

Average 6.91% yield gain of n-type TOPCon against PERC modules

A group of latest comparison test results of a 30 MW PV project in Jizhou (117°30'E, 39°59'N), Tianjin, demonstrate that n-type TOPCon modules achieve an average 6.91% more energy yield than p-type PERC.



Figure 1.The location information of Tianjin, Jizhou

The 30MW PV power plant was developed by GD Power Development in Jixian, Tianjin Province. This project consists of 20 MW of P-type PERC 545W bifacial modules from unnamed manufacturers, and the remaining capacity made up of N-type TOPCon 555W bifacial modules supplied by JinkoSolar. All of the modules are installed on fixed tilt racking at a 30 degree angle. Each string is designed with 26 pieces of modules, and every 16 strings are connected to one 225kw string inverter.

Comparison	Cumulative Power Generation (kWh)	Power Generation per Kilowatt (kWh/KW)	Gain (%)
N-type 555W-BDV	72165.0	312.564	6.9 1%
P-type 545W-BDVP	66283.8	292.359	

Table 1: Comparison of energy yield and gain of N-type and P-type modules

The performance of the two module types was analyzed from May 18 to July 19, 2023. During this two-month period, the N-type modules were shown to have generated an average of 312.564 kWh/kW, a **6.91%** increase on the 292.359 kWh/kW of P-type module at the site.

Conclusion:

In this paper, the performance of the PERC and TOPCon bifacial solar PV installed at a specific location of latitude 39°59'N and longitude 117°30'E, has been investigated for two months. In addition, especially in the summer heat environment during the test period, N-type modules have better temperature coefficients, lower degradation rates (LID and LeTID), better operating temperatures, higher bifacial factors, and better low-light performance, resulting in higher output power and more power per watt.



8.00 14.00% 7.00 12.00% 6.00 Energy output per watt (KWh/KW) 10.00% 5.00 Gair 8.00% 4.00 neration 6.00% 3.00 4.00% 2.00 2.00% 1.00 0.00 0.00% 2023/7/12 2023/7/17 2023/5/20 2023/5/25 2023/5/30 2023/6/4 2023/6/12 2023/6/17 2023/6/22 2023/6/27 2023/7/2 2023/7/7 P-type N-type Generation Gain

Figure 3: Comparison of daily energy yield of N-type and P-type modules

Figure 2. The project picture