

Case Study: 10% Energy Boost for Residential Installation



Denver, Colorado USA

Location: Denver, Colorado USA
 System Size: 6kW
 Modules: 26 REC 230PE modules
 Inverter: 1 SMA Sunny Boy SB5000US

Summary

A side-by-side comparison of a residential PV system with Tigo Energy dc optimizers showed an average increase in energy production of nearly 10%. Detailed analysis of the results proves that the boost in performance is due to balancing a string that is split across two orientations.

Test Conditions

For a period of 10 days in February this system was operated without DC optimizers. The daily energy production was logged and tabulated together with the daily energy from other PV systems located in the same neighborhood. This information was used to establish the baseline performance of the system under test, and to validate the correlation of the neighboring systems. Another 10 days of energy production was recorded with optimization. The average production with optimization was compared to the average production without optimization to determine the change in performance that may be attributed to the optimizers.

The Results—9.8% Energy Increase

For each period of the test, the ratio of the system under test was calculated relative to the average of the neighboring systems. Without optimization, the ratio between the systems was 0.8. Enabling the optimizers changed the ratio to 0.878—a boost of 9.8% due to the optimizers.

Figures 2 and 3 both show the array at 3 p.m. on a clear day, so any difference is entirely due to the optimizers. In Figure 2, without optimization, the two strings are clearly evident. The 7 modules in the southeast array are receiving less direct irradiance due to the position of the sun, but the other modules in the string—four in the lower left corner and two others in the main array—show reduced power output due to the string mismatch. Figure 3 shows a very different picture when the optimizers are enabled. The southeast array still shows reduced power, of course, but the other modules in the string have been restored to full power. Their output matches that of the modules in the same orientation, regardless of what string they are in.

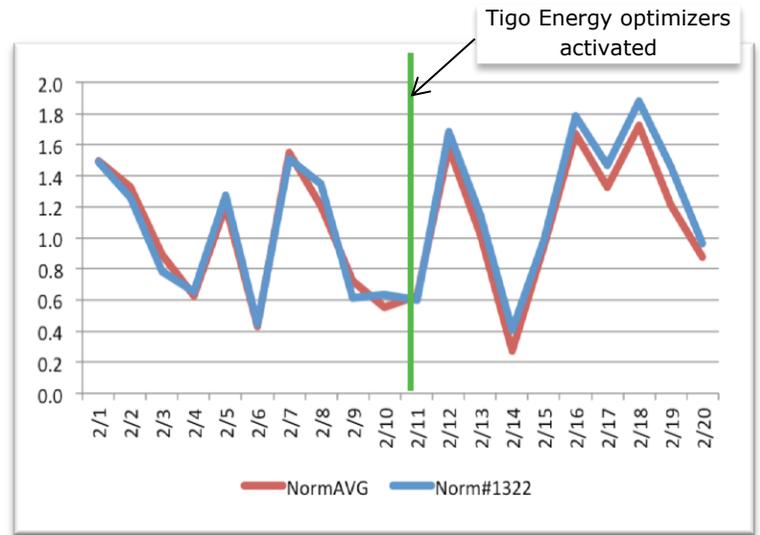


Figure 1: The system under test is shown with a blue line, while the average of three neighboring systems is shown with a red line. The chart clearly shows a consistent increase in the blue line's numbers during the second ten days relative to the first ten days, with a relatively greater boost on days with clear weather.

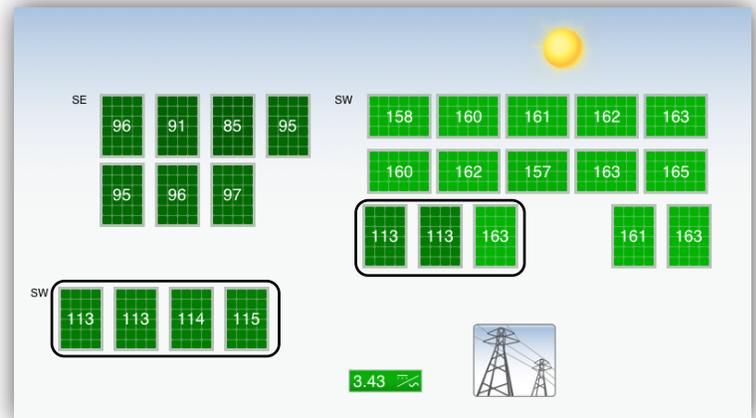


Figure 2: Data Center visualization for 3 p.m. on February 7 **without** Tigo Energy

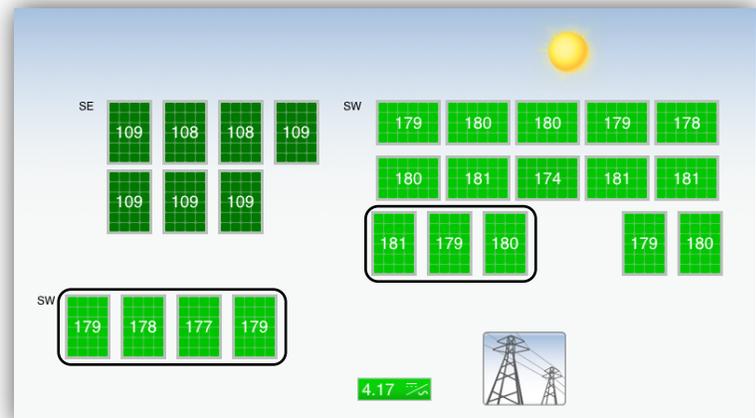


Figure 3: Data Center visualization for 3 p.m. on February 16 **with** Tigo Energy