Beacon 5

Mojave Desert, California, USA

Independent Field Tests Confirm TrueCapture Boosts PV Plant Performance

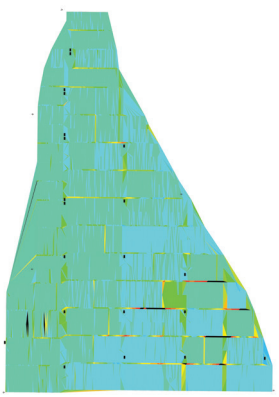
Project Overview

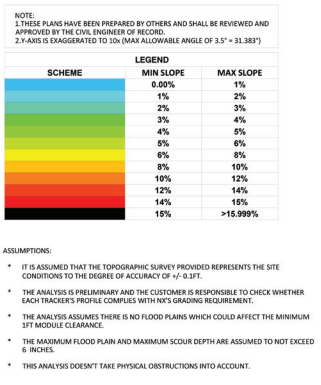
Built across the arid expanse of the Mojave Desert in Kern County north of Los Angeles, the 48 MW (DC) Beacon 5 solar power plant is one of five sites in the Beacon project portfolio, all of which feature Nextracker solar trackers. Completed and commissioned in 2017 with NX Horizon™ single-axis trackers and silicon full-cell modules, Beacon 5 has a ground cover ratio (GCR) of 50.48% and experiences an average of 26.39% diffuse light of the total solar resource. Given the undulating terrain and array layout, the site experienced significant row-to-row shading while operating with industry standard backtracking. Nextracker proposed implementing TrueCapture™, and the Beacon 5 site was upgraded in 2019 with software that utilizes both row-to-row and diffuse light optimization features.

Energy Yield Optimization Solution

With gigawatts already deployed globally, TrueCapture is Nextracker's smart tracker yield-optimization and control software. TrueCapture combines advanced sensing with machine-learning technologies to help mitigate energy losses and boost plant performance. TrueCapture continuously dispatches optimal tracking algorithms to each tracker row, correcting for inter-row shading anomalies caused by uneven ground and diffuse light conditions caused by cloudiness or haze. The increase in power production widens the "shoulders" of the power production curve for any given day, resulting in better performance, lower levelized cost of energy (LCOE), and maximized financial returns for the asset owner.

Name of project:	Beacon 5
Location:	Kern County, Mojave Desert, Calirfornia
Project Size:	48.2 MW (DC) 37.8 MW (AC)
Annual Energy Generated:	00.382 MWh
Owners:	Shikun & Binui and Ecofin
Offtaker:	L.A. Dept. of Water & Power





Putting TrueCapture to the Test

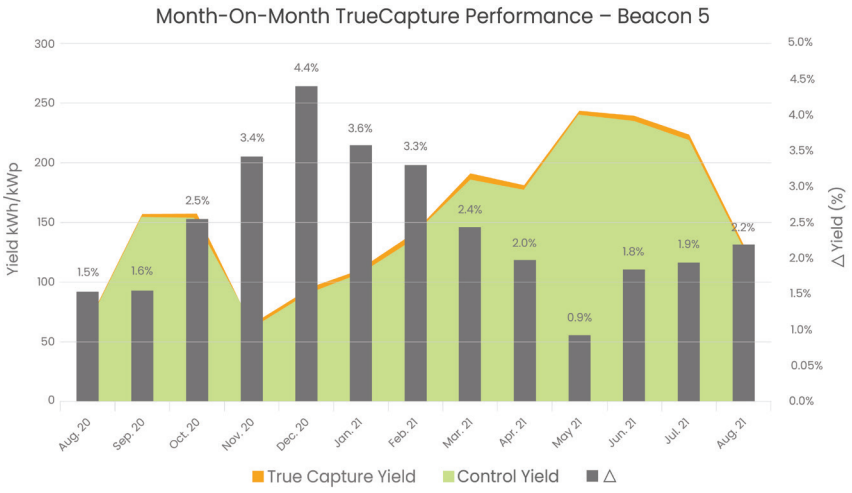
At the beginning of August 2020, under the supervision of independent engineering consultant Black & Veatch (B&V), sitewide validation experiments were carried out at Beacon 5 to test the efficacy of TrueCapture. The entire Beacon 5 site was divided into two portions: one zone representing 50% of the arrays as the TrueCapture "Test" group and the remaining arrays included as the "Control" group using standard tracking mode without TrueCapture. This is the largest test site implemented with 50% TrueCapture Test blocks and 50% non-TrueCapture Control blocks to date.

Blocks were assigned to the Test and Control groups, keeping in mind terrain variability in different blocks and shade from nearby mountains on some blocks, ensuring specific yield was balanced between the two groups. B&V performed an independent analysis confirming a positive bias toward the control group to enable a conservative assessment of the TrueCapture performance.

Nextracker's NX Navigator software is also deployed at Beacon 5. NX Navigator™ is a next-generation smart tracker control system that enables PV power plant owners and authorized operators to monitor and securely control their PV systems through an intuitive graphical user interface. The interface includes a detailed map view to visualize attention and action points.

TrueCapture Meets the Challenge

The operational dataset had a resolution of five minutes and included energy production for each inverter in the two groups. After the dataset was filtered, B&V calculated specific yield for each hour based on the DC capacity and the total energy produced for the hour. The hourly yields were aggregated at a monthly level and a comparison of the Test and Control yields was calculated.



After the first 12 months of testing, the results showed significant benefits to using TrueCapture. The Test group outperformed the Control group by 2.21% during that time, according to the bias-adjusted data validated by B&V. TrueCapture's ability to mitigate the losses caused by inter-row shading and diffuse irradiance resulted in a higher energy generation yield at the plant. Nextracker's years of modeling experience coupled with detailed plant performance analyses enabled the modeled expectations for this site to closely match the actual results.

As a result of the energy production benefits seen during the Beacon 5 study, Nextracker and Arevon have signed a master services agreement (MSA) to include TrueCapture on all new projects. In addition, TrueCapture has been deployed on seven legacy solar plants run by Arevon.

"We have seen Nextracker's TrueCapture software boost energy gains by 2.21% at Beacon 5. Arevon's direct experience with this innovative solution shows how it can add value across the portfolio."

- Anand Narayanan, VP of Asset Management at Arevon

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"Our independent analysis validated that TrueCapture outperformed the Control site by 2.21% on Beacon 5."

- Chris Billinger, Principal Consultant, Black & Veatch Management Consulting, LLC

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