Tech Saksham

Case Study Report

Data Analytics with Power BI

ANALYSIS OF COMMERCIAL ELECTRICITY CONSSUMPTION IN INDIAN STATE

“APC Mahalaxmi college for women”

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ABSTRACT

Electricity is a type of energy that can be found all around us. It is used to power our homes, businesses, and appliances. Electricity in science helps us understand how machines work. As we know, electrons are negatively charged particles.

Analysing how much energy your facility consumes lets you quantify the energy resources associated with your service, and identify and correct consumption inefficiencies. Measuring energy consumption lets you quantify the energy required by the different systems in your facility.

A power quality meter can measure and display the voltage, current, frequency, waveform, power factor, harmonics, interharmonics, flicker, voltage events, and energy consumption of the supply. A power quality monitor can also store and transmit the data to a computer or a network for further processing and reporting.

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CHAPTER 1

INTRODUCTION

● Problem Statement

Electricity outages have been a major impediment to doing business in countries worldwide Efficient electricity supply is an important prerequisite for aiding sustained agricultural and industrial growth to any economy. Electricity contributes to agricultural production either directly, by energising agricultural machinery and irrigation systems, or indirectly, as a complement to other inputs such as fertilizers and pesticides. Electricity in rural areas is widely believed to be a stimulus factor for increased agricultural productivity and mechanization .

● Proposed Solution

The proposed solution involves leveraging data analytics techniques with data sourced from the cloud and web to conduct an in-depth analysis of commercial electricity consumption in an Indian state.As we know, developing country like India has been promoting itself by enhancing various initiatives on all sectors and regions to achieve economic targets and for prepare to meet global competition for proclaim efficient nation. Accumulation of changes in energy consumption especially commercial energy pointed is indirectly spurs the problems on the consumption of non-commercial energy regularly consumes by rural people. Though, initiation of various commercial energy is always supports to economic growth and it never ever make worsen to that yet looking for another trend of consumption in non-commercial type and its reflects among the rural have to consider and necessary steps need to execute for the support of primary energy consumers and to boost economy level. Visualization tools will be used to present findings comprehensively, facilitating informed decision-making, while continuous monitoring will ensure ongoing optimization of energy resources and efficiency initiatives.

- **Feature**
- **Utilisation patterns :** Analyze peak and off-peak consumption times to identify trends in commercial electricity usage, aiding in resource allocation and infrastructure planning.

- **Sectoral Breakdown :** Segment consumption data by industry sectors to understand which sectors are the largest consumers, enabling targeted energy efficiency initiatives and tariff structure.

- **Seasonal Variation :** Evaluate seasonal fluctuations in electricity demand to anticipate future demands, optimize supply chain management, and implement demand-side management strategies.

- **Advantages**
- **Enchance Resource Management :** Electricity management is a vast topic in environmental science that deals with the control, monitoring, and conservation of energy consumption. This not only includes efficiency in consumption but also the creation and distribution of electric power.

- **Proactive Decision -Making :** By leveraging cloud/web-based data analytics, stakeholders can proactively identify consumption patterns, anticipate demand fluctuations, and plan infrastructure upgrades or maintenance activities accordingly. This proactive approach enhances grid stability, reduces downtime, and enhances overall operational efficiency.

- **Scope**

Based on recent data from the Central Electricity Authority (CEA), the peak power demand is expected to reach 230 GW by 2035. Meeting this demand requires strategic capacity addition and robust infrastructure development.

Powering India: an analysis of commercial electricity consumption in an Indian state using data analytics sourced from cloud or web platforms would entail examining trends, patterns, and factors influencing electricity usage. This analysis could encompass identifying peak consumption periods, understanding the impact of economic activities and industrial sectors on electricity demand, detecting anomalies or inefficiencies in consumption patterns, and forecasting future consumption trends to aid in resource allocation and infrastructure planning. Additionally, it could involve exploring correlations between electricity usage and external factors such as weather conditions, demographic shifts, or policy changes, providing valuable insights for policymakers, utility providers, and businesses to optimize energy management strategies and promote sustainable development.

CHAPTER 2

SERVICES AND TOOLS REQUIRED

2.1 Services Used

- **Data collection and integration**

  Depending on your data sources and needs, you can use different methods to collect energy data, such as manual reading, wired or wireless communication, or cloud-based services. Manual reading is the simplest but most time-consuming and error-prone method.. This could include industries, offices, retail outlets, etc. Data integration techniques will be crucial to ensure uniformity and consistency in the dataset.

- **Descriptive Analytics :** Perform descriptive analytics to understand the current patterns and trends in commercial electricity consumption. This involves summarizing the data through measures such as mean, median, mode, and standard deviation, as well as visualizing the data using charts and graphs to identify any outliers or anomalies.

- **Predictive Modeling : Precise electricity forecasting is a pertinent challenge in effectively controlling the supply and demand of power. This is due to the inherent volatility of electricity, which cannot be stored and must be utilised promptly.**

2.2 Tools and Software used

Tools:

• PowerBI: The main tool for this project is PowerBI, which will be used to create interactive dashboards for real-time data visualization.

• Power Query: This is a data connection technology that enables you to discover, connect, combine, and refine data across a wide variety of sources.

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Software Requirements:

• PowerBI Desktop: This is a Windows application that you can use to create reports and publish them to PowerBI.

• PowerBI Service: This is an online SaaS (Software as a Service) service that you use to publish reports, create new dashboards, and share insights.

• PowerBI Mobile: This is a mobile application that you can use to access your reports and dashboards on the go.

CHAPTER 3

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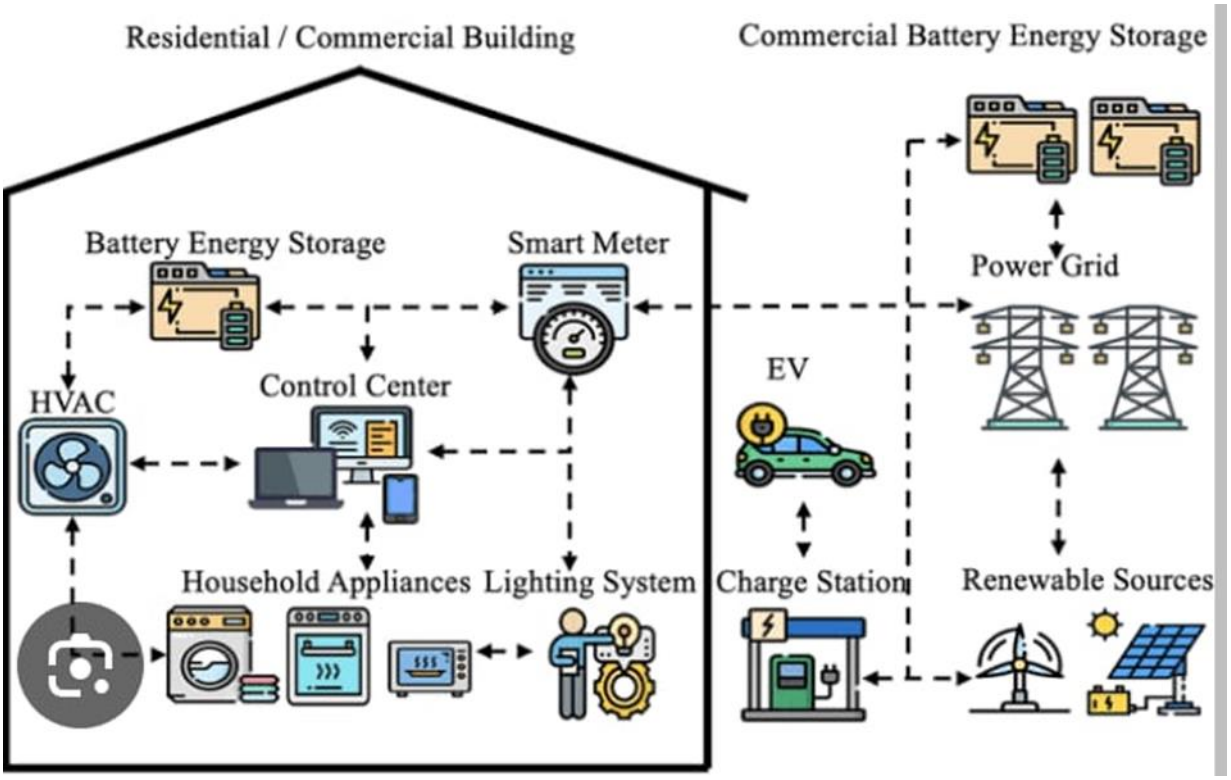
3.1 Architecture



Data Analytics Architecture for Commercial Electricity Consumption in Indian State:

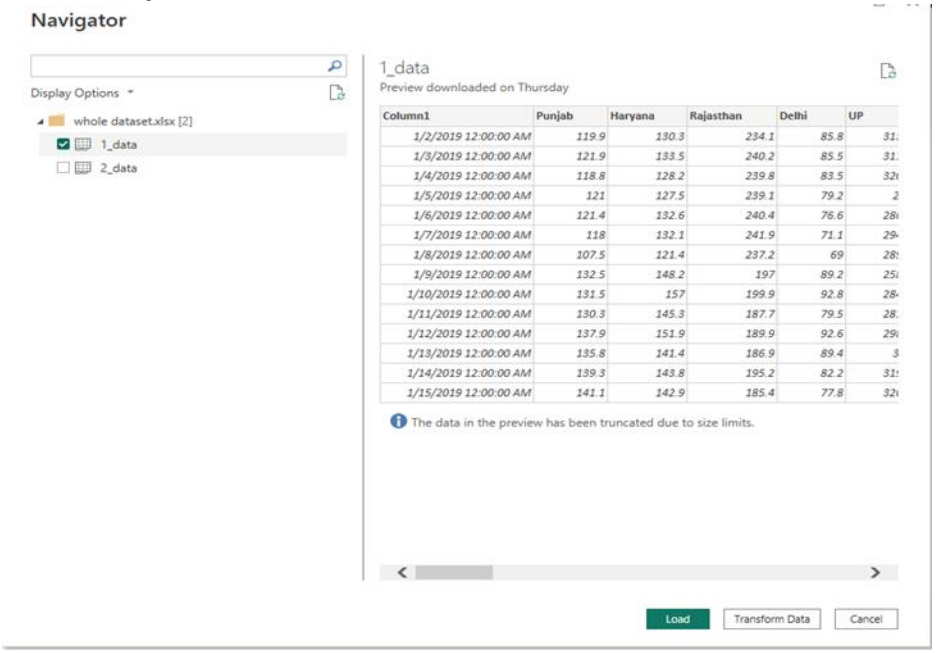
- **Data collection :** Gather data from cloud/web sources including government databases, utility companies, and IoT devices.
- **Data Preprocessing :** Cleanse and preprocess the data to handle missing values, outliers, and inconsistencies.
- **Data Storage :** Store the processed data in a scalable and efficient data storage system such as a data warehouse or data lake.
- **Data integration :** Integrate data from multiple sources to create a comprehensive dataset for analysis.
- **Analysis and Modeling :** Utilize machine learning and statistical techniques to analyze the data and build predictive models.
- **Visualization :** Create visualizations such as charts, graphs, and maps to present insights and trends in electricity consumption.
- **Interpretation :** Interpret the results of the analysis to understand patterns, identify consumption drivers, and inform decision-making.
- **Reporting and Deployment :** Generate reports and deploy the analytics solution for stakeholders to use in optimizing electricity consumption strategies.

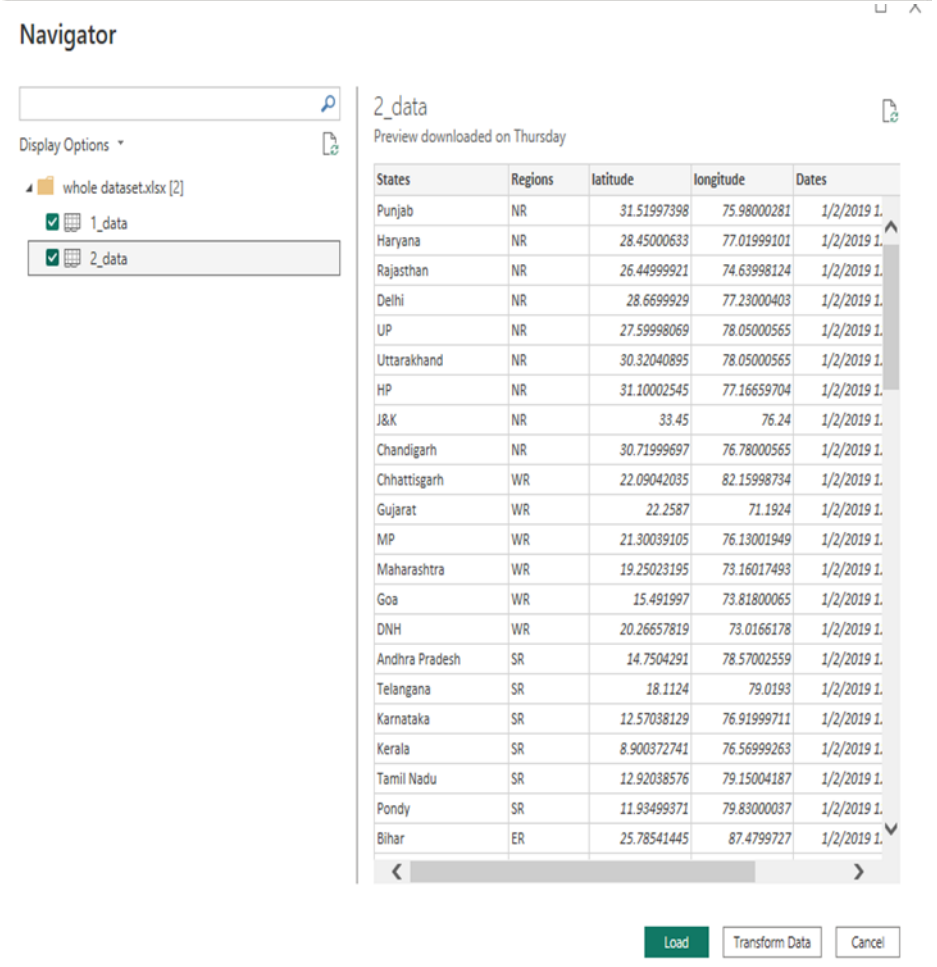
CHAPTER 4

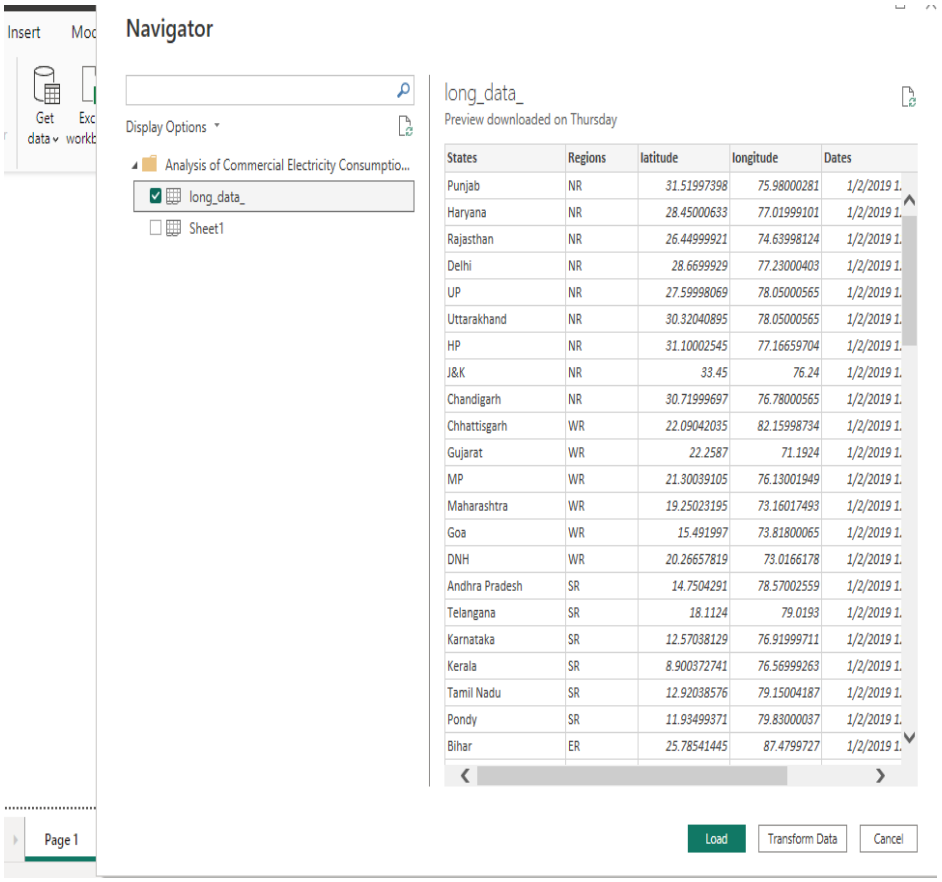
MODELING AND RESULT

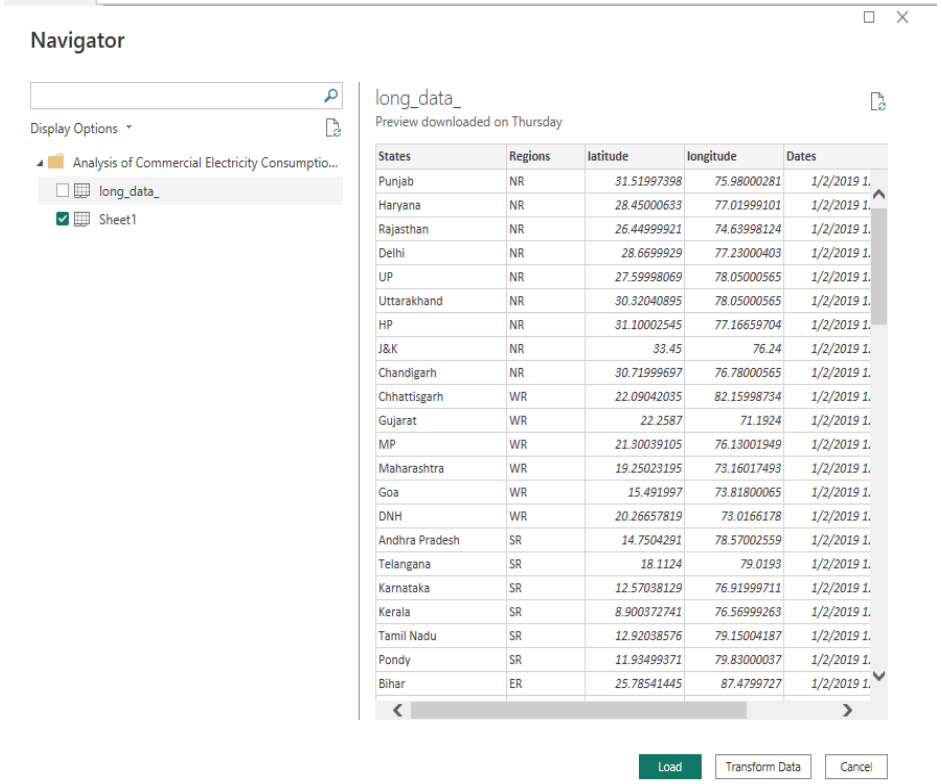
Manage relationship The results of the analysis of the electricity consumption and power quality indicators in two office buildings are presented. It comprises electricity consumption and power quality during work days and weekends. The consumption data analysed is from a one year period and the power quality analysis is based on a one week measuring period. The aim of this analysis is to determine the current situation in these buildings in order to study the possibilities and limitations to implement different energy

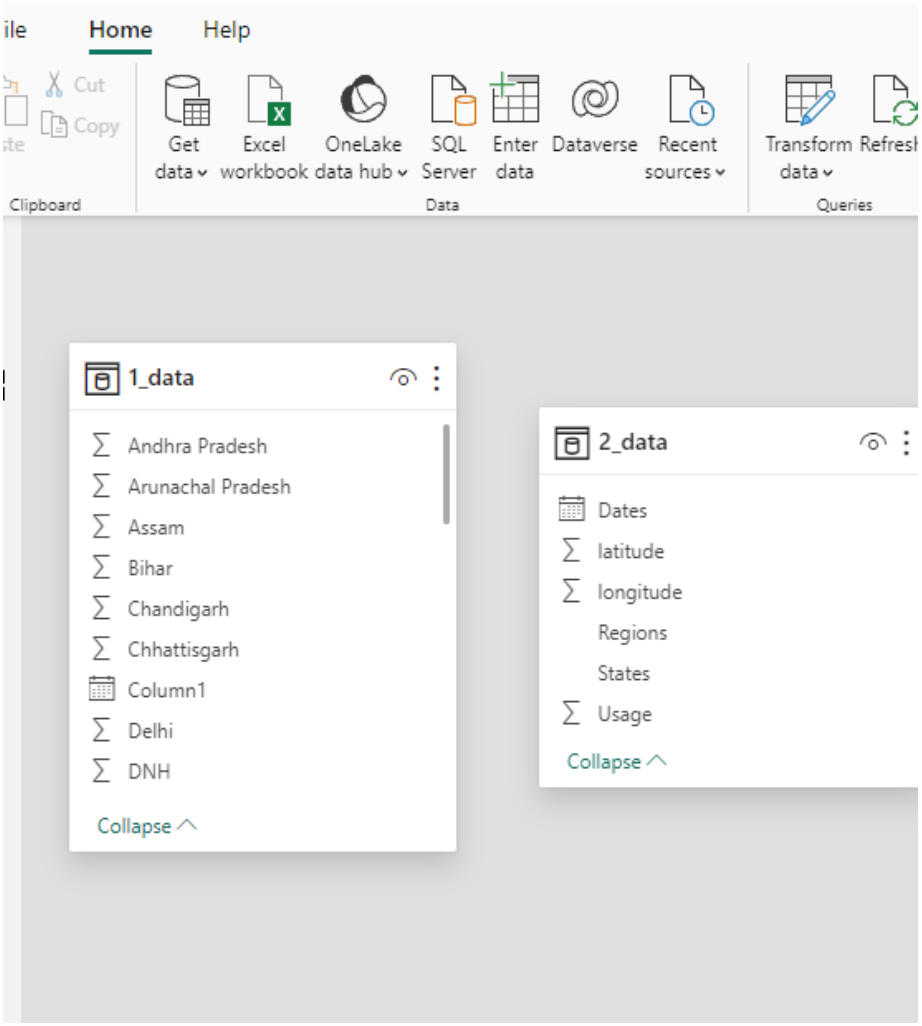
efficiency measures

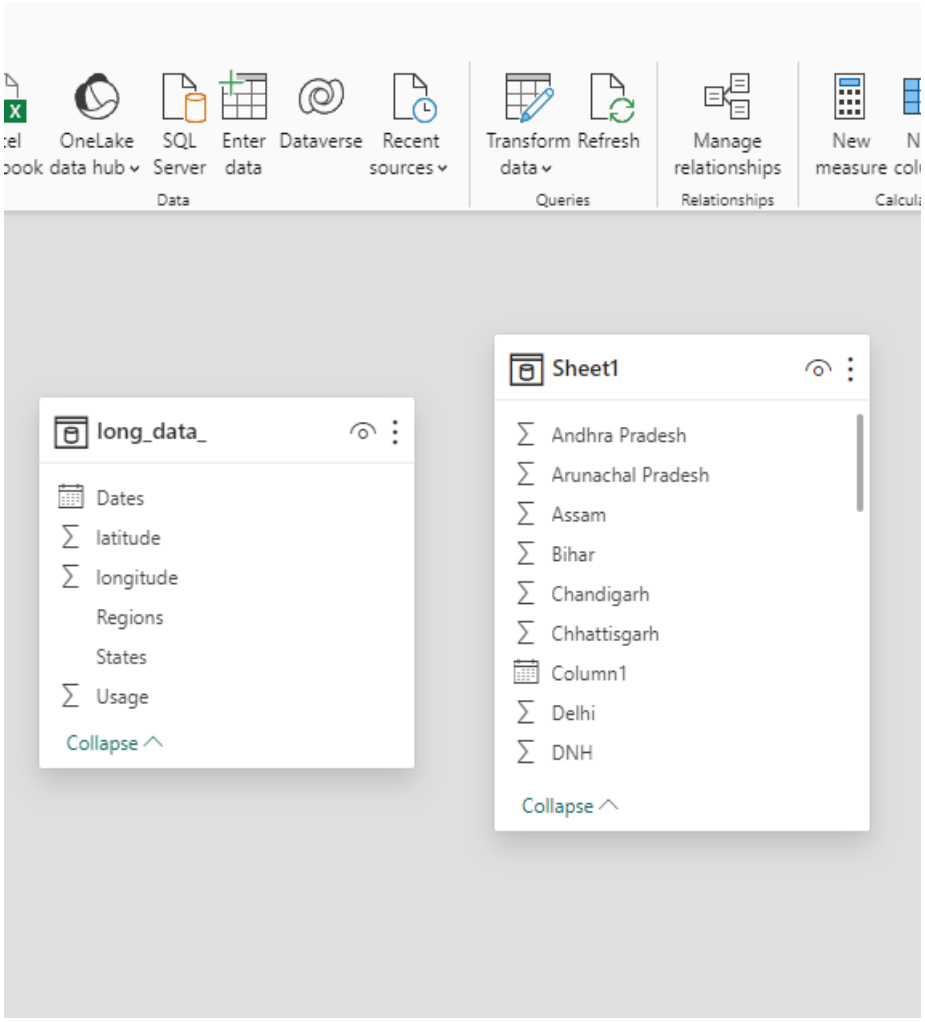












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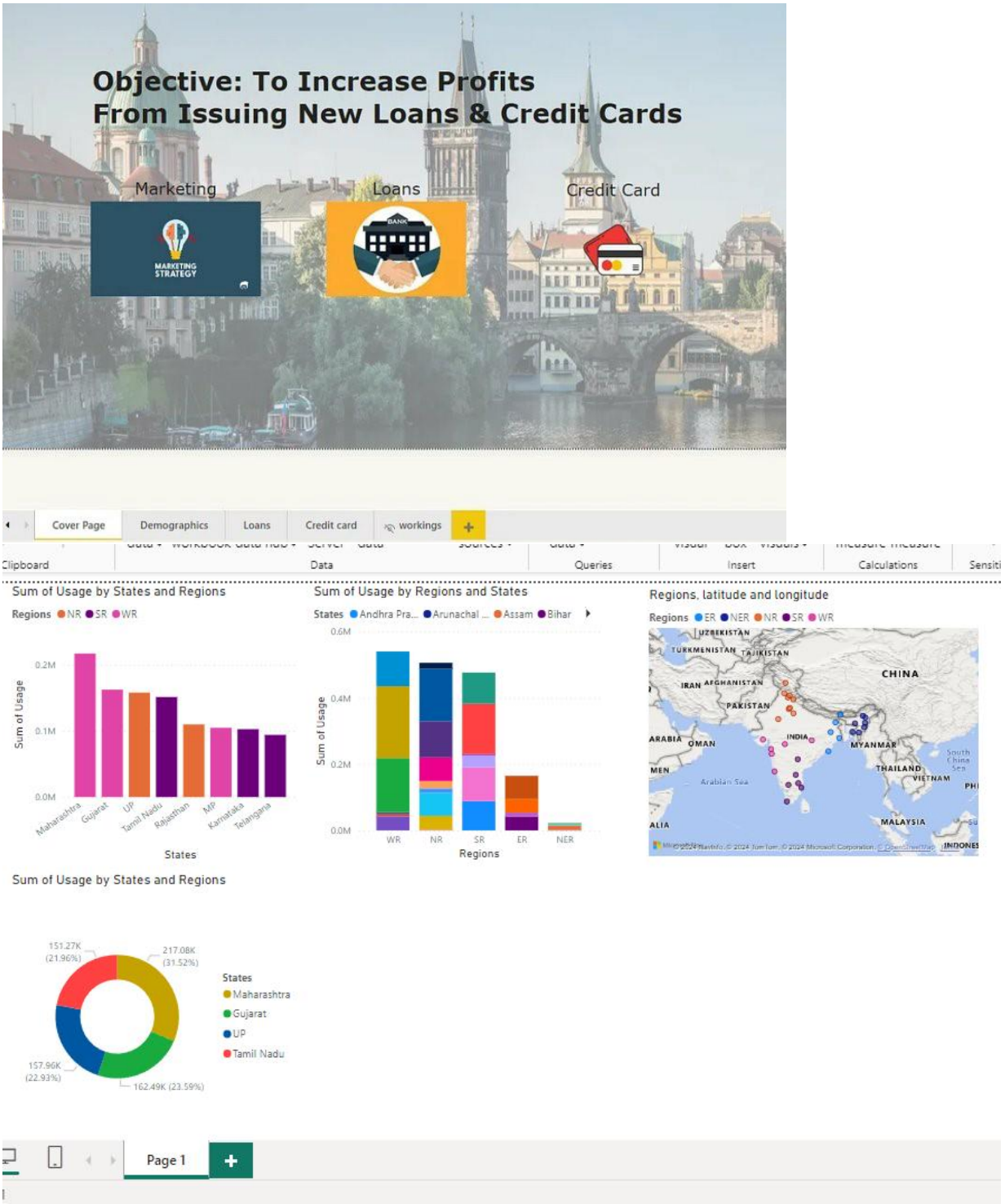
Dashboard



CONCLUSION

After conducting a comprehensive analysis of commercial electricity consumption in the selected Indian state using data analytics with data sourced from cloud/web platforms, it is evident that several key patterns and trends emerge. The analysis reveals distinct seasonal variations in consumption, with notable peaks during periods of economic activity and industrial production. Additionally, certain geographic regions within the state exhibit higher consumption rates, likely influenced by factors such as urbanization, industrial development, and infrastructure availability. Furthermore, the study highlights the importance of proactive energy management strategies, including demand-side management initiatives and investment in renewable energy infrastructure, to ensure sustainable electricity usage and mitigate potential

supply constraints. Overall, these insights underscore the significance of leveraging data-driven approaches to optimize commercial electricity consumption and drive towards a more resilient and efficient energy ecosystem in the state.

FUTURE SCOPE

Looking ahead, there are several promising avenues for further exploration and enhancement of the analysis of commercial electricity consumption in the Indian state leveraging data analytics and cloud/web-based data sources. Future research could delve deeper into granular sub-sector analysis to identify specific industries or business categories driving electricity demand and develop targeted energy efficiency measures tailored to their unique requirements. Additionally, integrating real-time data streams and advanced predictive analytics techniques can enable proactive demand forecasting and optimization, empowering stakeholders to anticipate and respond to fluctuations in electricity usage more effectively. Furthermore, exploring the intersection of emerging technologies such as Internet of Things (IoT) devices and smart meters with data analytics holds immense potential for enabling finer-grained monitoring and control of electricity consumption at the commercial level, paving the way for more agile and sustainable energy management practices in the state.

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LINK

https://github.com/githubtraining/hellogitworld.git

