

Project Design Phase-I

Solution Architecture

Date	16 February 2026
Team ID	LTVIP2026TMIDS55781
Project Name	Plugging into the Future: An Exploration of Electricity Consumption Patterns Using Tableau
Maximum Marks	4 Marks

Solution Architecture:

Plugging into the Future: An Exploration of Electricity Consumption Patterns Using Tableau

The platform follows a layered system architecture designed to efficiently collect, process, analyze, and visualize electricity consumption data.

1. Data Providers & Sources

- **Sources:** Power utilities, government energy portals, smart meter systems, and regional grid offices.
- **Data Generated:** Electricity consumption readings, peak load and demand logs, regional usage reports, and seasonal/time-based data.

1. Data Ingestion Layer

- **Methods:** CSV/Excel uploads, API integrations from smart meters, and scheduled data imports.

2. Raw Data Storage Layer

- **Infrastructure:** Secure cloud storage systems (Amazon S3, Google Cloud Storage) or a local data lake.
- **Purpose:** Ensures high availability of historical electricity data for long-term analysis.

3. Data Processing & Transformation Layer (ETL)

- **Tools:** Python (Pandas) and ETL pipelines.
- **Actions:** Cleans and prepares data by removing missing/inconsistent values, standardizing regional and time formats, and aggregating data by state, region, quarter, and year into analytics-ready datasets.

4. Data Storage & Query Layer

- **Technologies:** Amazon RDS, PostgreSQL, or a dedicated data warehouse.
- **Purpose:** Stores cleaned, structured data optimized for fast analytical queries and scalable access.

5. Analytics & Visualization Layer

- **Tools:** Tableau Desktop, Tableau Server, or Tableau Public.
- **Outputs:** Interactive dashboards showcasing state-wise comparisons, 2019 vs. 2020 usage trends, quarterly/seasonal demand patterns, peak load identification, and KPIs (total usage, growth percentage, high-demand regions).

6. Monitoring & Alerts Layer (Optional)

- **Features:** Threshold-based alerts for abnormal consumption, automated weekly reports, and email notifications to utility managers for proactive decision-making.

7. End Users & Stakeholders

- **Audience:** Energy planners, policymakers, utility company managers, infrastructure and sustainability teams, and government decision-makers.
- **Outcomes:** Enables data-driven energy planning, demand forecasting, load balancing, identification of high-consumption zones, and improved power distribution efficiency.

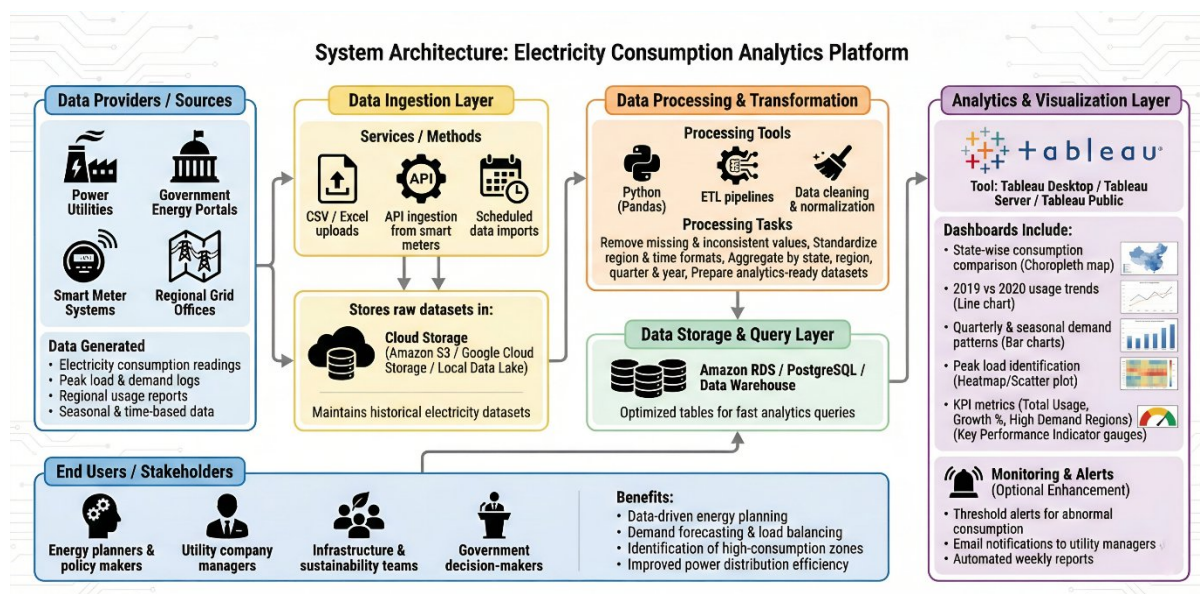


FIG:-System Architecture (Electricity Consumption)