LumeTrax
Vision · Quarterly Performance Report

QUARTERLY PERFORMANCE REPORT

PV Project: SAMPLE-001

50 MWp · MENA

Reporting period: Q4 2025 · October 1 – December 31, 2025

PERFORMANCE RATIO	0.832	MEASURED
AVAILABILITY	99.4%	MEASURED
SPECIFIC YIELD	1,742 kWh/kWp	CALCULATED
DEVIATION FROM EXPECTED (P50)	–2.4%	CALCULATED

Prepared by LumeTrax Vision — performance analytics and loss attribution for utility-scale and hybrid renewable assets. Methodology documented and source-classified. Every figure traces back to a historian record, alarm event, or operational entry. Period-over-period comparable across the same template.

SAMPLE — Anonymised. Synthetic data, real methodology. No real customer name. Numbers are illustrative.

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1. Executive summary

PV Project SAMPLE-001 (60 MWp, MENA) delivered **52,438 MWh** in Q4 2025 against a weather-normalized expectation of **53,725 MWh** — a deviation of **−2.4% from P50 expected**. Availability held at **99.4%**; Performance Ratio at **0.832**; specific yield at **1,742 kWh/kWp**. Of the 1,287 MWh shortfall, 49% is **recoverable** (soiling losses with cleaning ROI confirmed; one OEM warranty event opened); 32% is **permanent** (weather variance below P50 reference); **19% is counterparty-attributable** (one DG-side curtailment under PPA force-majeure clause).

Three operational items flagged in §6: (1) inverter cohort drift on Block 04 — opening warranty claim within OEM 90-day window; (2) cleaning cycle ROI breakeven at current soiling rate of 1.4%/month — was recommended on Strings A1–A8 within 14 days; (3) BESS module 7 thermal flag closed in 38 minutes — within SLA. Root cause: ambient excursion, not equipment fault.

KPI	Q4 2025 (this period)	Q3 2025 (prior period)	Δ vs prior	Source class
Performance Ratio (PR)	0.832	0.847	−0.015	Calculated (weather-normalized)
Availability (capacity-weighted)	99.4%	99.6%	−0.2 pp	Measured
Specific yield (kWh/kWp)	1,742	1,798	−3.1%	Calculated
Capacity factor	23.6%	24.2%	−0.6 pp	Calculated
Energy delivered (MWh)	52,438	53,912	−2.7%	Measured
Deviation from P50 (P50)	−2.4%	−1.1%	−1.3 pp	Calculated
Recoverable loss share	49%	22%	+27 pp	Judged (counterparty allocation)

2. Methodology and source-class glossary

Every figure in this report carries a **source class**. The classification is the methodology property that makes the deliverable defensible to a lender's IE, an insurer, or a contract counterparty. Disagreements between counterparties typically resolve at the assumption-or-judgement layer.

Source class	Definition	Example in this report
MEASURED	Direct historian / metering / alarm-event record. Auditable to time-stamped source data.	Energy delivered (52,438 MWh), inverter output time-series, breaker trip
CALCULATED	Derived from measured data via documented methodology. Formula and inputs disclosed.	Performance Ratio (PR), capacity-weighted availability, loss-attribution w
ASSUMED	Required input where measurement isn't available; assumption disclosed, sensitivity bounded.	OEM-published efficiency curve at module level, design-stage soiling-ra
JUDGED	Reviewer interpretation where data is contested, ambiguous, or insufficient.	Counterparty allocation under PPA force-majeure clause (DG-side curta

KPI definitions

Performance Ratio (PR) — measured AC energy at the meter divided by weather-normalized expected AC energy. Reference irradiance: pyranometer-corrected on-site GHI (15-minute resolution). Reference temperature: ambient backsheet thermistor (per OEM datasheet). Reference rated DC capacity: as-built register, validated against nameplate.

Availability (capacity-weighted) — sum of (operational capacity × operational hours) divided by (rated capacity × period hours). Operational capacity excludes inverters in fault, curtailed, or offline states.

Specific yield — measured AC energy at the meter divided by rated DC capacity (50 MWp).

Deviation from expected (P50) — measured energy delivered minus weather-normalized P50 expected energy, expressed as a percentage of expected.

3. Loss attribution — Q4 2025

The 1,287 MWh shortfall between P50 expected (53,725 MWh) and actual (52,438 MWh) decomposes into the categories below. Each loss bucket links back to the historian record, alarm event, or operational entry that generated it (footnote IDs in the right-most column).

Bucket	MWh	% of expected	Recovery class	Source
P50 expected (weather-normalized)	53,725	100.0%	—	**Calculated [M.1]**
Soiling losses	−1,128	−2.1%	Recoverable	Calculated [L.2]
Inverter clipping (Block 04)	−430	−0.8%	Permanent (design)	Calculated [L.3]
Curtailment (DG-side)	−752	−1.4%	Counterparty (PPA FM)	Judged [L.4]
Equipment downtime	−322	−0.6%	Counterparty (OEM warr.)	Measured [L.5]
Tracker drift (Row B12)	−86	−0.2%	Recoverable (O&M)	Calculated [L.6]
Weather variance vs P50	+157	+0.3%	Permanent (weather)	Calculated [L.7]
Anomaly / unattributed	−274	−0.5%	Judged (review)	Judged [L.8]
Actual energy delivered	52,438	97.6%	—	**Measured [M.2]**

[M.1] Methodology section §10.1. [M.2] Methodology section §10.2. [L.2]–[L.8] Loss-attribution evidence pack — appendix B. Cleaning ROI breakeven calculator, OEM warranty claim reference, and downtime classification taxonomy are documented in the customer methodology pack.

4. Counterparty allocation

Of the 1,287 MWh shortfall, allocation by counterparty is below. Each row links to the contract clause and evidence pack for downstream claim execution.

Counterparty	MWh allocated	% of shortfall	Status	Evidence
PPA-recoverable (operator-side)	1,214	94%	Wash + tracker work scheduled [L.2, L.6, L.8]	
OEM warranty (Block 04 inverter cohort drift)	322	25%	Claim opened 2025-12-08	[L.5]
O&M-attributable (response delay)	0	0%	All SLAs met	[L.5]
PPA force-majeure (DG-side curtailment)	752	58%	Claim filed 2025-11-22	[L.4]
Weather variance (non-recoverable)	−157	−12%	Recorded — no action	[L.7]
Permanent design loss (clipping)	430	33%	Recorded — no action	[L.3]

5. Cohort benchmarking and recommendations

Inverter-level cohort variance vs the plant median is the leading indicator for emerging equipment issues. Block 04 has been under-performing the cohort by 4.1% over a six-week trailing window — pattern consistent with bypass-diode degradation.

Inverter block	Cohort variance (% vs median, trailing 6w)	Pattern match	Confidence	Action
Block 01	+0.4%	—	—	—
Block 02	+0.1%	—	—	—
Block 03	−0.2%	—	—	—
Block 04	**−4.1%**	**Bypass-diode degradation**	**High**	**OEM warranty claim opened**
Block 05	+0.6%	—	—	—
Block 06	−0.8%	—	Low	Watch-list (next period)
Block 07	+1.2%	—	—	—
Block 08	+0.5%	—	—	—

Recommendations

Priority	Action	Expected impact	Owner	Window
High	OEM warranty claim — Block 04 (bypass-diode pattern)	~382 MWh recovered (run-rate)	Asset owner / OEM	OEM SLA: 90 days
High	String wash A1–A8 (soiling at 2.1% loss, ROI breakeven 1 MW)	~481 MWh recovered (next period)	O&M contractor	14 days
Medium	Tracker realignment Row B12 (drift 0.6° from optimal)	~86 MWh recovered (next period)	O&M contractor	30 days
Watch	Block 06 cohort drift (–0.8%) — within noise band; track next period		Vision auto-flag	Next period

Appendix A — Calculation worked example: Performance Ratio

PR is the most-scrutinised KPI in lender reviews. The full calculation for Q4 2025 is shown below, with each input sourced.

Input	Value	Unit	Source
Energy delivered at meter	52,438	MWh	Measured · revenue meter (15-min historian)
Average plane-of-array irradiance	192.4	W/m² (period mean)	Measured · 4× pyranometer array (15-min)
Period hours	2,208	h	Calculated · period definition
Reference irradiance	1,000	W/m²	Assumed · STC convention (IEC 61724-1)
Rated DC capacity	50.0	MWp	As-built register · validated against module nameplate
Temperature derating factor	0.961	—	Calculated · OEM curve, ambient backsheet thermistor
Weather-normalized expected energy	53,725	MWh	Calculated · pvlib-equivalent, methodology §10.1
Performance Ratio (PR)	**0.832**	**—**	**Calculated · 52,438 / 63,037 [theoretical at STC]**
Weather-normalized PR (W-PR)	**0.976**	**—**	**Calculated · 52,438 / 53,725**

Appendix B — Data lineage and source dignity

Every figure in this report links to a source record. The data lineage (operator commands, alarms, historian tags, work-order trail) is preserved by LumeTrax Core and read by Vision through the same tenant. The methodology, calculation logic, and source-class definitions in this report are version-controlled and consistent across this period and the prior period — same plant, comparable numbers, no definition drift.

Audit & Assurance can issue an independent technical review on this asset using the same data record. The review is conflict-screened (LumeTrax does not represent OEMs in performance disputes) and the deliverable distinguishes measured / calculated / assumed / judged sources without blending.

End of report.