1. Introduction :

1.1 Project Overview: In today's data-driven world, understanding electricity consumption patterns is critical for effective energy management, policy planning, and sustainability efforts. With the increasing demand for electricity and regional variations in usage, there is a need to visualize and analyze how power is consumed over time across different regions.

1.2 This project titled "Exploration of Electricity Consumption Patterns Using Tableau" aims to uncover valuable insights from structured time-series data related to power usage across Indian states. The dataset includes fields such as State, Region, Date, Usage (in Mega Units), Latitude, and Longitude, covering a time period of 24 months — from January 2019 to December 2020.

1.3 Using Tableau, we convert this raw consumption data into interactive dashboards and stories that allow users to explore and interpret energy trends. The visualizations help answer key questions such as:

1.4 Which states or regions consume the most electricity?

1.5 How has power usage changed month-to-month or year-to-year?

1.6 What impact did specific events (like lockdowns) have on energy consumption?

1.7 Are there any seasonal or quarterly trends in usage?

1.8 Through visual storytelling, filters, maps, and charts, the project provides a user-friendly, self-service analytical tool for policymakers, analysts, and energy departments to gain a deeper understanding of electricity demand patterns. The goal is to support data-driven decisions and promote efficient power distribution and planning.

1.9 Purpose: The purpose of this project is to enable data-driven insights into electricity consumption trends across Indian states and regions. By visualizing and analyzing large volumes of power usage data over a two-year period, this project helps stakeholders such as government agencies, utility providers, and policy analysts make informed decisions related to energy planning and management.

1.10 Energy consumption data often resides in raw spreadsheet formats,

making it difficult to interpret or act upon quickly. This project bridges that gap by creating an interactive Tableau dashboard that transforms this raw data into visual, meaningful, and actionable insights.

1.11 Through this dashboard, stakeholders can:

1.12 Monitor and compare electricity usage across different states and regions.

1.13 Identify high and low consumption zones to optimize resource distribution.

1.14 Track monthly, quarterly, and yearly trends to support seasonal planning.

1.15 Evaluate the impact of events such as national lockdowns on energy demand.

1.16 Explore usage patterns in metro cities compared to rural regions.

1.17 This project acts not only as an analytical tool but also as a strategic decision-support system for energy management teams. It simplifies complex data interpretation by:

1.18 Providing filters (e.g., region, state, time range) for focused analysis,

1.19 Enabling quick visual comparisons between years or regions,

1.20 And presenting key findings through interactive dashboards and storyboards.

1.21 Ultimately, the purpose of this solution is to empower stakeholders with a scalable and user-friendly analytics platform that supports smart energy management, policy formulation, and sustainable resource usage.

1.22 Through this dashboard, stakeholders can:

- Visually compare product performance across different store areas (e.g., aisle vs. end-cap).
- Analyze the effectiveness of promotional strategies across demographic groups.
- Understand how traffic zones influence buying decisions, and adjust layouts accordingly.
- Compare pricing against competitors to better position products for conversion.

The project serves not only as a tool for analysis but also as a strategic aid for marketing, merchandising, and operations teams. It simplifies the decision-making process by:

- Providing custom filters (like demographics and traffic level),
- Enabling quick comparisons between different positioning strategies,
- And delivering visual stories that present findings in a sequential, understandable way.

Ultimately, the purpose of this solution is to empower retail organizations with a scalable, visual analytics platform that improves sales performance, enhances the shopping experience, and leads to smarter marketing and placement strategies.

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2. IDEATION PHASE :

2.1 Problem Statement : Government bodies, electricity boards, and energy analysts often face a major challenge: they lack clear visibility into how electricity is consumed across different states, regions, and time periods. While raw data is collected regularly from multiple sources, it is often stored in large, unstructured spreadsheets, making it difficult to analyze, compare, or draw meaningful conclusions.

2.2 The absence of interactive visual tools makes it hard for stakeholders to explore how electricity consumption varies based on factors like region, time of year, or major events (e.g., lockdown periods). As a result, important trends remain hidden, and opportunities to improve resource allocation, demand forecasting, or energy policy planning are often missed.

2.3 Traditional reporting methods such as spreadsheets:

2.4 Lack interactivity and real-time filtering

2.5 Do not allow easy comparison across regions or time periods

2.6 Require manual effort and are time-consuming to analyze

2.7 Make it hard to communicate insights to non-technical stakeholders

2.8 This problem becomes even more critical when working with nationwide data covering multiple states and time spans. Without a centralized and visual reporting solution, it is difficult to identify usage peaks, predict demand, or assess the effect of government policies.

2.9 Hence, there is a strong need for a solution that:

2.10 Visualizes electricity usage trends in a clear and interactive manner

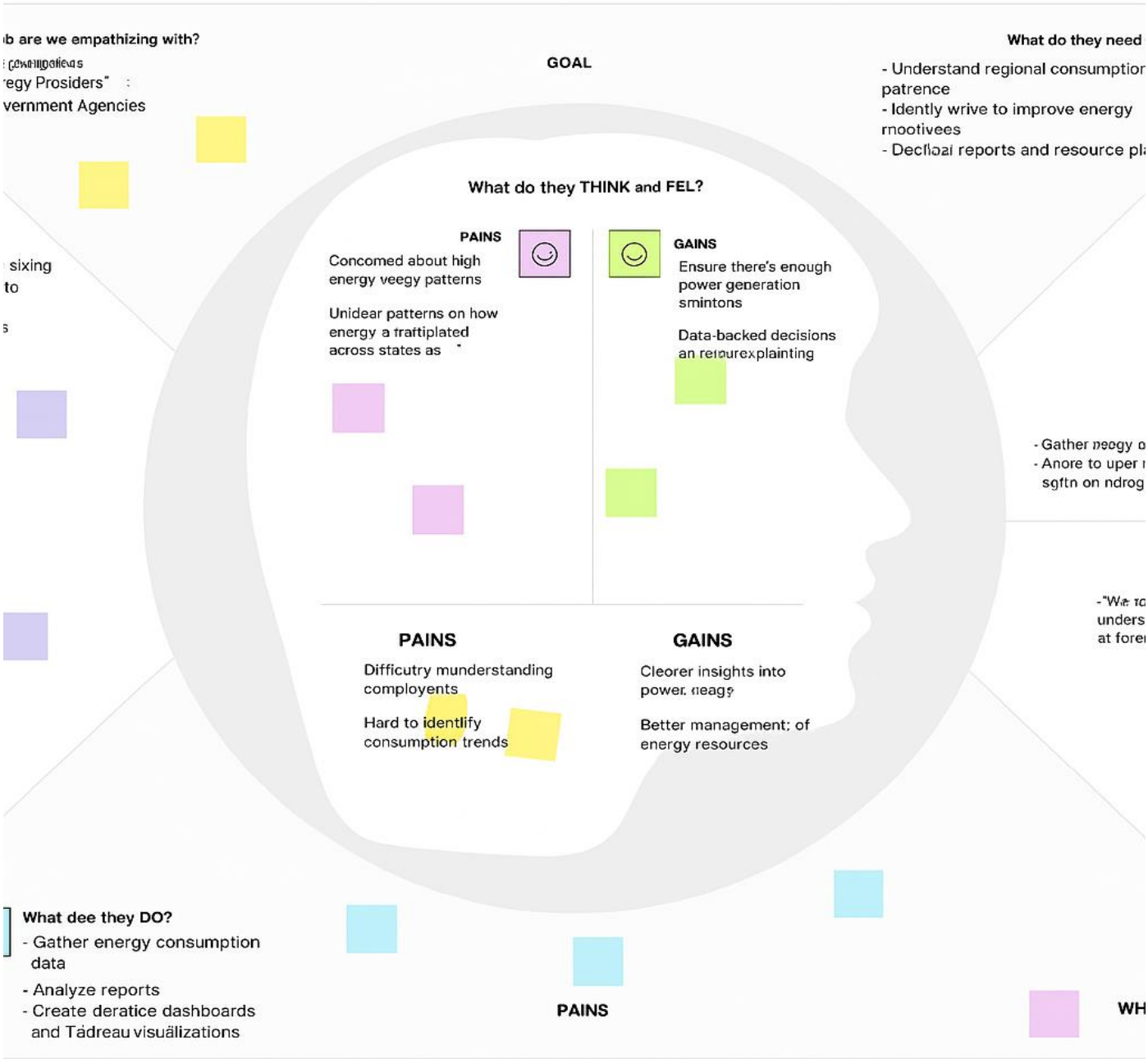
2.11 Allows comparison across years, months, regions, and states

2.12 Helps stakeholders make informed, data-driven decisions

2.13 Supports real-time filtering and intuitive storytelling

2.14 This project aims to solve this problem by developing a dynamic Tableau dashboard that connects policymakers, planners, and analysts directly to the electricity consumption data — making it easy to analyze, understand, and act upon.

2.15 Empathy Map Canvas :



2.16 Brainstorming :

2.16.1. To begin our project, our team organized a brainstorming session to explore how we could effectively visualize electricity consumption patterns across Indian states using Tableau. The goal was to discover meaningful insights from the dataset Consumption.csv, which contains power usage data for a period of 24 months (from January 2019 to December 2020).

2.16.2. We examined and discussed the key columns of the dataset, including:

2.16.3. State – Indian states where electricity usage is recorded

2.16.4. Region – Grouping of states by zones (e.g., North, South, East, West, North-East)

2.16.5. Date – Weekly timestamp of electricity usage

2.16.6. Usage – Electricity consumption in Mega Units (MU)

2.16.7. Latitude & Longitude – Used for mapping geographical visualizations

2.16.8. During our session, we discussed:

2.16.9. How power usage changed over time (e.g., before and after COVID-19 lockdowns)

2.16.10. Which states or regions consumed the most electricity

2.16.11. How we could visualize the quarterly, monthly, and yearly trends

2.16.12. What types of dashboards and charts would help decision-makers (such as energy analysts or government departments) easily understand the data

2.16.13. We also divided tasks such as:

2.16.14. One member worked on preparing and cleaning the data

2.16.15. Another handled database import and SQL queries

2.16.16. The rest of the team focused on visualization and dashboard design in Tableau

2.16.17. This collaborative approach helped us define a clear direction for building an interactive, insightful, and user-friendly dashboard that supports data-driven decisions in the energy sector.

Idea	Category
Compare electricity usage by state for the years 2019 and 2020 using bar charts	Yearly Comparison

Use a line chart to show monthly consumption trends across the 24-month period	Time Series Analysis
Display a regional map to visualize consumption by region using color intensity (filled map)	Geographical Analysis
Create a before-and-after comparison for electricity usage around the COVID-19 lockdown period	Event Impact Analysis
Add filters for year, month, region, and state to allow interactive exploration	Interactivity
Use pie/donut charts to compare total regional consumption	Regional Breakdown
Show top N and bottom N states by usage using horizontal bar charts	Ranking & Performance
Build a dashboard that highlights state-wise quarterly usage	Temporal Aggregation
Add a Tableau Story that guides users through patterns, insights, and conclusions	Storytelling/Presentation

2.16.18. Prioritization:

Priority	Idea	Reason
★ High	Bar Chart for 2019 vs 2020 State Consumption	Essential to identify year-on-year change in power usage across states.
★ High	Filters for Year, Region, and State	Crucial for user interactivity and personalized analysis in dashboards.

Priority	Idea	Reason
★ High	Line Chart for Monthly Consumption Trends	Helps target customer segments more precisely
★ High	Filled Map for Region-wise Usage	Essential for interactivity

★ Medium	Before and After Lockdown Usage Comparison	Adds depth to financial and behavioral insight
★ Low	Story Dashboard with Narratives	Adds polish and storytelling but not critical to logic

3. REQUIREMENT ANALYSIS :

3.1 Customer Journey map : The Customer Journey Map helps visualize the end-user's experience from problem identification to solution adoption. For this project, our primary users are retail managers, marketing analysts, and store planners who want to improve sales using data-driven product placement.

Stage	User Action	User Experience	Pain Points / Barriers	Solution / Feature in Dashboard
Awareness	Notices unusual energy demand or inconsistent state-level usage	Frustrated due to lack of easy insights	Relies on spreadsheets and static reports	Dashboard shows usage trends across time and regions
Consideration	Tries to explore historical consumption data manually from CSV or reports	Overwhelmed by raw data complexity	Manual filtering and comparison is time-consuming	Tableau organizes data visually with filters and charts
Adoption	Uses dashboard filters to compare usage by state, year, and month	Feels in control, can explore insights independently	Unsure how to detect trends or year-to-year changes	Filters for year, region, month, lockdown flag, etc.
Insight	Discovers consumption peaks during summer or pre-lockdown periods	Understands how demand shifts over time	Difficult to validate findings from raw data	Line graphs and highlight tables show clear usage trends
Action	Shares insights with department or uses them	Confident in data-backed	Needs easy way to explain	Dashboard stories and

Stage	User Action	User Experience	Pain Points / Barriers	Solution / Feature in Dashboard
	in forecasting/planning	decisions	insights to stakeholders	visuals help present findings clearly
Feedback	Requests enhancements like region-specific filters or quarterly analysis	Feels empowered to dig deeper	Wants more flexibility and automation for future projects	Dashboard is scalable and can be updated with new data

3.2 Solution Requirement:

FR No.	Functional Requirement (Epic)	Sub-Requirement (Story / Sub-Task)
FR-1	Visualize State-Level Consumption	Create bar chart showing electricity usage by state for 2019 and 2020
FR-2	Year-over-Year Comparison	Add a dual bar chart or line chart comparing monthly consumption for 2019 vs. 2020
FR-3	Analyze Regional Consumption	Build filled map showing usage by region with color intensity
FR-	Track Lockdown	Create before-and-after

FR No.	Functional Requirement (Epic)	Sub-Requirement (Story / Sub-Task)
4	Impact	lockdown usage charts (line or area chart)
FR-5	Quarterly Usage Summary	Display usage trends grouped by quarter using bar or line chart
FR-6	Add Interactivity	Add filters for year, region, state, and lockdown indicator
FR-7	Storytelling	Create a Tableau story with sequential dashboards to guide users through insights
FR-8	Exporting Dashboard	Enable dashboard to be exported as PDF or image for sharing with decision-makers

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3.3 Non-Functional Requirements (NFR)

NFR No.	Non-Functional Requirement	Description
NFR-1	Usability	The dashboard should be intuitive, easy to navigate, and understandable by non-technical users
NFR-2	Reliability	Visuals must consistently display correct results when filters are applied
NFR-3	Performance	Dashboards should load within 5 seconds even

NFR No.	Non-Functional Requirement	Description
		when working with more than 1,000 rows of data
NFR-4	Availability	The dashboard should be accessible at any time via Tableau Public or downloadable reports
NFR-5	Scalability	The system should support additional states, years, or data rows without needing redesign
NFR-6	Security	Dataset should be handled locally or shared securely; no personal or sensitive information exposed

3.4 Data Flow Diagram: A **Data Flow Diagram (DFD)** shows how data moves through your system — from input to final output — across different components. This project processes a CSV dataset through Tableau to produce interactive dashboards for business decision-making.

Level 1 DFD – Detailed Process Flow:

	Process Component	Description
1	Data Input	User uploads Consumption.csv (file containing State, Region, Date, Us Longitude) into MySQL or directly into Tableau
2	Data Cleaning & Formatting	Missing value check, date formatting, column renaming (e.g., "Usage" as "Electricity_Consumed"), removing duplicates
3	Calculated Fields	Calculations such as: Monthly Usage, Year-over-Year % Change, Lockdown Impact, Quarterly Averages

4	Visualization Engine	Tableau is used to create charts like bar graphs (state-wise), line charts (monthly trends), filled maps (region-wise), and pie charts

	Process Component	Description
5	Filters	Applied on Promotion, Traffic, Demographics, Product Category
6	Dashboard Assembly	All sheets combined into one interactive dashboard
7	Storytelling Mode	Tableau story created to walk stakeholders through key insights
8	Output	Users view or export dashboard results (PDF, image, or shareable link)

3.5 Technology Stack: This section outlines the tools, technologies, and components used to build and deploy the solution. It includes both the architecture layers and the technology choices for your project.

A. Technical Architecture (3-Tier Design)

Layer	Component Description
Presentation Layer	The final Tableau Dashboard UI, visible to users. Includes interactive filters and visuals
Application Layer	Tableau Engine responsible for creating calculations, visual logic, and rendering visuals
Data Layer	Raw dataset: Product Positioning.csv stored locally or on Google Drive

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B. Components & Technologies Used

S. No	Component	Description	Technology Used
1	User Interface	Tableau Dashboard with visual and filter components	Tableau Public / Desktop
2	Data Processing	Data cleaning, type conversion, and calculated fields	Tableau, Optional: Python/Pandas
3	File Storage	Dataset stored and imported into Tableau	Local File System / Google Drive
4	Visualization Engine	Chart rendering and interactivity	Tableau Visualization Engine
5	Story Presentation	Tableau Story feature for sequential insights	Tableau
6	Export & Sharing	Export reports in PDF/Image formats; public dashboard access	Tableau Public / PDF Export

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C. Application Characteristics

Feature	Description	Technology Used
Open Source Frameworks	Tableau Public is freely accessible, optional use of Python (Pandas)	Tableau Public, Pandas
Security	Controlled data sharing via Tableau Public permissions and Google Drive	Tableau Share Settings
Scalability	Can support more data rows, product lines, or new categories easily	Tableau Extract Engine

Feature	Description	Technology Used
Availability	Hosted via Tableau Public or downloadable as a file for 24/7 access	Tableau Public
Performance	Fast loading for up to 1000+ rows with live filters and dashboard response	Tableau (Live / Extract)

4. PROJECT DESIGN:

4.1 Problem Solution Fit:

The Problem

Government agencies, energy analysts, and planners often struggle with understanding electricity consumption trends across different states and regions in India. While electricity usage data is collected regularly, much of it is underutilized due to:

- Lack of interactive tools for visual exploration and pattern recognition
- Difficulty in comparing consumption across time periods, regions, or states
- Reliance on static spreadsheets or manual reports that make trend detection difficult

This results in missed opportunities for optimizing energy planning, forecasting demand, and identifying the impact of external factors such as the COVID-19 lockdown. Without visual tools, it is challenging to support data-driven decisions related to resource allocation and policy formulation.

The Solution

This project provides an interactive Tableau dashboard that transforms raw electricity usage data into meaningful visuals and stories. The solution enables:

- State-wise and region-wise electricity usage comparison
- Monthly and yearly trend analysis across 2019 and 2020
- Visual comparison of electricity usage before and after lockdown periods
- Filters and interactivity for easy exploration by non-technical users
- Exportable dashboards for reporting and stakeholder communication

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🟩 Why This Solution Fits the Problem

Challenge	How the Solution Solves It
Static, unfilterable spreadsheets	Tableau dashboard allows dynamic filtering and exploration
No correlation between multiple variables	Users can interactively combine factors like traffic + promo + demographics
Manual analysis is time-consuming	Visuals offer instant insights, reducing dependency on Excel
Poor placement decisions	Dashboard shows which placements drive the most sales
Difficulty sharing insights with teams	Tableau stories present clear, step-by-step visual narratives

4.2 Proposed Solution : To address the challenges faced by policymakers, energy analysts, and decision-makers in understanding electricity usage trends across India, we propose a Tableau-based interactive dashboard solution. This solution enables detailed exploration of electricity consumption data from multiple perspectives such as time (monthly, yearly), geography (state, region), and external events (e.g., COVID-19 lockdown).

4.3 The proposed solution transforms the raw tabular data in Consumption.csv into a rich visual analytics environment. Users can interact with various visualizations, apply filters (year, region, state, lockd

🟩 Key Features of the Proposed Solution

Feature	Description
Bar Charts	Compare electricity usage across Indian states or regions for the years 2019 and 2020
Line Charts	Show monthly consumption trends to identify seasonal patterns and spikes
Filled Maps	Visualize region-wise electricity usage on the Indian map with color gradients
Area Charts	Display usage before and after the COVID-19 lockdown to show impact on consumption
Highlight Tables	Cross-analyze usage trends based on time periods (e.g., quarters, lockdown, peak months)
Pie / Donut Charts	Breakdown of regional contribution to total energy usage or usage category comparison
Interactive Filters	Allow filtering by Year, State, Region, and Lockdown Status for custom analysis
Calculated Fields	Add custom metrics like Year-over-Year (YoY) growth, total consumption, and lockdown effect
Dashboard Story	A Tableau Story that walks stakeholders through key insights in a sequential, guided format
Export Options	Export charts and dashboards as PDF or image for easy sharing or inclusion in presentations

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🛠️ How the Solution Will Be Implemented

1. Data Upload & Preparation

- Import the Product Positioning.csv file into Tableau
- Clean and format the data

- Create calculated fields like Gap and Promotion Impact

2. **Dashboard Design**
   - Develop individual chart types on separate sheets
   - Apply filters globally across all visualizations
   - Use color coding and labels to enhance readability
3. **Storytelling and Output**
   - Use Tableau Story feature to sequence insights
   - Export dashboards or visual summaries for presentations

4.4 Solution Architecture:

. 🔹 **A. Technology Stack:**

Component	Technology Used
Data Storage	Local CSV File / Google Drive
Data Processing	Tableau Desktop or Public
Visualization Engine	Tableau Visualization Engine
Storytelling & Output	Tableau Story Feature
Sharing & Export	Tableau Public, PDF Export
Optional Enhancements	Python + Pandas (for advanced preprocessing)

B. Key Functional Features Enabled by Architecture:

□ 🔢 **Calculated Fields:**

- Year-over-Year % Change = ((Usage in 2020 - Usage in 2019) / Usage in 2019) × 100
- Lockdown Impact = Usage Before Lockdown − Usage During Lockdown
- Total Annual Consumption = SUM of electricity usage grouped by year

□ 🎚️ Dashboard Filters:

- Filter by Year (2019 / 2020)
- Filter by Region (e.g., North, South, East, West)
- Filter by State (individual Indian states)
- Filter by Lockdown Period (Before / During / After)

 Charts & Visuals:

- Bar Charts for state-wise electricity usage
- Line Charts for monthly trend comparisons across two years
- Area Charts to visualize pre- and post-lockdown consumption
- Filled Maps to show regional consumption levels on the Indian map
- Highlight Tables for quarterly and year-wise cross-analysis
- Donut Charts for comparing share of usage by region

5. PROJECT PLANNING & SCHEDULING:

5.1 Project Planning: Project planning is essential to ensure the systematic development of the Tableau dashboard. Our approach followed the Agile methodology with three focused sprints, each creation and final presentation. targeting core functional elements of the solution — from data handling to dashboard

Electricity Consumption Dashboard

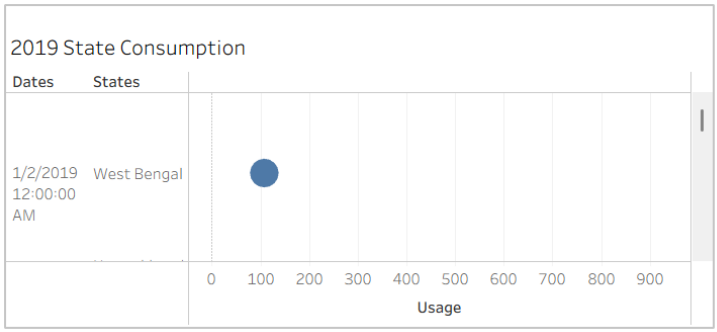
Sprint	Functotup	Functional Requirement (Epic)	User Story / Task	Story Points	Priority	Team Members
Sprint-1	Data Setup & Cleaning	USN-1	As an analyst, I want to upload and clean the electricity dataset so it is ready for visualization Tableau	2	High	You + Teammates
Sprint-1	Basic Visualization Design	USN-2	As a user, I want to build bar and donut charts to compare usage by region and promotion impact	3	High	You
Sprint-2	Advanced Visualizations	USN-4	As a user, I want to add filters usage patterns using highlight'tïples and lockdown impact area charts	3	Médium	You + Peer
Sprint-3	Story Buiiding	USN-6	As a user, I want to view total consumption contribution and YoY change using waterfall anbarts	2	Medium	You
Sprint-3	Export & Presentation	USN-7	As a presenter, I want to create a Tableau Story to communicate electricity usage trends stepbystep	2	Medium	You

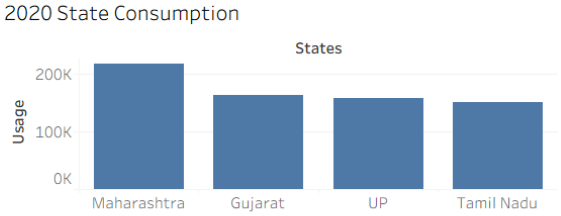
6. PERFORMANCE TESTING :

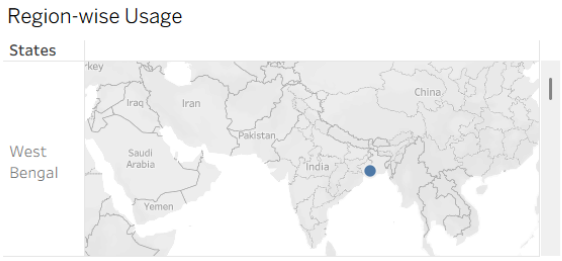
Model Performance Testing:

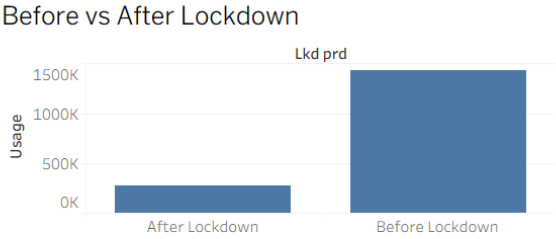
S.No.	Parameter	Screenshot / Values
1.	Data Rendered	The dataset used contains **1000 entries** related to product placement, pricing, traffic, demographics, promotions, and sales volume. Key fields include: •Product_Position •Foot_Traffic •Promotion •Consumer_Demographics • Sales Volume
2.	Data Preprocessing	- Verified and converted column types - Removed missing/null entries (none in this dataset) - Renamed columns for clarity in Tableau
3.	Utilization of Filters	Global filters used in dashboard: • Product Category • Promotion (Yes/No) • Foot Traffic (Low/Medium/High) • Seasonal (Yes/No) All filters are applied across all visualizations to enable comparative analysis
4.	Calculation fields Used	- Price Difference = [Price] - [Competitor's Price] - % Gap = ([Price] - [Competitor's Price]) / [Competitor's Price
5.	Dashboard design	Included: • Bar Chart – Avg Sales by Product Category • Donut Chart – Promotion-wise Sales • Funnel Chart – Sales by Product Position • Area Chart – Traffic vs Sales • Highlight Table – Demographics vs Sales Volume • Waterfall Chart – Contribution of each Product Category
6	Story Design	Story includes: • Overview • Placement Strategy Impact • Promotion Effectiveness • Sales Optimization Insights

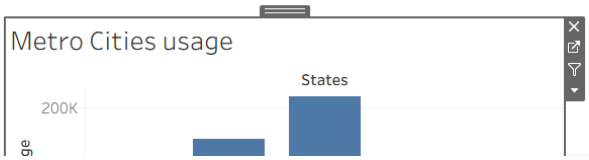
7. RESULTS :











7.1. Output Screenshots:

8. ADVANTAGES & DISADVANTAGES:

Advantage	Description
1. Easy to Understand & Use	The Tableau dashboard uses visual charts like line graphs, bar charts, and area plots that are simple to navigate and interpret, even for users without technical skills.
2. Actionable Visual Insights	Users can analyze electricity consumption trends across years, states, and lockdown periods using filters and visuals that update instantly.
3. Data-Driven Decision-Making	The dashboard empowers policy makers and analysts to base energy-related decisions on actual consumption data, reducing guesswork.
4. Customization & Flexibility	Filters allow users to view consumption data by year, region, quarter, and metro areas,

Advantage	Description
	giving tailored insights.
5. Visual Storytelling	Tableau's Story feature helps in presenting data insights sequentially, making it ideal for explaining trends to senior officials or during presentations.
6. Low Cost & Lightweight Setup	The project uses Tableau Public and a CSV file as a data source, avoiding the need for heavy infrastructure or paid software.
7. Scalable Design	New yearly data or more regions/states can be added to the dataset and visualizations without needing to rebuild the dashboard structure.

Disadvantage	**Description**
1. Static Data Source	Since the dataset is uploaded manually as a CSV, it does not support real-time updates. New data must be re-uploaded.
2. No Predictive Capabilities	The current project only shows past trends; it does not use forecasting to predict future electricity consumption.
3. Limited Automation	Lack of connection to live energy databases or APIs prevents continuous automatic refresh of data.
4. Requires Tableau Familiarity for Editing	Creating new charts or modifying the dashboard requires Tableau knowledge, which could be a barrier for non-technical users.
5. No Backend Storage for Historical Dashboards	Unless exported or versioned manually, Tableau Public does not support storing multiple historical dashboard versions.

Conclusion:

This project, **Electricity Consumption Trend Analysis Using Tableau**, successfully demonstrates how public energy consumption data — when visualized interactively — can provide meaningful insights that support data-driven decision-making for policymakers, planners, and energy analysts.

By converting a static dataset (Electricity_Consumption.csv) into a dynamic, filterable Tableau dashboard, the project enables stakeholders

- Improved data accessibility and clarity.
- Supported quick, evidence-based decisions.
- Reduced dependency on complex, manual reporting.
-

While the static CSV data limits real-time updates and the current scope does not include forecasting or predictive analytics, the system lays a solid groundwork for future integration with dynamic data sources and advanced analytics models.

In conclusion, the project demonstrates the power of Tableau as a platform for transforming raw electricity consumption data into meaningful stories that inform sustainable energy planning and usage optimization.

This project, **Electricity Consumption Trend Analysis Using Tableau**, demonstrates how structured energy usage data — when visualized effectively — can reveal actionable insights that enhance decision-making for utility planners, government bodies, and energy analysts.

9. FUTURE SCOPE:

1. 📡 Real-Time Data Integration
   - Integrate live electricity consumption data from smart meters, government energy portals, or APIs.
   - Use Tableau's live connection capabilities or third-party connectors to automatically refresh dashboards without manual file uploads.
2. 🧠 Predictive Analytics and Forecasting
   - Incorporate machine learning models (using Python, R, or Tableau Extensions) to:
     - Forecast future electricity demand based on seasonal trends and growth patterns.
     - Detect anomalies in consumption (e.g., sudden spikes or drops indicating faults or outages).
   - Implement time-series models to improve energy planning and load forecasting.
3. ☁️ Cloud Deployment for Broader Access
   - Deploy the dashboard to Tableau Cloud or Tableau Server to allow secure, multi-user collaboration across departments (e.g., energy, planning, environment).
   - Enable access to real-time and historical data insights from anywhere.
4. 🔍 Enhanced Segmentation & Filtering
   - Introduce filters such as day/night consumption, weekday vs. weekend usage, or per capita electricity usage.
   - Break down data by industry (residential, commercial, industrial) or income zones for more targeted energy policy insights.
5. 📈 Historical Comparison and Benchmarking
   - Add features to compare year-over-year (YoY) or month-over-month (MoM) consumption for the same state or region.
   - Include toggles for pre- and post-lockdown analysis or event-specific benchmarking (e.g., during heatwaves or elections).
6. 🛠️ Dashboard-as-a-Service Model
   - Convert the dashboard into a ready-to-use tool that can be offered to government energy departments, utility companies, or academic institutions.
   - Allow customizable themes, auto-updating graphs, and integration with institutional data for targeted use.

10. APPENDIX:

- Dataset Link - consumption.csv

- GitHub – https://github.com/Chandrika188/Plugging-into-the-futures-an-exploration-of-electricity-consumption-patterns-using-tableau/tree/main/Documents/Doc%20and%20Demo