

Unlocking ₹4.6 Lakhs/Year in Hidden Revenue from a 90 kWp Hospital Rooftop Plant

EXECUTIVE SUMMARY

A 90.2 kWp rooftop solar plant at a multi-speciality hospital in Udaipur, Rajasthan was underperforming by ₹1.8–3.0 lakhs/year due to unchecked soiling. BijleeAI's performance audit identified the issue, quantified the revenue loss, and unlocked a 4.6x annual revenue recovery path — without installing a single new sensor.

KEY PERFORMANCE INDICATORS

Specific Yield 1,764 kWh/kWp/yr	Performance Ratio 84% annual average	Revenue at Risk ₹15,000 /month identified
Cleaning ROI 3–5x payback on cleaning	Expansion Headroom 30 kWp additional capacity	Payback Period 1.9 yrs at current tariff

Background

A Multi-Speciality Hospital, Udaipur, Rajasthan commissioned a 90.2 kWp rooftop solar plant to offset its daytime power consumption and reduce its grid electricity bill. Udaipur, located in the high-irradiance zone of Rajasthan, offers ideal conditions for rooftop solar — with a daily global horizontal irradiance (GHI) of approximately 5.5–5.8 kWh/m²/day. At the prevailing commercial tariff, the plant was projected to deliver an annual generation of roughly 1,59,000 kWh and offset approximately ₹15–18 lakhs in electricity costs per year, with a payback period of under two years.

Eighteen months after commissioning, the facilities team noticed that monthly generation figures from the inverter display were consistently lower than the projections in the original feasibility report — but without a dedicated monitoring platform, they had no way to quantify the shortfall, diagnose its cause, or determine whether the gap was within normal tolerance or a sign of a deeper problem.

The Challenge

Before onboarding to BijleeAI, the hospital's facilities team was operating the plant essentially blind. The core challenge was the absence of weather-adjusted benchmarking: the facilities team had inverter generation data, but no way to compare it against what the plant should have produced given actual irradiance conditions on any given month. This made it impossible to distinguish between unavoidable weather-driven variation and genuine performance losses attributable to soiling, shading, or equipment degradation.

- No data-driven cleaning schedule: Panel cleaning was scheduled on a fixed calendar basis — typically twice per year — without any assessment of how much soiling had actually accumulated or how much revenue was being lost as a result. In Rajasthan's dust-prone climate, this approach left the plant operating with significant soiling losses for extended periods between cleanings.
- No quantified revenue-at-risk figure: The facilities team knew generation was below expectations but had no way to translate the shortfall into a rupee figure. Without a financial loss estimate, it was difficult to make the case internally for more frequent cleaning or maintenance investment.
- No expansion analysis: The hospital's rooftop had additional unused area, but without a detailed performance baseline and load profile analysis, there was no evidence base for evaluating whether a capacity expansion was financially justified.

What BijleeAI Found

When BijleeAI ingested the plant's historical generation data and overlaid it with satellite-derived irradiance data for the Udaipur location, the monitoring engine immediately identified a statistically significant and widening gap between expected and actual output. The performance ratio — a normalised metric that strips out weather variation — was running at approximately 78–80% in the months preceding the audit, against an industry benchmark of 82–86% for well-maintained plants in comparable irradiance zones. The gap mapped directly onto periods of low cleaning frequency.

- Soiling losses quantified at ₹1.8–3.0 lakhs/year: By modelling the specific yield deficit against the prevailing commercial tariff, BijleeAI estimated that unmanaged soiling was costing the hospital between ₹1.8 and ₹3.0 lakhs annually in recoverable generation — equivalent to approximately ₹15,000/month at the midpoint. This figure became the anchor for the cleaning ROI calculation.
- Performance ratio recoverable to 84%: Analysis of the plant's performance in the weeks immediately following a documented cleaning event confirmed that the system was capable of operating at an 84% annual average performance ratio when soiling was managed proactively. The deficit was not attributable to equipment degradation or panel quality — it was entirely a soiling and maintenance scheduling problem.
- 30 kWp of expansion headroom identified: A structural load assessment of the unused rooftop area, combined with a shadow analysis and load profile matching, confirmed that an additional 30 kWp of capacity could be installed without any structural or grid connection constraints. At the current tariff, the incremental capacity would achieve payback within the same 1.9-year window as the existing system.

The Solution

BijleeAI's platform replaced the hospital's ad hoc cleaning schedule with a data-driven alert system. Instead of cleaning on a fixed calendar, the Cleaning Due Alert engine continuously monitors the performance ratio trend and triggers a cleaning recommendation only when the estimated revenue loss from continued soiling exceeds the cost of a cleaning intervention. This approach ensures that every cleaning event is financially justified and that no unnecessary cleaning spend is incurred.

- Cleaning ROI alerts: The platform calculates the real-time cost-benefit of a cleaning intervention and generates an alert when the 30-day rolling revenue loss from soiling exceeds the estimated cleaning cost. This replaced twice-yearly fixed-schedule cleaning with event-driven, economically optimised maintenance.
- Loss waterfall diagnostics: Each month, BijleeAI generates a loss waterfall breakdown showing the contribution of soiling, thermal losses, clipping, and downtime to the overall performance gap. This gives the facilities team a ranked view of which loss categories to prioritise, without requiring any additional on-site sensors.
- Expansion feasibility modelling: BijleeAI's platform used the plant's actual performance data — not the original feasibility assumptions — to build a bottom-up financial model for the 30 kWp expansion. The model incorporated actual tariff rates, current irradiance data, and the plant's demonstrated performance ratio post-cleaning to produce a conservative payback estimate.

Results

Within the first operating cycle after onboarding to BijleeAI, the hospital's facilities team had a clear, quantified picture of their plant's performance gaps and a data-backed path to recovering them. The combination of optimised cleaning scheduling and the expansion opportunity analysis identified a total annual revenue recovery path of approximately ₹4.6 lakhs — without installing a single new sensor on the existing plant.

- Cleaning ROI of 3–5x: Each cleaning event, triggered by BijleeAI's alert engine at the optimal economic threshold, delivered a 3–5x return on the cleaning cost in recovered generation revenue over the subsequent 30-day period. At the midpoint revenue-at-risk figure of ₹15,000/month, a single cleaning event costing approximately ₹3,000–5,000 recovered its cost within 6–10 days.
- Performance ratio restored to 84%: Following the implementation of the data-driven cleaning schedule, the plant's annual average performance ratio recovered to 84% — in line with the industry benchmark for the irradiance zone and consistent with the plant's post-cleaning performance observed in historical data.
- Payback period confirmed at 1.9 years: The full-system payback period — accounting for the original capital cost, annual O&M, and the recovered generation revenue — was confirmed at 1.9 years at the current commercial tariff. The expansion analysis validated that an additional 30 kWp of capacity would achieve the same payback period, making the expansion case straightforward to present to the hospital's management committee.

What's Next

The hospital is currently evaluating the 30 kWp rooftop expansion, with BijleeAI's financial model submitted to its capital expenditure committee for approval. In parallel, BijleeAI's monitoring platform continues to run monthly anomaly detection scans on the existing 90.2 kWp system — tracking performance ratio trends, flagging deviations that exceed statistical thresholds, and generating automated monthly performance reports for the facilities team. As the plant ages, the degradation tracking module will provide early warning of any equipment-level performance decline, ensuring the hospital retains full visibility over its solar asset's contribution to its energy cost reduction programme.

