Project Design Phase

Proposed Solution

Date	14 February 2026
Team ID	LTVIP2026TMIDS83348
Project Name	Weather Based Prediction Of Wind Turbine Energy Output - A Next Generation Approach To Renewable Energy Management
Maximum Marks	2 Marks

Proposed Solution Details:

S.No.	Parameter	Description
1	**Problem Statement (Problem to be solved)**	Wind farm operators and energy planners face operational and financial challenges due to unpredictable weather conditions affecting wind turbine energy generation. There is a lack of accessible, weather-driven predictive tools to accurately forecast energy output and support grid stability and renewable energy management.
2	**Idea / Solution Description**	Develop an Exploratory Data Analysis (EDA) and Machine Learning–based Weather-Driven Wind Energy Prediction System. The solution analyzes historical weather parameters (wind speed, temperature, pressure, humidity) and turbine output data, visualizes performance trends, and provides predictive energy forecasts through a Flask-based web application for operational decision support.
3	**Novelty / Uniqueness**	Combines detailed weather analytics with ML-based

		energy forecasting in a lightweight and scalable web application. Focuses on integrating environmental factors directly into turbine output prediction, providing both visualization and actionable forecasting in a single platform. Designed to be modular and cloud-ready.
4	**Social Impact / Customer Satisfaction**	Enhances renewable energy efficiency and grid reliability. Supports cleaner energy adoption by improving forecasting accuracy. Reduces financial risk for wind farm operators and contributes to sustainable energy planning and carbon reduction goals.
5	**Business Model (Revenue Model)**	Subscription-based model for renewable energy companies and grid operators. Tiered access (basic forecasting, advanced analytics, enterprise dashboards). Potential partnerships with energy utilities, smart grid providers, and government renewable energy programs.
6	**Scalability of the Solution**	Scales by adding multiple wind farms, turbine datasets, and geographic regions. Cloud deployment enables multi-user access. Future integration with real-time weather APIs, IoT turbine sensors, and smart grid systems for large-scale renewable energy management.