Project Design Phase-II
Technology Stack (Architecture & Stack)

Date	31 January 3035
Team ID	PNT2025TMID00584
Project Name	Global Energy Trends: A Comprehensive Analysis of Key Regions and Generation Models using Power BI
Maximum Marks	4 Marks

Components & Technologies

Table 1:

S.No	Component	Description & Technology
1	User Interface	Web-based dashboard for visualizing energy trends Power BI, React.js, HTML, CSS
2	Application Logic-1	Data extraction and preprocessing Python, Pandas, NumPy
3	Application Logic-2	Predictive analytics and forecasting model Scikit-Learn, TensorFlow
4	Application Logic-3	Policy impact analysis Power BI DAX, SQL Queries
5	Database	Stores historical and real-time energy data PostgreSQL, MySQL
6	Cloud Database	Cloud-based storage for scalability AWS RDS, Google BigQuery
7	File Storage	Stores reports, visualizations, and logs AWS S3, Google Cloud Storage

8	External API-1	Fetches real-time energy data EIA API, OpenWeather API
9	External API-2	Retrieves government policy data GovData API, World Bank API
10	Machine Learning Model	Predicts energy demand and grid stability LSTM, XGBoost, ARIMA
11	Infrastructure	Cloud hosting and deployment AWS EC2, Azure Kubernetes

Application Characteristics

Table 2:

S.No	Characteristics	Description & Technology
1	Open-Source Frameworks	Frameworks used for development Django, Flask, FastAPI
2	Security Implementations	Authentication and data security OAuth 2.0, JWT, IAM Controls
3	Scalable Architecture	Supports high-volume energy data processing Microservices, Kubernetes
4	Availability	Ensures high uptime Load Balancers, Distributed Servers
5	Performance	Optimized for fast response times CDN, Redis Cache, GraphQL

Deployment Strategy

- Development & Testing: Local environment using Docker
- Staging: Hosted on AWS/Azure for testing
- Production: Deployed on Kubernetes with CI/CD pipelines