PLUGGING INTO THE FUTURE: AN EXPLORATION OF ELECTRICITY CONSUMPTION PATTERNS

A PROJECT REPORT

Submitted by

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CHAPTER - 1

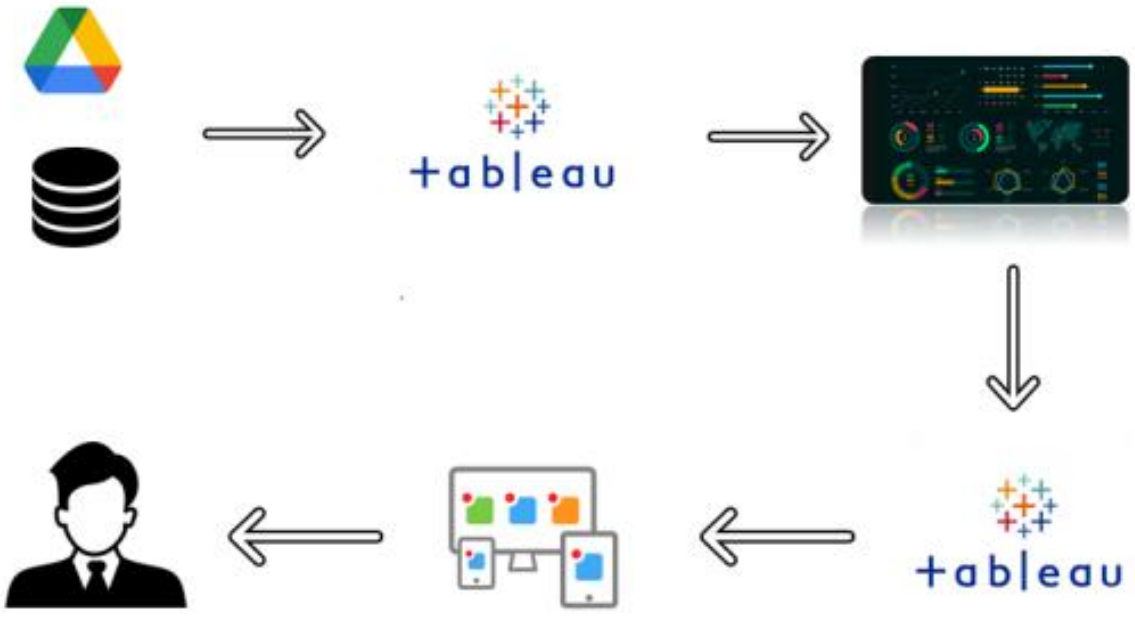
INTRODUCTION

1.INTRODUCTION :

Analyzing Electricity Consumption in India from Jan 2019 till 5th December 2020. This data set contains a record of Electricity consumption in each states of India, here we are going to analyse State wise , Region wise and Overall Electricity consumption in India.

In this project we are trying to analyse the usage of electricity related data and able to extract some insights from the data using Business Intelligence tool. To extract the Insights from the data and put the data in the form of visualizations, Dashboard, Story with the help of Tableau tool.

Technical Architecture:



1.1 OVERVIEW

Project Description :

India is the world's third-largest producer and third-largest consumer of electricity. The national electric grid in India has an installed capacity of 370.106 GW as of 31 March 2020. Renewable power plants, which also include large hydroelectric plants, constitute 35.86% of India's total installed capacity. During the fiscal year (FY) 2019–20, the total electricity generation in the country was 1,598 TWh, of which 1,383.5 TWh generated by utilities. The gross electricity consumption per capita in FY2019 was 1,208 kWh.

In 2015-16, electric energy consumption in agriculture was recorded as being the highest (17.89%) worldwide. The per capita electricity consumption is low compared to most other countries despite India having a low electricity tariff.

In light of the recent COVID-19 situation, when everyone has been under lockdown for the months of March to June the impacts of the lockdown on economic activities have been faced by every sector in a positive or a negative way.

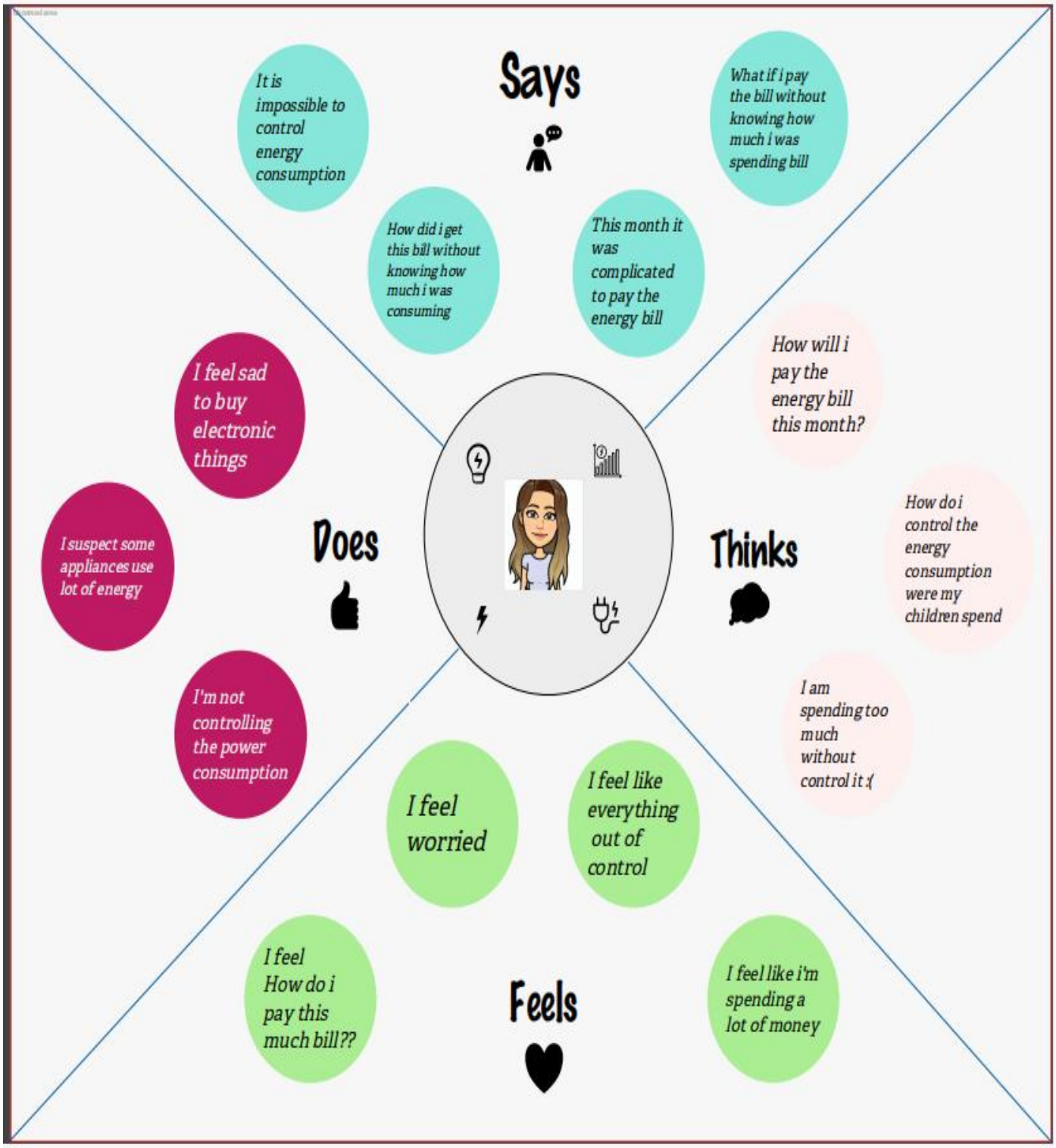
The data set is exhaustive in its demonstration of energy consumption state wise.

CHAPTER -2

PROBLEM DEFINITION & DESIGN THINKING

2.1. EMPATHY MAP

An Empathy Map is a tool used to help understand and empathize with the perspective of a particular user or customer. It is a visual representation of the user's attitudes, behaviors, emotions, and experiences that can be used to gain a deeper understanding of their needs and motivations. The Empathy Map is typically divided into **four quadrants**: **"Says," "Thinks," "Does,"** and **"Feels."** In each quadrant, the user's thoughts, feelings, actions and spoken words are recorded to help build a more complete understanding of their perspective. The Empathy Map is often used in design thinking and user experience research to help inform the design of products or services that better meet the needs of the user.


Says
It is impossible to control energy consumption
What if i pay the bill without knowing how much i was spending bill
How did i get this bill without knowing how much i was consuming
This month it was complicated to pay the energy bill
Does
I feel sad to buy electronic things
I suspect some appliances use lot of energy
I'm not controlling the power consumption
Thinks
How will i pay the energy bill this month?
How do i control the energy consumption were my children spend
I am spending too much without control it :(
Feels
I feel worried
I feel like everything out of control
I feel How do i pay this much bill??
I feel like i'm spending a lot of money

2.2 IDEATION & BRAINSTORMING MAP :

* Ideation and Brainstorming Maps are tools used to generate and organize ideas in a structured and visual way. They are commonly used in creative problem solving, innovation, and product design to generate a large number of ideas and then organize them into meaningful categories.

* Ideation and Brainstorming Maps typically start with a central theme or problem statement in the center of the map. From there, branches are drawn out to represent different categories or subtopics related to the central theme. These categories can then be further expanded with additional branches to represent specific ideas.

* The purpose of an Ideation and Brainstorming Map is to encourage free thinking and generate as many ideas as possible. It allows participants to visually see how ideas are connected and to build upon each other's ideas. The map can then be used to prioritize and refine the most promising ideas. There are many variations of Ideation and Brainstorming Maps, including Mind Maps, Spider Maps and Fishbone Diagrams.

DEFINE

Consumption pattern of energy shows the percentage use of different sources. This pattern of energy changes over time.

Problem

Electricity consumption was continued to go up rapidly faster than energy consumption.

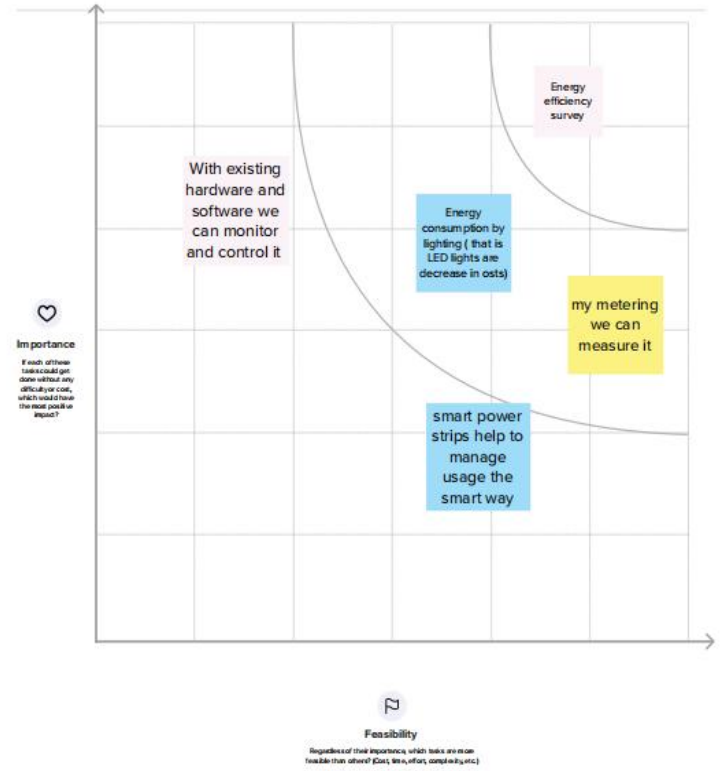
What we need to do??

We want to collect the data of electricty consumption pattern in diferrent regions

Idea Bank

Person 1	Improving energy efficiency can lower the utility bills	Building management system to control your building services	my metering we can measure it
Person 2	Energy efficiency survey	With existing hardware and software we can monitor and control it	Select an energy efficient heating system that doesn't use electricity
Person 3	Energy Audits(It can provide a list of items where deficiencies exist)	Use a power strip to reduce your plug load	Energy consumption by lighting (that is LED lights are decrease in osts)
Person 4	Operational Fixes, it is the technical changes which will bear the quickest payback	Dry your clothes and dishes naturally	consuming less hot water will also reduce gas electricity bill

Prioritize



CHAPTER - 3

DATA COLLECTION & EXTRACTION FROM DATABASE IN MYSQL

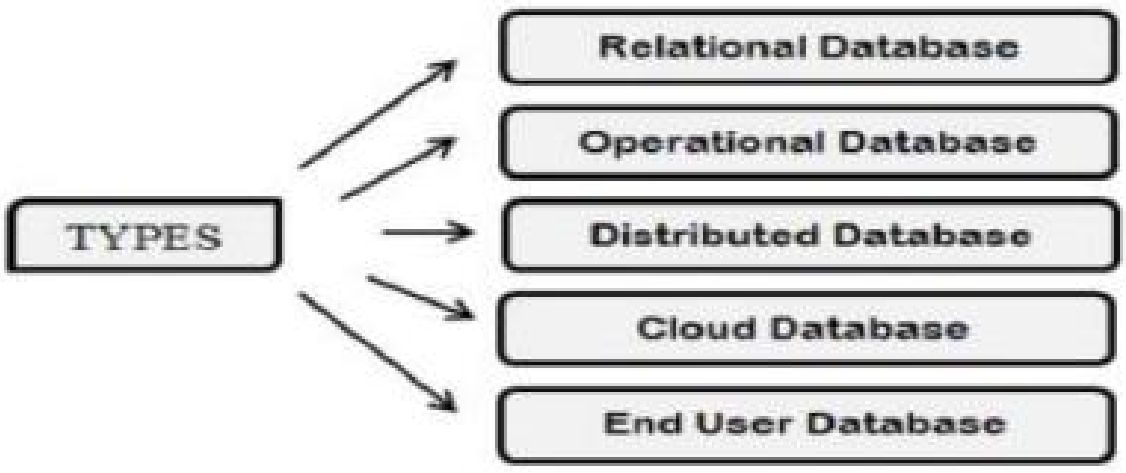
3.1 Collect The Dataset :

Data collection is the process of gathering and measuring information on variables of interest in an established systematic fashion that enables one to answer stated research questions, test hypotheses, evaluate outcomes and generate insights from the data.

3.1.1 Understand The Data :

Data contains all the meta information regarding the columns described in the CSV files.

3.2: Storing Data In DB & Perform SQL Operations:



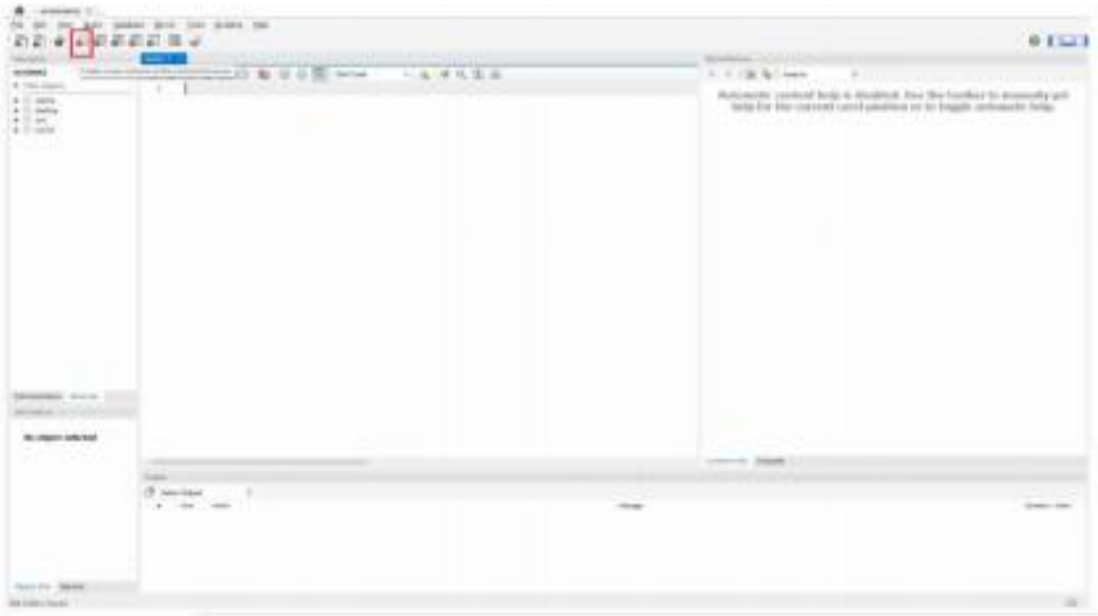
3.2.1. : Introduction To Database :

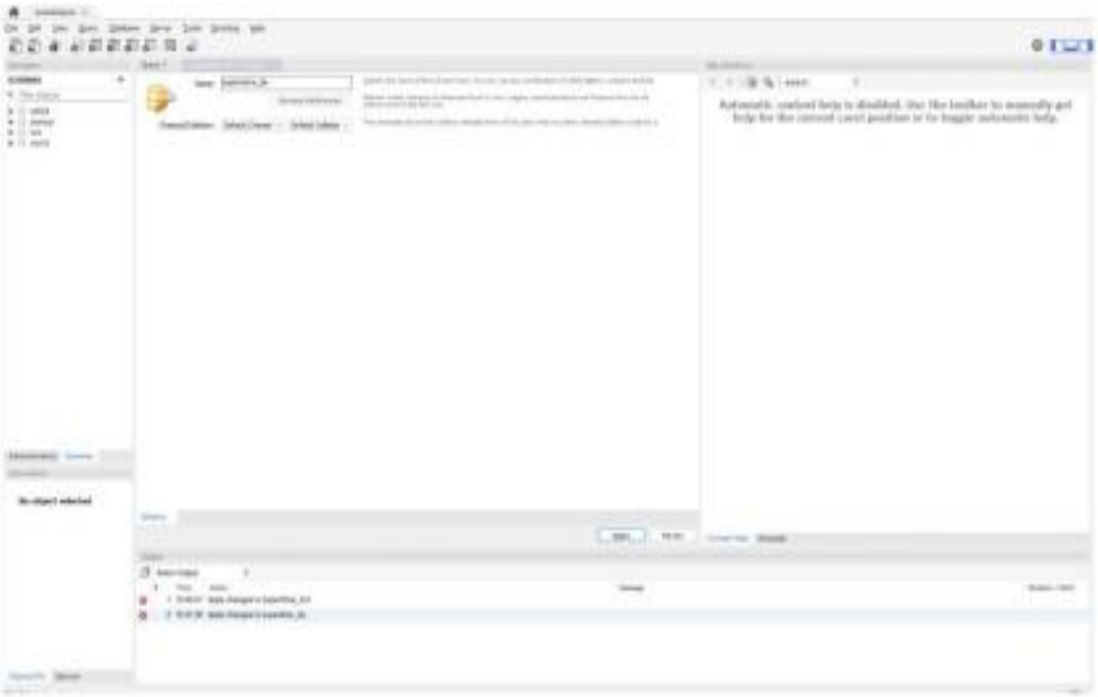
• A database is an organized collection of data, generally stored and accessed electronically from a computer system. It supports the storage and manipulation of data.

• Its ability to organize, process and manage information in a structured and controlled manner is the key to many aspects of modern business efficiency.

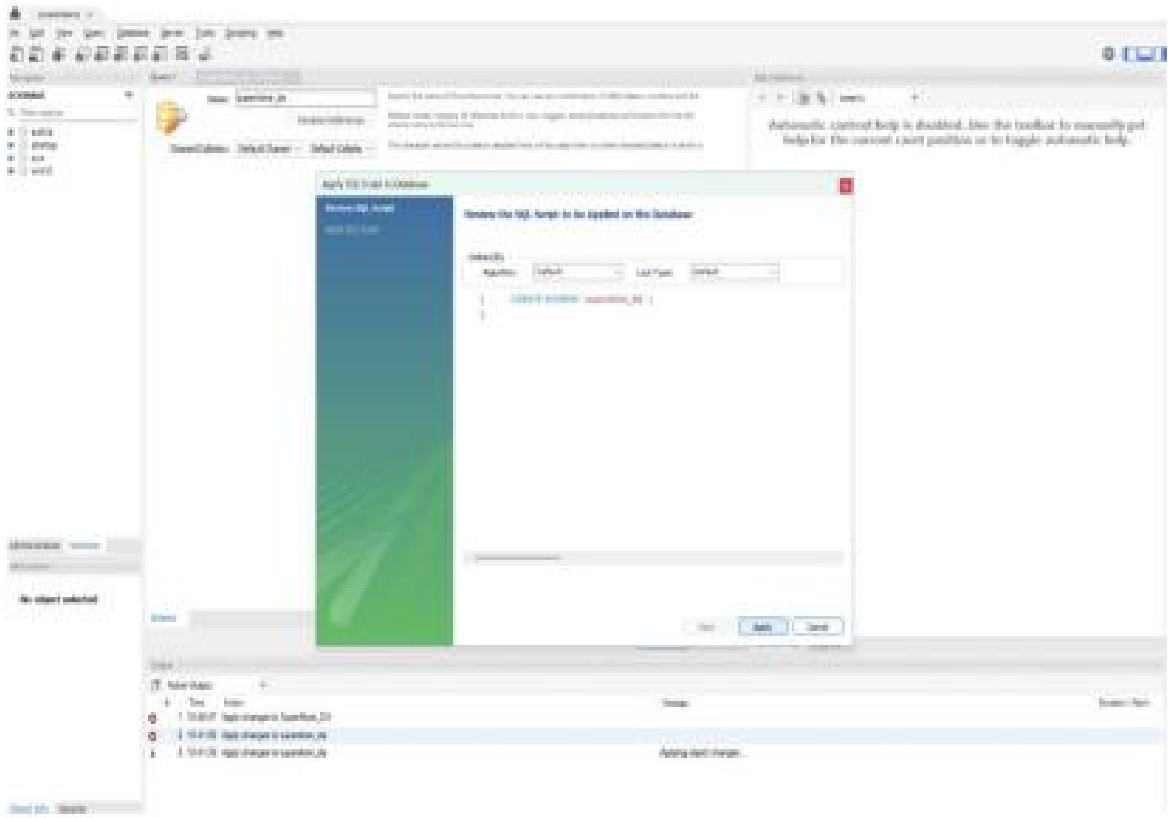
3.2.2.: Creating Database And Table In MYSQL :

- Click on the database icon on the icon menu panel to create the schema.
- Give the name of the schema and click on apply.



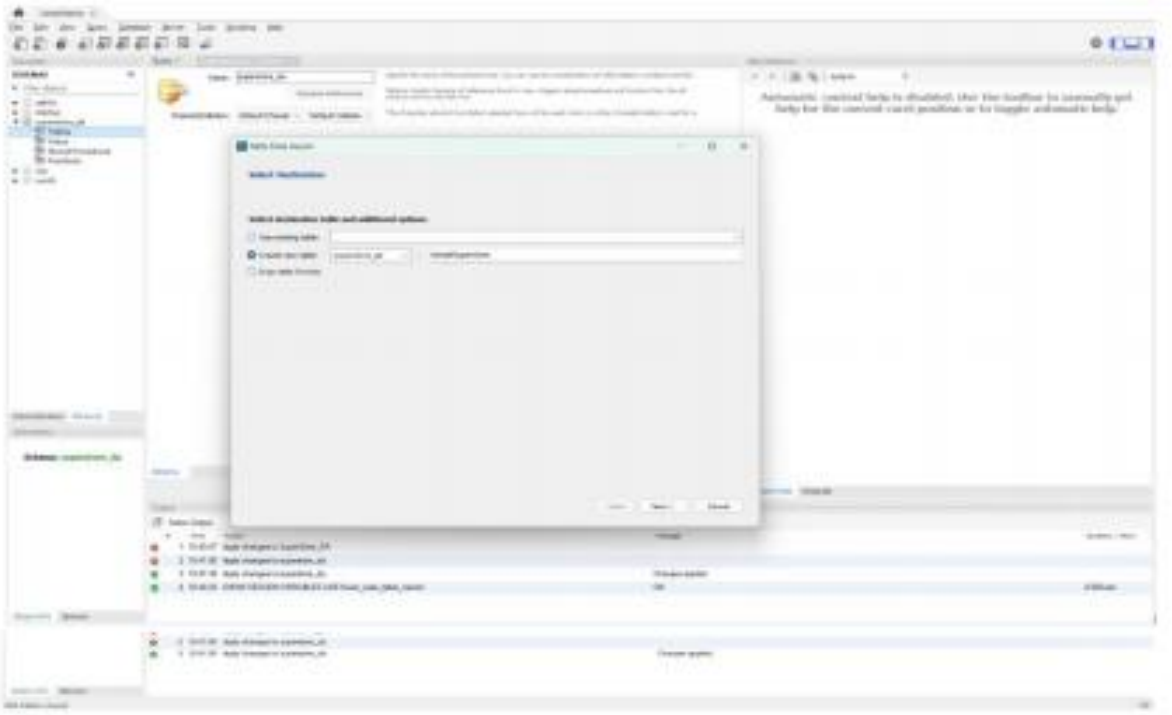


• Here you can see SQL query in SQL script for creation of new schema. Click on Apply.
• As you can see of the left panel Schema with the given name
is created.
• Click on schema name and give a Right-Click on tables
• Now click on Table Data Import Wizard to load the dataset.

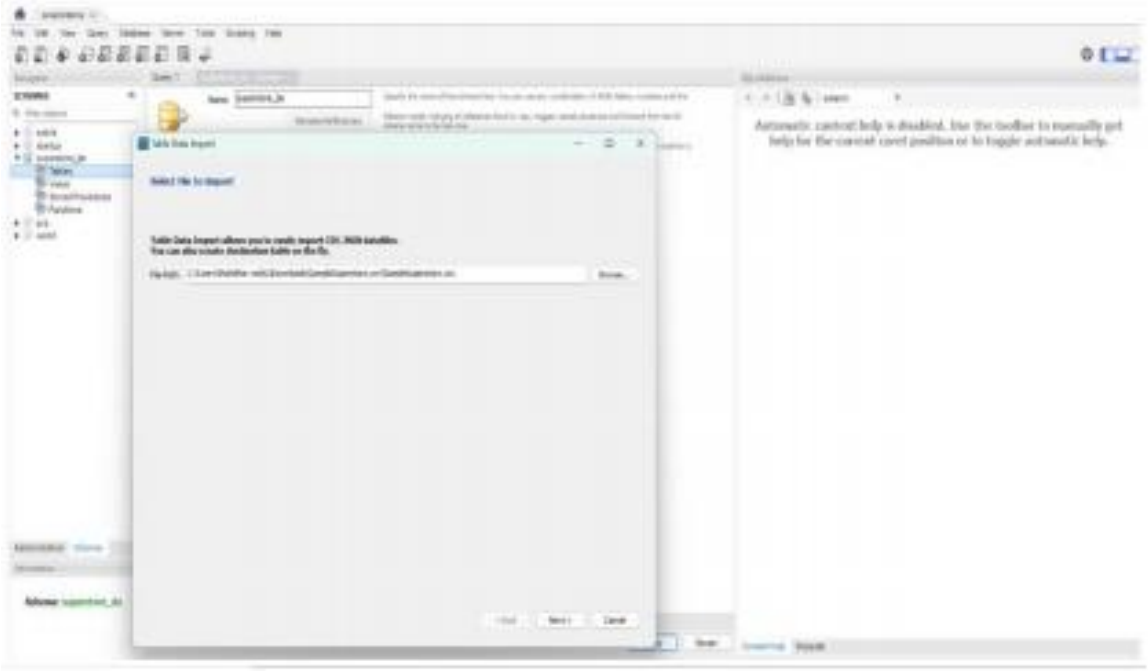


• Click on Browse and select the file in your computer to load the dataset file as a Table into that schema you created in MySQL.

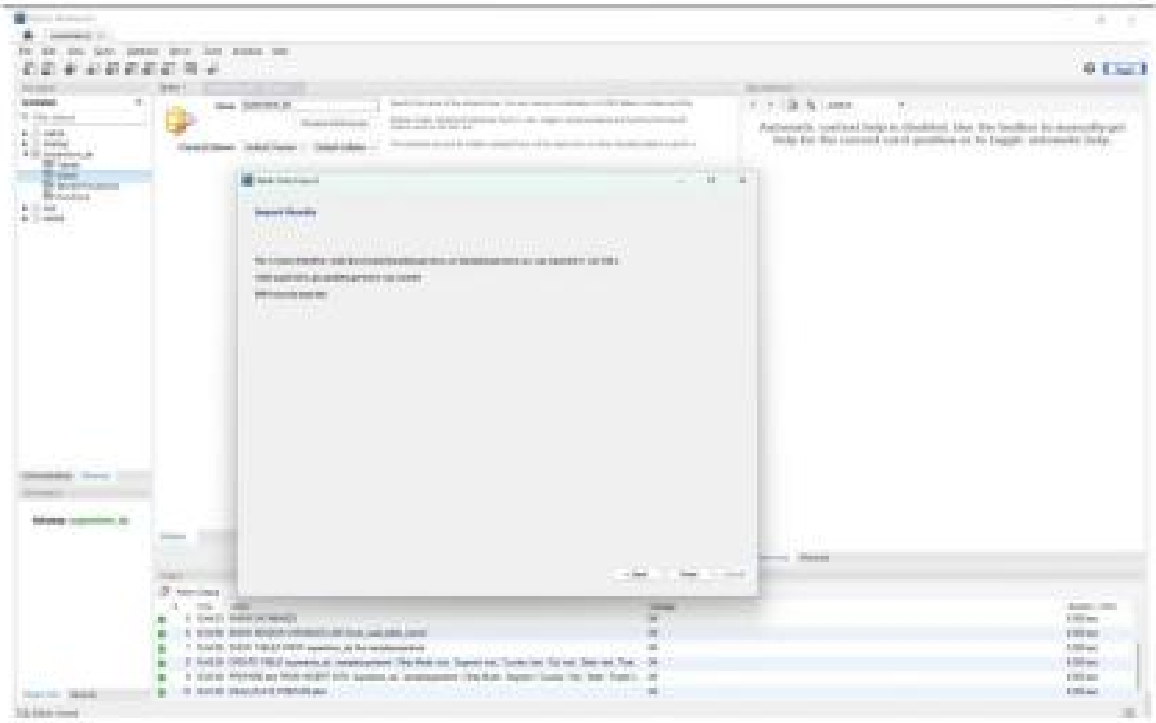
- If you want add the dataset to existing table click on use existing table and select from the dropdown of tables lists.



- Otherwise go with create new table and Click on **Next.**



• Here you can see the dataset that loaded from the excel/csv file we have loaded and you can see the datatype of each column too.



• Here you can see the total number of records/rows that are loaded.

• Here you can see the loaded dataset that we goby using select statement in query tab.

3.2.3 : CRUD Operations :

• CRUD is an acronym for

CREATE,

READ(SELECT),

UPDATE, and DELETE
statements in SQL
Server.

• CRUD in database terms can be mentioned as Data Manipulation
Language (DML) Statements.

3.2.4 : Basic SQL Operations :

• DDL – Data Definition Language
• DQL – Data Query Language
• DML – Data Manipulation Language
• DCL – Data Control Language
• TCL – Transaction Control Language

CHAPTER-4

INTRODUCTION TO TABLEAU

4.1.: What is Tableau?

• Tableau is a ground breaking data visualization software created by Tableau Software.
• Tableau connects easily and nearly any data source.
• Tableau allows for instantaneous insight by transforming data into interactive data visualizations called dashboards.

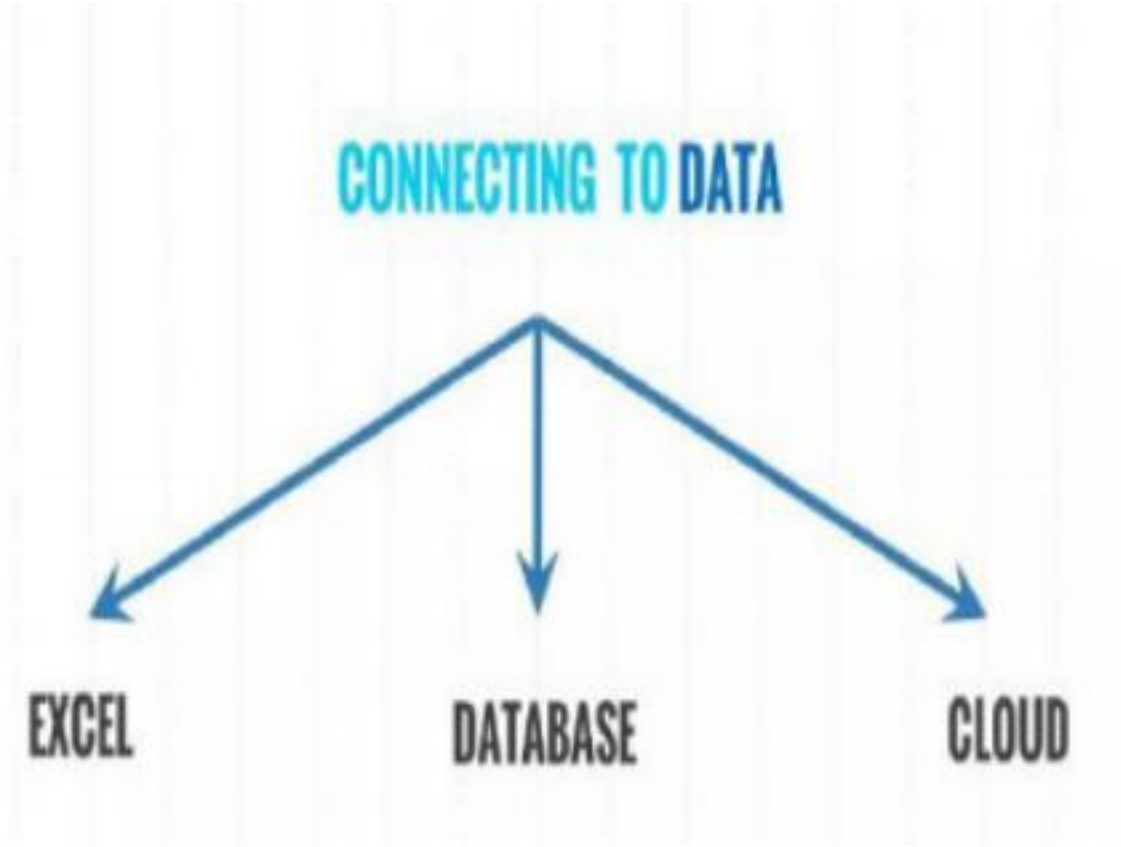
4.2.:Features of Tableau :

- Informative Dashboards
- Supports numerous Data Sources
- Provides Great Security
- Easy Collaboration & Sharing
- Provides Mobile Version
- Trend lines and Predictive analysis
- Availability of Geo Maps

4.3.: Products of Tableau :

- Tableau Public
- Tableau Server
- Tableau Desktop

4.4.:Connecting Tableau with Data Sources :



CHAPTER - 5

CONNECTING DATABASE AND TABLEAU

5.1.: Connecting Database and Tableau :

• Before you begin your analysis, you must connect to your data and then set up the data source.

• Before you can build a view and analyze your data, you must first connect Tableau to your data.

• Tableau supports connecting to a wide variety of data, stored in a variety of places.

• For example, your data might be stored on your computer in a spreadsheet or a text file, or in a big data, relational, or database on a server in your enterprise.

CHAPTER – 6

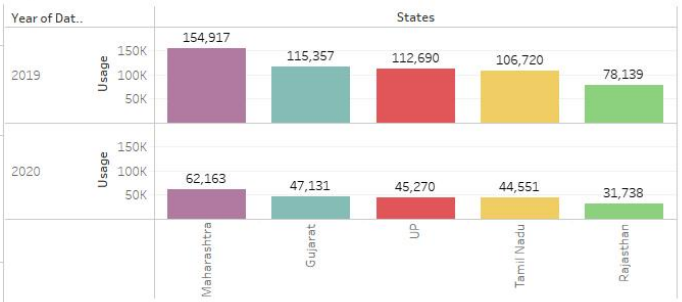
DASHBOARD AND STORIES

Regionwise State Consumption

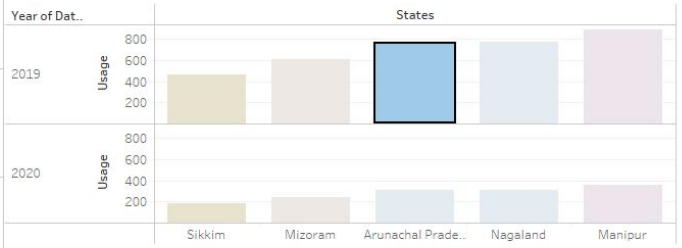
Regions	States	2019	2020
ER	Bihar	30,008	11,821
	Jharkhand		
	Odisha	28,967	11,507
	Sikkim	466	182
	West Bengal	49,869	19,901
NER	Arunachal Pradesh	754	307
	Assam	8,979	3,575
	Manipur	895	360
	Meghalaya	2,018	821
	Mizoram	614	244
	Nagaland		311
	Tripura	1,483	
NR	Chandigarh	1,472	611
	Delhi	29,458	12,482
	Haryana	48,995	20,587
	HP	9,491	3,873
	J&K	15,915	6,350
	Punjab	49,636	21,361
	Rajasthan	78,139	31,738
	UP	112,690	45,270
	Uttarakhand	12,899	
SR	Andhra Pradesh	63,097	25,507
	Karnataka	73,077	29,589
	Kerala	25,798	10,515
	Pondy	2,653	1,106
	Tamil Nadu	106,720	44,551
	Telangana		
WR	Chhattisgarh	30,180	12,010
	DNH	5,845	2,419
	Goa	4,006	1,573
	Gujarat	115,357	47,131
	Maharashtra	154,917	62,163
	MP	74,975	

Dates — Usage (0K, 100K, 200K)

Top N



Bottom N



States: Andhra P.., Arunacha.., Assam, Bihar, Chandiga.., Chhattis.., Delhi, DNH, Goa, Gujarat, Haryana, HP, J&K, Jharkhand, Karnataka, Kerala, Maharas.., Manipur, Meghala.., Mizoram, MP, Nagaland, Odisha, Pondy, Punjab, Rajasthan, Sikkim, Tamil Na.., Telangana

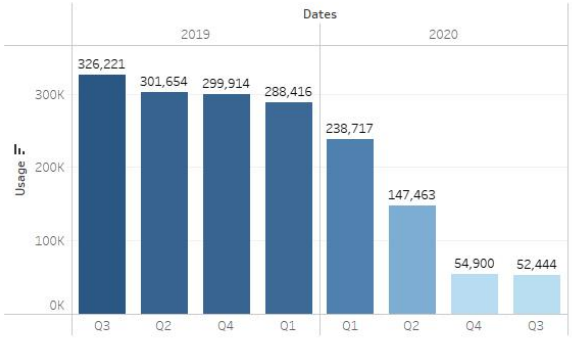
Top N: 5

Bottom N: 5

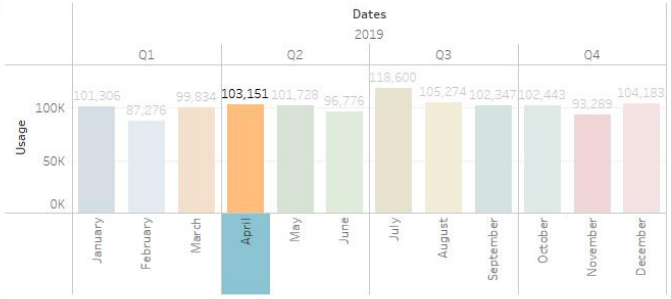
Dashboard 1 | Dashboard 3

tate Consumption | Quarter wise Usage | Usage by Year | Metro City States | Year Wise Consumption in Region | Sheet 17 | Dashboard 1 | Dashboard 2 | Dashboard 3 | Story on Electricity Consum...

Quarter wise Usage



2019 Monthwise Consumption

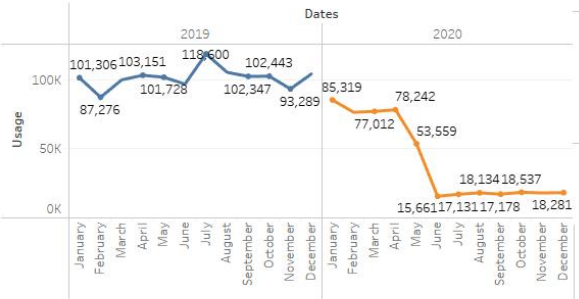


Usage: 52,444 – 326K

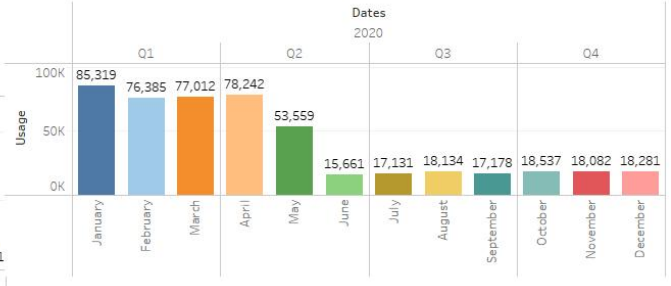
Year of Dates: 2019, 2020

Month of Dates: January, February, March, April, May, June, July, August, September, October, November, December

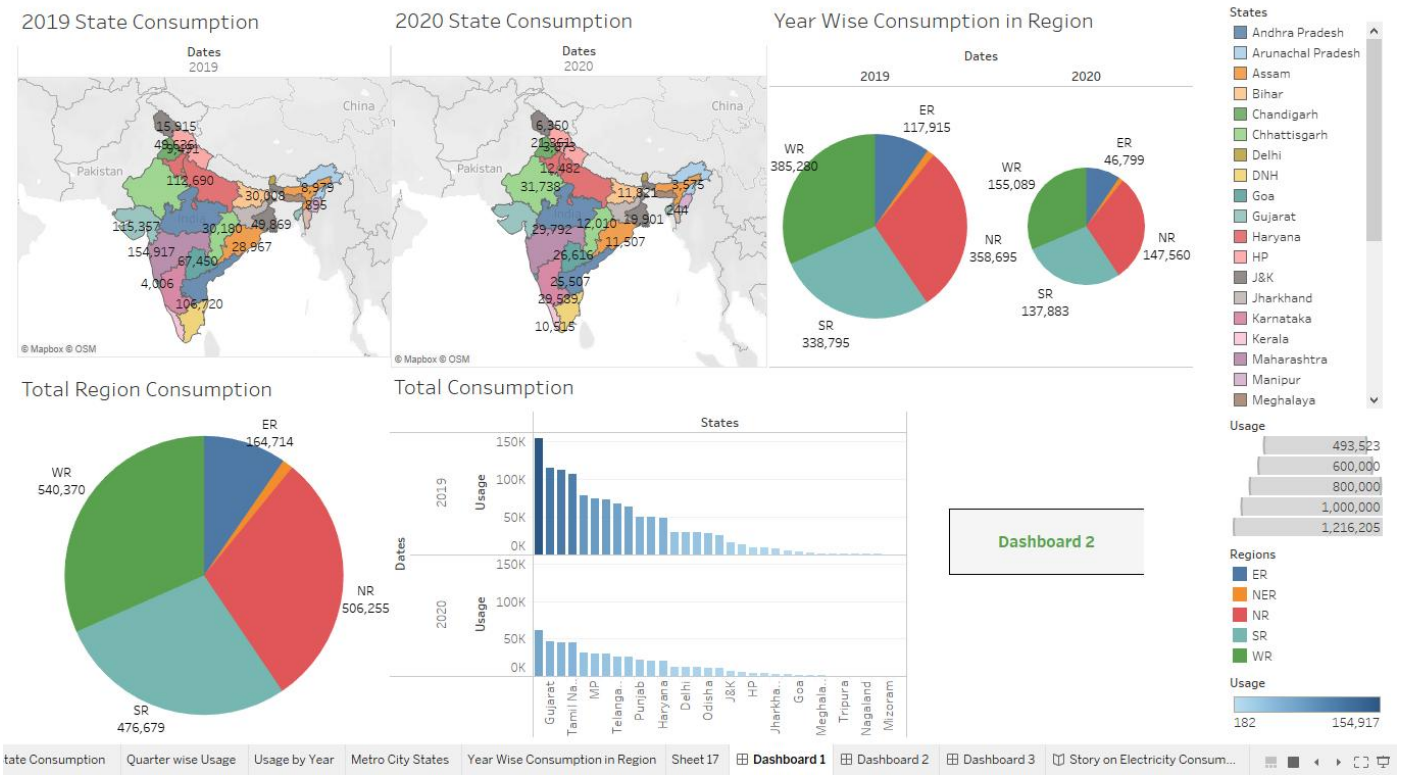
Usage by Year



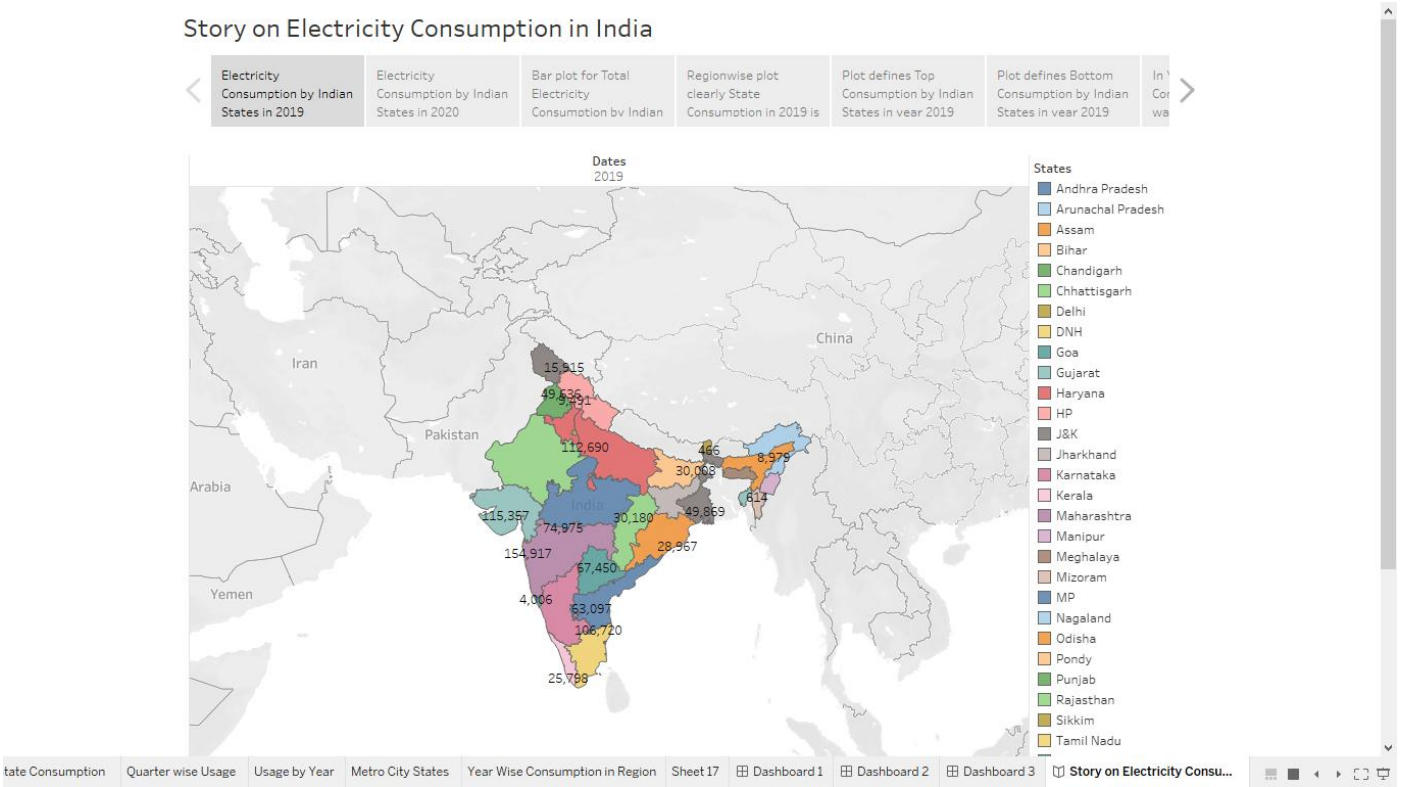
2020 Monthwise Consumption



tate Consumption | Quarter wise Usage | Usage by Year | Metro City States | Year Wise Consumption in Region | Sheet 17 | Dashboard 1 | Dashboard 2 | Dashboard 3 | Story on Electricity Consum...


2019 State Consumption
2020 State Consumption
Year Wise Consumption in Region
Total Region Consumption
Total Consumption
Dashboard 2
States
Regions
Usage
tate Consumption
Quarter wise Usage
Usage by Year
Metro City States
Year Wise Consumption in Region
Sheet 17
Dashboard 1
Dashboard 2
Dashboard 3
Story on Electricity Consum...

STORY


Story on Electricity Consumption in India
Electricity Consumption by Indian States in 2019
Electricity Consumption by Indian States in 2020
Bar plot for Total Electricity Consumption by Indian
Regionwise plot clearly State Consumption in 2019 is
Plot defines Top Consumption by Indian States in year 2019
Plot defines Bottom Consumption by Indian States in year 2019
States
Tate Consumption
Quarter wise Usage
Usage by Year
Metro City States
Year Wise Consumption in Region
Sheet 17
Dashboard 1
Dashboard 2
Dashboard 3
Story on Electricity Consu...

CHAPTER - 7

CONCLUSION

Electricity Consumption States

- Maharashtra is the Highest Electricity consumption user of India.
- Gujarat is the Second Highest Electricity consumption user of India.
- Sikkim is the Lowest Electricity Consumption user of India .

Electricity Consumption before and during Lockdown in India

- Electricity consumption was more in 2019 in month of March-June before Lockdown
- Electricity Consumption was less in 2020 in month of March-June during the Lockdown

Electricity Consumption in Quarters

- Electricity Consumption in 2019 for Quarter 3 was Highest.
- Electricity Consumption in 2019 for Quarter 1 was Lowest.
- Electricity Consumption in 2020 for Quarter 3 was Lowest.
- Electricity Consumption in 2020 for Quarter 1 was Highest.

Electricity Consumption in Regions

- Total Electricity consumption in Western Region is Highest.
- Total Electricity consumption in North Eastern Region is Lowest.
- Electricity Consumption in 2020 for Quarter 3 was Lowest.
- Electricity Consumption in 2020 for Quarter 1 was Highest.