

# **FORECASTING THE FUTURE: PREDICTION OF RENEWABLE ENERGY GENERATION USING SARIMA**

**A MINI PROJECT REPORT**

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## **BONAFIDE CERTIFICATE**

Certified that this Report titled **“FORECASTING THE FUTURE: PREDICTION OF RENEWABLE ENERGY USING SARIMA”** is the bonafide work of **VIKASHINI S (221801062), VIJAY KUMAR V(221801505)** who carried out the work under my supervision. Certified further that to the best of my knowledge the work reported herein does not form part of any other thesis or dissertation on the basis of which a degree or award was conferred on an earlier occasion on this or any other candidate.

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## **ABSTRACT**

In recent years, there has been a significant shift towards the use of renewable energy sources, driven by the need to cut carbon emissions and establish sustainable energy systems. As this transformation develops, one of the most significant issues is accurate forecasting of renewable energy generation, which is crucial for efficient energy grid management and assuring a consistent supply. This research aims to create a predictive model to estimate wind and solar electricity generation. To create accurate predictions, the model considers historical data, weather forecasts, and environmental factors such as temperature, humidity, wind speed, and sun irradiance. Given the seasonal nature of renewable energy production, where factors such as sunlight and wind availability change over time, the Seasonal Autoregressive Integrated Moving Average (SARIMA) algorithm is used for this task. The SARIMA model performs very well with time series data, making it an excellent choice for estimating energy generation over time. It successfully captures both seasonal patterns and trends in the data while reducing the possibility of overfitting, which is often a problem with other models. The end result is a more dependable and exact estimate of renewable energy output, which is critical for easing the transition to a cleaner, renewable-based energy grid.

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## **LIST OF ABBREVIATIONS**

1. RES – Renewable Energy Source
2. DL – Deep Learning
3. ML – Machine Learning
4. SARIMA – Seasonal Auto-Regressive Integrated Moving Average
5. SVM – Support Vector Machine
6. ANN – Artificial Neural Network
7. LSTM – Long Short-Term Memory
8. LR – Linear Regression
9. RF – Random Forest
10. MSE – Mean Squared Error
11. MAE – Mean Absolute Error
12. SVR – Support Vector Regression
13. IJS-SVR – Support Vector Regression Optimized by Improved Jellyfish Search Algorithm
14. RFR - Random Forest Regression
15. PV – Photovoltaic
16. NREL – National Renewable Energy Laboratory
17. XGB – Extreme Gradient Boosting
18. RMSE - Root Mean Squared Error