PLUGGING INTO THE FUTURE:AN EXPLORATION OF ELECTRICITY CONSUMPTION PATTERNS

1.INTRODUCTION:

1.1 OVERVIEW:

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 370.106GW 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) 2019-2020, the total electricity generation in the country was 1,598TWh, of which 1,383.5TWh generated by utilities. The gross electricity consumption per capita in FY2019 was 1,208kWh. 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. The dataset is exhaustive in its demonstration of energy consumption state wise. Analyzing Electricity Consumption in India from Jan 2019 till 5th December 2020. This dataset contains a record of Electricity Consumption in each states of India, here we are going to analyze State wise, Region wise and Overall Electricity consumption in India.

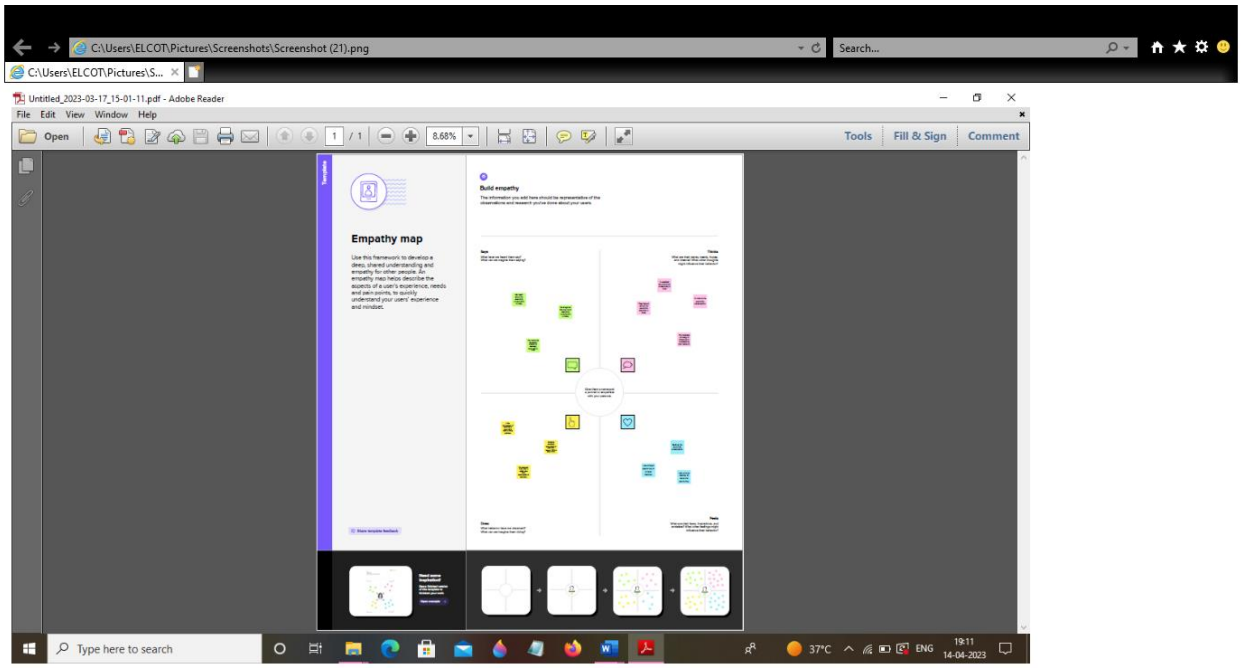
1.2 PURPOSE:

We can analyze the Electricity Consumption in India from January 2019 till 5th December 2020. By understanding this consumption patterns and trends, we can achieve the opportunities that develop businesses market and strategies to meet the growing demand for electricity in India.

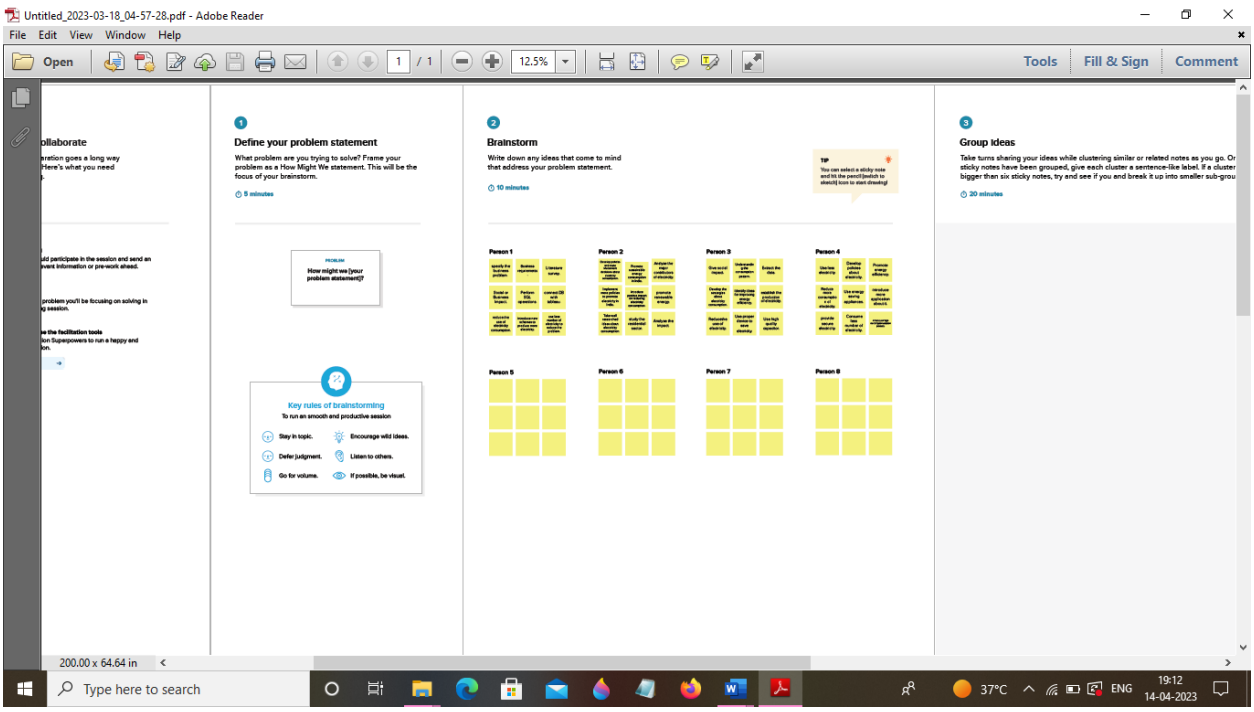
By using this technique we can determine which state consume more electricity and which state consume less electricity, then it will be used to reduce the consumption patterns in that particular state.

2.PROBLEM DEFINITION & DESIGN THINKING:

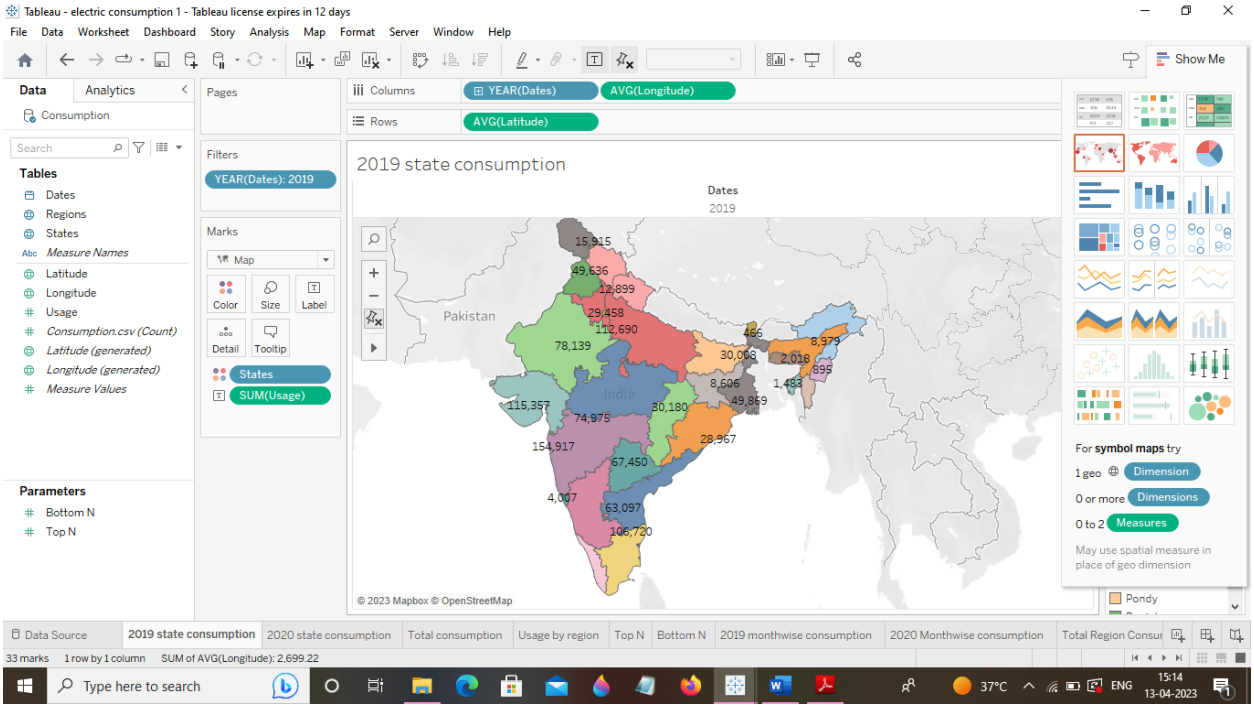
2.1 EMPATHY MAP



2.2 IDEATION & BRAINSTORMING MAP



3. RESULT: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49,636
12,899
29,458
112,690
78,139
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1,483
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© 2023 Mapbox © OpenStreetMap
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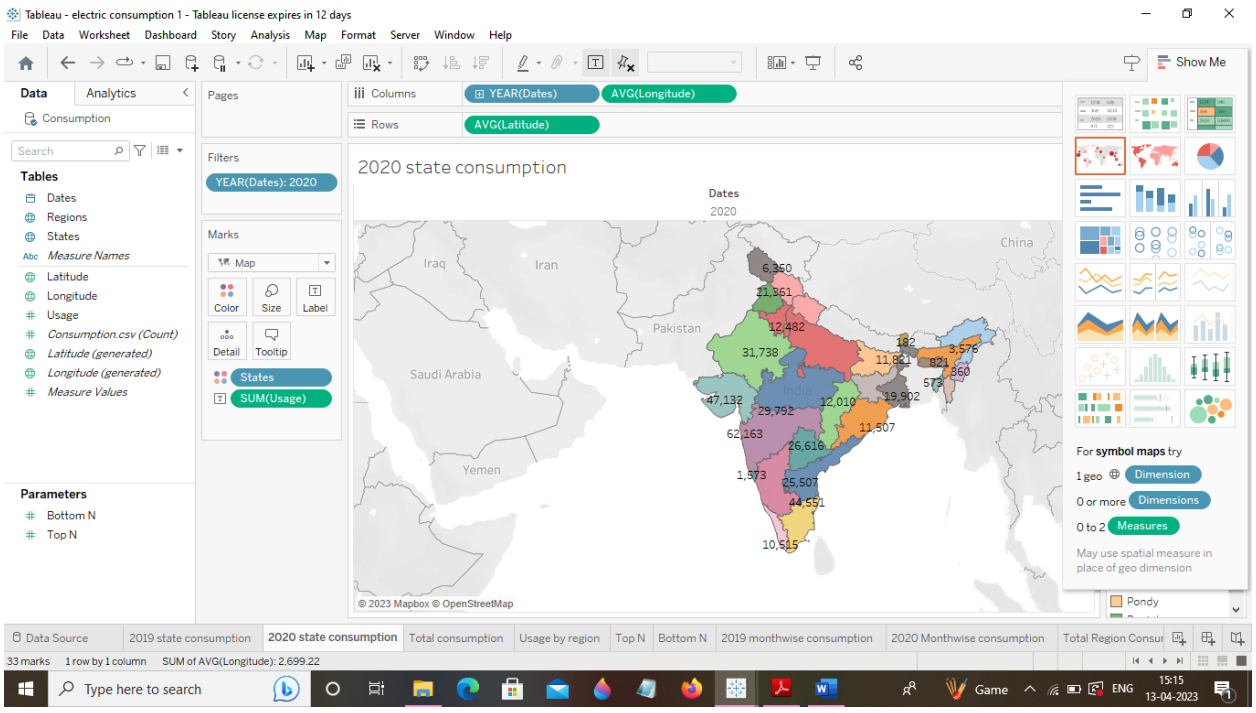
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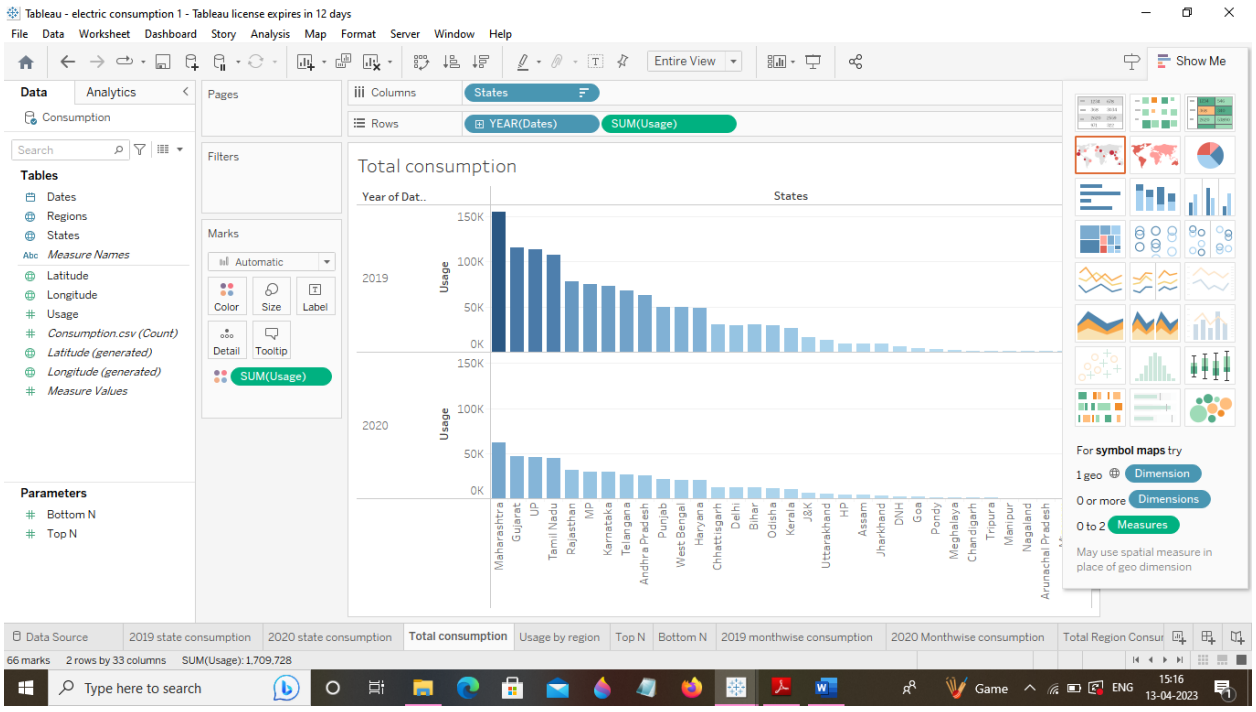
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Haryana
Chhattisgarh
Delhi
Bihar
Odisha
Kerala
J&K
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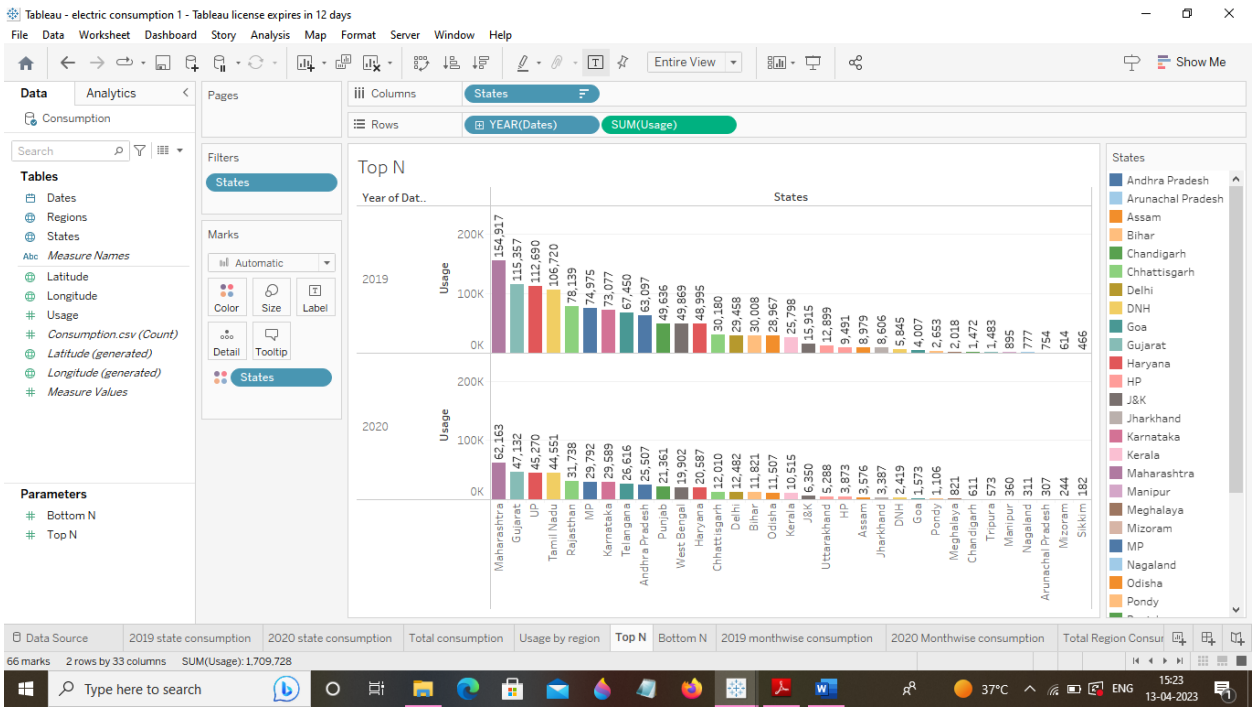
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UP 112,690
Tamil Nadu 106,720
Rajasthan 78,139
MP 74,975
Karnataka 73,077
Telangana 67,450
Andhra Pradesh 63,097
Punjab 49,636
West Bengal 49,869
Haryana 48,995
Chhattisgarh 30,180
Delhi 29,458
Bihar 30,008
Odisha 28,967
Kerala 25,798
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Uttarakhand 12,899
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Manipur 895
Nagaland 777
Arunachal Pradesh 754
Mizoram 614
Sikkim 466
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Gujarat 47,132
UP 45,270
Tamil Nadu 44,551
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Karnataka 29,589
Telangana 26,616
Andhra Pradesh 25,507
Punjab 21,361
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Goa 1,573
Pondy 1,106
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Chandigarh 611
Tripura 573
Manipur 360
Nagaland 311
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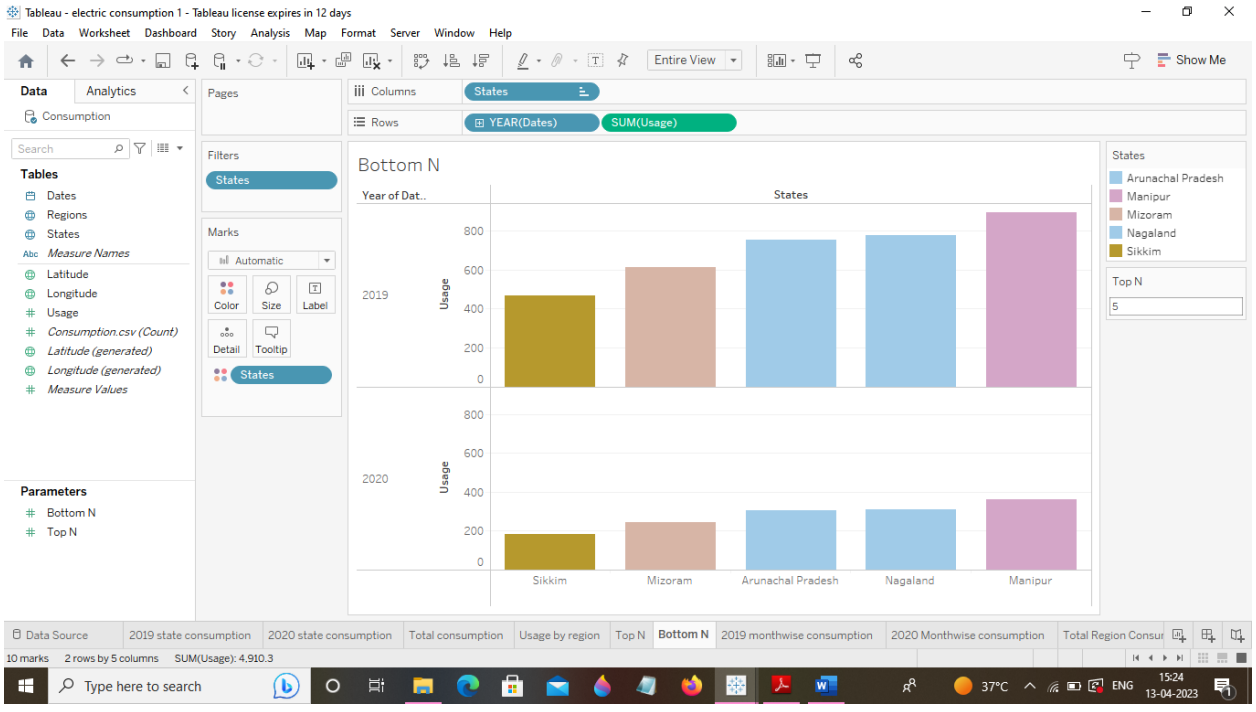
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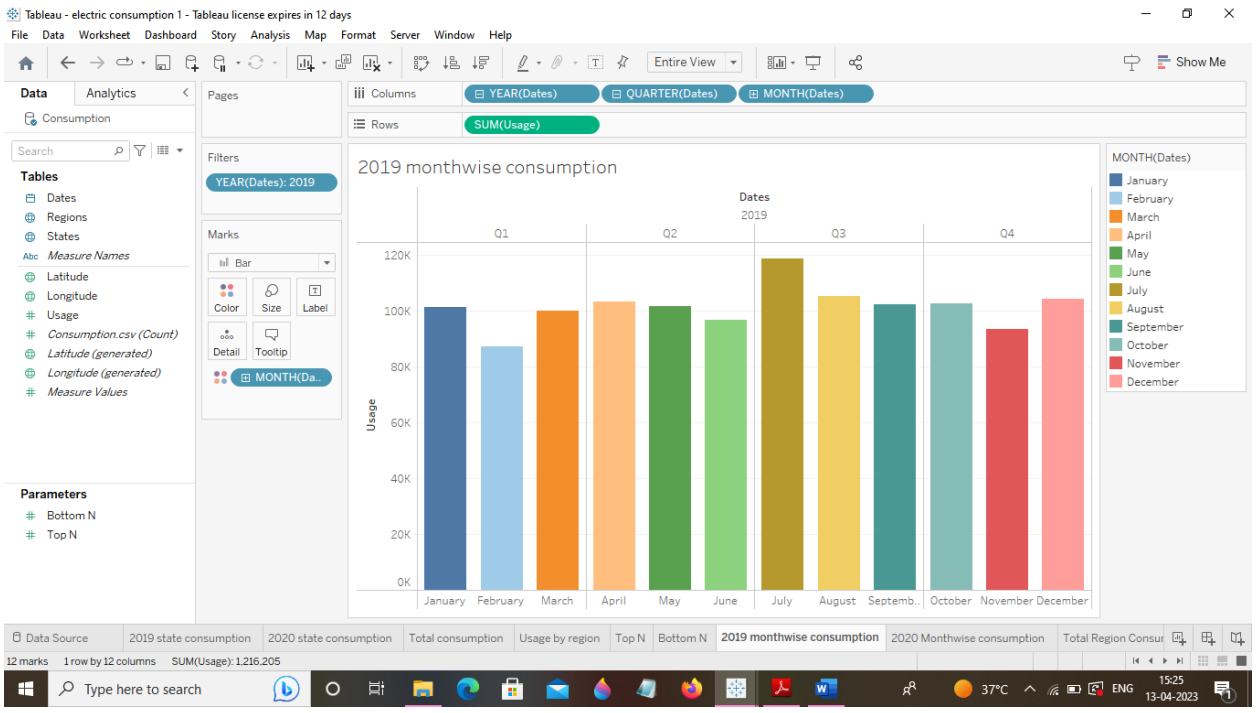
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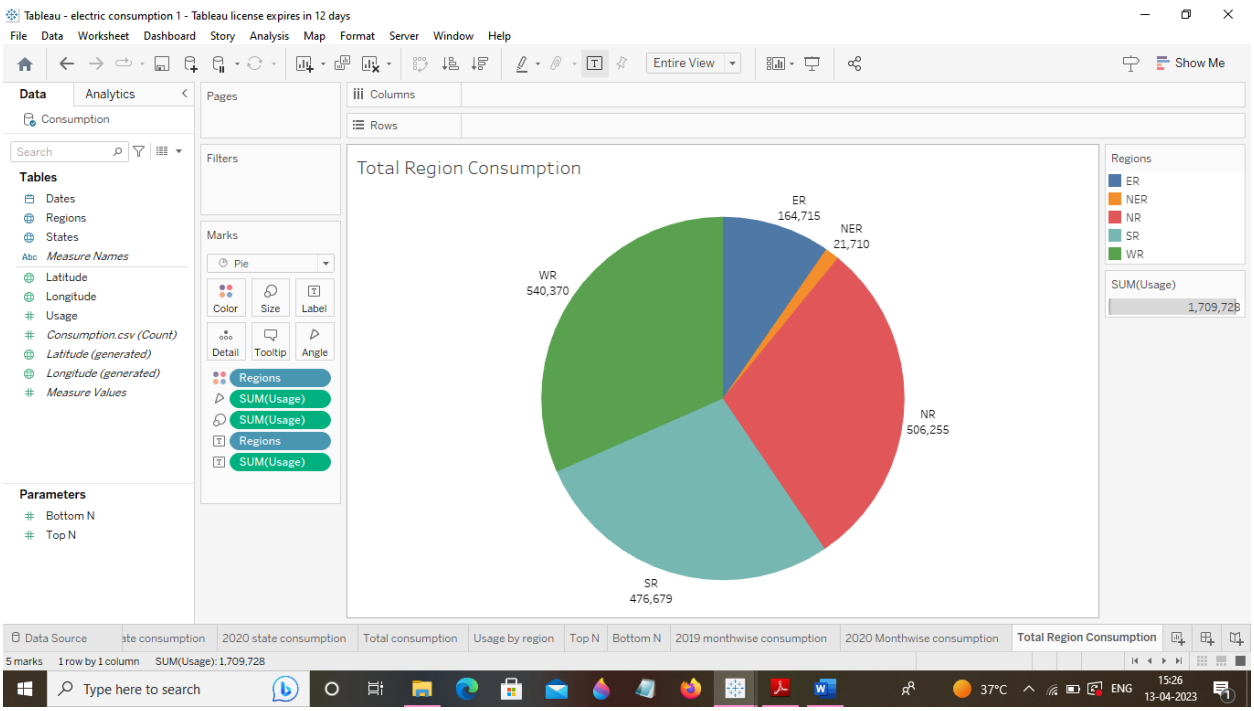
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164,715
NER
21,710
NR
506,255
SR
476,679
WR
540,370
Regions
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SUM(Usage)
1,709,728
Data Source
2020 state consumption
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Usage by region
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Total Region Consumption
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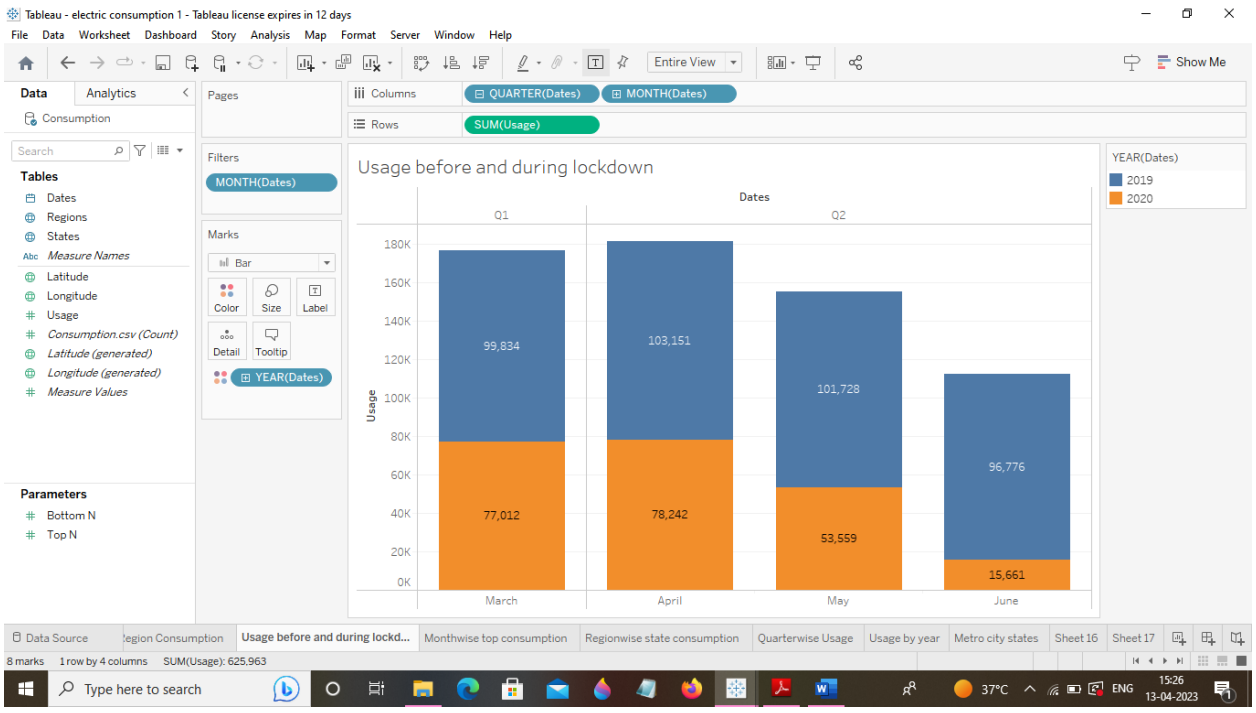
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Bottom N
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Usage before and during lockdown
Dates
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180K
160K
140K
120K
100K
80K
60K
40K
20K
0K
99,834
77,012
103,151
78,242
101,728
53,559
96,776
15,661
March
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YEAR(Dates)
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Data Source
Usage before and during lockd...
Monthwise top consumption
Regionwise state consumption
Quarterwise Usage
Usage by year
Metro city states
Sheet 16
Sheet 17
8 marks
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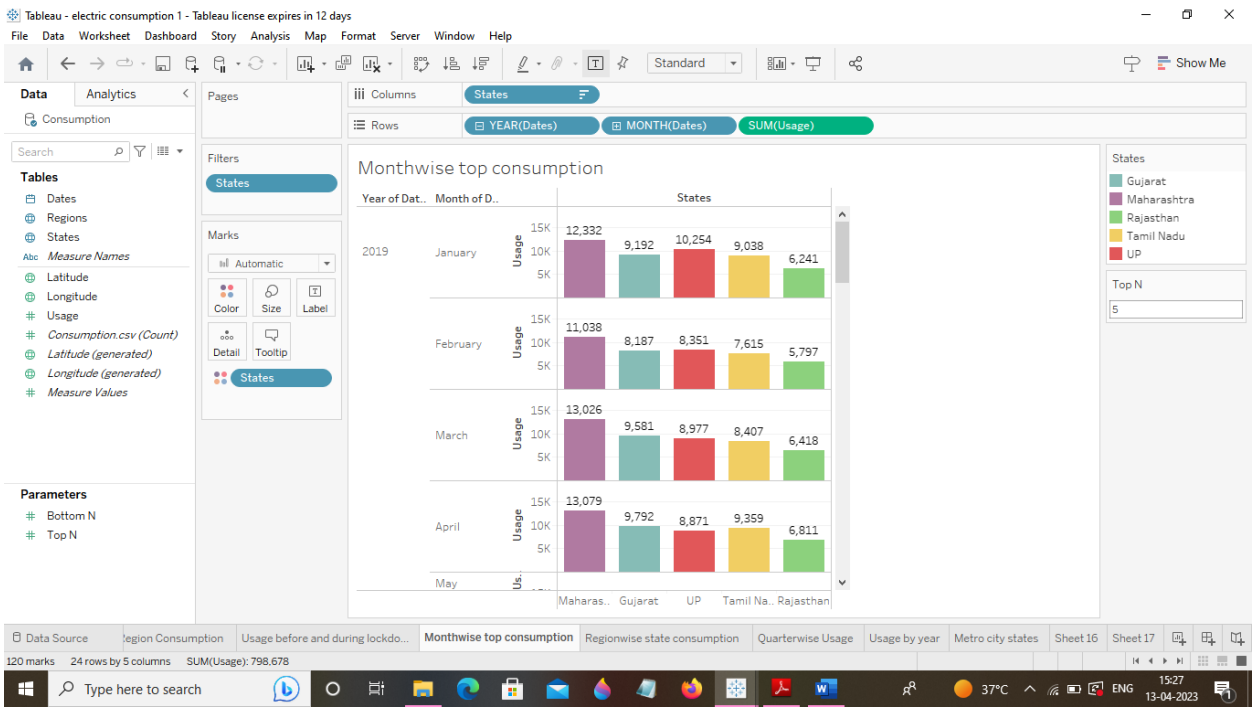
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12,332
9,192
10,254
9,038
6,241
11,038
8,187
8,351
7,615
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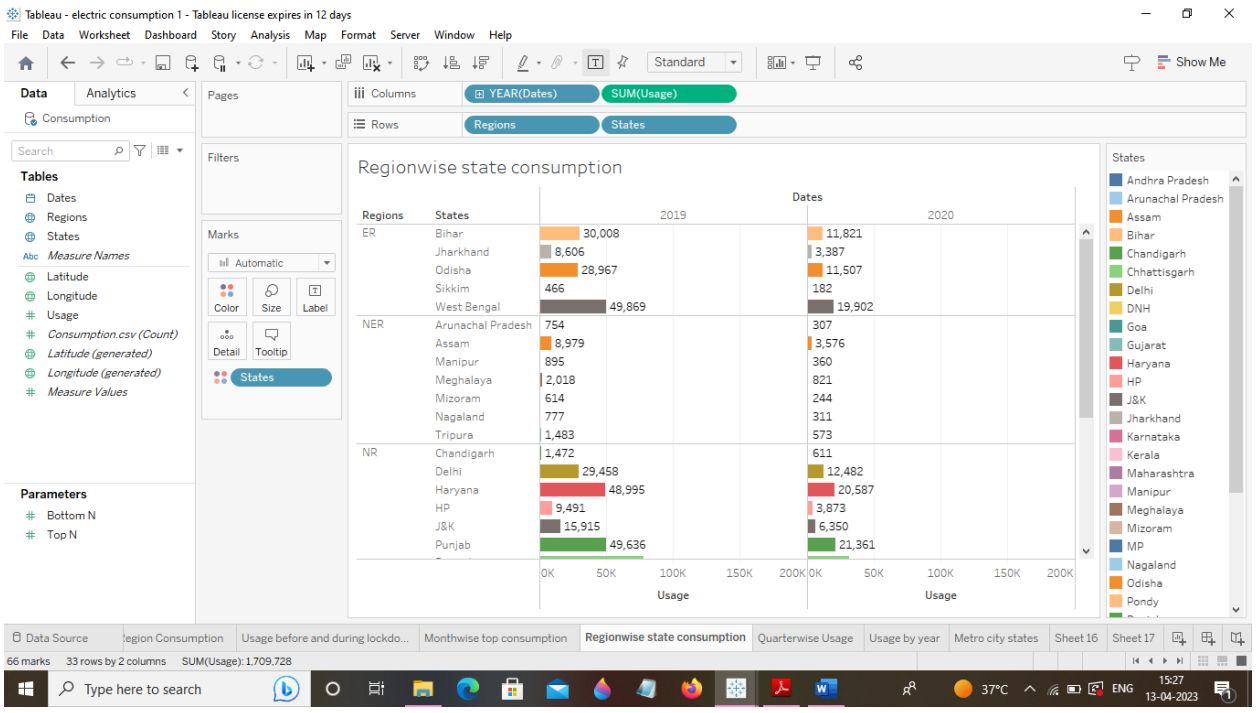
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Regionwise state consumption
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Jharkhand 8,606 3,387
Odisha 28,967 11,507
Sikkim 466 182
West Bengal 49,869 19,902
NER Arunachal Pradesh 754 307
Assam 8,979 3,576
Manipur 895 360
Meghalaya 2,018 821
Mizoram 614 244
Nagaland 777 311
Tripura 1,483 573
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
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Usage
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Andhra Pradesh
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Monthwise top consumption
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66 marks 33 rows by 2 columns SUM(Usage): 1,709,728
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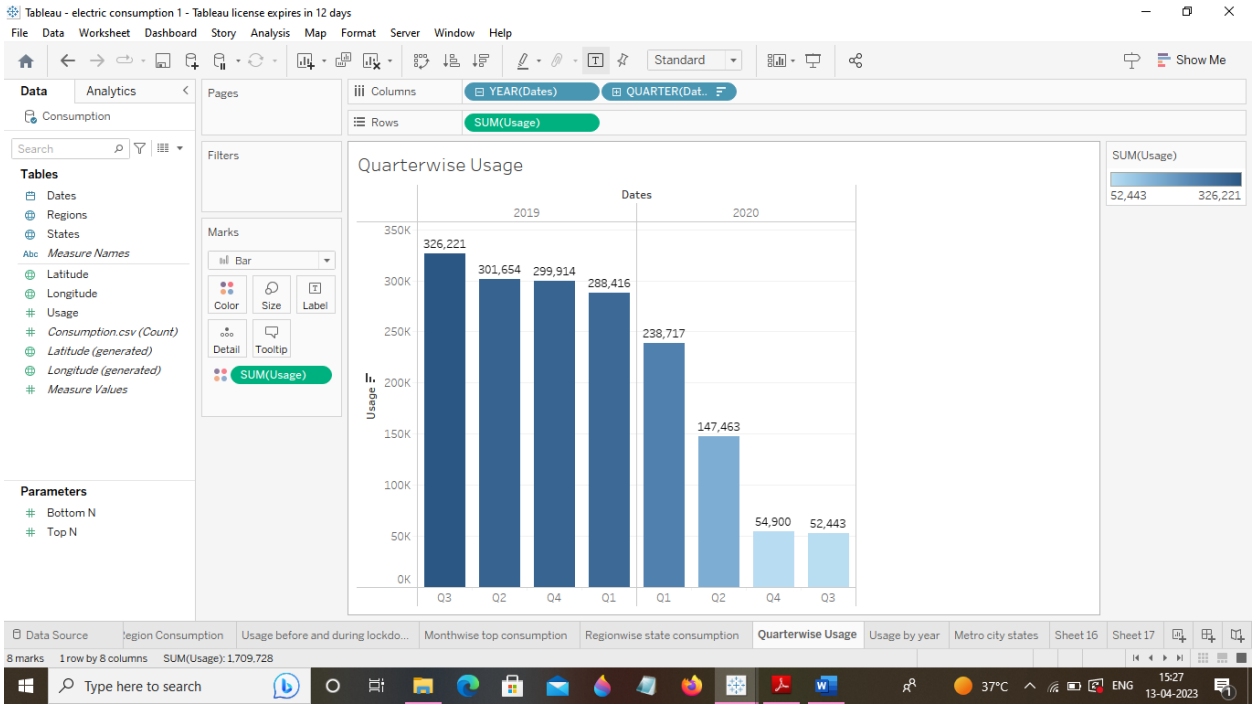
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Rows SUM(Usage)
Quarterwise Usage
Dates
2019 2020
350K
300K
250K
200K
150K
100K
50K
0K
Usage
326,221
301,654
299,914
288,416
238,717
147,463
54,900
52,443
Q3 Q2 Q4 Q1 Q1 Q2 Q4 Q3
SUM(Usage)
52,443 326,221
Data Source
Monthwise top consumption
Regionwise state consumption
Quarterwise Usage
Usage by year
Metro city states
Sheet 16
Sheet 17
8 marks 1 row by 8 columns SUM(Usage): 1,709,728
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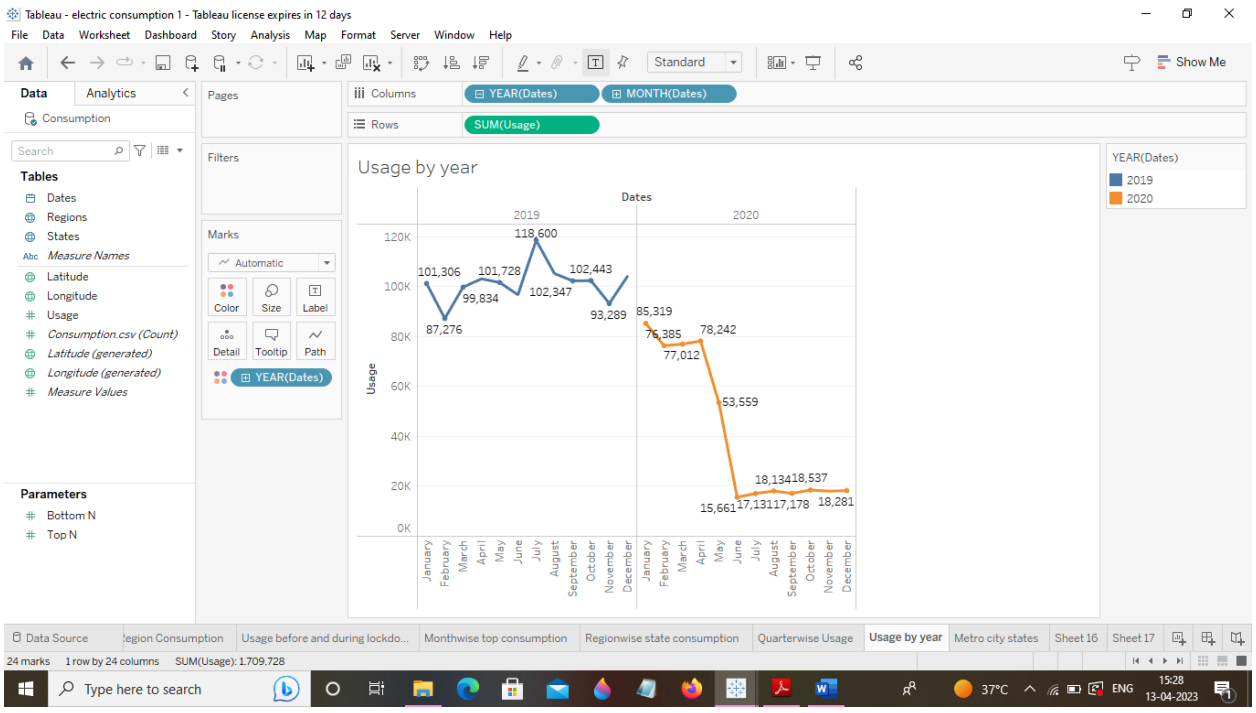
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Columns YEAR(Dates) MONTH(Dates)
Rows SUM(Usage)
Usage by year
Dates
2019 2020
Usage
120K 100K 80K 60K 40K 20K 0K
101,306 99,834 101,728 118,600 102,347 102,443 93,289 87,276
85,319 76,385 77,012 78,242 53,559 15,661 17,131 17,178 18,134 18,537 18,281
January February March April May June July August September October November December
YEAR(Dates)
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Data Source
Usage before and during lockdo...
Monthwise top consumption
Regionwise state consumption
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Usage by year
Metro city states
Sheet 16
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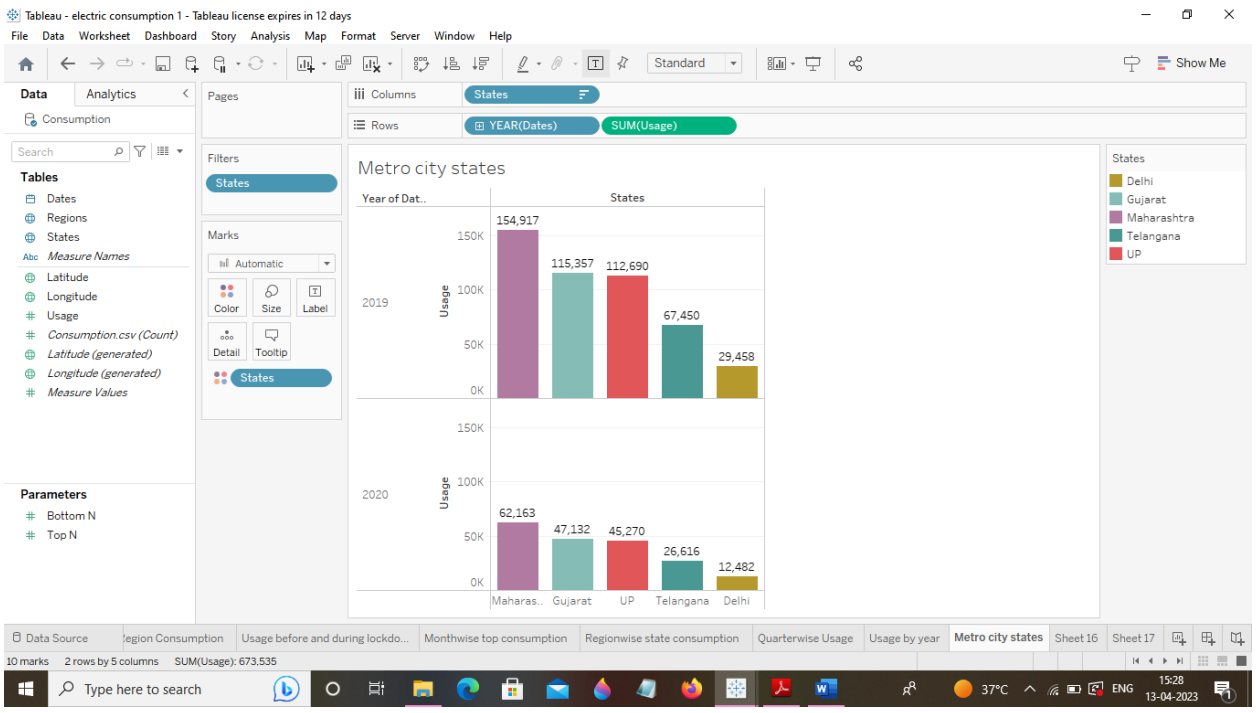
Tableau - electric consumption 1 - Tableau license expires in 12 days
File Data Worksheet Dashboard Story Analysis Map Format Server Window Help
Data Analytics
Consumption
Tables
Dates
Regions
States
Measure Names
Latitude
Longitude
Usage
Consumption.csv (Count)
Latitude (generated)
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Measure Values
Parameters
Bottom N
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States
Marks
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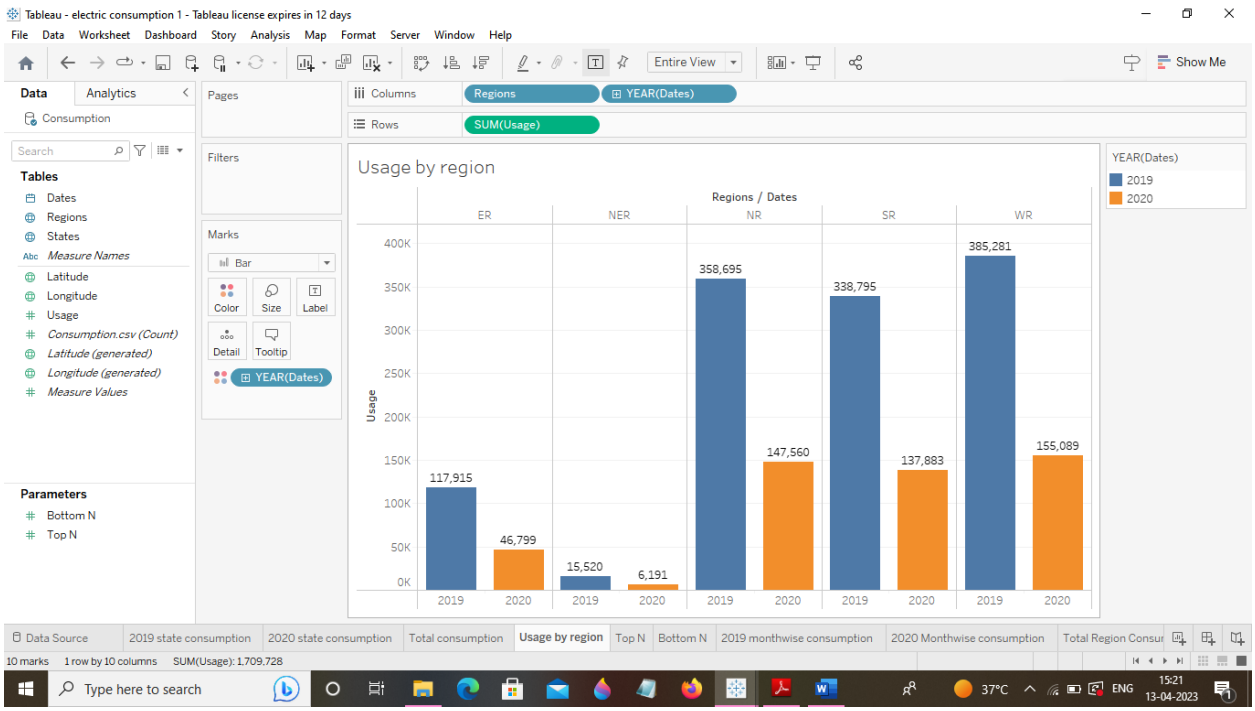
Color Size Label
Detail Tooltip
States
Columns States
Rows YEAR(Dates) SUM(Usage)
Metro city states
Year of Dat..
States
2019
2020
Usage
150K 100K 50K 0K
154,917 115,357 112,690 67,450 29,458
62,163 47,132 45,270 26,616 12,482
Maharas.. Gujarat UP Telangana Delhi
States
Delhi
Gujarat
Maharashtra
Telangana
UP
Data Source
Usage before and during lockdo...
Monthwise top consumption
Regionwise state consumption
Quarterwise Usage
Usage by year
Metro city states
Sheet 16
Sheet 17
10 marks 2 rows by 5 columns SUM(Usage): 673,535
Type here to search
37°C
ENG
15:28
13-04-2023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Entire View
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Tooltip
YEAR(Dates)
Columns
Regions
YEAR(Dates)
Rows
SUM(Usage)
Usage by region
Regions / Dates
ER
NER
NR
SR
WR
Usage
400K
350K
300K
250K
200K
150K
100K
50K
0K
117,915
46,799
15,520
6,191
358,695
147,560
338,795
137,883
385,281
155,089
2019
2020
YEAR(Dates)
2019
2020
Data Source
2019 state consumption
2020 state consumption
Total consumption
Usage by region
Top N
Bottom N
2019 monthwise consumption
2020 Monthwise consumption
Total Region Consur
10 marks
1 row by 10 columns
SUM(Usage): 1,709,728
Type here to search
37°C
ENG
15:21
13-04-2023

4.ADVANTAGES & DISADVANTAGES:

ADVANTAGES:

- By collecting this information can be used to identify areas where consumption high and areas where it is low.
- Identify opportunities for improving energy efficiency and reducing consumption in different sectors and regions.
- It can be used to develop policies and programs to promote energy efficiency.
- By understanding consumption patterns and trends, the analysis can help businesses identify market opportunities and develop strategies to meet the growing demand for electricity in India.
- The study found that policies promoting energy efficiency and renewable energy development have had a positive impact on reducing electricity consumption in India.
- A study by (Kumar et al., 2020) analyzed the electricity consumption patterns in India and identified the major contributors to the consumption.
    - Another study by (Jain and Rathi, 2019) analyzed the impact of government policies on electricity consumption in India.
    - The overall studies found that the residential sector was the largest consumer of electricity, followed by the commercial and industrial sectors.
    - From this data analyzes, Maharashtra is the highest Electricity consumption user of India.
    - Gujarat is the second highest electricity consumption user of India.
    - And then Sikkim is the lowest electricity consumption user of India.
    - This data is in the form of a time series for a period of 24months beginning from January 2019 till 5th December 2020.
    - Rows and columns put together, each datapoint reflects the power consumed in Mega Units (MU) by the given state(column) at the given date (row).

- Power System Operation Corporation Limited (POSOCO) is a wholly-owned Government of India enterprise under the Ministry of Power. It was earlier a wholly-owned subsidiary of power grid corporation of India limited. It was formed in March 2009 to handle the power management.

DISADVANTAGES:

- By using this data analysis, the Government will reduce the electricity providing in particular states, who will consume the maximum amount of electricity.
- It will affect that area people and industrial sectors a lot.
- By knowing about the consumption rate in several states, can increase the problems in different ways such as from politics, social welfare sectors, etc.
- In electricity, there are a limited number of feasible sites for a large number of dams.
- Hydroelectric natural seasonal changes in river and ecosystems can be destroyed.

5. APPLICATIONS:

- Electricity consumption data can be used for government agencies, electricity providers and investors to develop policies and make investment decisions that promote sustainable energy development and consumption in India.
- By providing access to electricity, the analysis can help to improve the quality of life for people living in areas without access to electricity, including providing access to lighting, heating, cooling and powering essential services such as hospitals and schools.
- The industrial sector uses electricity for operating industrial motors and machinery, lights, computers and office equipment for facility heating, cooling and ventilation.
- All other sectors also experience growth of nearly two times compared to 2015. In the domestic sector, the growth is attributed to the rise in population and income levels of the residents.
- Commercial sectors grow because of expanding commercial floor space and the intensity of electricity usage per square meter. This sector shows higher growth than the agriculture sector, and these two sectors also consume the same amount of electricity by 2030.
- The commercial sectors also experience many potential electricity savings in this scenario and a slight decrease in the domestic sector.
- The domestic sector decreased only slightly because of the ongoing rural electrification program and the government's priority to have a 100%electrification rate, especially in rural areas.
- High Renewable and Gas production (HRG). This topic focuses on the generation of electricity.
- Low Renewable and Gas Production(LRG) : Again, focusing on the generation of electricity from LRG is preferred to coal- and lignite-based power plants.

6. CONCLUSION:

- Analyzing Electricity Consumption in India from January 2019 till 5th December 2020. It will help to determine the consumption pattern in India from state wise, region wise and overall consumption in India. Also the fifteen graph can be drawn for region wise and state wise consumption of electricity in India. Light Bulb switch off lights and fans when not required. Replace bulbs with tube lights & CFL (Compact Fluorescent Lamps). Utilize natural light by using electronic chokes & regulators. Optimize use of lights in malls, multiplexes & hotels. These are the precautions for save the electricity.

7. FUTURE SCOPE:

- India's energy demand was projected to increase by almost 50% between 2019 and 2030, but growth over this period is now closer to 35% in the STEPS, and 25% in the Delayed Recovery Scenario.
- Electricity demand growth in India outpaces other regions to 2030, after which growth is most pronounced in Southeast Asia and Africa.
- China sees the largest absolute increase in demand, accounting for over 40% of the global growth to 2030.
    - Future Energy Systems develops the energy technologies of the near future, examines their integration into current infrastructure and considers their social, economic and environmental impacts.
    - This study was designed to understand the growth in electricity demand from the individual end-use sectors.
    - It forms a building block for a multi-year study on the future of coal ecosystem being undertaken at Brookings India.
    - While the 2020 demand analysis considers planned growth in capacity addition of thermal and RE, and a national lifeline consumption for unelectrified household, an estimate for 2030 necessarily needs to consider growth in the electricity demand for end-use sectors.