Project Design Phase
Solution Architecture

Date	14 June 2025
Team ID	LTVIP2025TMID47623
Project Name	Exploration of Electricity Consumption Patterns
Maximum Marks	4 Marks

Solution Architecture:

◈ Goals of the Architecture

1. ✅ Find the best technology stack to visually analyze electricity consumption trends across Indian states and time periods using Tableau.
2. ✅ Define the system's structure and behavior, including data import (CSV or MySQL), preprocessing (in Tableau or Python), and dashboard development (in Tableau Public).
3. ✅ Clearly outline key components and development phases — from data ingestion to visualization — to ensure an interactive and user-friendly analytics solution.
4. ✅ Provide a scalable and modular technical architecture that supports future enhancements such as new datasets, real-time data integration, or migration to Tableau Cloud.

📐 **Architecture Components**

Layer	Component Description
Source	Consumption.csv file containing electricity usage data along with fields like State, Region, Date, Usage (MU), Latitude, and Longitude.
Data Layer	Raw dataset imported into Tableau or optionally into a MySQL database. Data includes weekly records over 24 months.
Processing Layer	Data cleaning (e.g., removing nulls, formatting dates), type conversion, and creation of calculated fields (e.g., Year-over-Year % change, Lockdown Flag), done within Tableau or using Python (Pandas).

Layer	Component Description
Application Layer	Tableau logic engine used to apply filters (Year, Region, Lockdown), generate calculated fields, and render visuals (maps, line graphs, bar charts).
Presentation Layer	Final dashboard built in Tableau including interactive visuals such as bar charts, filled maps, line charts, and a Tableau Story for guided insights.
Users	Government energy planners, policy analysts, researchers, or decision-makers — accessing the dashboard via Tableau Public or exported PDF reports.

🔄 Development Phases

Phase	Description
Phase 1 – Data Preparation	Import the Consumption.csv file. Clean the dataset by formatting date fields, renaming columns (e.g., "Usage"), handling missing values, and ensuring consistency.
Phase 2 – Basic Visuals	Create foundational visualizations such as bar charts (state-wise usage), line charts (monthly trends), and apply basic filters like Year and Region.
Phase 3 – Advanced Visuals	Add deeper analytics through filled maps (region-wise usage), area charts (lockdown comparison), highlight tables (quarterly usage), and calculated fields (e.g., YOY % change).
Phase 4 – Dashboard + Story	Combine all visuals into an interactive dashboard. Implement filters and tooltips. Build a Tableau Story to present key insights in a structured, sequential narrative.
Phase 5 – Final Report	Publish the dashboard to Tableau Public. Export visuals or the entire dashboard as PDF/images for stakeholder presentations and documentation.