	means an owner or occupier of a premises who is supplied or requires to be supplied with electricity by the Distribution Licensee.
<b>Distribution Licensee</b>	means the holder of a license to distribute electricity issued by the Commission under Section 9 of the Act
<b>Electrical Contractor</b>	means a person who holds a Certificate of Registration as an Electrical Contractor issued under Regulation 75 of the Electricity Regulations 1994.
<b>Electrical Work</b>	means any work performed or carried out on an electrical installation and includes the installing, constructing, erecting or repairing, the altering of the structure, the replacing of any of its parts, the adding of any part to it or the carrying out of any work for the purposes of its maintenance, but does not include work in relation to: (a) the manufacturing of an electrical installation or the assembling in the course of, or in connection with, its manufacture for the purpose of producing a new article; or (b) the oiling, greasing, cleaning or painting of an electrical installation.
<b>Electricity Distribution Network</b>	has the meaning as in Section 2 of the Act
<b>Indirect Connection</b>	means the connection of a renewable energy installation to a supply line indirectly through the internal distribution board of the consumer where the renewable energy installation is connected to an electrical point within the premises of the consumer instead of the point of common connection.
<b>Installation</b>	means the whole of any plant or equipment under one ownership or, where a management is prescribed, the person in charge of the same management, designed for the supply or use, or both, as the case may be, electricity; including prime movers, if any, with all necessary plant,

	building and land in connection therewith, pipe line, supply line, electricity supply infrastructure, domestic and non-domestic electrical installation and consuming apparatus, if any
<b>Net Energy Metering (NEM)</b>	means a mechanism where an eligible consumer installs a solar PV or other RE generation system primarily for his own use and the excess energy to be exported to the grid for which credit to be received that may be used to offset part of the electricity bill for energy provided by the Distribution Licensee to the electricity consumer during the applicable billing period.
<b>Non Stand-alone System</b>	means a system connected to the electricity utility grid.
<b>Private Installation</b>	means an installation operated by a licensee or consumer solely for the supply of electricity to and use thereof on the licensee's or consumer's own property or premises, or, in the case of consumer, taking electricity from a public installation or supply authority, for use only on the licensee's or consumer's property or premises
<b>Public Installation</b>	means an installation operated by a licensee for the supply of electricity to any person other than the licensee
<b>solar photovoltaic (PV) system</b>	means sunlight converted directly to electricity through a system which includes solar PV cells, modules, inverter, the associated protection and control devices, alternating current and direct current cable and other related devices up to the incoming terminal of the PV meter
<b>solar photovoltaic generation for self-consumption</b>	means electricity generated from solar PV system is entirely for own use and in the event of excess of generation, the energy is not allowed to be exported to the grid
<b>Stand-alone System</b>	means a system completely independent from any electricity utility grid.
<b>Supply Line</b>	has the meaning as in Section 2 of the Act

4. Any installation or extension to an existing installation likely to cause undue interference shall comply with Regulation 30 of the Electricity Regulations 1994 which stipulates that:

**Regulation 30** : “Power of Commission to make adjustment or alteration to installation.

When an installation is found likely to cause undue interference with the supply of electricity to other consumers or other installations, the Commission may require the consumer, occupier or management of the installation to make adjustments or alterations to the installation or the operation of the electrical system to such an extent, as he considers necessary, to rectify the situation.”

5. Any person who installs electrical equipment or apparatus shall comply with the Section 33C of the Act which stipulates that:

**Section 33C (1)**: “A competent person or a person under the control of a competent person who undertakes to carry out electrical work shall ensure that such electrical work complies with any regulations made under this Act, the electrical infrastructure safety code or non-domestic electrical installation safety code, as the case maybe, or in the absence of such regulations or codes, with standards and prudent industry practices as may be determined by the Commission.

**(2)**: The person undertaking electrical work under subsection (1) shall ensure that such work shall not cause electricity related injury to any person or damage to any property.”

### **Purpose of these Guidelines**

6. These Guidelines describe the registration procedures, the specification and requirements of solar photovoltaic (PV) system installation for self-consumption that shall be complied by any person who uses, works, operates or installs such installation.
7. The procedures and requirements are as in **ANNEX 1**.

## Application of these Guidelines

8. These Guidelines shall apply to:
  - i. any person who uses, works or operates any solar PV generating facility for self-consumption and indirect connection to the licensee distribution network in Peninsular Malaysia and Sabah; and
  - ii. the relevant Distribution Licensee (DL) whose network is to be connected with the self-consumption solar PV generating facility.

## Notice by the Commission

9. The Commission may issue written notices from time to time in relation to these Guidelines.

## Amendment and Variation

10. The Commission may at any time amend, modify, vary or revoke these Guidelines.

**Dated:** 19 April 2017



**DATUK IR. AHMAD FAUZI BIN HASAN**  
Chief Executive Officer  
for Energy Commission

## **ANNEX 1 - Connection of Solar Photovoltaic Installation for Self-Consumption**

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### **Attachment 1 - Self-Consumption Solar PV System Registration Form**

## **1.0 General requirements**

1.1 The use of solar photovoltaic (PV) panel systems has grown significantly in Malaysia since the Feed in Tariff (“FiT”) mechanism been introduced under the Renewable Energy Act 2011. Under the FiT mechanism, a successful bidder will be awarded with FiT certification based on dedicated selling rates for supplying the energy to the grid. Since the FiT quota is reducing and it is expected to end by 2017, the government is encouraging individual, commercial and industrial consumers to install solar PV for their own consumption, looking to hedge against the rising cost of electricity.

1.2 The consumer or Electrical Contractor involved in the installation and commissioning of the solar PV system for self-consumption can make use of these guidelines for:

- i. understanding the solar PV system requirements;
- ii. reference to installed capacity, plan, design and commissioning of the installation;
- iii. reference to registration procedures with the DL; and
- iv. reference to licensing requirements.

## **2.0 Obligations of the Consumer**

2.1 As an individual or commercial premise consumer who decides to install the solar PV system for self-consumption, it is advisable to do some due diligence on the following items:

- i. understand the electricity consumption of your premises or businesses and choose the right size system for your needs. The six-monthly consumption profile will determine the viability of solar PV system and will help you decide on the appropriate size of the system;
- ii. understand the electricity tariffs since the decision for investing in a solar PV system will depend on what electricity tariffs been imposed by the DL’s company and how these may change once the solar PV system is installed;

- iii. find a solar PV installer with competency certified by the Commission and make sure the installer has the relevant experience in designing, constructing and commissioning the system;
- iv. survey and make comparison on the products to be purchased and workmanship guarantees since there is a diverse range of products on the market; and
- v. engage with the Sustainable Energy Development Authority (SEDA) early to understand grid connection requirements if the consumer intends to participate in Net Energy Metering Scheme.

### **3.0 Finding a solar PV Registered Electrical Contractor**

3.1 Finding the right person or company to manage the design and installation of the solar PV system is important. Although there is no physical difference between PV panels installed on residential and commercial properties, installation and inverter requirements can be quite different. So, it is important to ensure that your installer has the relevant experience for the system size.

3.2 Solar PV systems come with some responsibilities for the consumer including learning the basic safe operation and maintenance of the system by checking the overall cabling and cleaning of PV modules on yearly basis. A comprehensive, on site solar and load analysis and two-way interview can help ensure a thoughtfully designed and well planned installation.

3.3 The registered Electrical Contractor will tailor the PV system based on how much electricity to be offset and the physical properties of the premises by:

- establishing the consumer electrical loads over an average day using a load analysis;
- determining the type of panels;
- determining the size of solar PV system;
- deciding the type of inverter;

- establishing the location of solar panels in relation to angles; and
- advising on the local planning authority and building permits requirements.

#### **4.0 Technical Requirements for Solar PV System Installation**

##### **(a) Installed Capacity**

4.1 For a stand-alone system, there is no capacity limit for solar PV system installation for self-consumption purposes.

4.2 For a non-stand-alone system, the capacity limit for solar PV system installation shall be lower than seventy-five per cent (75%) of the maximum demand of the consumer's existing installation.

##### **(b) Plan and Design**

4.3 As the connection is done internally, the consumer shall appoint a qualified Electrical Contractor to design the solar PV system interconnection.

4.4 All drawings, plans, and specifications shall be approved by a suitably qualified competent person. No substantial amendment and modification shall be made to the plan and specification unless such amendment and modification has been approved by the said competent person.

4.5 Notwithstanding item 4.4, the consumer is to engage a DL's registered company to conduct a Power System Study (PSS) for the solar PV system with a capacity of 425 kW and above. The PSS report shall be presented to the DL for endorsement with the following technical requirements including but not limited to:

- a) general description of the electrical supply system and connection of solar PV system;
- b) analysis on load flow;
- c) analysis on short circuit (fault level will be provided by the DL);

d) analysis on different scenarios as below:

- with solar PV system under maximum and minimum load;
  - without solar PV system under maximum and minimum load;
- and

e) proposal on the controlling and operating philosophy for electrical system

4.6 A certified copy of the drawings, plans and specifications including any subsequent approved amendments and modifications, shall be kept by the consumer for reference.

(c) Connection Requirements

4.7 For self-consumption purposes, the consumer and registered Electrical Contractor are responsible to ensure there is no electricity generation export to the grid and the system does not adversely impact the quality of supply from the DL. The following requirements shall be adhered by the consumer and registered Electrical Contractor:

- i. purchase and install the appropriate functionality within the inverter with the capability of but not restricted to zero rated energy to grid and generation controller not to exceed the load demand, use of external device or energy storage to mitigate the export of excess energy from consumer's solar PV system to the DL's network;
- ii. ensure that the size and specification of the wiring from the PV arrays to the Main Switch Board (MSB) or Distribution Board (DB) is suitable and correct to guarantee the deliverability of the energy flow to the consumer's system;
- iii. ensure that the solar PV system does not adversely impact the quality of the DL's supply by complying to the standards on voltage, flickers, frequency, harmonics and power factor;

- iv. ensure that the DL company has access to the consumption meter (DL's meter) and solar PV meter at any time required by the DL; and
- v. Label shown below shall be clearly placed at the DB to remind the operator that the device should be access cautiously as there could be an energised part that comes from the indirect solar PV system.



- vi. inform in writing officially to the DL whenever the consumer intends to close or terminate its account.

(d) Testing and Commissioning

4.8 The testing and commissioning works shall be performed by a suitably qualified competent person and shall comply with:

- i. the requirements under Electricity Supply Act 1990 and the Electricity Regulations 1994;
- ii. the plan and specification as mentioned in paragraph 4.2 and including any subsequent approved amendments and modifications; and
- iii. such other requirements imposed by any other written law relating to the construction and installation of the generating facility.

4.9 Upon completion of the installation work, the installation shall be tested by a suitably qualified competent person, and who shall certify a Completion Certificate and Test Certificate (in Form G and Form H as prescribed in the First Schedule, Electrical Regulations 1994) for the installation and submit a

copy of the said certificate to the DL for registration purposes. (Please refer to Item 7.0)

4.10 In the event that the building or premises ownership does not belong to the consumer of the solar PV system installation, it is advisable to establish an agreement with the landlord, building owner or joint management body (JMB) as part of the lease or rental term. This agreement should determine the responsibilities of both consumer and landlord, building owner or JMB in installing and maintaining a solar PV system. Please take note that as solar PV system is long-term investment and may involve some renovations or changes at the building, it can be difficult for the solar PV system's consumer to secure landlord's permission and long term finance arrangements if necessary precautions measures are not in place.

## **5.0 Compliance with government policies and laws of Malaysia**

All parties that are subject to these guidelines shall ensure that they comply at all times with the applicable laws of Malaysia in particular the Act and Regulations.

## **6.0 Licensing requirements**

For solar PV system installation above 24kW for single phase and 72kW for three phase, any person who uses, works or operates the installation shall require a licence as stipulated under the "Guidelines on Licensing Under Section 9 of the Act".

To know more about the guidelines, visit:

<http://st.gov.my/index.php/en/policies/guidelines>

## **7.0 Registration of the Installation with the Distribution Licensee**

7.1 The consumer of the solar PV system is required to register the installation with the DL by submitting the following documents:

- i. Self-Consumption Solar PV System Registration Form;

- ii. a certified copy of the drawings, plans and specifications including any subsequent approved amendments and modifications by the suitably qualified competent person;
- iii. a PSS report endorsed by DL subsequent to the PSS presentation under item 4.5; and
- iv. Completion Certificate and Test Certificate for the installation shall be in Form G and Form H as prescribed in the First Schedule, Electrical Regulations 1994.

## **8.0 Connecting to the Grid under Net Energy Metering Scheme**

8.1 For those who are interested to participate in the Net Energy Metering scheme that allows the consumer of the solar PV system to export the excess energy generated from the installation to the DL's network, please refer to "Guidelines for Solar Photovoltaic Installation on Net Energy Metering Scheme" which is downloadable at:

<http://st.gov.my/index.php/en/policies/guidelines>

## **9.0 Provision of Information to the Commission**

Upon request, the consumer of the solar PV system shall furnish to the Commission in such manner and at such times as the Commission may require, such documents, accounts, estimates, returns, reports and other information as the Commission deems necessary.

## **10.0 Suspension**

10.1 The Commission may, upon service of written notice to the consumer, suspend the operation of the solar PV system upon the occurrence of the following events:

- i. if the consumer has failed to comply with the recommendations from any Electrical Services Engineer, Competent Electrical Engineer or

Electrical Supervisor on the defects in the installation which is likely to cause danger;

- ii. if the consumer has failed to comply with or is in breach of any condition of its license, and has failed or neglected to remedy the same after the consumer has been requested to do so by the Commission;
- iii. if the consumer has failed to comply with any directive or order or notice given in writing pursuant to the Electricity Supply Act 1990.

10.2 When the operation of the solar PV system is suspended pursuant to Paragraph 10.1 above, the consumer shall not be entitled to any payment or compensation from the Government for any loss or damage that may have occurred, incurred or suffered by the consumer.

10.3 The period of any suspension imposed shall be determined by the Commission. The suspension shall cease as soon as the breach has been remedied by the consumer and the Commission shall certify the same.

## Attachment 1 - Self-Consumption Solar PV System Registration Form

PART 1: INFORMATION	
<ul style="list-style-type: none"> <li>• Please submit the registration form to the Distribution Licensee before commissioning the solar PV system installation.</li> <li>• Consumer shall comply with “Guidelines on the Connection of Solar Photovoltaic Installation for Self-Consumption”.</li> <li>• Consumer need to conduct PSS for solar PV system with capacity <math>\geq 425\text{kW}</math>.</li> <li>• Applicant need to apply for a generating licence from Energy Commission for a single phase system with capacity <math>\geq 24\text{kW}</math> or single phase system with capacity <math>\geq 72\text{kW}</math>.</li> </ul>	<p><b>For office use only:</b></p> <p><b>Reference No:</b> _____</p> <p><b>Serial No:</b> _____</p> <p><b>Date Received:</b> _____</p> <p><b>Time Received:</b> _____</p> <p><b>Receiving Officer:</b> _____</p>
PART 2: CONSUMER INFORMATION	
<p>Applicant Name: _____ IC/ROC Number: _____</p> <p>Electricity Bill account number: _____</p> <p>Distribution Licensee Company: _____ (e.g. TNB, SESB, etc.)</p> <p>Email address: _____ Phone Number: _____</p> <p>Mailing Address: _____</p> <p>_____</p> <p>I hereby authorize the Competent Person as described in PART 4 to act on my behalf to manage my Self Consumption (SelCo) registration</p> <p>Signature: _____ Date: _____</p>	
PART 3: ALTERNATIVE CONTACT PERSON	
<p>Name: _____ IC Number: _____</p> <p>Relationship: _____</p> <p>Email address: _____ Phone Number: _____</p> <p>Mailing Address: _____</p> <p>_____</p>	
PART 4: COMPETENT PERSON (ELECTRICAL CONTRACTOR) DETAILS	
<p>Name: _____ IC/ Certification No.: _____</p> <p>Company Name: _____ Company ROC No: _____</p> <p>Phone Number: _____ E-mail address: _____</p> <p>Mailing Address: _____</p>	

**PART 5: SERVICE PROVIDER DETAILS (IF ANY)**

Name: \_\_\_\_\_ IC/ Certification No.: \_\_\_\_\_  
Company Name: \_\_\_\_\_ Company ROC No: \_\_\_\_\_  
Phone Number: \_\_\_\_\_ E-mail address: \_\_\_\_\_  
Mailing Address: \_\_\_\_\_

**PART 6: CONSUMER INFORMATION**

Installation Address: \_\_\_\_\_  
\_\_\_\_\_

Installation Site Ownership:  Fully Owned  Owned (charged to bank)  Leased

If not fully owned, please provide the owner's name:  
\_\_\_\_\_

Is the applicant an existing FIAH? :  Yes  No If yes, please provide the existing solar capacity installed(kW) \_\_\_\_\_

Voltage at point of common coupling:  Low Voltage (230V/400V)  Medium Voltage (11kV/33kV)  
@Utility meter

Reasons for installing solar PV system  Reduce electricity bill  Peak Shaving  
 Reduce Green House effect Other reasons: \_\_\_\_\_

Installation Type  Farm  Roof (Domestic)  
 Roof (Commercial)  Garage  
 Others: \_\_\_\_\_

**PART 7: TECHNICAL INFORMATION**

- a) Maximum demand of existing installation \_\_\_\_\_ kW
- b) Installed Solar PV Capacity \_\_\_\_\_ in kW<sub>p</sub> c) \_\_\_\_\_ in kW<sub>ac</sub>
- d) Expected generation per month \_\_\_\_\_ kWh
- e) Date of Commissioning of solar system: \_\_\_\_\_ (dd/mm/yyyy)
- f) Installation of Battery Energy Storage System:  Yes  No If yes, Battery capacity \_\_\_\_\_ kW  
Battery Manufacturer: \_\_\_\_\_
- g) Daytime Peak Demand (11am to 3pm) \_\_\_\_\_ kW (Friday to Monday)
- h) Daytime Lowest Demand \_\_\_\_\_ kW

Note: For stand alone system, no capacity limit for solar PV system installation.  
For non stand alone system, solar PV system installed capacity shall not be more than 75% of maximum demand.

**PART 8: PHOTOVOLTAIC (PV) INSTALLATION INFORMATION**

a) PV Module : i) Type: Monocrystalline  Polycrystalline  Thin Film   
Others: \_\_\_\_\_

: ii) Manufacturer \_\_\_\_\_

: iii) Module capacity \_\_\_\_\_

b) PV Inverter i) Number of inverter installed \_\_\_\_\_

ii) Inverter capacity \_\_\_\_\_

iii) Type: Single Phase  Three Phase

iv) Manufacturer \_\_\_\_\_

v) Power Factor:  \_\_\_\_\_ lagging  \_\_\_\_\_ leading  unity

**PART 9: DECLARATION**

By signing this form, I declare that:

- I am representing the applicant of the premise and the information furnished above is true to my knowledge and belief.
- I hereby acknowledge that all information given are true and the relevant Authority shall have the right to take any action if the above information is false.
- I confirm that the solar PV system design comply to the standards (IEEE 1547, IEC 61727, MS 1837, Guidelines on the Connection of Solar Photovoltaic Installation for Self-Consumption) and the inverter (s) used are as per approved lists.
- I also verify that the site condition is fit for installation of the solar PV system as per applicable regulations.
- I further agree to comply with the specifications, terms and conditions stipulated in the applicable guidelines and related regulations, as amended from time to time.

Signature :

Competent Person stamp:

Name: \_\_\_\_\_

Date: \_\_\_\_\_



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