

Enhancing Renewable Energy Efficiency with Artificial Intelligence

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INTRODUCTION

Traditional power assets face tremendous demanding situations inclusive of pollution, greenhouse gas emissions, and the fast depletion of herbal assets, which will increase the need for sustainable answers.

Renewable energy, which includes solar, wind, and hydropower, is taken into consideration as one of the most crucial environmentally friendly options. However, it faces challenges in predicting output and efficiently dealing with grids due to climate fluctuations and manufacturing instability.

Artificial intelligence offers powerful equipment to cope with these challenges by way of analyzing big information, forecasting manufacturing, optimizing storage, and handling clever grids efficiently.

Integrating AI with renewable energy can accelerate the transition towards a low-emission financial system and enhance environmental and social sustainability.

METHODOLOGY

Data Collection: Gather manufacturing measurements from renewable power vegetation, weather records, and reading power consumption.

Data Analysis: Use machine learning techniques to forecast power manufacturing and consumption.

Modeling: Develop predictive fashions to optimize energy distribution and decrease losses.

Implementation: Integrate models into smart grids to manage assets extra efficiently.

RESULTS

Significant improvement was achieved in the accuracy of forecasting solar and wind electricity generation, increasing by up to 20–30%, enabling better planning and optimization of renewable energy resources. Losses were reduced in intelligent electrical grids, resulting in enhanced overall grid stability, reliability, and operational efficiency. The economic feasibility of renewable energy solutions increased, encouraging wider adoption of smart grids, and promoting integration of clean energy technologies, and ultimately supporting a more sustainable and resilient energy infrastructure for the future.

CONCLUSION

Traditional energy sources face major challenges such as pollution, greenhouse gas emissions, and the depletion of natural resources. Renewable energy, including solar, wind, and hydropower, offers an environmentally friendly solution, but it faces difficulties in production forecasting and smart grid management. Artificial intelligence contributes by analyzing data, predicting output, and optimizing storage and grid management, thereby increasing renewable energy efficiency, reducing losses, and enhancing economic, environmental, and social sustainability.