DATA ANALYTICS WITH POWER BI

"ANALYSIS OF COMMERCIAL ELECTRICITY CONSUMPTION INDIAN STATES"

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ABSTRACT

This study examines the patterns and trends of commercial electricity consumption in [Indian State] over a specified period. Utilizing comprehensive data sets from (relevant sources) employ statistical techniques and analytical tools to identify key drivers influencing commercial electricity usage. Our analysis delves into sectoral consumption patterns, seasonal variations, and the impact of economic factors on

electricity demand. Additionally, we explore the efficacy of existing policies and potential intervention for promoting energy efficiency and sustainability in the commercial sector. The finding of this study provide valuable insights for policymakers, utilities, and stakeholders to optimize energy management strategies and foster sustainable economic development in [Indian State].

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CHAPTER 1

INTRODUCTION

• Problem Statement

The commercial sector is a significant consumer of electricity in [Indian State], contributing to its overall energy demand. However, there is a lack of comprehensive understanding regarding the drivers, patterns, and dynamics of commercial electricity consumption within the state. This knowledge gap hampers effective energy planning, resource allocation, and policy formulation

aimed at promoting energy efficiency and sustainability. Therefore, the objective of this study is to analyze commercial electricity consumption patterns in [India State] and identify the factors influencing its variability. The analysis of commercial electricity consumption in an Indian state aim to address several key challenges.

Proposed Solution

Gather comprehensive data on commercial electricity consumption from relevant sources such as utility companies, government agencies, and industry reports. Utilize advanced statistical techniques and data analytics tools to analyze consumption patterns, trends, and variations over time. Explore sectoral breakdowns, geographical disparities, and seasonal fluctuations in commercial electricity usage. Identify the main factors influencing commercial electricity consumption, including economic indicators, business activities, technological advancements, and regulatory policies. Conduct regression analysis and econometric modeling to quantify the relationships between these factors and electricity demand.

• Feature

- **Real-Time Analysis**: Real-time analysis of commercial electricity consumption in an Indian state would involve monitoring and analyzing data on electricity usage from commercial establishments such as offices, shops, industries, etc.
- **Customer Segmentation**: By segmenting commercial electricity customers in this way, utilities and policymakers can tailor their approaches to energy management, pricing, and incentives to better meet the diverse needs of different customer groups while promoting sustainability and efficiency
- **Trend Analysis** : Trend analysis of commercial electricity consumption in an Indian state involves examining historical data to identify patterns, trends, and insights over time.
- **Predictive Analysis**: It will use historical data to predict future customer behavior.

• Advantages

- **Data-Driven Decisions**: Consumption analysis provides valuable insights for stakeholders, enabling data-driven decision-making in areas such as energy planning, investment prioritization, and market
- **Improved Customer Engagement**: By improving customer engagement in the analysis of commercial electricity consumption, utilities can build trust, foster collaboration, and drive positive behavior change, leading to more sustainable energy practices, reduced costs, and enhanced customer
- **Policy insights**: Policymakers can use consumption data to formulate policies and regulations that encourage sustainable energy practices, promote renewable energy adoption, and address energy access challenges in underserved areas.

scope

- Analyzing the overall trends in commercial electricity consumption over time, including historical data analysis and forecasting future trends. Examining electricity usage patterns across different sectors such as manufacturing, retail, hospitality, IT, healthcare, etc., to understand sector-specific consumption behaviors and requirements .Studying regional variations in electricity consumption within the state, considering factors such as urban vs. rural areas, industrial vs. residential zones, and coastal vs. inland regions. Conducting surveys, focus groups, or behavioral studies to understand customer perceptions, attitudes, and behaviors related to energy usage, conservation, and adoption of energy-efficient technologies. Utilizing advanced analytics and forecasting models to predict future electricity demand trends, considering factors such as population growth, economic development, and technological advancements. Infrastructure Planning: Planning and designing electricity infrastructure upgrades and expansions to meet projected demand growth, improve grid reliability, and accommodate emerging technologies.

CHAPTER 2

SERVICES AND TOOLS REQUIRED

2.1 Services Used

- **Data Collection and Storage Services**: In India, this could include the Ministry of power or the state Electricity board. This could be achieved through services like Azure Data Factory, Azure Event Hubs, or AWS Kinesis for real-time data collection, and Azure SQL Database or AWS RDS for data storage.

- **Data Processing Services**: cloud-based platform where users can publish, share, and collaborate on Power BI reports and dashboards. It provides features such as data refresh scheduling, sharing and collaboration tools, and access control through integration with Azure Active Directory.

- **Historical Data Analysis:** Analyzing historical electricity consumption data from previous years to identify trends, seasonal variations, and any significant changes in consumption patterns.

2.2 Tools and Software used

Tools:

- **Power BI**: The main tool for this project is Power BI, 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:

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

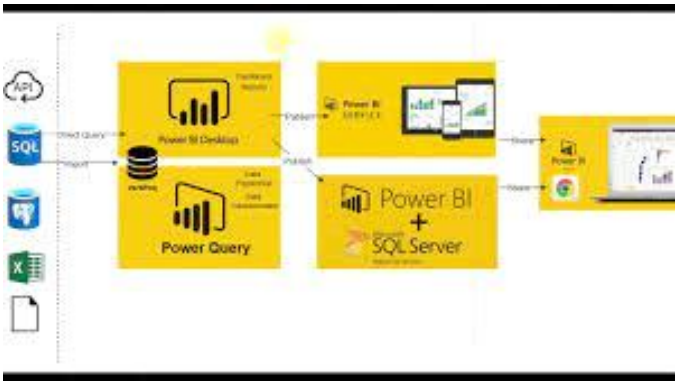
- **Power BI Service**: This is an online SaaS (Software as a Service) service that you use to publish reports, create new dashboards, and share insights.

- **Power BI 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



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

- **Data Collection**: Real-time customer data is collected from the various source of commercial electricity. This could be achieved using services like Azure Event Hubs or AWS Kinesis.
- **Data Storage**: The collected data is stored in a database for processing. Azure SQL Database or AWS RDS can be used for this purpose.
- **Data Processing**: The stored data is processed in real-time using services like Azure Stream Analytics or AWS Kinesis Data Analytics.
- **Machine Learning**: Predictive models are built based on processed data using Azure Machine Learning or AWS Sage Maker. These models can help in predicting customer behavior, detecting fraud, etc.
- **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.
- **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 of commercial electricity of consumption in an Indian state, you would typically need access to data from the state's electricity board or relevant government agencies. Start by examine basic statistics such as total consumption, average consumption per sector, seasonal variation, and year over year changes. These data provide the valuable insights for policymakers, businesses, and other stakeholders.

CHAPTER 4

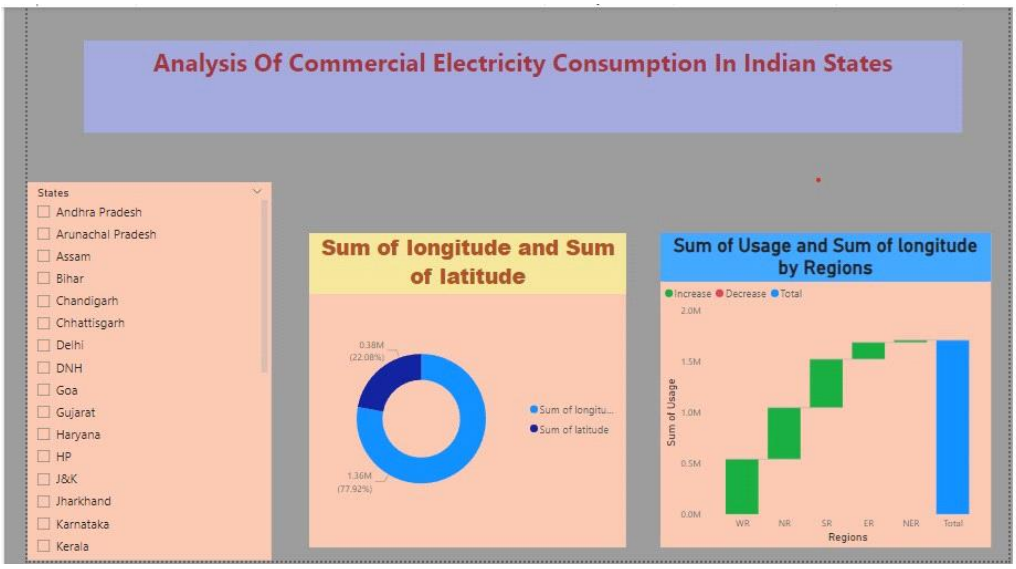
DATA WITH RESULT

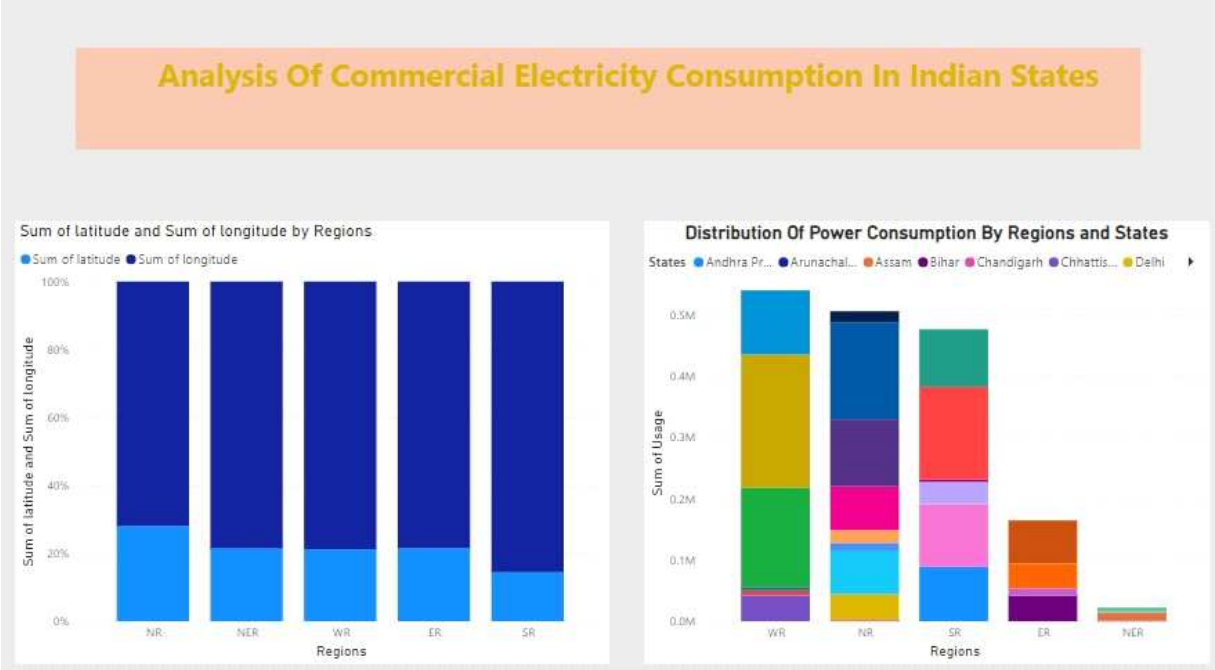
The usage of electricity in state wise data:

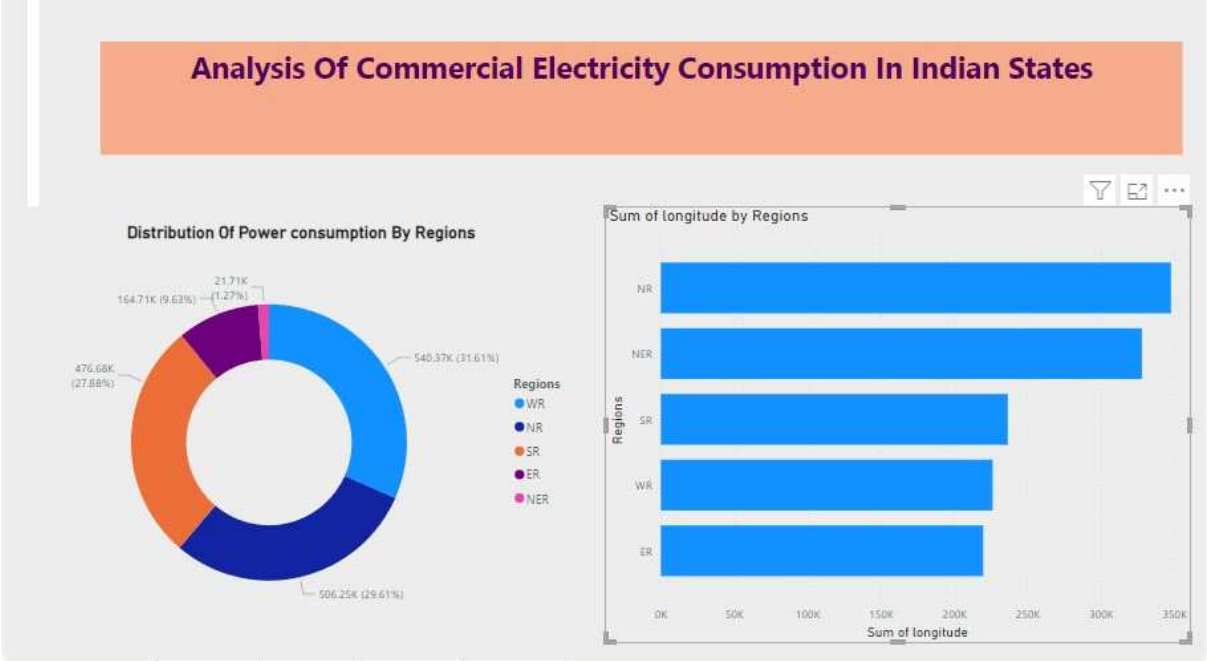
Column1	Punjab	Haryana	Rajasthan	Delhi	UP
1/2/2019 12:00:00 AM	119.9	130.3	234.1	85.8	313.9
1/3/2019 12:00:00 AM	121.9	133.5	240.2	85.5	311.8
1/4/2019 12:00:00 AM	118.8	128.2	239.8	83.5	320.7
1/5/2019 12:00:00 AM	121	127.5	239.1	79.2	299
1/6/2019 12:00:00 AM	121.4	132.6	240.4	76.6	286.8
1/7/2019 12:00:00 AM	118	132.1	241.9	71.1	294.2
1/8/2019 12:00:00 AM	107.5	121.4	237.2	69	289.4
1/9/2019 12:00:00 AM	132.5	148.2	197	89.2	258.6
1/10/2019 12:00:00 AM	131.5	157	199.9	92.8	284.2
1/11/2019 12:00:00 AM	130.3	145.3	187.7	79.5	281.4
1/12/2019 12:00:00 AM	137.9	151.9	189.9	92.6	298.6
1/13/2019 12:00:00 AM	135.8	141.4	186.9	89.4	310
1/14/2019 12:00:00 AM	139.3	143.8	195.2	82.2	319.5
1/15/2019 12:00:00 AM	141.1	142.9	185.4	77.8	326.7

States	Regions	latitude	longitude	Dates	Usage
Punjab	NR	31.51997398	75.98000281	1/2/2019 12:00:00 AM	119.9
Haryana	NR	28.45000633	77.01999101	1/2/2019 12:00:00 AM	130.3
Rajasthan	NR	26.44999921	74.63998124	1/2/2019 12:00:00 AM	234.1
Delhi	NR	28.6699929	77.23000403	1/2/2019 12:00:00 AM	85.8
UP	NR	27.59998069	78.05000565	1/2/2019 12:00:00 AM	313.9
Uttarakhand	NR	30.32040895	78.05000565	1/2/2019 12:00:00 AM	40.7
HP	NR	31.10002545	77.16659704	1/2/2019 12:00:00 AM	30
J&K	NR	33.45	76.24	1/2/2019 12:00:00 AM	52.5
Chandigarh	NR	30.71999697	76.78000565	1/2/2019 12:00:00 AM	5
Chhattisgarh	WR	22.09042035	82.15998734	1/2/2019 12:00:00 AM	78.7
Gujarat	WR	22.2587	71.1924	1/2/2019 12:00:00 AM	319.5
MP	WR	21.30039105	76.13001949	1/2/2019 12:00:00 AM	253
Maharashtra	WR	19.25023195	73.16017493	1/2/2019 12:00:00 AM	428.6
Goa	WR	15.491997	73.81800065	1/2/2019 12:00:00 AM	12.8
DNH	WR	20.26657819	73.0166178	1/2/2019 12:00:00 AM	18.6
Andhra Pradesh	SR	14.7504291	78.57002559	1/2/2019 12:00:00 AM	164.6
Telangana	SR	18.1124	79.0193	1/2/2019 12:00:00 AM	204.2
Karnataka	SR	12.57038129	76.91999711	1/2/2019 12:00:00 AM	206.3
Kerala	SR	8.900372741	76.56999263	1/2/2019 12:00:00 AM	72.7
Tamil Nadu	SR	12.92038576	79.15004187	1/2/2019 12:00:00 AM	268.3
Pondy	SR	11.93499371	79.83000037	1/2/2019 12:00:00 AM	6.3
Bihar	ER	25.78541445	87.4799727	1/2/2019 12:00:00 AM	82.3
Jharkhand	ER	23.80039349	86.41998572	1/2/2019 12:00:00 AM	24.8
Odisha	ER	19.82042971	85.90001746	1/2/2019 12:00:00 AM	70.2

Dashboard


Analysis Of Commercial Electricity Consumption In Indian States
States
Andhra Pradesh
Arunachal Pradesh
Assam
Bihar
Chandigarh
Chhattisgarh
Delhi
DNH
Goa
Gujarat
Haryana
HP
J&K
Jharkhand
Karnataka
Kerala
Sum of longitude and Sum of latitude
0.38M (22.08%)
1.36M (77.92%)
Sum of longitu...
Sum of latitude
Sum of Usage and Sum of longitude by Regions
Increase
Decrease
Total
2.0M
1.5M
1.0M
0.5M
0.0M
Sum of Usage
WR
NR
SR
ER
NER
Total
Regions


Analysis Of Commercial Electricity Consumption In Indian States
Sum of latitude and Sum of longitude by Regions
Sum of latitude
Sum of longitude
100%
80%
60%
40%
20%
0%
Sum of latitude and Sum of longitude
NR
NER
WR
ER
SR
Regions
Distribution Of Power Consumption By Regions and States
States
Andhra Pr...
Arunachal...
Assam
Bihar
Chandigarh
Chhattis...
Delhi
0.5M
0.4M
0.3M
0.2M
0.1M
0.0M
Sum of Usage
WR
NR
SR
ER
NER
Regions



CONCLUSION

The analysis reveals variations in electricity consumption across different sectors, with significant contributions from retail, manufacturing, and services industries. Understanding these sectoral patterns is crucial for targeted policy interventions and infrastructure planning. Commercial electricity consumption in the state has shown steady growth over the analyzed period, indicating a robust economic activity and increasing demand for commercial services .Benchmarking the state's commercial electricity consumption against national averages and similar states provides valuable insights into its relative performance and areas for improvement. Policy interventions aimed at promoting energy efficiency,

renewable energy adoption, and demand-side management can help mitigate the impact of rising electricity consumption on the environment and ensure sustainable development. Overall, the analysis underscores the importance of informed decision-making, strategic planning, and stakeholder collaboration in managing commercial electricity consumption effectively and sustainably in the Indian state.

FUTURE SCOPE

The future scope of this project is vast. The future scope of analysis of commercial electricity consumption in an Indian state offers several opportunities for further research and exploration. Conducting a more detailed examination of electricity consumption patterns within specific commercial sectors (e.g., retail, hospitality, manufacturing, IT) to identify sector-specific trends, challenges, and opportunities. Engaging local communities, businesses, and civil society organizations in energy conservation initiatives, awareness campaigns, and collaborative projects to foster a culture of energy efficiency and sustainability. Considering the long-term sustainability implications of commercial electricity consumption, including its impact on greenhouse gas emissions, air quality, natural resource depletion, and socio-economic development, and developing holistic strategies to address these challenges. By exploring these future avenues of analysis, researchers, policymakers, and industry stakeholders can deepen their understanding of commercial electricity consumption dynamics in Indian states and develop evidence-based strategies to promote sustainable energy use and economic development.

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