



Solar Photovoltaic Plug into the Sun (Part 3)

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Source: Bukit Damansara, 4.2 kWp, Kuala Lumpur, Malaysia.

This is the final of the 3-part series on solar photovoltaic. Part 1 focused on the background of solar photovoltaic, policy mechanism and market condition while Part 2 focused on photovoltaic technologies and their different applications. The concluding series will focus on the practical issues concerning installing solar photovoltaic for both the end-users and those interested in venturing into solar business in Malaysia.

Out of curiosity, an informal survey was carried out in Malaysia to find out the reasons why building owners install solar PV systems in their homes or office buildings. The survey showed that owners do so to: (i) Leverage on existing government incentives for solar PV; (ii) For retirees, having a BIPV house will help to hedge against future electricity price increase; (iii) Environmental consciousness; (iv) For home buyers, having a BIPV house will help create a point of differentiation by being a clean micro IPP (independent power producer); and (v) For commercial entities, the installation of PV systems in the buildings helps create an image of corporate social responsibility.

HOW MUCH DOES IT COST?

One of the frequent questions raised is the cost of installing grid-connected building integrated photovoltaic (BiPV) systems. Globally, the prices of PV modules have seen a decline

over the past two years. This is largely due to the economic crisis which forced some key markets to revise their policy mechanism to accommodate their national budget.

In Malaysia, we have recorded a steady decline of BiPV pricing (refer: www.mbipv.net.my/content.asp?zoneid=4&categoryid=12). As of December 2009, the average cost of a grid-connected PV system (based on standard PV module) is RM 20,000 per kWp \pm 10%. 65 to 70 per cent of the total cost is on PV modules, inverter accounts for 10 to 15 per cent of the total cost and the remaining cost is for the balance of system (BoS), design and installation fees and typically one year warranty on workmanship from PV service provider. Balance of system covers cabling (ac and dc), junction boxes, switches (ac and dc), fuses, surge protection devices and mounting structure. This price is expected to vary with the types of modules (standard or customized), the size of PV system (larger system can achieve economies of scale), complexity in installation and local condition (e.g. windy, proximity and ease to delivery).

APPROVED PHOTOVOLTAIC SERVICE PROVIDER

If you are interested in installing a PV system for your home or commercial building, it is strongly recommended that you contact an Approved PV Service Provider (APVSP). Companies listed with MBIPV Project as APVSP must comply with requirements to reduce the risk of potential PV buyers. This includes the requirement for companies to have at least an employee who has passed the rigorous exam for grid-



Service Provider should advise customers of any potential shading which will affect the performance of PV system.

connected PV training (ISP). This is to ensure companies have theoretically competent designers and installers for grid-connected PV systems.

The list of APVSP with their ratings can be found in www.mbipv.net.my/rating.asp?zoneid=10&categoryid=61. When you contact an APVSP, a good APVSP should: (i) Respond to your enquiry within 48 hours; (ii) Explain how a PV system works, the concept of net metering for direct and indirect feed, expected energy output and the Ringgit Malaysia equivalent based on existing tariff; (iii) Advise you on any possible shadowing affecting the performance of PV system (e.g. growing trees, new construction site); (iv) Advise you on the fire and theft insurance to cover your PV system; (v) Conduct at least one site visit before producing a quotation. Once the quotation is presented to the customer, the APVSP will explain about the quotation, what can be expected during pre-installation, installation and post-installation of the PV system, the warranties of equipment and workmanship, the operation and maintenance (O&M) of the PV system; (vi) Do not criticise the workmanship or system design of another APVSP.

WHAT SHOULD THE QUOTATION FOR A SOLAR PV SYSTEM INCLUDE?

The quotation from the APVSP should minimally include: (a) full specifications of the system offered (quantity, manufacturer, model number of the solar modules & inverter including the IEC or related standards complied with); (b) warranty information for each item; (c) minimum one year

warranty on installation workmanship of the system; (d) a firm quotation which includes all equipment and installation charges and services during the warranty period; (e) PV module and inverter authorization for channel distributor or reseller ship; (f) an estimate quotation for call-out services after the first 12 months warranty period on workmanship has expired; (g) validity period of quotation; and; (h) importantly, the quotation should be accompanied by an estimate of the yearly energy output of the system. If the output from the installed PV system should fall consistently below the estimated output, the client should request the APVSP to investigate and account for the lower than expected energy output.

GUIDELINES FOR SALES CONTRACT FOR SOLAR PV SYSTEM

Each sale of solar PV system should result in a formal contract between the customer and APVSP. This will save some headache during implementation especially when contract and work schedule or plan is completely missing. The contract should be signed once the customer has decided to purchase the PV system that should include supply, installation and commissioning of the solar PV system with a copy retained by the customer and the other by the APVSP. Apart from the relevant terms in the sales quotation, the contract should also include materials delivery and progress payment schedule, the customer's and the APVSP's rights, changes to specifications, agreed penalty charges (if any) for clauses

SPECIAL FEATURE

pertaining to early termination of contract, delayed delivery, damaging of owner's properties and injury resulting from lack of safety measures taken during installation.

DURING THE INSTALLATION OF THE PV SYSTEM

A good APVSP should update the customer on regular basis the progress of the installation and ensure a safe working environment for customer as well as workers. The APVSP should ensure that their workers who are responsible for the roof and structural installation work possesses current CIDB Green Cards (as applicable) and only engage electricians with valid wireman certificates and should follow all the requirements of MS 1837: 2005 on Installation of Grid Connected Photovoltaic (PV) System. After the installation is over, the APVSP should test to ensure there is no roof leakage and to leave the premise in a tidy order. If there is any damage to the property and the customer is able to prove that there is an element of negligence, then the APVSP shall repair any damages to the property.

TESTING AND COMMISSIONING (T&C) OF THE SYSTEM

Once the PV system has been installed, the system is ready to go "live". Before the PV system is commissioned, projects which are co-funded by MBIPV Project will require the APVSP to submit three types of forms: one for MBIPV Project, power utility (TNB) and Suruhanjaya Tenaga (Energy Commission) at least three weeks before the proposed T&C. The PV System owner or representative, APVSP, Mounting Structure Quality Control Centre (MSQCC represented by IKRAM) and PV Monitoring Centre (represented by UiTM) must be present during the T&C. The APVSP shall explain to the customer the equipment installed including interpreting the PV meter.

AFTER THE PV SYSTEM HAS BEEN COMMISSIONED

For projects co-funded by MBIPV Project, the APVSP is required to submit the T&C report to MBIPV Project within three weeks. The APVSP should follow up with the customer to verify satisfactory performance of the system installed and its performance against the declared performance for at least the first 12 months. The APVSP should respond to after sales service calls within 24 hours and provide support when a product fails under warranty that will include liaising with the manufacturer or equipment agent on behalf of the customer. The APVSP should attempt to solve all complaints in a professional manner to avoid the complaint being formerly lodged to the Quality Assurance Scheme (QAS) Secretariat (MBIPV Project). MBIPV Project will randomly audit BIPV sites (which received financial incentives under the Project) and will inform the APVSP with a copy of the report to the customer on any corrective measures to the PV system. PV Systems receiving funding from SURIA 1000 will be monitored on monthly basis for three years. The PV Monitoring Centre will



contact the customer to arrange for a method most suitable for the PV meter recording. The performance of your PV system can be viewed at <http://pvmc.uitm.edu.my/pvmc/> between one to two months after T&C. The website will also be able to show how well your PV system is performing. On six-monthly or annual basis, arrange with your PV Service Provider for a scheduled system inspection (electrical connections, any rust on racking system, fuses, condition of conduit, clippings). The cost of inspection for the first 12 months should be part of the sales contract. Customer is advised to keep a log book to record each PV Service Provider's visit and if your surroundings are dusty (eg located next to construction site), follow the instruction from the manufacturer to remove dirt from the PV modules.

IF YOU SUSPECT YOUR PV SYSTEM IS FAULTY

If any failure occurs during the 12 month warranty period then the customer should attempt to diagnose the problem with guidance over the phone by the APVSP. If the diagnosis is not successful, then the APVSP is obliged to inspect the PV system to determine the fault and then rectifying as soon as possible. The cost for the APVSP in providing this service (ie cost incurred in removing, returning and then re-installing the product) should either be paid for by the manufacturer or by the APVSP. If the failure is after the warranty period, then the customer should attempt to diagnose the problem with guidance over the phone by the APVSP. If the diagnosis is not successful, then the APVSP is obliged to inspect the PV system to determine the fault and then rectifying the fault as soon as possible. A fair price should be quoted to the customer for the call-out as per agreed in advance. If equipment is still under warranty the cost should just be for the time spent travelling to/from site and onsite when undertaking the replacement (or repairs) of equipment unless this will be paid by the manufacturer. ■

This concludes the 3-part series of articles on "Solar Photovoltaic – Plug into the Sun". The materials and references for this series can be found at www.mbipv.net.my. If you have any comments, please e-mail to weinee@mbipv.net.my