SOL04: Residential Solar Market Study

Technical Analysis Report | February 01, 2026

1. Data Overview

Subject: Sunrun (RUN)
Analysis Period: 2016-02-03 to 2026-01-30 (~10.0 years)
Total Observations: 9,506 rows across 4 datasets
Stock Data: 2,513 daily OHLCV observations
Data Sources: Yahoo Finance API (yfinance), synthetic operational metrics

2. Methodology

2.1 Metrics Computed

- Customer acquisition and retention
- Net Subscriber Value (NSV)
- Monthly Recurring Revenue (MRR)
- Installation volumes (MW)
- Storage attachment rates
- Customer contract economics
- Geographic market penetration

2.2 Risk Analytics (CFA Standards)

- **Sharpe Ratio:** (Return - Rf) / Volatility (Rf = 0 for relative comparison)
- **Sortino Ratio:** Return / Downside Deviation
- **Value at Risk (VaR):** Historical 95% and 99% confidence levels
- **Maximum Drawdown:** Largest peak-to-trough decline in cumulative returns

2.3 Technical Indicators

- **Moving Averages:** SMA/EMA (20, 50, 200 day)
- **Volatility:** Rolling standard deviation (20, 60, 252 day)
- **Momentum:** RSI-14, Price momentum (20-252 day)

3. Risk Metrics Summary

Ticker	Total Return	Ann. Return	Volatility	Sharpe	Max DD
RUN	134.6%	8.9%	77.6%	0.12	-94.1%

4. Detailed Risk Profile

Return Distribution

Metric	Value
Positive Days	50.8%
Best Day	32.82%
Worst Day	-40.04%
Sortino Ratio	0.17

Value at Risk

Confidence	Daily VaR
95%	-7.16%
99%	-11.28%

VaR indicates expected maximum daily loss at given confidence level.

5. Data Quality Assessment

Completeness: All trading days covered for analysis period
Adjustments: Prices adjusted for splits and dividends
Validation: Stock data cross-referenced with Yahoo Finance

Processing: Pandas DataFrame operations with NumPy calculations
Disclaimer: Operational metrics are synthetic/illustrative for portfolio demonstration

6. Key Observations

- Solar sector exhibits higher volatility than broad market indices
- Strong correlation with energy sector and interest rate movements
- Policy sensitivity (IRA, tax credits) impacts valuation multiples
- Technology improvements driving efficiency gains and cost reductions

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Portfolio Sample - Demonstrates data engineering methodology, not investment advice
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