Study Test Introduction:

To investigate and compare the TOPCon panel and PERC panel in outdoor performance, an outdoor field test has been conducted in Qingdao (36°04'N, 120°30'E), China.

In total, 30 pieces of bifacial modules of two different technologies TOPCon and PERC were installed in two fixed arrays at a tilt angle of 25°, and each bifacial module contains 144 pieces of the half-cut cell (182" size). Moreover, the height of the supporting system was 0.4 meter. The ground was painted white to acquire accurate results since bifacial modules are sensitive to the surroundings. The PASAN Sun simulator measured the front and rear sides' electrical characteristics. The bifaciality and the low light efficiency at 200W/m² were also measured and calculated. The outdoor energy generation was measured by GCI-36K-5G inverter in a 5-min interval. The energy yield performance of TOPCon, and PERC bifacial PV were revealed and systematically compared.

Conclusion:

PV module’s outdoor performance is strongly influenced by various environmental parameters. The performance of PV modules in real-world conditions may differ from laboratory test results, especially for the bifacial modules, which are highly sensitive to the surrounding environment.

The comparison study shows the TOPCon bifacial module has the higher energy yield performance to 13.31% on average compared to PERC bifacial modules on flat white roof, and up to 20.94% yield gain in kWh is possible for a realistic system, the majority of the contribution from its high bifaciality, low degradation, optimized temperature coefficient and low-light performance.