

BatteryPassport

BESS Performance Certification Report

A

Overall Certification Grade

Asset: BESS-CAL-2024-001

Grid Zone: AESO

Rated Capacity: 50000 kW

Inverter Type: grid-forming

Period: 2025-10-01 to 2025-12-31

Report ID: BP-20260410-001

Generated: 2026-04-10 06:23 UTC

1. Executive Summary

A

CERTIFICATION GRADE

95.0%

AVAILABILITY

97.5%

CAPACITY RATIO

Metric	Value	Status
Attestations (verified / total)	812 / 847	96%
Average Confidence Score	0.94	94%
Measured Peak Power	48750 kW	97.5% of nameplate
Data Quality	97.2% complete	3 gaps

2. Capacity Verification

Parameter	Value
Nameplate Capacity	50000 kW
Measured Peak Power	48750 kW
Capacity Ratio	97.5%
Data Points	847

3. Degradation Analysis

3.07%

ANNUAL DEGRADATION

97.5%

CURRENT CAPACITY

6.8

P50 REMAINING LIFE (YR)

Parameter	Value
Decay Rate (lambda)	0.0312 /year
Model Fit (R-squared)	0.910
Data Span	3.0 months
EOL Threshold	80% of nameplate

P50 Remaining Life	6.8 years
P90 Remaining Life (conservative)	5.2 years
P10 Remaining Life (optimistic)	9.1 years
Estimate Confidence	medium

4. Availability Scoring

Parameter	Value
Events Eligible	892
Events Responded	847
Events Missed	45
Events Ineligible (offline/maintenance)	12
Availability	95.0%
Verified Responses	812
Average Response Confidence	0.93

5. Revenue Verification

99.6% ENERGY MATCH	99.6% REVENUE MATCH	VERIFIED STATUS
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Metric	Claimed	ISO Verified
Total Energy (kWh)	42350.0	42180.0
Total Revenue (USD)	\$21175.00	\$21090.00

Category	Count
Matched (<1% discrepancy)	830
Minor (1-5%)	12
Major (5-15%)	5
Critical (>15%)	0

5. Validation Summary

847 telemetry bundles were processed through the SynthGrid 10-check physics validation pipeline during the reporting period.

Check	Passed	Failed	Rate
1. Telemetry Hash Integrity	835	12	99%
2. Edge Signature Valid	847	0	100%
3a. Frequency Event Confirmed	841	6	99%
3b. Nadir Matches Data	839	8	99%
4a. Power Within Capacity	847	0	100%
4b. SOC Range Valid	844	3	100%
4c. Peak Power Matches Data	843	4	100%
5a. Duration Plausible	847	0	100%
5b. Timestamps Consistent	845	2	100%
6. Energy Calculation Verified	820	27	97%

6. Data Quality Disclosure

Transparency notice: SynthGrid publishes data quality metrics for every certification report. The confidence scores below reflect the completeness and consistency of the underlying telemetry data.

Metric	Value
Data Completeness	97.2%
Average Confidence	0.94
Data Gaps Detected	3
Anomalies Flagged	7

Data Source Breakdown

Source	Attestations
live	712

7. Methodology

Each telemetry bundle is validated through SynthGrid's 10-check physics validation pipeline. Results are signed with Ed25519 and stored as attestation records.

#	Check	Description
1	Telemetry Hash Integrity	SHA-256 hash of raw telemetry data matches bundle header
2	Edge Signature Valid	Ed25519 signature from edge attester verified
3a	Frequency Event Confirmed	Grid frequency deviation exceeds deadband threshold
3b	Nadir Matches Data	Reported frequency nadir matches computed minimum
4a	Power Within Capacity	Peak power output does not exceed rated capacity
4b	SOC Range Valid	State of charge remains within [0, 1] bounds
4c	Peak Power Matches Data	Reported peak power matches computed maximum
5a	Duration Plausible	Event duration within configurable maximum
5b	Timestamps Consistent	Bundle timestamps match telemetry data range
6	Energy Calculation Verified	Trapezoidal energy integral within tolerance of reported value

Tolerance Configuration

Parameter	Value	Note
Energy Balance Tolerance	15%	Phase 1 default, pending empirical validation (GATE 1)
Frequency Deadband	0.036 Hz	WECC standard
Nadir Tolerance	0.001 Hz	Measurement precision bound
Peak Power Tolerance	1.0 kW	Rounding tolerance
Maximum Event Duration	120,000 ms	2-minute cap

8. Government Program Compliance

BC Hydro Electricity Storage Incentive

Canada - British Columbia

Metric	Threshold	Actual	Status
Capacity Retention	85%	97.5%	PASS
Availability	85%	95.0%	PASS

Overall: **COMPLIANT**

US Investment Tax Credit (Section 48E)

United States

Metric	Threshold	Actual	Status
Capacity Retention	80%	97.5%	PASS
Availability	80%	95.0%	PASS

Overall: **COMPLIANT**

9. Scope and Limitations

Verification scope: This report verifies data consistency using SynthGrid's 10-check physics validation pipeline applied to operator-provided telemetry. It does not independently measure battery performance.

Limitation	Impact	Mitigation
Data source reliance	Operator-provided BMS data could be biased within tolerance bounds	Statistical fleet comparison (20+ assets); Phase 2 ISO/market operator API cross-reference
No fault attribution	Cannot isolate battery vs inverter vs installation issues	Phase 2 inverter efficiency curves and transformer specs
No thermal normalization	Degradation analysis does not account for temperature effects	Phase 2 Arrhenius temperature correction
Key custody	Ed25519 signing keys are software-stored (not HSM-backed)	Sufficient for operational verification; HSM planned for Phase 2 evidentiary use

Cryptographic Attestation

This report was generated and signed by SynthGrid's validation infrastructure.

Report ID BP-20260410-001

**Content Hash
(SHA-256)** a8dc2b03f43e4b984bdcd6a5728d7031fa8b5c0dcfad2406193a5c923ab8e71f

**Signature
(Ed25519)** 67a691a336a041a6956b4cfe9e48bcdab80fdc013048bfd5cc17ad8f8b8c25aac45625926cb3c0d6a7
b1460819a669b2fbe2a7e175d1ecb2beb3a7502943570a

**Validator Public
Key** bab670027bc172dae2e839d459c457b98867f6478433f83dc5079776b3fcb0b5