Tech Saksham

Case Study Report

Data Analytics with Power BI

“Analysis of Commercial Electricity Consumption in Indian State”

Sivanthi Arts and Science College for Women

NM ID	NAME
0EBFD1A81EC6266B0DC494940119FEA3	K. SIVARANJANI

Trainer Name:R. UMAMAHESWARI

Master Trainer:R. UMAMAHESWARI

ABSTRACT

Electricity consumption in the household sector tends to increase during peak load time. It causes a significant difference between the power used during peak load time with outside peak load time. In fact, the bigger difference will become a problem for electricity companies because the generating capacity is not optimally utilized during outside peak load time. Consumers can reduce electricity consumption during the peak load time, or divert the use of it to outside peak load time. Apart from helping the government, this also helps ease the consumer economy. This paper aims to design an electricity consumption management system that can control electrical devices in small buildings in 3 mode, first, programming automatically according to use habits, second: remote control while away from home using android third: manual or direct control while at home.

INDEX

CHAPTER 1

INTRODUCTION

1.1 Problem Statement

Electricity intensive industries consume the cheaper electricity available from the grid instead of running their own coal/gas/oil fired captive power plants. The captive power generation capacity by such plants is nearly 53,000 MW, and they are mainly, established in steel, fertiliser, aluminium, cement etc, industries. These plants can draw cheaper electricity from the grid on Short term open Access (STOA) basis, avoiding their own higher cost of electricity generation and diverting power from other consumers. Some of these idling captive power plants can be used for ancillary services or grid resserve service and earn extra revenue.

1.2 Proposed Solution

Understanding how to calculate energy consumptioncan help you lower your electricity usage and reduce electric bills. Every device or in kilowatt-hours (kwh). Your power consumption level provider charges you for every kwh of used in your home your energy-provider charges you for every kwh of electricity you use per month. By tracking your household power usage, you can learn about factors affecting your power consumption, identify where you use the most electricity, and lower your energy usage.

1.3 Feature

- **Real-Time Analysis: The dashboard will provide real-time analysis of customer data.**
- **Customer Segmentation: It will segment customers based on various parameters like , states, regions, latitude,etc.**

- **Trend Analysis: The dashboard will identify and display trends in customer behavior.**
- **Predictive Analysis: It will use historical data to predict future customer behavior.**

1.4 Advantages

Energy Savings: Perhas the most obvious benefit of a commercial energy consumption analysis lies in itss potential to protect your bottom line. By analyzing a building's energy from the inside out, using the latest technologies and innovative soltuions, a comprehensive energy analysis can significantly reduce utility bills. Brand Values: Beyond monetary savings and operational inprovements, "green" buildings with energy efficient practices can help to improve brand recognition and customer/employee loyalty. The intangible benefits of a sustainable business image can also improve indoor air quality, ultimattely improving buildig occupant comfort levels and productivity.

1.5 Scope

India seeks greater energy efficiency and there is a growing market for technology and services that can help deliver it. Energy is one India's most dynamic consumptions and opportunities will evolve rapidly in renewables, energy technologies and power infrastructure. Energy conversation can be achieved in two different ways that include reducing the amount of primary energy consumed to supply the useful energy requrement (energy efficiency), and Reducing the end point use of nonessential energy.

CHAPTER 2

SERVICES AND TOOLS REQUIRED

2.1 Services Used

- **Data Collection and Storage Services: Electricity need to collect and store customer data in real-time. 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: Services like Azure Stream Analytics or AWS Kinesis Data Analytics can be used to process the real-time data.**

- **Machine Learning Services: Azure Machine Learning or AWS SageMaker can be used to build predictive models based on historical data.**

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.**

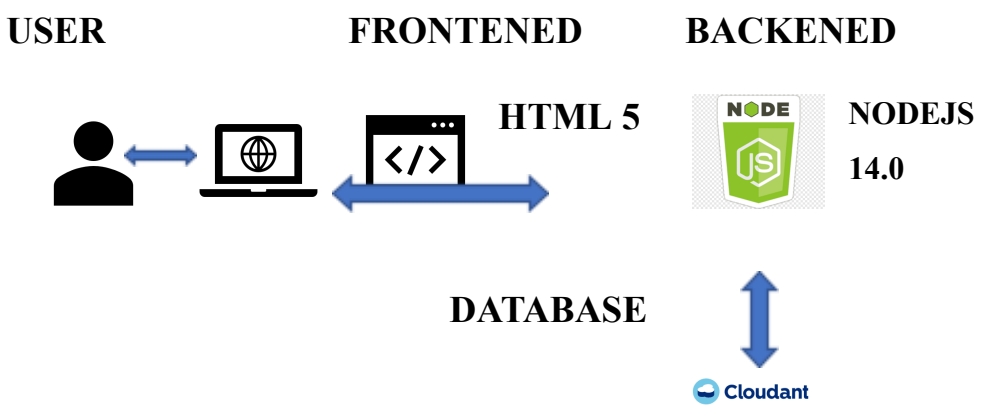
Software Requirements:

- **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



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

1. **Data Collection: Real-time customer data is collected from various sources like bank transactions, customer interactions, etc. This could be achieved using services like Azure Event Hubs or AWS Kinesis.**

2. **Data Storage: The collected data is stored in a database for processing. Azure SQL Database or AWS RDS can be used for this purpose.**

3. **Data Processing: The stored data is processed in real-time using services like Azure Stream Analytics or AWS Kinesis Data Analytics.**

4. **Machine Learning: Predictive models are built based on processed data using Azure Machine Learning or AWS SageMaker. These models can help in predicting customer behavior, detecting fraud, etc.**

5. **Data Visualization: The processed data and the results from the predictive models are visualized in real-time using PowerBI. PowerBI allows you to create interactive dashboards that can provide valuable insights into the data.**

6. **Data Access: The dashboards created in PowerBI can be accessed through PowerBI Desktop, PowerBI Service (online), and PowerBI Mobile.**

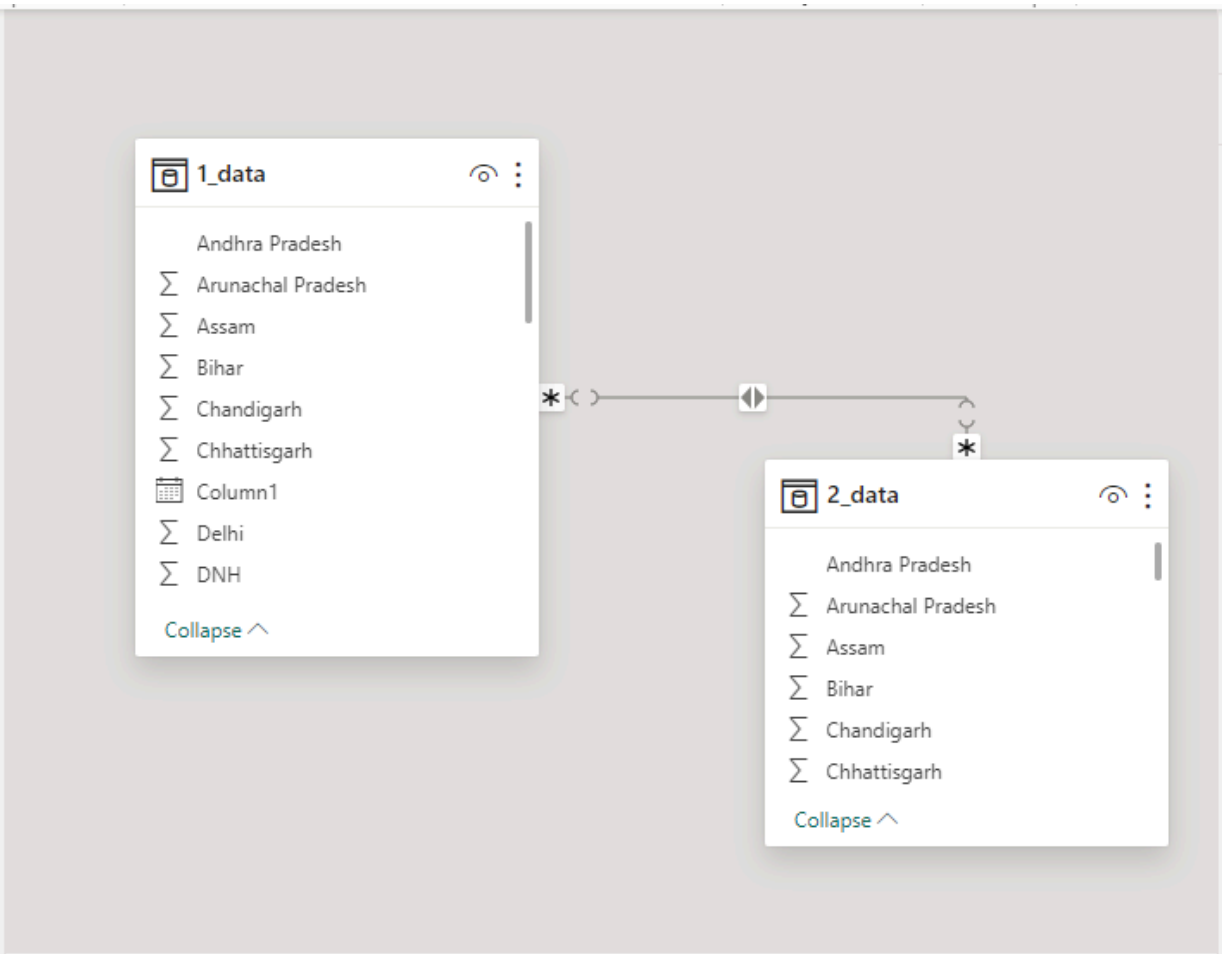
This architecture provides a comprehensive solution for real-time analysis of bank customers. However, it's important to note that the specific architecture may vary depending on the bank's existing infrastructure, specific requirements, and budget. It's also important to ensure that all tools and services comply with relevant data privacy and security regulations.

CHAPTER 4

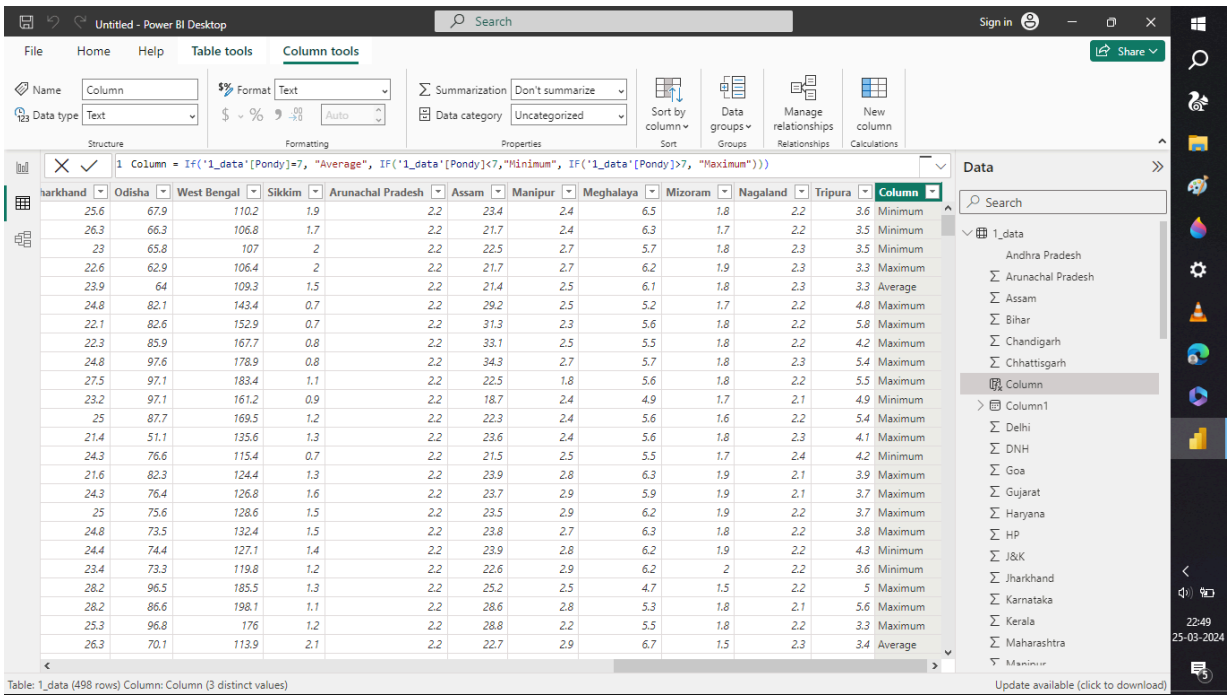
MODELING AND RESULT

Manage relationship

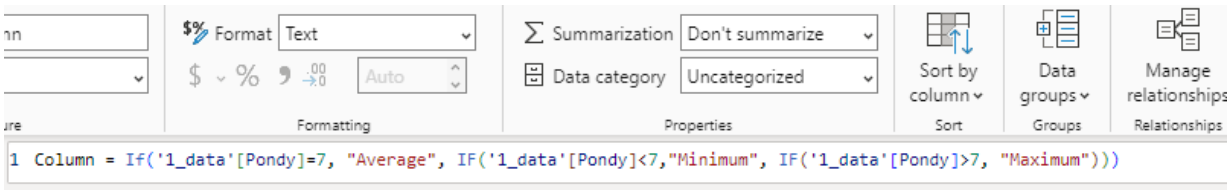
The "long data" file will be used as the main connector as it contains most key identifier (states, regions) which can be use to relates the 2 data files together. The State data file is use to link the client profile geographically with states.



In the above map there is a relationship between the states like Arunachal Pradesh and Bihar,etc.

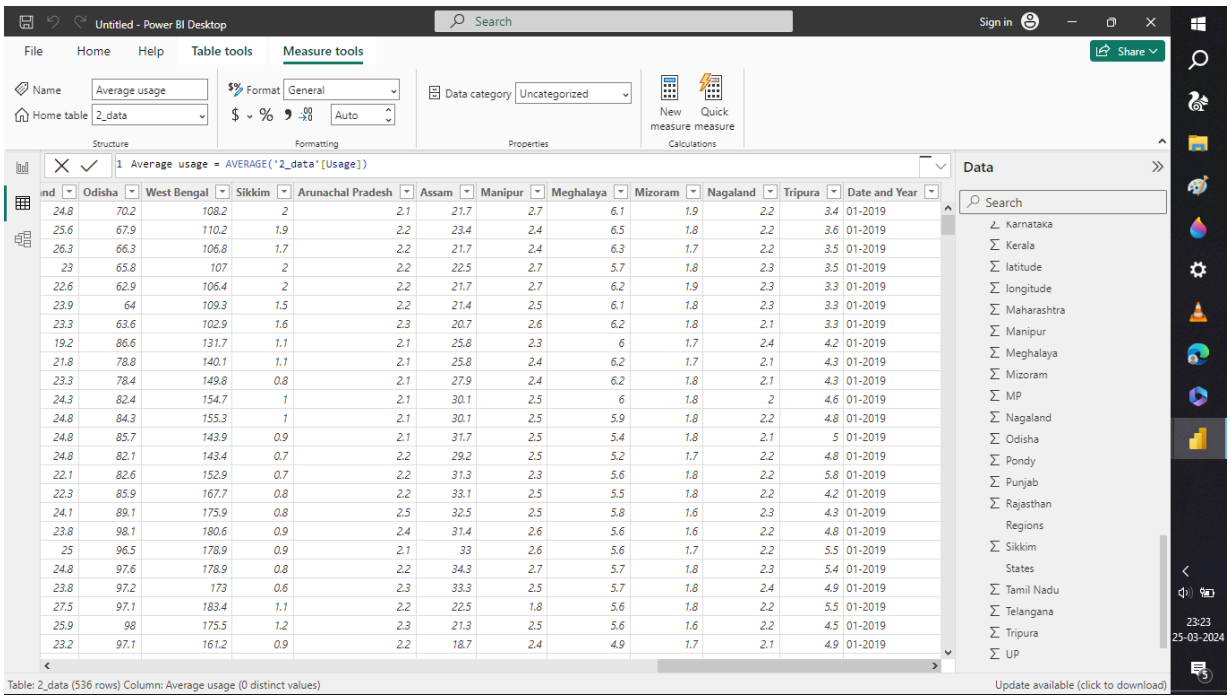


Adding a new column by the state Pondy and for that giving the formula as

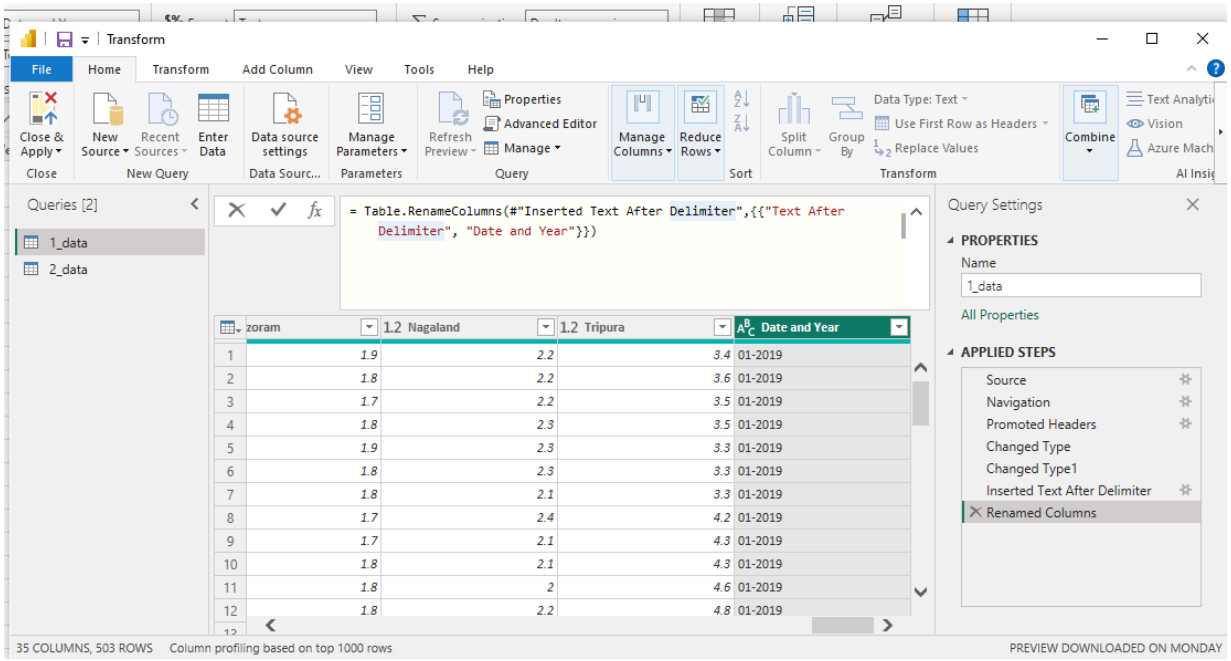


then we get a new column with the new values.

Next, we have to change the column with dates and time to dates only in the power query editor. Then we have to extract the date as date and year in the last column.



and the formula for the extraction of the table is given by

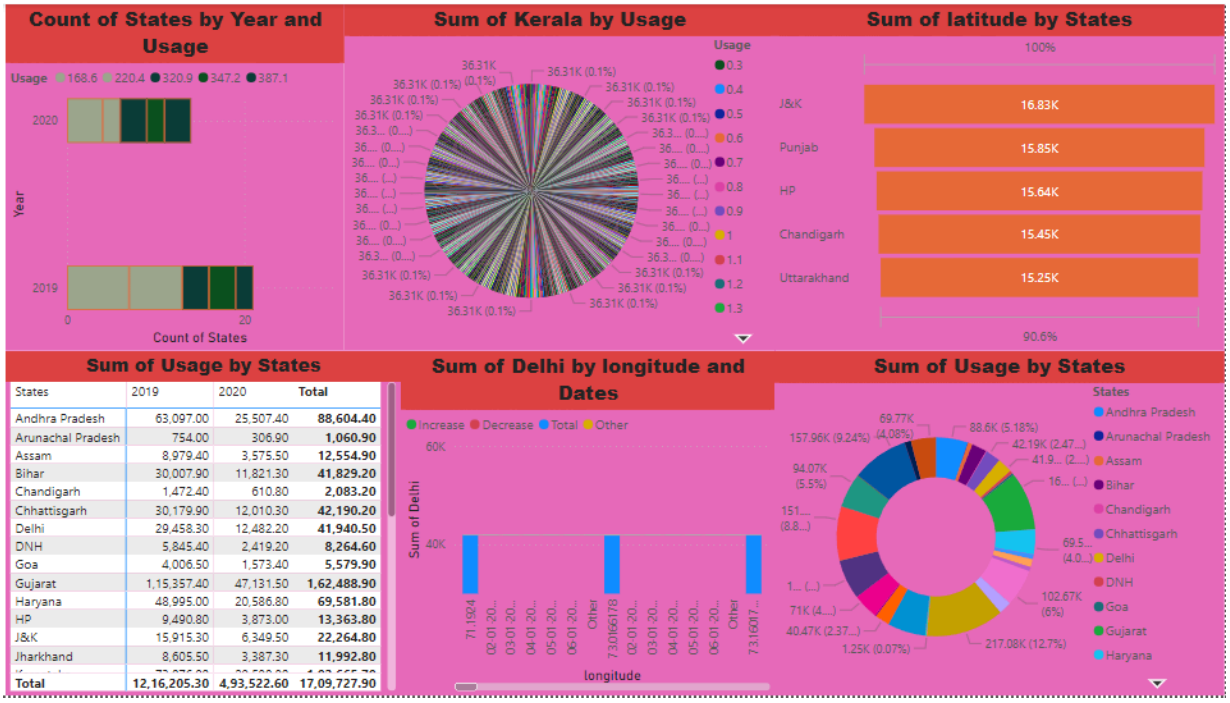


Modeling for Sum of Usage data:

For the sum of usage by states graph, we have to drag the sum of usage data in the x-axis and dragging the states data in the y-axis.

Applying the filter to the sum of usage for the graph we get the top ten states which has been using most of the electricity.

Dashboard



States	2019	2020	Total
Andhra Pradesh	63,097.00	25,507.40	**88,604.40**
Arunachal Pradesh	754.00	306.90	**1,060.90**
Assam	8,979.40	3,575.50	**12,554.90**
Bihar	30,007.90	11,821.30	**41,829.20**
Chandigarh	1,472.40	610.80	**2,083.20**
Chhattisgarh	30,179.90	12,010.30	**42,190.20**
Delhi	29,458.30	12,482.20	**41,940.50**
DNH	5,845.40	2,419.20	**8,264.60**
Goa	4,006.50	1,573.40	**5,579.90**
Gujarat	1,15,357.40	47,131.50	**1,62,488.90**
Haryana	48,995.00	20,586.80	**69,581.80**
HP	9,490.80	3,873.00	**13,363.80**
J&K	15,915.30	6,349.50	**22,264.80**
Jharkhand	8,605.50	3,387.30	**11,992.80**
Total	**12,16,205.30**	**4,93,522.60**	**17,09,727.90**

CONCLUSION

We prepared several models of electricity demand from 2015 to 2030, based on publicly available datasets and trends. Models were tested on data from previous years and adjusted accordingly. From several references ones, which show possible situation in case of renewable energy sources or classic energy sources preferrention, and in case of low and high electricity demand. The unambiguous result is a two to three fold increase of the electricity demand in all scenarios by 2030.

FUTURE SCOPE

Utilities in india have a mandate to supply power which becomes increasingly difficult through the centralised grid and is technically and economically challenging for more remote places. Utilities India have a mandate to supply power. Despite the union governments electrification spree, the availability of quality electricity is a far-fetched dream in rural areas. Supply of electricity through centrailised grid becomes increasingly difficult and technically and economically. Challenging for more remote places. Local, self-controlled electric systems capable of producing power are, thus, a way out. Electricity is one of the greatest gifts to mankind. But the supply in India has its shortcomings in terms of equity-economic, ecological, qualitative and quantitative which are much desired, said pavan publish reports, create new dashboards, and share insights.

REFERENCES

https://www.researchgate.net/publication/354401757_A_Study_on_Major_Commercial_Energy_Consumption_in_India

LINKS

