2011 Photon Field Performance Test Results Internal Q&A
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Q1. What is the Photon Field Performance Test?

A1. The Photon Laboratory has since 2005 conducted yield performance tests comparing international module brands over several years. The test helps consumers select suppliers based on product performance i.e. measured power output in real world conditions. Three modules from each supplier are included (note that one serves as back-up only). The results are published in the February issue of Photon Profi. The results will be included in the International and other language editions of Photon in February. More information is available in our fact sheet and on our website.

Q2. Who is Photon?

A2. Photon magazine is the leading trade magazine focusing on solar founded in 1996. The test is conducted by the independent Photon Laboratory based in Germany that is part of the Photon group of companies. The laboratory measures the performance of modules from different manufacturers at their outdoor test location just outside Aachen, Germany. The Photon Test is currently the most recognized field performance test, comparing international solar module brands over several years, during different seasons and in different light conditions. The collection of data is fully automated. Data collected is checked against data on weather conditions to ensure accuracy. Photon collects the modules used in the test from manufacturers who pay to participate. Scientific methodology is used to ensure the independence of the results.

Q3: What does the test measure?

A3: The Photon Field Performance Test measures the energy yield that is how many kilowatt hours of energy per kilowatt STC power a module generates during one year in real world conditions in the field in Germany. Since 2011 the test measures the performance ratio as well that is the amount of solar energy produced in relation to the solar radiation measured at the site throughout the test period. The test results show the bankability of REC modules as additional output allows the consumer to more quickly see a return on their investment.

Q4 Which REC module was tested?

A4: The REC 230AE module was tested. This module was installed on the test field in January 2010. Note also that in February 2011 the REC 230 Peak Energy and the Premium 210 modules. Premium 210 was the name of the REC AE before it was renamed in 2009. Due to installation delays these two modules are not part of the 2011 Photon test ranking. Their performance is published has been published in the Photon magazine since April 2011 in a separate (late comers) table. For the REC 230 Peak Energy modules we have performance data for the period from February – December 2011. During this period the module produced 1,1% more power than the REC 230AE module. **Our latest generation solar module is producing more power than our test winning module, REC AE.**

Q5 How did the REC module perform?

A5: The REC 230AE module generated more electricity than 37 other leading module manufacturers with in total 46 modules in the test **producing 6 percent more power than the test average**. REC multicrystaline modules outperformed 45 different types of modules, including thin film and monocrystaline products. The results published in the industry magazine Photon Profi state that **the highest performance ratio of 90.8 percent and also the highest yield of 1150.4 kWh/kW were measured for the REC module.**

Q6: Why did the REC module perform so well?

A6: As an integrated producer we control the entire value chain making sure that the silicon, cells and wafers in our modules are of the highest quality. They are high performing even in low light conditions due to the glass etching process used and the automation of the complete process as well as the high quality of our silicon, cells and wafers which we also produce. Our production facility is one of the most integrated in the world.

Q7: How did the REC Peak Energy Series module perform?

A7: For the REC 230PE modules we have performance data for the period February – December 2011. During this period the **module produced 1,1% more power than the REC 230AE module.**

Q8: Who else was included in the 2011 test?

A8: 46 different modules (including the REC 230AE) from 37 different manufacturers were included in the study including: Aleo Solar, Bisol, BP Solar, Canadian Solar Inc., CH Solar , CNPV Solar Power, Conergy, CSG PV Tech , Emmvee Photovoltaics, Evergreen Solar, First Solar, Frankfurt Solar, Hanwha Solar One, Isofoton, Kioto Photovoltaics , Kyocera, Mage Solar, Nexpower Technology, Perfectenergy, Photowatt, PV Power Technologies, Schott Solar, S-Energy, Sharp, Shell Solar, Siliken, Solar-Fabrik, Solarworld, Sonalis, Sovello, Sunrise Solartech, Sunways, Sunpeak, Trina Solar, Upsolar, Win Win Precision Technology. New modules have been added every month in 2011 so at the onset of 2012 the Photon test includes more than 120 module types.

Q9: Which modules were ranked in the top 10?

A9: The following modules were ranked in the top 10 (in parenthesis the deviation from the winning REC module): Siliken (1,3%), Nexpower Technology (1,3%), CH Solar (1,8%), CSG PV Tech (2,0%), CNPV Solar Power (2,1%), Win Win Precision Technology (2,2%), Solarworld (2,3%), Bisol (2,7%), and CSG PV Tech (2,8%).