Comprehensive Project Plan for Electricity Consumption Analytics

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

Project Objective
The objective of this project is to analyze electricity consumption patterns across Indian states for the years 2019 and 2020 using SQL and Tableau. The project aims to identify time-based trends, region-wise distribution, lockdown impact, and consumption disparities among states. The final outcome will be an interactive dashboard and story published to Tableau Public and integrated into a web interface.

Problem Context

Electricity demand fluctuates across time, geography, and external events such as the COVID-19 lockdown. Raw time-series data is difficult to interpret and does not directly support decision-making. There is a need for structured storage, aggregation, and visualization to support energy planning and policy decisions.

Project Scope

In Scope

- Data collection and validation of Consumption.csv
- Database schema design in MySQL
- SQL-based aggregation and analysis
- Year-wise and region-wise comparison
- Lockdown impact analysis
- Creation of interactive Tableau dashboard
- Story-based analytical presentation
- Publishing to Tableau Public
- Integration using Flask
- Documentation and GitHub repository structuring

Out of Scope

- Real-time API data ingestion
- Machine learning forecasting models
- Cloud deployment
- Large-scale distributed database implementation

Project Goals

- Store and manage electricity consumption data in a relational database
- Execute optimized SQL queries for aggregation
- Build minimum 8 unique visualizations
- Create minimum 5 story scenes in Tableau
- Analyze 2019 vs 2020 consumption differences
- Evaluate pre-lockdown and post-lockdown impact
- Publish dashboard publicly
- Structure repository professionally

Stakeholders

Primary Stakeholders

- State Electricity Boards
- Ministry of Power
- Renewable Energy Departments
- Grid Management Authorities

Secondary Stakeholders

- Policy Analysts
- Researchers
- Academic Evaluators

Project Methodology

The project follows a structured sequential development model:

Phase 1: Data Understanding
Understand dataset structure, validate attributes, check for null values.

Phase 2: Database Design
Design MySQL schema and indexing strategy.

Phase 3: SQL Aggregation
Implement analytical queries including:

- Total consumption
- Year-wise aggregation
- Month-wise grouping
- Quarter-wise grouping

- Region-wise totals
- State ranking
- Lockdown impact classification
- Growth rate calculation

Phase 4: Visualization
Connect MySQL to Tableau and create visualizations.

Phase 5: Dashboard and Story
Design interactive dashboard with filters and create narrative story scenes.

Phase 6: Publishing and Integration
Publish to Tableau Public and embed in Flask application.

Timeline and Milestones

Total Duration: 4 Weeks

Week 1 – Data Preparation and Database Setup

- Create database
- Import CSV
- Create indexes
- Validate row counts

Milestone 1: Database fully operational

Week 2 – SQL Analytical Development

- Write all aggregation queries
- Validate outputs
- Document query results

Milestone 2: Analytical layer complete

Week 3 – Tableau Visualization

- Connect database
- Create calculated fields
- Build visualizations
- Design dashboard
- Create story scenes

Milestone 3: Dashboard and story completed

Week 4 – Publishing and Documentation

- Publish to Tableau Public
- Integrate with Flask
- Perform performance testing
- Prepare documentation
- Record demo video

Milestone 4: Project ready for submission

Risk Assessment and Mitigation

Technical Risks

Risk: SQL aggregation errors
Mitigation: Validate totals against raw dataset

Risk: Dashboard performance lag
Mitigation: Use indexed columns and pre-aggregated queries

Risk: Publishing failure
Mitigation: Verify Tableau Public credentials early

Data Risks

Risk: Missing or inconsistent values
Mitigation: Perform data validation and cleaning before import

Project Risks

Risk: Timeline delays
Mitigation: Weekly milestone tracking and buffer allocation

Resource Requirements

Software Requirements

- Python 3.10+
- MySQL Server
- Tableau Desktop
- Tableau Public account
- VS Code
- Git and GitHub

Hardware Requirements

- 8GB RAM minimum
- 64-bit operating system

Deliverables

- Structured MySQL database
- Complete SQL analytical query file
- Tableau dashboard
- Tableau story
- Tableau Public link
- Flask integration
- Full documentation
- GitHub repository with proper folder structure
- Demo video

Performance Metrics

- Query execution time under 2 seconds
- Dashboard load time under 5 seconds
- Correct aggregation results
- Minimum 8 visualizations
- Minimum 5 story scenes
- Fully functional filters

Success Criteria

The project will be considered successful if:

- All analytical queries execute correctly
- Dashboard provides accurate insights
- Lockdown impact clearly visible
- Story communicates findings logically
- Repository is professionally structured
- All documentation is complete

Conclusion

This project planning document establishes a structured roadmap for implementing electricity consumption analytics using SQL and Tableau. It ensures clarity of objectives, timeline management, risk mitigation, and deliverable tracking, thereby enabling systematic development and successful execution of the project.