Tech Saksham

Case Study Report

Data Analytics with Power BI

“Analysis of Commercial Electricity Consumption in Indian States”

“INFANT JESUS COLLEGE FOR ARTS AND SCIENCE FOR WOMEN”

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ABSTRACT

In the digital age, data has become an invaluable asset for Industrial Sector. The proposed project, “Analysis for commercial Electricity Consumption in Indian States” focuses on analyzing the commercial electricity consumption in different Indian states using data analytics techniques and data sourced from the cloud and web. The objective is to gain insights into the patterns, trends, and factors influencing commercial electricity usage in these states. By leveraging tools such as data visualization, statistical analysis, machine learning, and web scraping, this study aims to identify key drivers of electricity consumption and provide actionable recommendations for optimizing energy usage in commercial sectors. The analysis will consider various factors such as industry types, geographical locations, time periods, and economic indicators to understand the dynamics of commercial electricity consumption in Indian states. Through this case study, we aim to contribute to the understanding of energy consumption patterns and support informed decision-making for sustainable energy management in the commercial sector.

INDEX

CHAPTER 1

INTRODUCTION

1.1 Problem Statement

There is a close relation between electricity consumption and economic growth. It was studied that those countries whose income level is higher there consumption of electricity is also higher. When a country condition improves it was seen their level of electricity consumption also increases. As we know India is a developing country and recently India economic growth is been increasing day by day in recent trend. Around 77 percent Indian economy grow during 2000 and 2007 and around 60 percent increase in electricity consumption.

1.2 Proposed Solution

The proposed solution for Analyzing for electricity consumption in Indian states is crucial for informed policy decisions and sustainable energy planning. Here are some proposed solutions and approaches for analyzing electricity consumption is The **“Report on India’s Renewable Electricity Roadmap 2030”** provides insights into integrating renewable energy (RE) into the heart of Indian electricity systems and The **National Energy Data: Survey and Analysis** report by the **Bureau of Energy Efficiency (BEE)** provides comprehensive energy data for tracking India’s energy transition goals.

1.3 Feature

- **Per Capita Consumption**: Investigate the per capita electricity consumption in different states. This metric provides insights into the average electricity usage by individuals within each state.

- **Urbanization and Industrialization**: Examine the level of urbanization and industrial development in each state. Urban areas tend to have higher electricity demand due to population density and economic activities.
- **Energy Mix**: Understand the energy sources used for electricity generation in each state. Some states rely more on coal, while others prioritize renewable energy sources like solar and wind.
- **Installed Capacity**: Evaluate the installed capacity of power plants in each state. This includes both conventional (thermal, hydro, nuclear) and renewable energy capacity.
- **Distribution Infrastructure**: Assess the efficiency and reliability of electricity distribution networks. Issues related to transmission losses, voltage fluctuations, and supply interruptions impact consumption patterns.
- **Economic Growth**: Consider the correlation between economic growth (GDP) and electricity consumption. States with robust economic activity often experience higher energy demand.
- **Seasonal Variations**: Analyse seasonal fluctuations in electricity consumption. For instance, air conditioning usage increases during hot summers, affecting overall demand.
- **Demographic Factors**: Explore demographic factors such as population density, income levels, and household size. These influence electricity needs.
- **Policy Initiatives**: Investigate state-level policies promoting energy efficiency, renewable energy adoption, and demand-side management.
- **Environmental Impact**: Study the environmental impact of electricity consumption, including carbon emissions and air quality.

1.4 Advantages

- **Informed Policy Decisions**:

- A thorough analysis helps policymakers make informed decisions. Understanding consumption patterns allows them to design effective energy policies, allocate resources, and promote sustainable practices.

- **Resource Allocation**:
  - By identifying high-consumption regions, states can allocate resources strategically. Investments in infrastructure, renewable energy projects, and grid improvements can be targeted where they are most needed.

- **Energy Efficiency Programs**:
  - Analysis reveals areas with inefficient energy use. Implementing energy efficiency programs, such as promoting LED lighting, smart meters, and efficient appliances, can lead to significant savings.

- **Data-Driven Decisions**:

The data-driven approaches and advantages for analyzing electricity consumption in Indian states are:

1. Machine learning model
2. Statistical model

1.5 Scope

The scope for analyzing electricity consumption in Indian states is vast and multifaceted in the form of Gather comprehensive data on electricity consumption across various states. This includes both historical and real-time data and Collaborate with state electricity boards, regulatory bodies, and central agencies to ensure accurate and consistent data collection. Utilize geographic information systems (GIS) to map consumption patterns. Identify high-consumption zones, load centres, and transmission corridors

and then investigate daily, monthly, and seasonal variations in consumption. Understand peak demand hours and off-peak periods.

CHAPTER 2

SERVICES AND TOOLS REQUIRED

2.1 Services Used

Data: In Power BI, you can connect to a wide variety of data sources, including databases, spreadsheets, online services, and more. This data serves as the foundation for your analysis and reports.

Data Model: The data model is where you define the relationships between tables. You create calculated measures and columns using the DAX language. This step is essential for accurate and meaningful data analysis.

Report Views: Once your data model is in place, you can start building reports. Power BI offers a user-friendly interface to create visualizations, charts, and tables. You can customize these reports to convey insights effectively.

Dashboards: Dashboards are a summary of your reports. They provide a high-level view of key insights and metrics. Users can interact with dashboards to explore data further and gain a deeper understanding.

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.

Software Requirements:

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

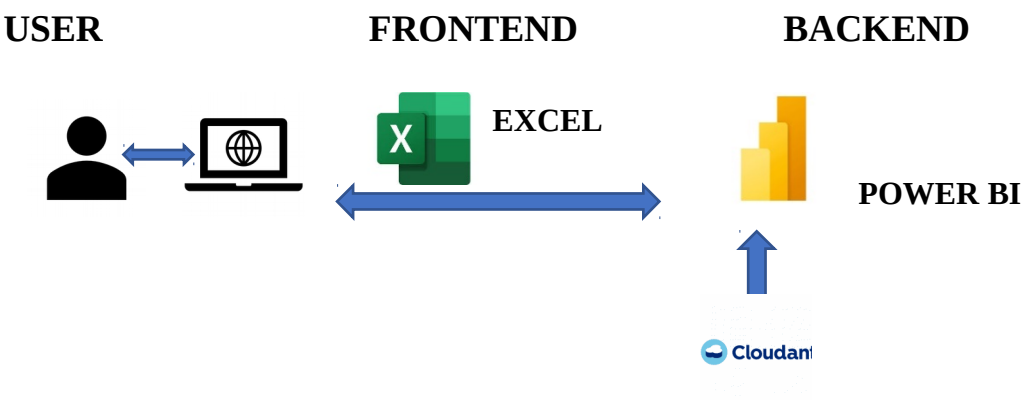
- **PowerBI Service**: This is an online SaaS (Software as a Service) service that you use to publish reports, create new dashboards, and share insights.

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

CHAPTER 3

PROJECT ARCHITECTURE

3.1 Architecture



Database

Here’s a high-level architecture for the project:

1. **Data Collection**: Real-time customer data is collected from various sources like Electricity consumption in Indian states, customer interactions, etc.
2. **Data Storage**: The collected data is stored in a database for processing. Database can be used for this purpose.
3. **Data Processing**: The stored data is processed in real-time using Power BI Services.
4. **Machine Learning**: Predictive models are built based on processed data. These models can help in predicting customer behavior, Electricity used etc.
5. **Data Visualization**: The processed data and the results from the predictive models are visualized in real-time using Power BI. Power BI allows you to create interactive dashboards that can provide valuable insights into the data.
6. **Data Access**: The dashboards created in Power BI can be accessed through Power BI Desktop, Power BI Service (online), and Power BI Mobile.

This architecture provides a comprehensive solution for real-time analysis on Electricity Consumption in Indian states. However, it’s important to note that the specific architecture may vary depending on the existing infrastructure, specific requirements, and consumption. It’s also important to ensure that all tools and services comply with relevant data privacy and security regulations.

CHAPTER 4

MODELING AND RESULT

Manage relationship

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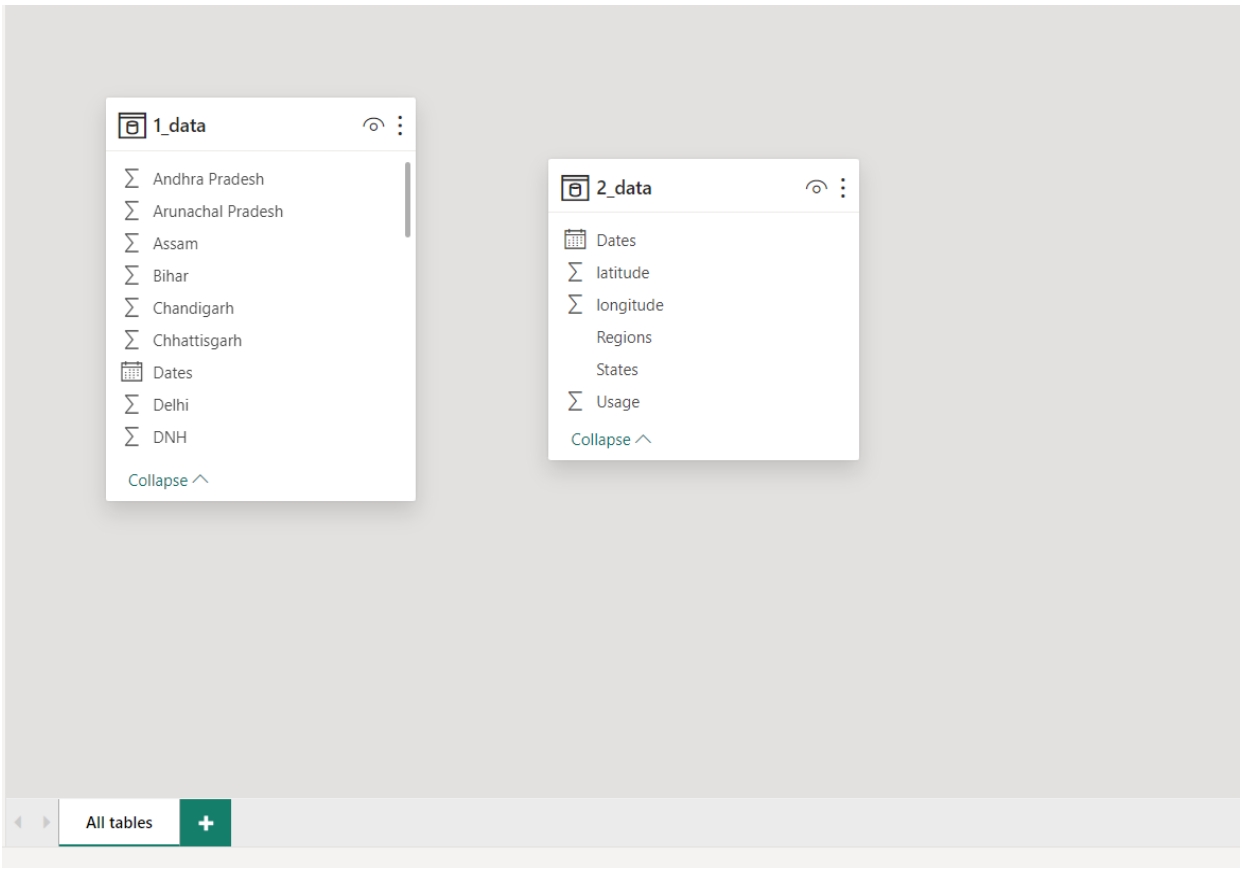
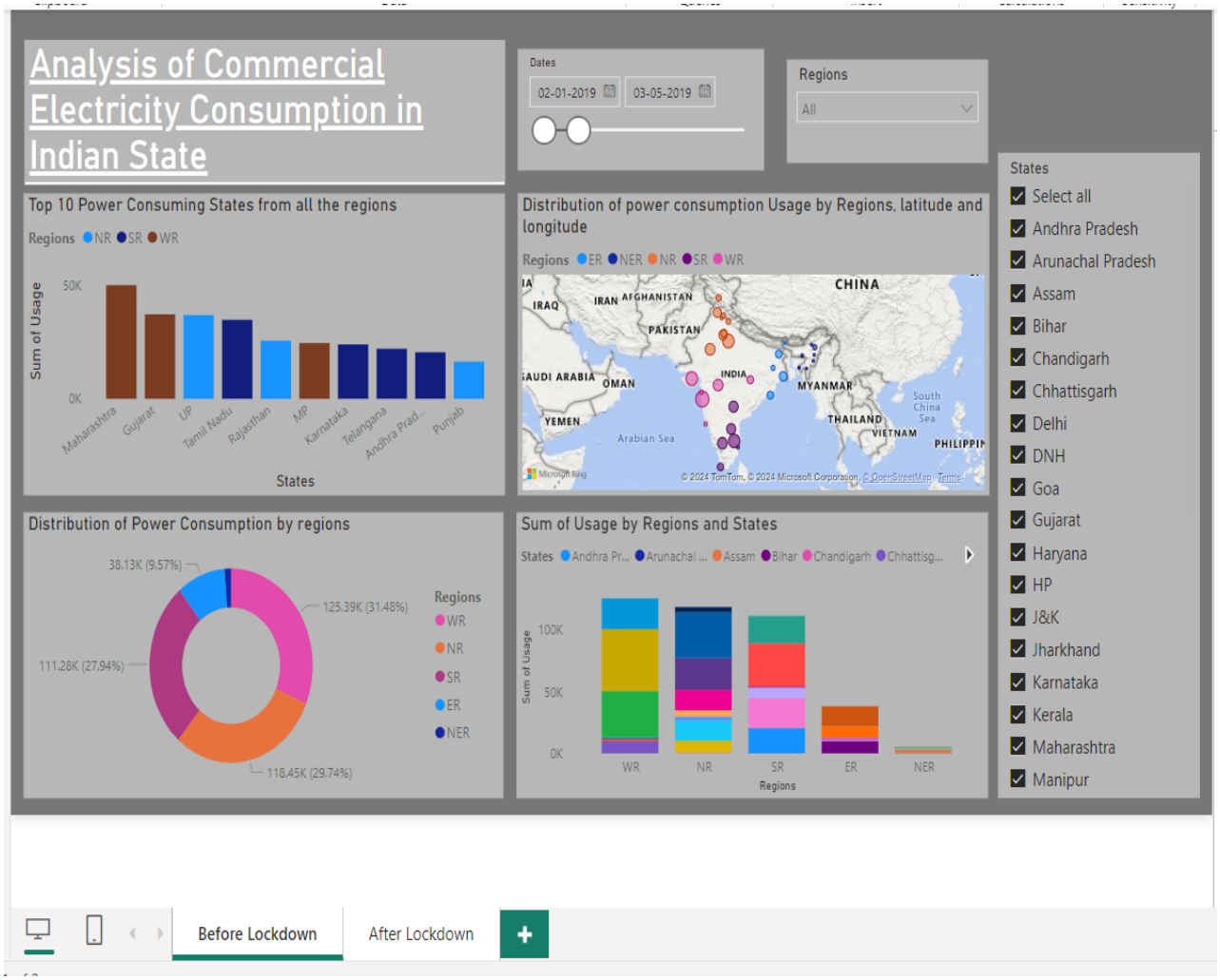
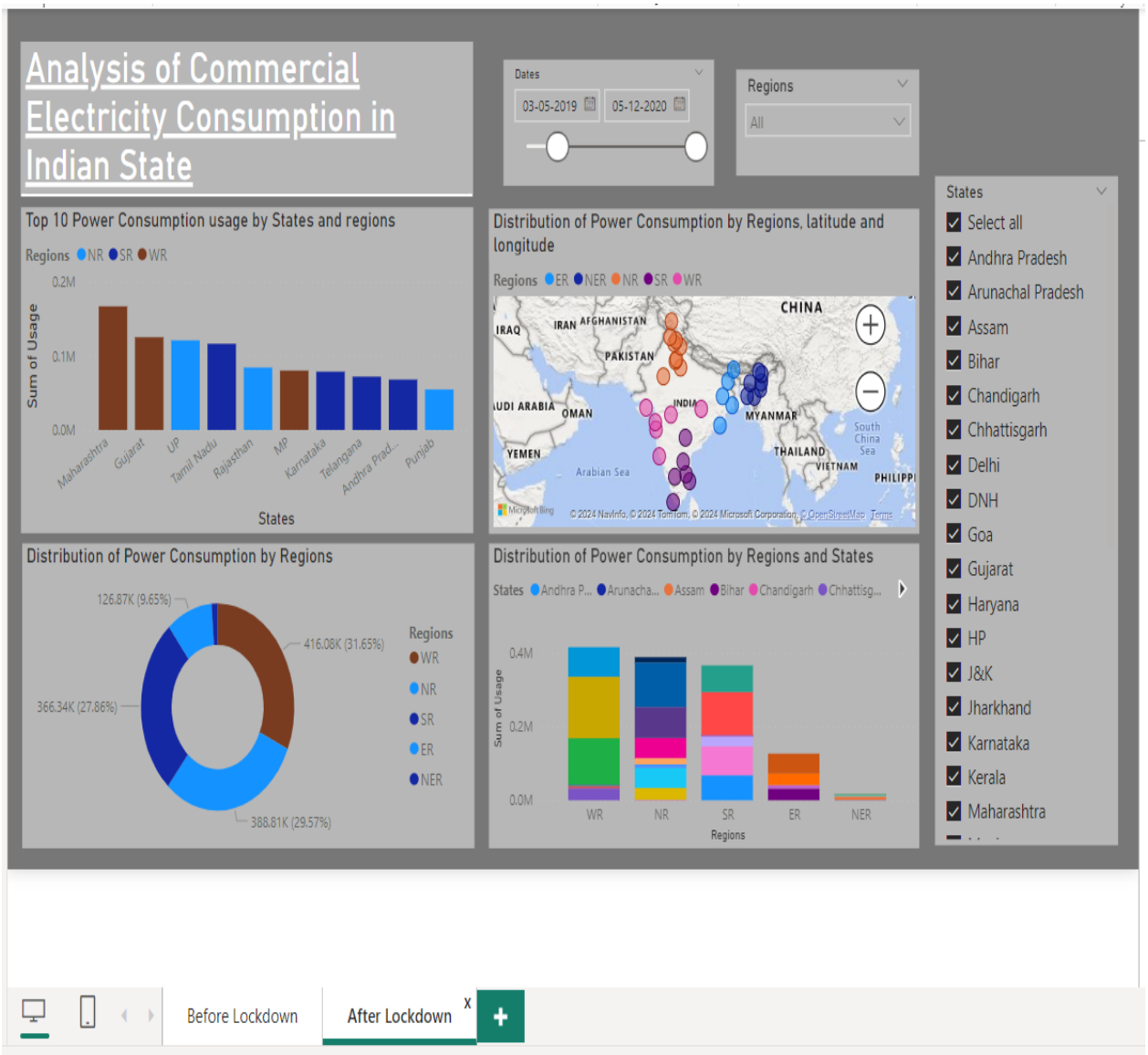


Dashboard





CONCLUSION

The project “Analysis for Electricity Consumption in Indian States” using Power BI has successfully demonstrated the potential of data analytics in the Industrial sector. The real-time analysis of Electricity utilization has provided valuable insights into overall Indian states. The interactive dashboards and reports have offered a comprehensive view of Electricity utilization, enabling the identification of patterns and correlations. The project has also highlighted the importance of data visualization in making complex data more understandable and accessible. The use of PowerBI has made it possible to present data in a visually appealing and easy-to-understand format, thereby aiding in better decision-making.

FUTURE SCOPE

The future scope of this project is vast. With the advent of advanced analytics and machine learning, Power BI can be leveraged to predict future trends based on historical data. Integrating these predictive analytics into the project could enable the bank to anticipate customer needs and proactively offer solutions. As data privacy and security become increasingly important, future iterations of this project should focus on implementing robust data governance strategies. This would ensure the secure handling of sensitive customer data while complying with data protection regulations. Additionally, the project could explore the integration of real-time data streams to provide even more timely and relevant insights.

REFERENCES

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