Project Development Phase
Preprocessing Steps and Business Questions with Visualization

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

1) PREPROCESSING STEPS :

Data preprocessing is a crucial phase in any data analytics project. It ensures that the dataset is accurate, structured, and ready for meaningful visualization. In this project, electricity consumption data for the years 2019 and 2020 was carefully prepared before building interactive dashboards in Tableau.

1.1 Data Import and Verification

The dataset (Consumption.xlsx) was imported into Tableau Public using the Microsoft Excel connector. After loading the file, the dataset was reviewed in the Data Source tab to ensure:

- All rows and columns were properly loaded
- Field names were correct
- No structural inconsistencies existed

This initial verification ensures data reliability before analysis begins.

1.2 Data Type Validation and Correction

Each field was examined and assigned the appropriate data type to enable correct aggregation and visualization:

- **States** → Dimension (Text)
- **Regions** → Dimension (Text)
- **Dates** → Date format
- **Usage** → Measure (Numeric)

Correct data typing is essential because numeric fields must aggregate properly (SUM, AVG), and date fields must support time-based analysis such as monthly and yearly trends.

1.3 Geographic Role Assignment

To enable geographic visualization, the “States” field was assigned a Geographic Role:

Right-click on States → Geographic Role → State/Province

This allowed Tableau to recognize Indian states and generate accurate filled map visualizations. Without this step, the geographic dashboard would not function correctly.

1.4 Data Cleaning and Handling Unknown Values

While creating map visualizations, certain states appeared as “Unknown.” This issue was resolved using:

Map → Edit Locations

Incorrect spellings and abbreviations were corrected to match Tableau's geographic database. This ensured that all states were properly displayed on the map.

1.5 Time Hierarchy Creation

The "Dates" field was used to derive:

- Month
- Quarter
- Year

This time hierarchy enabled:

- Monthly trend analysis
- Quarterly performance comparison
- Year-over-year consumption comparison

Time-based analysis is essential for identifying seasonal demand patterns and long-term growth trends.

1.6 Data Organization for Dashboard Development

The dataset was logically structured into analytical categories:

- State-wise analysis
- Region-wise comparison
- Monthly and yearly trends

This structured organization improved dashboard clarity and supported effective filtering and interaction.

2) BUSINESS QUESTIONS WITH VISUALIZATION

The primary objective of this project was to answer key analytical and business-driven questions using interactive Tableau dashboards. Each visualization was designed to deliver specific insights.

2.1 Which States Have the Highest Electricity Consumption?

Visualization Used: State-wise Bar Chart

States were placed on Rows and Usage on Columns. The bars were sorted in descending order to highlight top-consuming states.

Insight Generated:
This visualization identifies high-demand states, helping policymakers and energy planners focus on regions with greater electricity requirements. It supports infrastructure planning and resource allocation.

2.2 How Has Electricity Consumption Changed Over Time?

Visualization Used: Monthly Trend Line Chart

Month(Dates) was placed on Columns, Usage on Rows, and Year on Color. This created separate trend lines for 2019 and 2020.

Insight Generated:
The line chart reveals seasonal consumption patterns, peak demand periods, and year-over-year variations. It helps in forecasting and understanding demand fluctuations.

2.3 Which Region Consumes the Most Electricity?

Visualization Used: Region-wise Bar Chart and Pie Chart

Regions were compared using total electricity usage.

Insight Generated:
The comparison shows which region (North, South, East, West, North-East) has the highest electricity demand. This insight is useful for strategic planning and regional development.

2.4 What is the Geographic Distribution of Electricity Consumption?

Visualization Used: Filled Map

States were plotted on a geographic map, and Usage was represented using color intensity.

Insight Generated:
Darker shades indicate higher electricity consumption. The map provides a clear visual understanding of geographic demand concentration across India.

2.5 How Does Electricity Usage Vary Across Regions and Months?

Visualization Used: Heatmap

Regions were placed on Rows, Months on Columns, and Usage on Color.

Insight Generated:
The heatmap clearly highlights peak demand months for each region. It allows quick identification of high-usage periods and seasonal trends.

2.6 Who Are the Top and Bottom Electricity Consuming States?

Visualization Used: Top N and Bottom N Analysis

Filters were applied to display:

- Top 5 states by electricity usage
- Bottom 5 states by electricity usage

Insight Generated:
This helps identify states with exceptionally high or low electricity demand, enabling targeted energy management strategies.