Building Your Trust in Solar

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A one-month carport field test experiment had been conducted, comparing the performance under different daytime duration of TOPCon and N-type BC solar modules in Lebanon. They assessed the outdoor panel to evaluate energy yield across the day and month, providing a critical insights into their real-world energy yield under different irradiance as well as material-level reliability.

1. During the summer season from July 29 to August 31, the specific yield of TOPCon modules was higher than that of BC modules in average.

2. Under the dual influence of low irradiance in early morning and later afternoon, and high ambient temperature, the yield gain of TOPCon is a increase in 7am-8am and in 5pm-6pm in specific yield compared to BC modules.

3. The vacant duration of carport during 12pm-1pm , the higher the bifacial factor advantage of TOPCon contributes greatly to the high productivity of specific yield over BC modules.

The experiment group included eight pieces of TOPCon bifacial modules (630 Wp) and eight pieces of N-type BC bifacial panel (640Wp), both from tier-1 manufacturers. The modules were installed in two carports, with each connected to an inverter operated at maximum power point tracking (MPPT). The testing field was located in Mkalles, Lebanon (33.8623190N, 35.5508300E), with a carport near-flat tilt of 5 degrees, facing southeast, and with about 2.5 meters above the ground.

All modules were equipped with high-precision sensors to monitor power generation data in real time to ensure the accuracy and credibility of the test results. During the test, a number of key data were collected at in interval of 6 minutes, including DC voltage, current, power, module temperature, front irradiance etc. These data provide detailed information, allowing us to conduct in-depth analysis and comparison of the performance of the modules.

Some significant irradiance and performance changes were observed in initial days from July 29 to August 31, 2025. The daily average irradiance recorded in was 455.9 W/m², and the ambient temperature recorded was 30.22 ° C. The most observed irradiance range was 100-200W/m² occurred in 7am-8am and 5pm-6pm, which in turn affected the power generation of the modules.

Under such conditions, the power generation of TOPCon modules was 141.07 kWh/kW, versus BC of 137.26 kWh/kW,

This comparison test, characterized by monitoring and tracing the generation changes of N- type TOPCon and N-type BC modules across the daytime, low and high irradiance, elevated temperatures, intense and unintended ground reflection, provides an ideal environment to gain critical

