

SUCCESS STORY

5.405 kWp YINGLI POLYCRYSTALLINE GRID CONNECTED PV SYSTEM STUDY

AN INDEPENDENT STUDY BY THE
UNIVERSITI TEKNOLOGI MARA (UiTM)
GREEN ENERGY RESEARCH CENTRE

Shah Alam,
Malaysia



INSTALLATION

Project	5.405 kWp Yingli Polycrystalline Grid Connected PV System Study
Capacity ¹	5.405 kW
Type of Module	Yingli YGE 235
System Commissioned	March 2011
Period of Research	July 2012 to September 2015
Owner	Green Energy Research Centre (GERC), Fakulti Kejuruteraan Elektrik, Universiti Teknologi MARA (UiTM)

TECHNICAL SPECIFICATIONS

Array Configuration	String 1: 12 units module String 2: 11 units module
Inverter	SMA Sunny Boy: 1 unit Single Phase STP5000TL-20
Annualised Energy Yield	1269 kWh/kWp

YINGLI POLYCRYSTALLINE MODULE PERFORMS IN LATEST GRID-CONNECTED STUDY

The Green Energy Research Centre (GERC) is a centre of excellence (CoE) established under Faculty of Electrical Engineering, Universiti Teknologi MARA (UiTM), Malaysia. It was established in August 2011 with the aim of becoming a leading green energy consultancy-based centre in ASEAN region, particularly research and development in areas of photovoltaic systems and other renewable energy technologies.

Dr. Ahmad Maliki Omar, Head of GERC research team led the study on the performance of Yingli’s YL235P-29b photovoltaic panels in the urban tropics and has published its performance analysis on the university’s GERC website.

The Polycrystalline Photovoltaic (PV) panels have commonly been used from rooftop mounting for residential and commercial projects to ground installation in solar farm. Although the Polycrystalline modules are less efficient than Monocrystalline modules, they are still a more popular choice if the variant of solar efficiency is not intrinsically worse of and if the cost is much lower for an initial investment.

Therefore, to determine what is important when choosing a Polycrystalline module, an investor will need to consider the quality of the module and its efficiency which translate to the cost and performance to attain the quickest return on investment over time.

SYSTEM CONFIGURATION

The 5.405kWp Polycrystalline PV solar system is located in Shah Alam, Selangor (3° N, 101° E) under the equatorial rainforest climate, fully humid and has been in operation since July 2012. The system set up comprises 2 strings (12 & 11 modules/ string) connected to a single phase SMA inverter. Yingli panels are mounted directly on retrofitted metal deck rooftop of a parking space at the Green Energy Research Centre with an inclination of 10°, facing South-East.

PERFORMANCE ANALYSIS

A SMA data logger inverter is used to provide the recordings through high resolution data at 5 minute intervals from the period from July 2012 to September 2015. With an average daily Peak Sun Hour (PSH) of 4.43, the Actual Energy Yield is at 571.58 kWh/month and Specific Yield at 105.75 kWh/month per kWp giving a monthly Performance Ratio (PR) of 0.785. This is within the average ratio of 0.78 to 0.80 by industry standards. The results shows a considerable good correlation between specific energy yield and solar Peak Sun Hour (PSH) given Malaysia's tropical weather of sunny, rain and cloudy conditions.

PSH

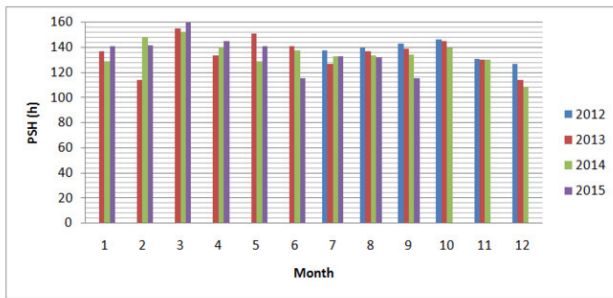


Figure 1. Peak Sun Hour, Ahmad Maliki Omar, 'Summary of Performance Analysis', http://gerc.uitm.edu.my/gerc/GCPV_yingli/Report%20summary.html, accessed 26 Oct. 2015.

POLYCRYSTALLINE MONTHLY ENERGY (kWh)

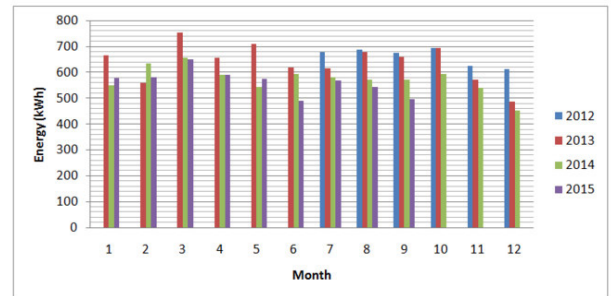


Figure 2. Polycrystalline Monthly Energy, Ahmad Maliki Omar, 'Summary of performance Analysis', http://gerc.uitm.edu.my/gerc/GCPV_yingli/Report%20summary.html, accessed 26 Oct. 2015.

SPECIFIC YIELD (kWh/kWp)

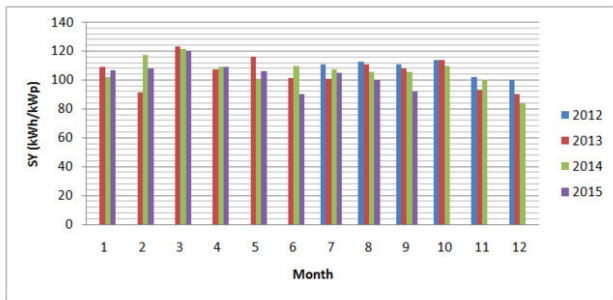


Figure 3. Specific Yield, Ahmad Maliki Omar, 'Summary of Performance Analysis', http://gerc.uitm.edu.my/gerc/GCPV_yingli/Report%20summary.html, accessed 26 Oct. 2015.

PERFORMANCE RATIO

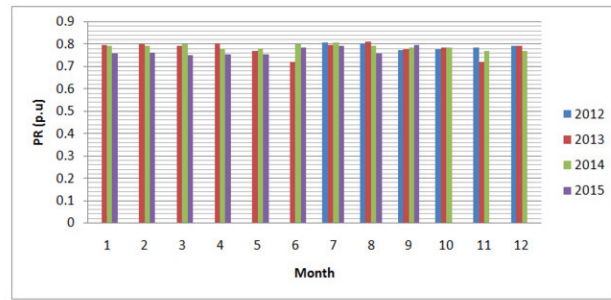


Figure 4. Performance Ratio, Ahmad Maliki Omar, 'Summary of Performance Analysis', http://gerc.uitm.edu.my/gerc/GCPV_yingli/Report%20summary.html, accessed 26 Oct. 2015.

¹On 8th November 2013, total array power was reduced from 6.11kWp to 5.405kWp

KEY BENEFITS OF THE SYSTEM

- Tested and proven by an independent institution under the Green Energy Research Centre (GERC), Fakulti Kejuruteraan Elektrik, Universiti Teknologi MARA (UiTM).
- Using a datalogged inverter, the data provided show that Specific Yield to be 105.75 kWh/month per kWp.
- The monthly Performance Ratio (PR) is 0.785 which is within the average ratio of 0.78 to 0.80 by industry standards.
- Suitable for tropical weather of sunny, rain and cloudy conditions such as Malaysia.
- Proven long-term performance of Yingli polycrystalline technology ensures ongoing high energy yields.
- Yingli panels' unique ability to perform well in varying temperature, high humidity and cloudy conditions.
- Yingli modules have an outstanding price/performance rate and a higher output power than expected.

IN CONCLUSION

In view of choosing a good solar panel, it is important to ensure that the solar panel performance is according to or better than what is claimed by the manufacturers. With higher conversion efficiency in converting light into electrical energy; this determines how much power a solar system generates which helps to ensure economic paybacks of the power produced.

With the pursue to innovate and providing top quality solar panels through research and development, Yingli Solar now offers Polycrystalline 60 cell with power output ranging from 250W to 270W while Polycrystalline 72 cell with power output ranging from 300W to 320W. Yingli Polycrystalline modules are ideal for all solar applications including residential, commercial and solar farm projects.