

— SUNSOLVE & NEXTPOWER

Designing competitive advantage with physics-based modelling

How Nextpower validates bifacial output and translates improved yield accuracy into real-world project value.

2021–2026 Multi-year engineering collaboration	400+ High-resolution simulations in six months
160 GW PV supplied by Nextpower across 45 countries	NX Horizon® Tracker platform modelled in full geometric detail

“Nextpower prides itself on being very technically competent and technically driven and in trusting the scientific results. We just want the right answer. The industry has players that have exaggerated yield claims and we want real numbers. SunSolve is the best and the most technically competent. The closest to reality is what SunSolve delivers.”

Jenya Meydbray — VP & General Manager, Advanced Module Frames, Nextpower

TAKEAWAYS AT A GLANCE

The rapid adoption of bifacial technology introduced significant complexity into solar yield modelling, making it difficult to accurately quantify performance and validate vendor claims.

To address this, Nextpower partnered with SunSolve to obtain an accurate, physics-based understanding of bifacial gain for its NX Horizon® platform, refining previous analysis and replacing standard industry assumptions with high-fidelity simulation.

Through a multi-year collaboration, Nextpower was able to:

- 01 **Optimise tracker designs for bifacial performance**
 - 02 **Generate accurate, bankable inputs for PVsyst**
 - 03 **Validate and demonstrate performance advantages with independent data**
-

In a highly competitive market where fractions of a percent can impact project outcomes, this level of accuracy provided a decisive commercial advantage.

ABOUT NEXTPOWER

Nextpower™ (formerly Nextracker) is a leading provider of solar and power technology solutions. As a global leader in intelligent solar tracker technology and integrated energy solutions, it provides advanced hardware including single-axis trackers, foundations, eBOS, power conversion, robotics, and software to optimise utility-scale solar projects, supplying more than 160 GW of PV projects across 45 countries. Nextpower rebranded in November 2025.

ABOUT THE COLLABORATION

Nextpower's engineering teams engaged with SunSolve between 2021 and 2026 — a pivotal period for both the maturation of bifacial-plus-tracker deployments and Nextpower's evolution into a leading utility-scale solar platform provider.

The collaboration began with SunSolve supporting detailed engineering studies to quantify the bifacial gains delivered by Nextpower's NX Horizon single-axis trackers. These insights helped inform the optimisation of tracker designs and operational software, enabling industry-leading power output from the latest generation of bifacial modules.

Building on this foundation, Nextpower teams went on to leverage SunSolve's high-accuracy modelling and advanced computational capabilities to demonstrate these performance advantages to project developers, investors, and EPCs. By providing independent, verifiable data, they were able to strengthen confidence in their technology — often playing a decisive role in securing gigawatt-scale supply agreements.

THE CHALLENGE

In utility-scale solar, minor details can have major impacts.

The rapid emergence of bifacial technology required an evolution in how PV project yield is modelled. However, the speed of adoption meant that many vendor claims around bifacial performance were difficult to independently validate.

At the same time, bifacial modules introduced a new level of complexity to yield modelling. Ground reflectivity (albedo) became an important variable — one that can change throughout the year, influenced by factors like snowfall, vegetation growth, and soil type. Module design also plays a role, in terms of how effectively the rear side of the panel converts reflected light into energy.

In addition to this, system components — including torque tubes, rails, gearboxes, actuators, combiner boxes, and DC cabling — can create rear-side shading that directly impacts irradiance on the back of the module and overall power output.

Understanding how these combined environmental and structural factors impact rear-side generation requires a detailed, physics-based view of how direct and reflected light interacts with the system. Accurately modelling these effects demands significant computational power, making traditional local processing prohibitively slow and impractical.

As a result of these challenges, conventional yield modelling tools that rely on simplifications and assumptions struggle to capture real-world complexity. This has led the industry to depend on approximations — and in some cases, overly optimistic performance claims.

THE SUNSOLVE SOLUTION

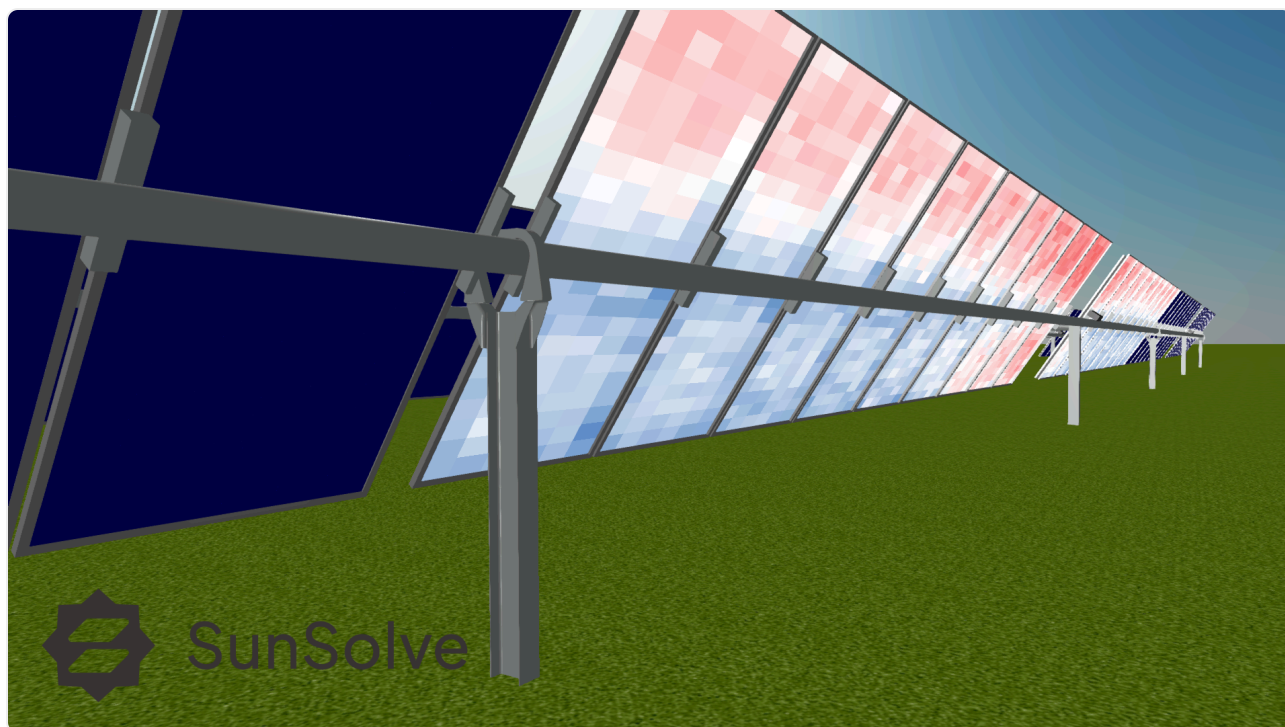
SunSolve's physics-based approach builds on decades of experience modelling solar cell and module performance, extending this expertise to the system level to deliver highly accurate, real-world yield insights. For Nextpower, this capability was critical.

In a market where even fractional improvements in energy yield can influence project outcomes, the ability to accurately quantify small performance differences is essential. However, capturing these effects — particularly for bifacial systems — requires modelling a complex interplay of geometry, materials, and environmental conditions.

“SunSolve is a sophisticated physics-based engine that uses forward ray tracing modelling. For Nextpower that is important in understanding the detailed differences between different tracker architectures, and how those differences can influence bifacial gains, which is the rear-side power generated by the modules. The outcome is representative of a real-world Nextpower tracker.”

Angel Velasco — Business Development, Performance Engineering Manager, Nextpower

To address this, Nextpower deployed SunSolve's advanced ray-tracing technology to simulate its tracker systems in full geometric detail. Rather than relying on approximations, SunSolve replicates the exact physical structure of the tracker, enabling precise modelling of how light interacts with every component — including rear-side irradiance, shading from structural elements, and the influence of ground conditions and module design.



Ray-traced view along a tracker row, with colour mapping rear-side irradiance across each module. The banding shows how torque tube, rails and row geometry redistribute rear light — the variation a single rear-mismatch factor is otherwise asked to summarise.

“Backside shading is caused by physical components — the torque tube, rails, wiring, gearboxes — all of these things matter, and their impact changes over time with sun position and ground conditions.”

Jenya Meydbray — VP & General Manager, Advanced Module Frames, Nextpower

By capturing these effects, SunSolve enabled Nextpower to analyse the “minute differences” between design choices — differences that, at scale, translate into meaningful commercial advantage.

A key outcome of this work was the ability to quantify how specific structural features — such as increased spacing between components and elevated rail designs — also impact rear-side performance. These are subtle effects that are often overlooked or misrepresented in conventional modelling approaches, but they can significantly influence annual energy production.

Equally important was SunSolve’s ability to bridge high-fidelity physics modelling with industry-standard tools. While detailed simulations provide deep insight, project financing and procurement decisions typically rely on PVSyst outputs. SunSolve enabled Nextpower to translate complex simulation results into energy-weighted parameters suitable for PVSyst, ensuring that final yield estimates most accurately reflected real system behaviour.

Despite the sophistication of the modelling, computational processes were kept streamlined. SunSolve’s cloud-based architecture, via zero-emissions data facilities, allows simulations to be run efficiently at scale. Over a six-month period, Nextpower completed more than 400 high-resolution simulations, each leveraging significant cloud-based computational resources.

This combination of accuracy, scalability, and practical applicability allowed Nextpower to generate independent, verifiable data that could be shared directly with developers, EPCs, and investors — supporting both engineering decisions and commercial outcomes.

WHY IT MATTERS

SunSolve's application by Nextpower teams enabled a substantial improvement in how bifacial performance is understood, quantified, and communicated.

In an industry where differences of less than one percent can determine vendor selection, the ability to accurately model rear-side irradiance and structural shading is critical. Conventional tools often rely on fixed assumptions or simplified inputs, which can obscure these effects or misrepresent their impact.

By contrast, SunSolve's physics-based modelling allows Nextpower to quantify small but significant gains with a high degree of confidence. Even improvements on the order of a fraction of a percent — once validated — can translate into meaningful increases in annual energy production when applied across utility-scale projects.

“Even a quarter percent can make or break a deal.”

Angel Velasco — Business Development, Performance Engineer, Nextpower

Beyond yield improvements, SunSolve also strengthens the credibility of performance claims. By enabling independent, transparent validation of tracker performance, Nextpower can provide customers with data grounded in physical reality.

This has important implications for project financing and procurement. Developers, EPCs, and investors rely on bankable models such as PVsyst, but the accuracy of these models depends heavily on the quality of their inputs. By using SunSolve to generate more representative parameters, Nextpower ensures that energy forecasts better reflect real-world system behaviour, reducing uncertainty and increasing confidence in project outcomes.

SunSolve also plays a critical role in product development. The interactions between tracker geometry, module design, and environmental conditions are complex and highly site-specific. Through detailed simulation, these variables can be explored and optimised during the design phase, reducing the need for costly field testing and accelerating innovation.

As Nextpower expands its focus from tracker systems to broader, integrated utility-scale solar solutions, this level of modelling becomes even more important. Understanding how each component contributes to overall system performance is essential for delivering optimised, high-performance power plants.

Model NX Horizon tracking systems with SunSolve

Contact PV Lighthouse to derive bifacial factors for your own site, hardware and weather — from solar cell right through to annual yield.

[Request a demo](#)sunsolve.com

SunSolve acknowledges and thanks Nextpower teams for generously sharing their insights and time in supporting the development of this case study.

ABOUT THE PARTIES

Nextpower

Nextpower™ (Nasdaq: NXT), formerly Nextracker, designs, engineers, and delivers an advanced energy technology platform for solar power plants, innovating across structural, electrical, and digital domains. Its integrated solutions are designed to streamline project execution, increase energy yield and long-term reliability, and enhance customer ROI. Building on over a decade of technology and market leadership, the company delivers intelligent power generation systems and services to meet rapidly expanding global electricity demand. Nextpower partners with the world's leading energy companies to power what's next. Learn more at www.nextpower.com.

SunSolve

SunSolve, from PV Lighthouse, is the only simulation environment that models the physics from solar cell right through to annual yield. Its ray-traced, spectrally resolved, cell-level engine is used by module manufacturers, developers, tracking companies and independent engineers, and has been applied and tested in more than 100 published papers. Learn more at www.sunsolve.com.