DATE	28-02-2026
TEAM ID	LTVIP2026TMIDS90651
PROJECT NAME	Weather-Based Prediction of Wind Turbine Energy Output: A Next-Generation Approach to Renewable Energy Management
MAXIMUM MARKS	5 MARKS

4.2 - Proposed Solution:

The proposed solution is a Weather-Based Wind Turbine Energy Output Prediction System that uses historical weather data and turbine performance data to accurately forecast power generation. The system applies machine learning techniques to model the complex relationship between weather conditions and energy output, enabling more reliable and data-driven predictions compared to traditional methods.

Key Components of the Proposed Solution

1. **Data Collection:**

   The system collects historical data such as wind speed, wind direction, temperature, air pressure, humidity, and actual turbine power output. This data forms the foundation for training and testing the prediction models.

2. **Data Preprocessing:**

   The collected data is cleaned and prepared by handling missing values, removing noise, and normalizing features. This step ensures high-quality input data and improves the accuracy of the prediction model.

3. **Feature Analysis and Selection:**

   Important weather parameters that influence power generation are identified and selected. This helps the model focus on the most relevant inputs affecting wind turbine performance.

4. **Model Training Using Machine Learning:**

   Machine learning algorithms (such as regression models, decision trees, or ensemble methods) are trained using historical data. These models learn the relationship between weather conditions and energy output and can generalize to new, unseen data.

5. **Prediction and Forecasting:**

Once trained, the model predicts future wind turbine energy output based on new or forecasted weather data. The system can provide short-term or long-term predictions depending on user requirements.

6. **Visualization and Reporting:**

   The predicted results are displayed using charts, graphs, and dashboards. The system also allows comparison between predicted and actual output to evaluate performance and improve model accuracy.

Benefits of the Proposed Solution

- Improved accuracy in wind energy output prediction
- Better utilization of renewable energy resources
- Enhanced decision-making for energy management
- Reduced uncertainty caused by weather variability
- Increased efficiency and reliability of wind power systems