eduJournal

Energy Consumption

Project Objective: Analyze urban energy consumption patterns to optimize resource allocation and enhance sustainability.

Phase 1: Project Initiation and Problem Definition

Problem Statement: Predictive Analysis of Energy Consumption Patterns in Urban Areas

Background: Urban areas face increasing challenges in managing energy resources efficiently. Understanding energy consumption patterns is crucial for optimizing resource allocation and reducing environmental impact.

Phase 2: Data Collection and Preparation

Data Sources:

Real-Time Streaming Data from IoT Sensors Across Urban Infrastructure

Historical Energy Consumption Data from Utility Providers

Weather Data (Temperature, Humidity) with Hourly Granularity

Socioeconomic and Demographic Data from Government Sources

Data Preparation:

Design and Implement Fact and Dimension Tables in SQL to Model Urban Energy Consumption Data.

Populate Fact Tables with Granular Energy Consumption Metrics and Dimension Tables with Descriptive Attributes.

Use SQL Queries to Extract and Load Data from Various Sources into Fact and Dimension Tables.

Phase 3: Exploratory Data Analysis (EDA)

Analysis Tasks:

Utilize Pivot Tables in Excel to Summarize and Analyze Energy Consumption Patterns by Time, Location, and Demographics.

Conduct Time-Series Analysis Using SQL Window Functions on Fact Tables to Identify Trends and Seasonal Patterns.

Join Fact and Dimension Tables in SQL to Enrich Energy Consumption Data with Weather and Socioeconomic Attributes.

Visualize EDA Results Using Tableau to Provide Interactive Insights.

Phase 4: Advanced Analysis and Modeling

Analysis Tasks:

Develop Advanced SQL Queries to Perform Complex Aggregations and Calculations on Fact Tables.

Use Excel Pivot Tables to Perform What-If Analysis and Scenario Planning Based on Dimension Attributes.

Build Tableau Dashboards to Visualize Key Metrics and Trends in Urban Energy Consumption, Utilizing Fact and Dimension Tables.

Implement SQL Stored Procedures to Automate Data Updates and Reporting Processes.

Phase 5: Reporting and Visualization

Visualization Tasks:

Design Interactive Dashboards in Tableau to Present Key Energy Consumption Metrics and Trends.

Create Drill-Down Visualizations to Explore Energy Consumption Patterns at Various Granularity Levels, Utilizing Dimension Tables.

Utilize Pivot Tables in Excel to Generate Detailed Reports and Ad-Hoc Analysis, Aggregating Data from Fact Tables.

Incorporate Geospatial Visualizations in Tableau to Highlight Regional Disparities in Energy Consumption, Linked to Dimension Tables.

Phase 6: Documentation and Presentation

Deliverables:

Detailed Documentation of Fact and Dimension Tables, Including Data Dictionary and Schema Diagrams.

Excel Workbooks with Pivot Tables and Dynamic Reports for Stakeholders, Integrated with Fact and Dimension Tables.

Tableau Dashboards with Interactive Visualizations and Insights, Utilizing Fact and Dimension Tables.

Executive Presentation Deck Demonstrating Insights Gained and Actionable Recommendations, Supported by Fact and Dimension Tables.

Drive link for Dataset:

https://drive.google.com/drive/folders/1Zs0wv5I0ONNG76d0WtD1mCUyf-1G5HOG?usp=sharing