Final Project Report

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

1. Introduction

This project analyzes electricity consumption trends across Indian states and regions. The objective is to explore usage patterns over time and generate actionable insights through interactive dashboards and visual analytics.

2. Problem Statement

Understanding electricity consumption patterns is critical for planning infrastructure, policy decisions, and efficient energy distribution. This project visualizes historical data to reveal trends, regional differences, and behavioral shifts.

3. Dataset Overview

The dataset includes time-series electricity consumption data for Indian states covering 2019–2020. Fields include state, region, coordinates, dates, and usage values measured in Mega Units.

4. Methodology

The workflow includes data collection, cleaning, preparation, visualization design, dashboard creation, and performance testing. Analytical storytelling is used to present findings clearly.

5. Visualizations Developed

1   2019 State Consumption
2   2020 State Consumption
3   Total Consumption
4   Usage by Region
5   Top N and Bottom N States
6   2019 & 2020 Month-wise Consumption
7   Total Consumption Region-wise
8   Usage Before and After Lockdown
9   Region-wise State Usage
10 Quarter Usage
11 Metro City State Usage

6. Dashboard and Story

Interactive dashboards summarize electricity trends, enabling comparisons across states, regions, and time periods. Storyboards guide users through key analytical insights.

7. Performance Testing

Performance evaluation ensures efficient rendering of data, optimal filter usage, and accurate calculations for smooth dashboard interaction.

8. Results

The analysis reveals regional consumption variations, seasonal patterns, and the measurable impact of lockdown periods on electricity demand.

9. Advantages

• Easy interpretation of large datasets
• Visual identification of trends
• Supports data-driven decision making

10. Limitations

• Dependent on dataset accuracy
• Historical scope limited to available data

11. Conclusion

The project successfully demonstrates how visualization tools can transform raw electricity data into meaningful insights for planning and optimization.

12.Preparation Steps

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1. Problem Understanding
Define the purpose of analyzing electricity consumption.

Identify stakeholders (government, utilities, planners, analysts).

Clarify what insights are expected — trends, regional demand, or efficiency patterns.

2. Data Collection
Gather electricity consumption data by:

Year

Month/Quarter

Region

State

Ensure the dataset includes consistent time-series information.

3. Data Cleaning & Preparation
Remove duplicate or missing values.

Standardize units of electricity usage.

Format date fields correctly.

Categorize regions/states properly.

4. Data Structuring
Organize data into logical tables:

Time-based consumption

Region/state-wise usage

Create calculated fields if required.

5. Tableau Data Import
Connect cleaned datasets to Tableau.

Validate field types (date, numeric, categorical).

Create relationships between tables if needed.

6. Visualization Planning
Decide which visuals best represent insights:

Line charts → time trends

Bar charts → state comparisons

Pie charts → regional distribution

Maps → geographic consumption patterns

7. Dashboard Development
Combine visuals into interactive dashboards.

Add filters (year, region, state).

Maintain clean layout and readability.

8. Insight Generation
Identify patterns, peaks, and drops.

Compare year-wise and region-wise trends.

Highlight anomalies.

9. Story Creation in Tableau
Arrange dashboards logically.

Build a narrative flow: overview → comparison → deep insights.

10. Validation & Refinement
Check accuracy of visuals.

Ensure clarity of interpretation.

Optimize dashboard performance.

11. Documentation & Reporting

Write findings.

Include screenshots and explanations.

Add conclusions and recommendations.

13.📊 Business Questions for the Project

Consumption Trends
1. How has electricity consumption changed year by year?

2. What seasonal patterns exist in electricity usage?

Regional Insights

3. Which region consumes the most electricity?

4. Which region shows the fastest growth in demand?

State-Level Analysis
5. Which states are top electricity consumers?

6. Which states have the lowest usage?

7. Are there unexpected spikes or declines?

Efficiency & Planning
8. How can consumption patterns inform energy planning?

9. What time periods show peak demand?

Comparative Analysis

10. How does consumption differ between years?

11. Which areas demonstrate stable vs fluctuating usage?

Strategic Decision Support
12. Where should infrastructure investment be prioritized?

13. How can demand forecasting improve grid management?

Future-Oriented Questions

14. What trends indicate increasing electricity dependency?

15. How can data insights support sustainable energy planning?

14.Future Scope

Future work may include predictive analytics, real-time monitoring integration, and AI-driven forecasting.

15.Appendix

Includes dataset references, dashboard links, and implementation notes.

16.Source code

```
from flask import Flask, render_template
app= Flask(__name__)


@app.route('/')
def home():
    return render_template("index.html")
if __name__=='__main__':
    app.run(debug=True)
```

17 .GitHub Link

https://github.com/Chennampalliaswini/Plugging-into-the-future-An-exploration-of-electricity-consumption-patterns-using-tableau