# Renewable Energy Production Analysis and Forecasting Report

Introduction:

Renewable energy plays a pivotal role in mitigating climate change and transitioning towards a sustainable energy future. In this report, I analyzed the production trends of solar and wind energy in France between 2020 and 2023, aiming to identify insights and recommend strategies for improving renewable energy forecasting and integration into the power grid.

Findings and Insights:

- **Dominance of Wind Energy:**
  - My analysis indicates that wind energy production surpasses solar energy production by a significant margin in France. Wind contributes approximately four times more energy output than solar sources during the analyzed period.
  - Geographical advantages, technological advancements, and supportive policies contribute to the prominence of wind energy in France's renewable energy landscape.
- **Seasonal Patterns:**
  - Solar energy production peaks during the summer months (May to August), coinciding with the sunniest days. In contrast, wind energy peaks during January, February, March, and December, corresponding to favorable wind conditions.
  - Solar energy production remains relatively constant throughout the year, while wind energy exhibits substantial variability, aligning with seasonal patterns and wind conditions.
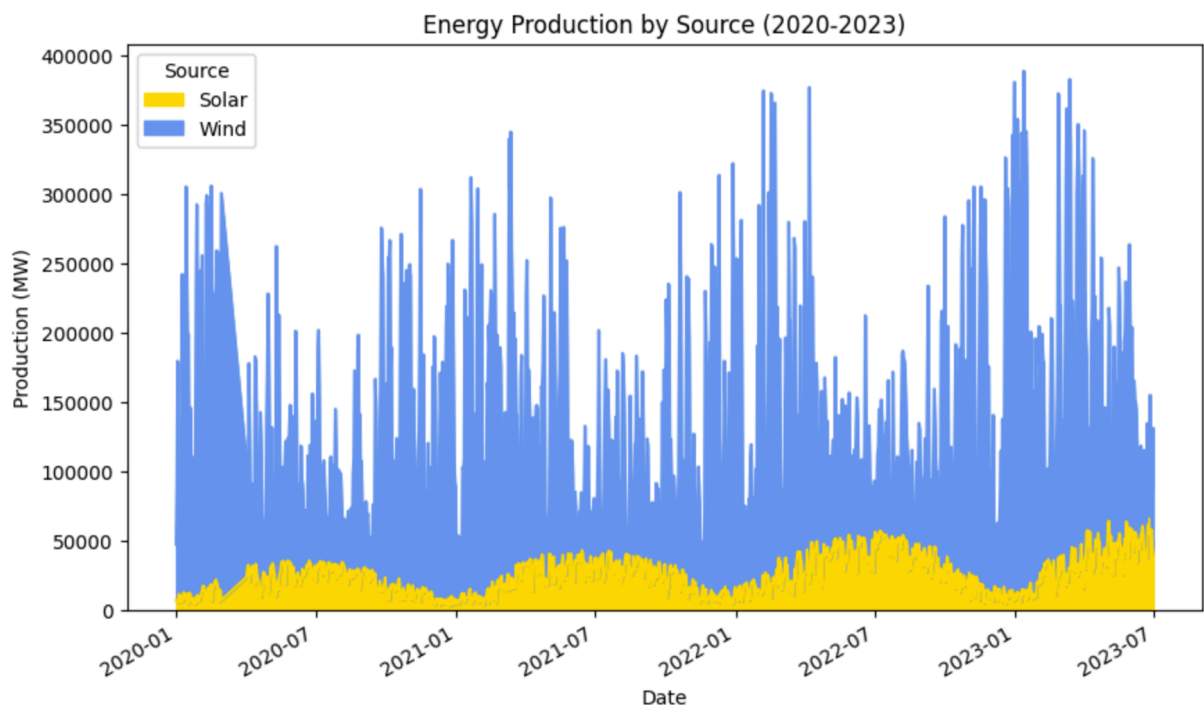
- **Forecasting with LSTM:**
  - I tested various machine learning models for predicting future energy production and found that LSTM (Long Short-Term Memory) is the most effective technique.

Recommendations:

- **Grid Integration Strategies:**
  - Develop robust grid integration strategies to accommodate the variability of renewable energy sources.
  - Invest in energy storage solutions and grid infrastructure upgrades to enhance flexibility and reliability.
- **Policy Support:**
  - Continue implementing supportive policies and regulatory frameworks to incentivize renewable energy investments.

- Explore market based incentives and innovative financing mechanisms to drive renewable energy deployment.

Conclusion:

My analysis underscores the dominance of wind energy production over solar alternatives in France, driven by a combination of geographical, technological, and policy factors. By leveraging advanced forecasting techniques like LSTM and adopting strategic measures for grid integration and policy support, France can further accelerate its transition towards a sustainable and resilient energy future.