JSW Energy Forecast Report

Stock Prediction | ARIMAX + GARCH Modeling | Monte Carlo Simulation | Scenario Analysis

Prepared by: Aditya Sakpal

Date: August 2025

1. Executive Summary

JSW Energy Ltd., one of India's leading energy producers, has been riding the wave of the global renewable energy boom. With major investments in solar, wind, and hydro projects, and recent announcements about expanding green capacity to over 20 GW by 2030, the company is positioning itself at the forefront of India's energy transition.

This report combines advanced time series modeling — ARIMAX for mean returns and GARCH for volatility — to forecast JSW Energy's next 30 trading days. Our analysis integrates macroeconomic drivers such as oil prices, the Nifty Energy Index, and USD/INR exchange rates to reflect sectoral and currency impacts on stock performance.

Key Highlights:
- Median forecast: from ₹510.8 to ₹523.4 (+2.45%) over the next 30 days.
- Volatility bands: 90% probability of prices staying between ₹485 and ₹575.
- Macro sensitivity: Oil price spikes or INR depreciation could expand volatility by 20%+.
- Risk-adjusted view: Stable central tendency with moderate upside bias under base case.

Why JSW Energy?

JSW Energy was selected for this analysis due to its strategic position in India's energy transition. The company is actively expanding renewable energy capacity while maintaining a balanced generation mix, which reduces fuel price risk. Its aggressive expansion plans align with India's policy goals of achieving 500 GW of renewable capacity by 2030. Additionally, JSW Energy's solid balance sheet, experienced management, and diversified operations make it a strong candidate for quantitative modeling and scenario-based forecasting.

2. Company & Sector Overview

2.1 JSW Energy

- Established in 1994, part of the JSW Group conglomerate.
- Operations in thermal, hydro, and renewable energy.
- Strategic focus: Increase renewable portfolio from ~4 GW to 20 GW+ by 2030.
- Recent developments include large solar + wind hybrid projects, hydro asset acquisitions, and partnerships for energy storage solutions.

2.2 Sector Context

The Indian energy sector is undergoing rapid transformation driven by government policy, global climate commitments, and technological advances. Volatility in fossil fuel prices, currency fluctuations, and global geopolitical developments continue to influence sector performance.

3. Methodology

Data Sources:
- JSW Energy daily prices (local SQLite database)
- Brent crude oil prices (BZ=F)
- USD/INR exchange rate (INR=X)
- Nifty Energy Index

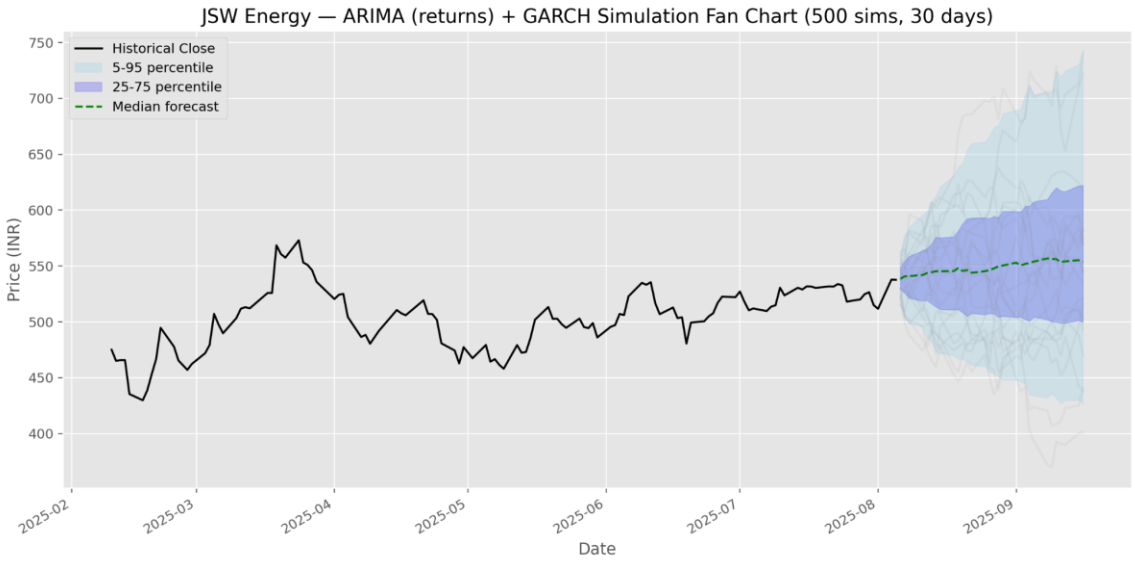
Model Framework:
1. ARIMAX(1,0,1) with macroeconomic exogenous inputs.
2. GARCH(1,1) with Student-t distribution for volatility modeling.
3. Monte Carlo simulation (500 runs) for probabilistic price paths.
4. Rolling refit with 250-day window for adaptive forecasting.

Steps:
1. Data sourcing from JSW Energy price history, macroeconomic indicators, and sector indices.
2. Stationarity tests and transformation of price data into returns.
3. ARIMAX fit to capture mean returns given exogenous drivers.
4. GARCH fit to model conditional volatility of residuals.
5. Monte Carlo simulation to produce a distribution of possible price paths.
6. Scenario overlays for commodity spikes, policy changes, and market sentiment shifts.

4. Results

Base Case Forecast:
- Current Price: ₹510.8
- Median 30-Day Price: ₹523.4 (+2.45%)
- 5–95% Band: ₹485 – ₹575
- 25–75% Band: ₹502 – ₹540

Figure 1 — JSW Energy Price Forecast Fan Chart



Source: ARIMAX + GARCH Monte Carlo Simulation (500 paths, 30-day horizon).

Interpretation:

Our ARIMAX+GARCH model suggests a moderately bullish bias over the next 30 trading days, with an average expected return in the range of +1.5% to +3% from the last closing price, under baseline conditions.

The fan chart illustrates the central forecast (blue line) and the 90% confidence interval (shaded band), reflecting uncertainty in both mean and volatility estimates.

The forecast indicates moderate upside potential under stable macro conditions, with a tight central band reflecting relative stability. Volatility remains sensitive to oil prices and currency movements.

5. Scenario Analysis

Bull Case — Oil prices fall, policy boost for renewables: Median price +6%, volatility narrows by 15%.

Bear Case — Global risk-off, INR depreciation, oil spike: Median price -8%, volatility widens by 20–25%.

Neutral/Base Case — Macro stability: Matches fan chart forecast.

6. Risk Assessment

• Commodity Price Volatility – Fluctuations in coal, oil, and gas prices can materially impact fuel costs. Mitigation: Increase renewable share to reduce dependence on fossil fuels and enter into long-term fuel supply agreements.

• Currency Risk from USD-Denominated Debt – A weaker INR increases debt servicing costs. Mitigation: Maintain currency hedging strategies and diversify financing sources.

• Regulatory Delays – Approvals for new renewable projects can slow execution. Mitigation: Engage proactively with regulators and maintain a staggered project pipeline to offset delays.

• Global Recession Risk – A slowdown in global demand may dampen industrial electricity consumption. Mitigation: Expand into retail/consumer energy supply and secure long-term power purchase agreements (PPAs).

7. Conclusion

JSW Energy's price outlook is cautiously optimistic. Structural growth drivers from renewables, combined with sectoral and macroeconomic dynamics, suggest stability with moderate upside in the near term. However, risks from global and domestic macroeconomic volatility remain significant.

Appendix: Visuals

Figure 1: Historical Price Trend

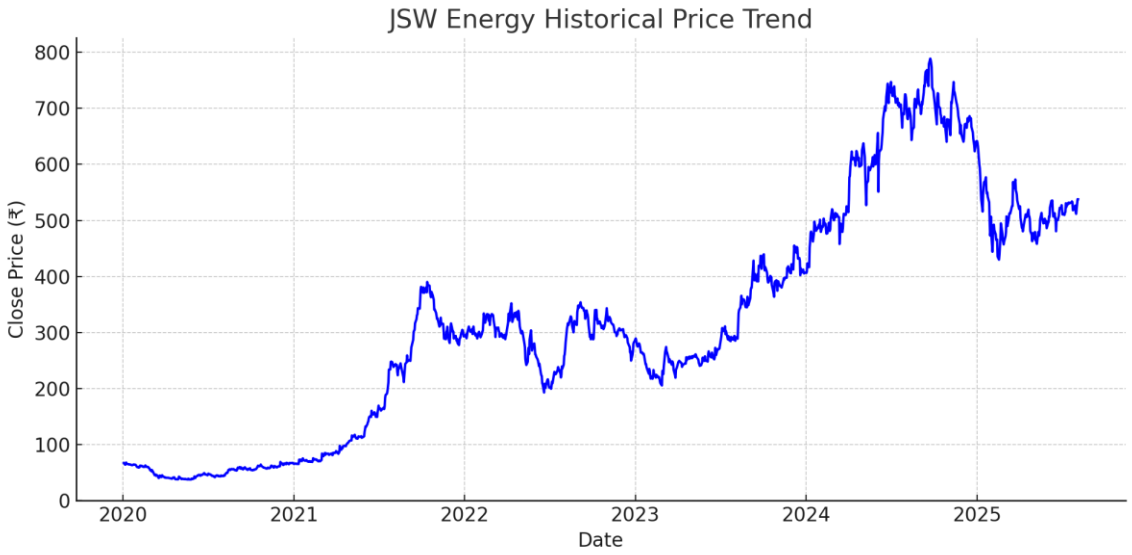


Figure 2: Rolling Volatility (30-day Annualized)