Output Performance of TOP on and PER Module by TÜV Nord in Malaysia

To compare the difference in energy yield between different types of PV modules, TOPCon and PERC bifacial under the outdoor environment, a field test study had been conducted by TÜV Nord in Malaysia during the period 01/01/2023 - 03/31/2023.

According to the test result, when comparing normalized energy yield gain, 182 TOPCon bifacial module is higher than that of 182 PERC bifacial module. Comparing the influence of different cell size on energy yield, the normalized energy yield of 210 PERC bifacial module is 0.98% lower than that of 182 PERC bifacial module.

[redacted]

Figure 1. Location of the power station on Google Map

6 pieces of three types of module, 182 TOPcon bifacial module type, 182 PERC bifacial module type and 210 PERC bifacial module type, were installed in fixed 1P shape and connected to the grid with HM-1500 micro-inverters. The basic module information is shown as below.

The output terminal of each module is implanted with high-precision sensors to monitor the modules' power generation parameters in real time, and the data is aggregated and calculated through Alibaba Cloud platform digital monitoring system. In addition, the cloud platform digital monitoring system can realize the monitoring of real-time meteorological data of the demonstration site, and can also calculate the performance ratio of the theoretical and actual power generation of the phoin

HALM solar simulator was used to test the modules' initial laboratory electrical performance parameters. The initial laboratory power of the 6 test modules is shown in the table below.

The test equipment mainly includes custom-bulit data acquisition system for lab-quality DC monitoring at the module-level and multi-sensor weather station and irradiance sensor for meteorological monitoring. Monitoring system configurations are shown below. The test data acquisition interval is 5 seconds. The data recording period is 1 minute. The data acquisition accuracy of all the following equipment can meet the requirements of field trial. The module-level monitoring equipment and multi-sensor weather station connect to the data acquisition equipment through several RS485 communication cables. The data acquisition equipment can achieve stable data transmission, local stroage and remote upload to Alibaba Cloud platform using 4G wireless network.