LumeTrax
Audit & Assurance · Independent Technical Review

BANKABILITY REVIEW
Source-classified · Conflict-screened

INDEPENDENT TECHNICAL REVIEW

PV Project: SAMPLE-001 50 MWp · MENA

Engagement scope: Bankability Review
Reporting period under review: Q4 2025 · October 1 – December 31, 2025

HEADLINE FINDING	VALUE	CLASS
Plant performance vs PPA-contracted	**WITHIN TOLERANCE**	**JUDGED**
Weather-normalized PR (W-PR)	**0.976**	**CALCULATED**
OEM-reported availability vs verified	**–0.3% reconciliation delta**	**JUDGED**
Recoverable loss share	**49%**	**JUDGED**
Conflict screening outcome	**No structural favourability**	**GOVERNANCE**

Prepared by LumeTrax Audit & Assurance. Conflict-screened against OEM, EPC, and IPP commercial relationships. Source classification (measured / calculated / assumed / judged) applied to every figure. Methodology and source-class definitions are version-controlled and consistent with the platform's reporting standard.

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

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Engagement reference: AA-SAMPLE-Q4-2025-V1 · Issued: 2026-05-08 · Document version: audit-sample-v1

1. Executive summary

Audit & Assurance has reviewed the Q4 2025 operating record of PV Project SAMPLE-001 (50 MWp, MENA) under a Bankability Review engagement. The review covers period performance against PPA contracted definitions, reconciliation of OEM-reported figures against operating-data-derived figures, loss attribution per cause, counterparty allocation under contract clauses, and operational recommendations bounded by what the data supports.

Headline finding. Plant performance is within PPA tolerance for the period. Weather-normalized PR (W-PR) is **0.976** against a contractual reference of 0.97. Energy delivered is **52,438 MWh** against P50-expected **53,725 MWh** (–2.4% deviation), of which **49% (1,287 MWh)** is recoverable through documented operational action and **32%** is permanent (weather variance below P50). Reconciliation against the OEM-reported availability shows a –**0.3% delta** explainable by counted-vs-uncounted curtailment events; reviewed and accepted.

Recommendations. Three operational items merit lender-side attention: (1) inverter cohort drift on Block 04 (bypass-diode pattern, OEM warranty claim opened within 90-day window); (2) cleaning-cycle ROI breakeven at current soiling rate of 1.4% — wash recommended on Strings A1–A8 within 14 days; (3) DG-side curtailment under PPA force-majeure clause — claim filed; reviewer concurs with operator's classification.

Conflict-screening outcome. No structural favourability identified between LumeTrax (as platform vendor for this asset) and the engagement scope. The review does not represent the OEM in performance disputes; the reviewer's commercial position is independent of equipment under review. See §9.

2. Methodology and source-class glossary

This review distinguishes four source classes for every figure. Disagreements between counterparties typically resolve at the assumption-or-judgement layer, where they belong.

Source class	Definition	Example in this review
MEASURED	Direct historian / metering / alarm-event record. Auditable to timestamp + source ID.	Energy delivered (52,438 MWh), inverter output time-series, breaker trip
CALCULATED	Derived from measured data via documented methodology; formula referenced in §10.	Performance Ratio (PR), capacity-weighted availability, loss-attribution w
ASSUMED	Required input where measurement isn't available; assumption named, sourced, and bounded.	OEM-published efficiency curve, design-stage soiling-rate (1.2% / week
JUDGED	Reviewer interpretation where data is contested, ambiguous, or insufficient. Reviewer signs.	Counterparty allocation under PPA force-majeure (DG-side curtailment,

Reference standards

PR computed per IEC 61724-1. Availability per IEC 61400-26-1 (capacity-weighted variant). Weather normalization via pvlib-equivalent physics-aware modelling (radiation, temperature, soiling). Methodology version pinned to engagement initiation (2025-10-01); changes mid-engagement disclosed in §10.

3. Asset overview (anonymised)

Configuration as confirmed against the as-built register and validated against operating data during this engagement.

Attribute	Value	Source
Asset type	Utility-scale photovoltaic plant	As-built register
Rated DC capacity	50.0 MWp	As-built · validated against module nameplate
Module configuration	8 inverter blocks × 6.25 MW (anonymised)	As-built register
Storage	None (PV-only configuration)	—
Commissioning date	2023 (date anonymised)	Documentary
Region	MENA (specific country withheld)	Customer preference
PPA structure	Take-or-pay with PR-based performance bands and DG-side curtailment force-majeure clause	PPA dated [redacted]
Reporting cadence under contract	Quarterly + annual reconciliation	PPA · §11.4
O&M structure	Owner-managed with third-party O&M contractor (anonymised)	Contracts review
Operating platform	LumeTrax (Core, Asset Manager, Vision modules active)	Subscription register

4. Performance metrics — measured vs PPA-contracted

Measured operational metrics for the period under review, compared against PPA-contracted reference values. Bands and tolerances reflect the contract regime; underperformance against band minima is flagged.

Metric	Q4 2025 measured	PPA reference (band)	Status	Source
Performance Ratio (PR)	0.832	≥ 0.81 (band 1)	WITHIN	Calculated
Weather-normalized PR (W-PR)	0.976	≥ 0.97 (contractual)	WITHIN	Calculated
Availability (capacity-weighted)	99.4%	≥ 98.0%	WITHIN	Measured
Specific yield	1,742 kWh/kWp	P50 1,786 (−2.4%)	WITHIN P50–P90	Calculated
Capacity factor	23.9%	P50 24.5% (P90 22.1%)	WITHIN P50–P90	Calculated
Energy delivered	52,438 MWh	P50 53,725 MWh	WITHIN P50–P90	Measured
Curtailment exposure	1.4% of period	Pass-through under FM	ACCEPTED (FM)	Judged

Reviewer's note: the asset is performing within all PPA-contracted bands. The −2.4% deviation from P50 expected energy is within the P50–P90 range specified in the PPA. Reviewer concurs with operator's representation.

5. Loss attribution and counterparty allocation

The 1,287 MWh shortfall between P50 expected and actual energy is decomposed by cause (loss attribution) and by counterparty (allocation). Reviewer reproduces the operator's classification independently from the source data and concurs except where flagged.

Counterparty	MWh allocated	% of shortfall	Reviewer concurs?	Evidence
Operator-side recoverable (wash, tracker, anomaly)	1,214	94%	Yes — wash + work scheduled	Calculated [L.2, L.6, L.8]
OEM warranty (Block 04 cohort drift)	322	25%	Yes — claim within 90-day window	Measured [L.5]
O&M-attributable (response delay)	0	0%	Yes — all SLAs met	Measured
PPA force-majeure (DG-side curtailment)	752	58%	Yes — FM evidence accepted	Judged [L.4]
Weather variance (non-recoverable)	−157	−12%	Yes — within P50 reference	Calculated [L.7]
Permanent design loss (clipping)	430	33%	Yes — design intent	Calculated [L.3]

Loss-attribution waterfall by cause is reproduced from the source data; full waterfall in the Q4 2025 Vision quarterly performance report (vision-sample-report-v1).

6. Reconciliation — OEM-reported vs operating-data-verified

OEM-reported figures from the inverter portal are reconciled below against operating-data-derived figures from the LumeTrax historian. Deltas are explained per row. Where the delta is material (>0.5%), reviewer accepts or rejects the operator's interpretation.

Metric	OEM-reported	LumeTrax-verified	Δ	Explanation	Reviewer
Availability (capacity-weighted)	99.7%	99.4%	−0.3%	OEM excludes curtailment from availability denominator; LumeTrax includes pe	ACCEPTED
Energy delivered (MWh)	52,612	52,438	−174	OEM uses inverter-side AC; LumeTrax uses revenue meter (MV-side). Delta =	ACCEPTED
Inverter uptime (hours)	2,196	2,196	0	Identical.	ACCEPTED
Average DC efficiency	98.4%	98.4%	0	Identical.	ACCEPTED
Soiling-loss rate (% / week)	1.0%	1.4%	+0.4%	OEM uses design assumption; LumeTrax uses cleaning-cycle inflection analysi	ACCEPTED — LumeTrax preferred

Reconciliation summary: the −0.3% availability delta and the −174 MWh energy delta are both explainable by definition / measurement-point differences (IEC 61400-26-1 vs OEM portal default; revenue-meter vs inverter-side AC). The +0.4% soiling-rate delta is methodology-driven; reviewer prefers the LumeTrax cleaning-cycle inflection method as it is observation-based rather than design-assumption-based. No counterparty action triggered by reconciliation.

7. Recommendations and risks

Operationally actionable items, prioritised. Bounded by what data and methodology support — speculative recommendations excluded.

Pri.	Item	Expected impact	Window	Source
High	OEM warranty claim — Block 04 (bypass-diode pattern, +322 MWh recovered (run-rate)	OEM SLA: 90 days	Calculated
High	String wash A1–A8 (soiling 2.1% loss vs ROI breakeven 1.4%)	+~430 MWh recovered (next period)	14 days	Calculated
Medium	Tracker realignment Row B12 (drift 0.6° from optimal)	+~86 MWh recovered (next period)	30 days	Calculated
Watch	Block 06 cohort drift (–0.8%) — within noise band, track next period		Next period	Calculated

Material risks identified

OEM warranty timeline. The Block 04 bypass-diode pattern is consistent with cohort-wide degradation rather than isolated module failure. The OEM warranty claim opened on 2025-12-08 must conclude inside the 90-day window or the recovery class shifts from counterparty to permanent loss. Track at next period.

Soiling-rate methodology. Reviewer adopts cleaning-cycle inflection analysis (1.4% / week) over OEM design assumption (1.0% / week). This methodology choice is documented and consistent with IEC 61724-1 §6.3. If the OEM disputes the methodology in a downstream warranty discussion, the source-class is JUDGED — the dispute resolves at methodology layer, not measurement layer.

DG-side curtailment. Treated as PPA force-majeure under the contract's §11.7 clause; claim filed 2025-11-22. Reviewer concurs; the curtailment event is documented in grid-operator records and matches the operator's representation.

Appendix A — Conflict screening

Per Audit & Assurance methodology, every engagement runs through a documented conflict-screening checklist before scope is signed. This engagement's screening outcome:

Check	Outcome	Notes
OEM, EPC, or operator under review named at engagement initiation	DOCUMENTED	Asset OEM identity disclosed in engagement letter (anonymised in this sa
LumeTrax commercial relationship with named counterparties	DISCLOSED	LumeTrax is platform vendor for this asset; not a counterparty in any perfo
Structural conflict identified	NONE	Review reports on asset performance, not platform behaviour. Reviewer is
Engagement scope adjustments to remove conflict	N/A	No adjustments required
Customer's right to challenge screening outcome	CONTRACTUAL	Customer notified of right; no challenge raised

Appendix B — Reviewer signature and credentials

This review was prepared and signed by a senior renewable-energy engineer with operating-asset experience in PV, BESS, and hybrid configurations. Reviewer's commercial position is independent of OEM, EPC, and IPP relationships affecting the equipment under review. The review is reviewable, defensible, and citable in lender, investor, insurer, or contract-counterparty proceedings.

Reviewer	[Senior Engineer · LumeTrax Audit & Assurance]
Credentials	Renewable-energy engineering · operating-asset specialist (anonymised in this sample)
Signature	_____
Date issued	2026-05-08
Engagement reference	AA-SAMPLE-Q4-2025-V1
Period under review	Q4 2025 (Oct 1 – Dec 31, 2025)

End of review.