PLUGGING INTO THE FUTURE:

AN EXPLORATION OF ELECTRICITY CONSUMPTION PATTERNS

Project Based Experimental Learning program

Plugging into the Future: An Exploration of Electricity Consumption Patterns

Milestone 1: Define Problem / Problem Understanding:

Activity 1: Specify the business problem.

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 dataset is exhaustive in its demonstration of energy consumption state wise.
Analysing 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 analyse State wise , Region wise and Overall Electricity consumption in India.

Activity 2: Business requirements.

The business requirements for analyzing analysis on electricity consumption in India Identify the current patterns of electricity consumption in different regions and sectors of India. This information can be used to identify areas where consumption is

high and areas where it is low. Identify opportunities for improving energy efficiency and reducing consumption in different sectors and regions. This information can be used to develop policies and programs to promote energy efficiency. This information can be used by government agencies, electricity providers, and investors to develop policies and make investment decisions that promote sustainable energy development and consumption in India.

Activity 3: Literature Survey.

Power is among the most critical components of infrastructure, crucial for the economic growth and welfare of nations. The existence and development of adequate power infrastructure is essential for sustained growth of the Indian economy. The fundamental principle of India's power industry has been to provide universal access to affordable power in a sustainable way. The Ministry of Power has made significant efforts over the past few years to turn the country from one with a power shortage to one with a surplus by establishing a single national grid, fortifying the distribution network, and achieving universal household electrification.

India's power sector is one of the most diversified in the world. Sources of power generation range from conventional sources such as coal, lignite, natural gas, oil, hydro and nuclear power, to viable non-conventional sources such as wind, solar, agricultural and domestic waste. Electricity demand in the country has increased rapidly and is expected to rise further in the years to come. In order to meet the increasing demand for electricity in the country, massive addition to the installed generating capacity is required.

India was ranked fourth in wind power, fifth in solar power and fourth in renewable power installed capacity, as of 2020. India is the only country among the G20 nations that is on track to achieve the

targets under the

Paris

MARKET SIZE

India is the third-largest producer and consumer of electricity worldwide, with an installed power capacity of 408.71 GW as of October 31, 2022.

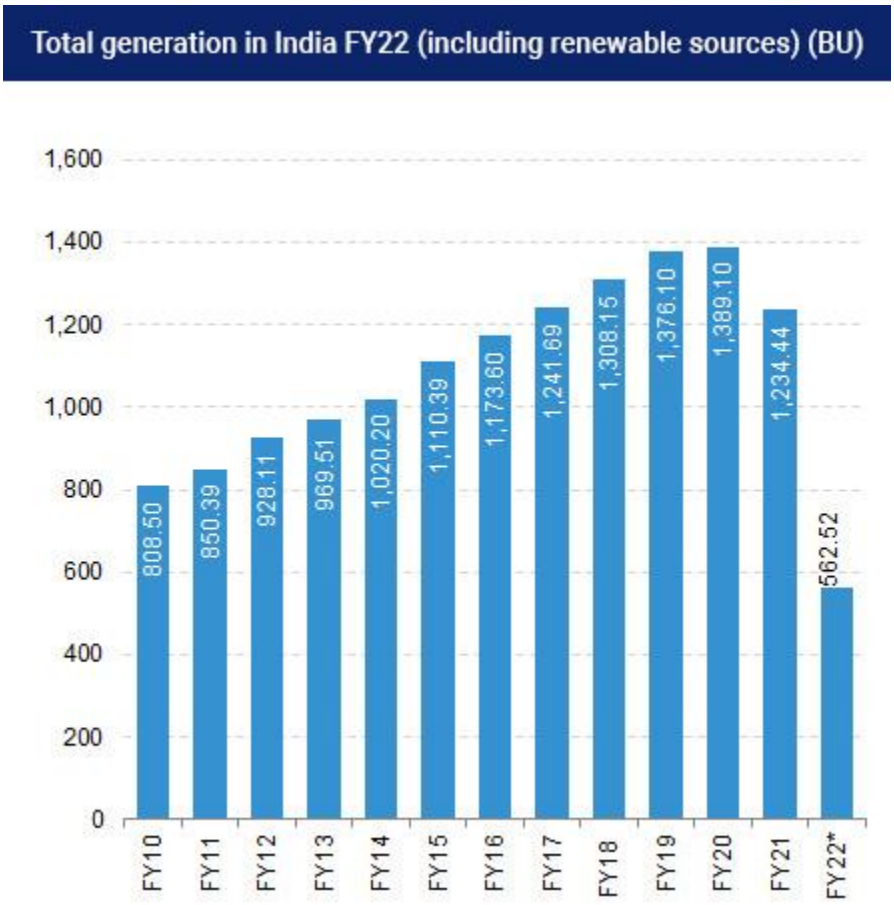
As of October 31, 2022, India’s installed renewable energy capacity (including hydro) stood at 165.94 GW, representing 40.6% of the overall installed power capacity. Solar energy is estimated to contribute 61.62 GW, followed by 41.84 GW from wind power, 10.70 GW from biomass, 4.92 GW from small hydropower, and 46.85 GW from hydropower.

The non-hydro renewable energy capacity addition stood at 4.2 GW for the first three months of FY23 against 2.6 GW for the first three months of FY22.

With electricity generation (including renewable sources) of 846.18 BU in India between April-September 2022, the country witnessed a growth of 10.67% YoY. According to data from the Ministry of Power, India's power consumption increased 1.64% YoY in October 2022 to 114.64 BU.

The peak power demand in the country stood at 210.79 GW on June 9, 2022.

All India actual PLF of thermal power plants stood at 68.24% in June 2022, compared with 67.92% in May 2022.



DEVELOPMENT/INVESMENTS

Total FDI inflows in the power sector reached US$ 16.39 billion between April 2000-June 2022, accounting for 2.71% of the total FDI inflow in India.

Some major investments and developments in the Indian power sector are as follows:

- In November 2022, the Maharashtra State Electricity Distribution Corporation Limited (MSEDCL) granted the "Letter of Award" (LoA) to Tata Power Renewable Energy Limited (TPREL), a Tata Power subsidiary, to build a 150 MW solar project in Solapur, Maharashtra.
- In October 2022, SJVN started commissioning its 75 MW Solar Power Project in Parasan Solar Park which is located at Tehsil Kalpi, District Jalaun near Kanpur, Uttar Pradesh.
- In August 2022, NHPC Limited and the Government of Himachal Pradesh inked an implementation agreement for the 500 MW Dugar Hydroelectric Project in the Chamba District of Himachal Pradesh.
- In August 2022, Norfund, who manage the Norwegian Climate Investment Fund, and KLP, Norway's biggest pension company, signed an agreement to buy a 49% share of a 420 MW solar power plant in Rajasthan for Rs. 2.8 billion (US$ 35.05 million).

- In August 2022, Tata Power Green Energy Limited (TPGEL), a wholly-owned subsidiary of Tata Power, commissioned a 225MW hybrid power project in Rajasthan.

- In August 2022, NHPC signed a MoU with the Investment Board Nepal (IBN) to develop 750 MW West Seti and 450 MW SR-6 Hydroelectric Projects in Nepal.

- In July 2022, NTPC signed a MoU with MASEN (Moroccan Agency for Sustainable Energy) for cooperation in the renewable energy sector.

- In June 2022, SJVN announced a collaboration with the Assam government for the development of hydro and renewable energy projects in the state.

- In June 2022, SJVN signed investment agreements worth Rs. 80,000 crore (US$ 10.24 billion) with the Uttar Pradesh government for implementing three solar power projects in the state.

- In May 2022, SJVN signed a pact with Tata Power Solar Systems to build a 1,000 MW solar project worth Rs. 5,500 crore (US$ 704.38 million) in Bikaner, Rajasthan.

- In June 2022, NTPC declared commercial operation of second part capacity of 15 MW out of 56 MW Kawas Solar PV project in Gujarat.

- In June 2022, NHPC signed an engineering, procurement, and construction (EPC) contract with Adani Infra Limited to develop a 600 MW solar project under the Central Public Sector Undertaking program (Phase-II).

- Investment in India’s renewable energy sector grew more than 125% YoY to touch a record US$ 14.5 billion in FY22.

- In March 2022, NTPC announced that it was ready to start partial power generation of 10 GW from a 92 MW floating solar energy plant being set up at NTPC's unit at Kayamkulam in Kerala.

- In March 2022, NTPC announced that it will start commercial operations of 74.88 MW capacity of its 296 MW Fatehgarh solar project in Rajasthan.

- In March 2022, Adani Solar and Smart Power India (SPI), a subsidiary of Rockefeller Foundation, signed a non-financial and non-commercial MoU promote the usage of solar rooftop panels in rural India.

- In February 2022, Kolkata-based Eminent Electricity Distribution Ltd., a subsidiary of CESC Limited, bid Rs. 871 crore (US$ 113.24 million) to take over Chandigarh’s power supply department, which was approved and the transition will happen by the end of March.

- SJVN Limited is looking to develop 10,000 MW solar power projects inviting investment of Rs. 50,000 crore (US$ 6.56 billion) in the next five years in Rajasthan.

- In November 2021, NTPC announced that its 80 MW solar power-generation capacity in Jetsar (Rajasthan) has started commercial operations from October 22, 2021. The total capacity of the project is 160 MW.

- In November 2021, SJVN began the second unit work of the 1,320 MW Buxar thermal power plant in Bihar.

GOVERNMENT POLICIES &INTIATIVES

The Government of India has identified the power sector as a key sector of focus to promote sustained industrial growth. Some initiatives by the Government to boost the Indian power sector are as below:

- Under the Union Budget 2022-23, the government announced the issuance of sovereign green bonds, as well as conferring infrastructure status to energy storage systems, including grid-scale battery systems.
- In the Union Budget 2022-23, the government allocated Rs. 19,500 crore (US$ 2.57 billion) for a PLI scheme to boost manufacturing of high-efficiency solar modules.
- As of August 24, 2022, over 36.86 crore LED bulbs, 72.18 lakh LED tube lights and 23.59 lakh energy-efficient fans have been distributed across the country, saving around 48,411 million kWh per year and around Rs. 19,332 crore (US$ 2.47 billion) in cost savings.
- As of November 2022, over 51.62 lakh smart metres have been deployed under the National Smart Grid Mission (NSGM), with a further 61.13 lakh to be deployed.
- Electrification in the country is increasing with support from schemes like Deen Dayal Upadhyay Gram Jyoti Yojana (DDUGJY), Ujwal DISCOM Assurance Yojana (UDAY), and Integrated Power Development Scheme (IPDS).
- In order to meet India's 500 GW renewable energy target and tackle the annual issue of coal demand supply mismatch, the Ministry of Power has identified 81 thermal units which will replace coal with renewable energy generation by 2026.
- In February 2022, a parliamentary standing committee recommended the government to take steps to increase the loan limit for renewable energy sector under priority sector lending. The current limit stands at Rs. 30 crore (U$ 3.93 million).
- In December 2021, West Bengal got a loan approval for US$ 135 million from the International Bank for Reconstruction and Development (also called the World Bank) to improve the operational efficiency and reliability of electricity supply in select regions in the state.
- In November 2021, the government announced future plans to increase the funding under the PLI scheme for domestic solar cells and module manufacturing to RS. 24,000 crore (US$ 3.17 billion) from the existing Rs. 4,500 crore (US$ 594.68 million) to make India an exporting nation.
- In November 2021, Energy Efficiency Services Limited (EESL) stated that it will partner with private sector energy service companies to scale up its Building Energy Efficiency Programme (BEEP).
- In September 2021, the Government of the United Kingdom announced that it will invest US$ 1.2 billion through public and private investments in green projects and renewable energy in India to support the latter's target of 450 GW of renewable energy by 2030.

- The Pradhan Mantri Sahaj Bijli Har Ghar Yojana, “Saubhagya”, was launched by the Government of India with an aim of achieving universal household electrification. As of March 2021, 2.82 crore households have been electrified under this scheme.

- According to the S&P Global Platts Top 250 Global Energy Rankings 2021, Reliance Industries Ltd. and Indian Oil Corp. Ltd. ranked 3rd and 6th, respectively.

ROAD AHEAD

In the current decade (2020-2029), the Indian electricity sector is likely to witness a major transformation with respect to demand growth, energy mix and market operations. India wants to ensure that everyone has reliable access to sufficient electricity at all times, while also accelerating the clean energy transition by lowering its reliance on dirty fossil fuels and moving toward more environmentally friendly, renewable sources of energy. Future investments will benefit from strong demand fundamentals, policy support and increasing government focus on infrastructure.

The Government of India is preparing a 'rent a roof' policy for supporting its target of generating 40 GW of power through solar rooftop projects by 2022. It also plans to set up 21 new nuclear power reactors with a total installed capacity of 15,700 MW by 2031.

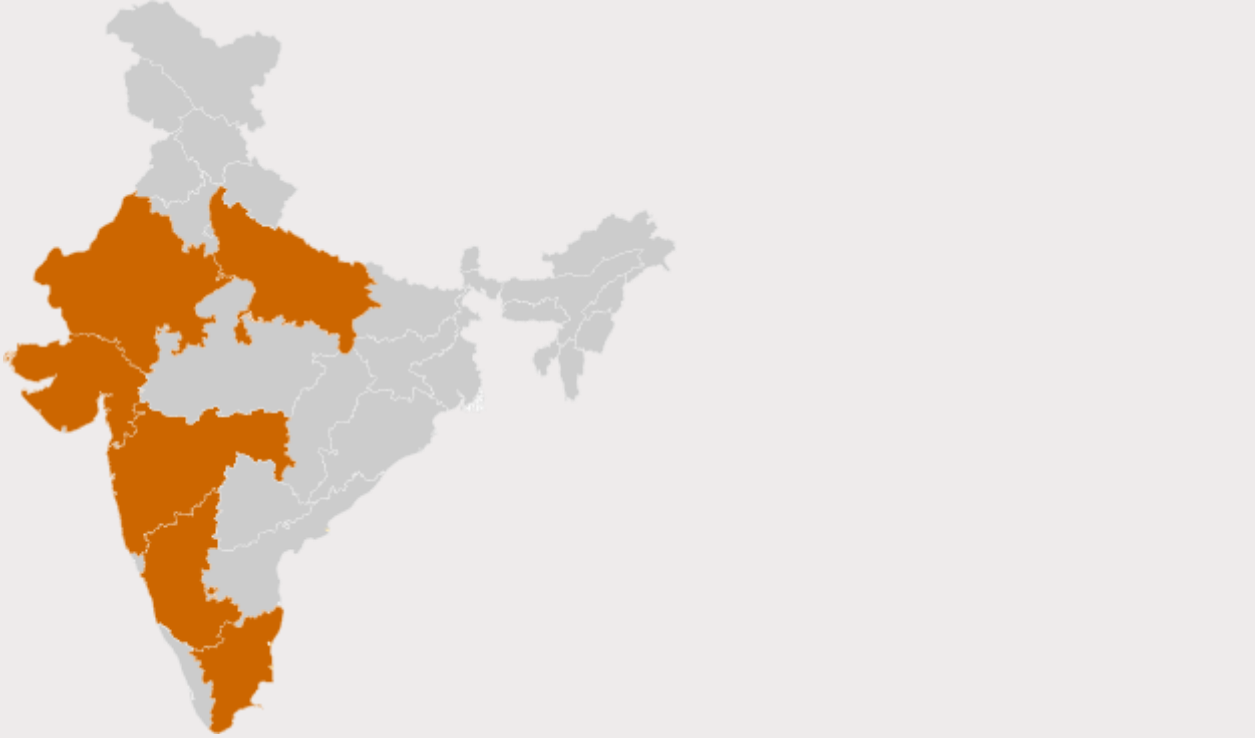
The Central Electricity Authority (CEA) estimates India’s power requirement to grow to reach 817 GW by 2030. Also, by 2029-30, CEA estimates that the share of renewable energy generation would increase from 18% to 44%, while that of thermal energy is expected to reduce from 78% to 52%.

The government plans to establish renewable energy capacity of 500 GW by 2030.

References: *Central Electricity Authority, Ministry of New and Renewable Energy, Media Reports, Press Releases, Press Information Bureau (PIB)*

Top Power Producing States in India

- **Gujarat**
- **Maharashtra**
- **Tamil Nadu**
- **Rajasthan**
- **Karnataka**
- **Uttar Pradesh**



Industry Contacts

- **Ministry of New and Renewable Energy (MNRE)**
- **Indian Wind Energy Association (INWEA)**
- **Indian Electrical & Electronics Manufacturer's Association (IEEMA)**
- **Central Electricity Authority**

Activity 4: Social or Business Impact.

Social Impact: 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, and cooling, and powering essential services such as hospitals and schools.

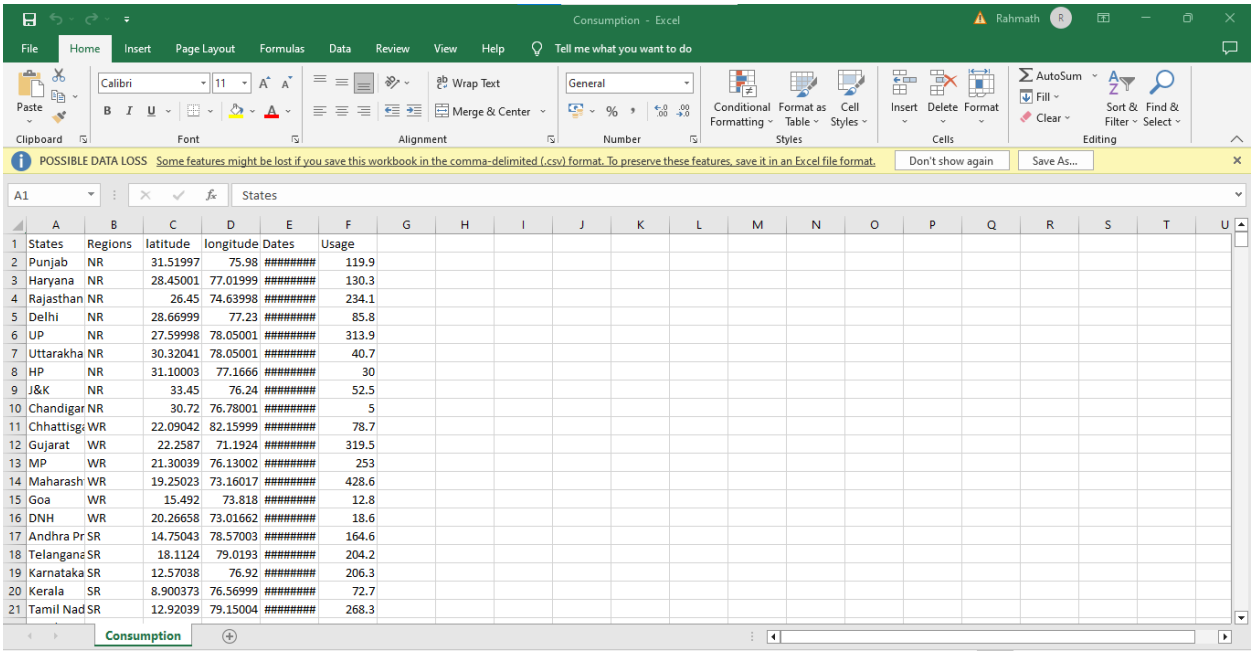
Business Model/Impact: By understanding consumption patterns and trends, the analysis can help businesses identify market opportunities and develop strategies to meet the growing demand for electricity in India.

Milestone 2: Data Collection & Extraction from Database:

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, and evaluate outcomes and generate insights from the data.

Activity 1: Collect the dataset:

The data is collected from the given datasheet in the project manual.



Consumption - Excel

	A	B	C	D	E	F
1	States	Regions	latitude	longitude	Dates	Usage
2	Punjab	NR	31.51997	75.98	########	119.9
3	Haryana	NR	28.45001	77.01999	########	130.3
4	Rajasthan	NR	26.45	74.63998	########	234.1
5	Delhi	NR	28.66999	77.23	########	85.8
6	UP	NR	27.59998	78.05001	########	313.9
7	Uttarakha	NR	30.32041	78.05001	########	40.7
8	HP	NR	31.10003	77.1666	########	30
9	J&K	NR	33.45	76.24	########	52.5
10	Chandigar	NR	30.72	76.78001	########	5
11	Chhattisg	WR	22.09042	82.15999	########	78.7
12	Gujarat	WR	22.2587	71.1924	########	319.5
13	MP	WR	21.30039	76.13002	########	253
14	Maharash	WR	19.25023	73.16017	########	428.6
15	Goa	WR	15.492	73.818	########	12.8
16	DNH	WR	20.26658	73.01662	########	18.6
17	Andhra Pr	SR	14.75043	78.57003	########	164.6
18	Telangana	SR	18.1124	79.0193	########	204.2
19	Karnataka	SR	12.57038	76.92	########	206.3
20	Kerala	SR	8.900373	76.56999	########	72.7
21	Tamil Nad	SR	12.92039	79.15004	########	268.3

Activity 1.1: Understand the data:

In Dataset Consumption.csv data is in the form of a time series for a period of 24 months beginning from 2nd Jan 2019 till 5th December 2020. Columns contains States, Regions, Latitude, Longitude, Dates and Usage. The dataset has been scraped from the weekly energy reports of POSOC.

Fields Include,

States - Indian States

Regions- States in Regions on Indian Map

Latitude - States in Regions on Indian Map

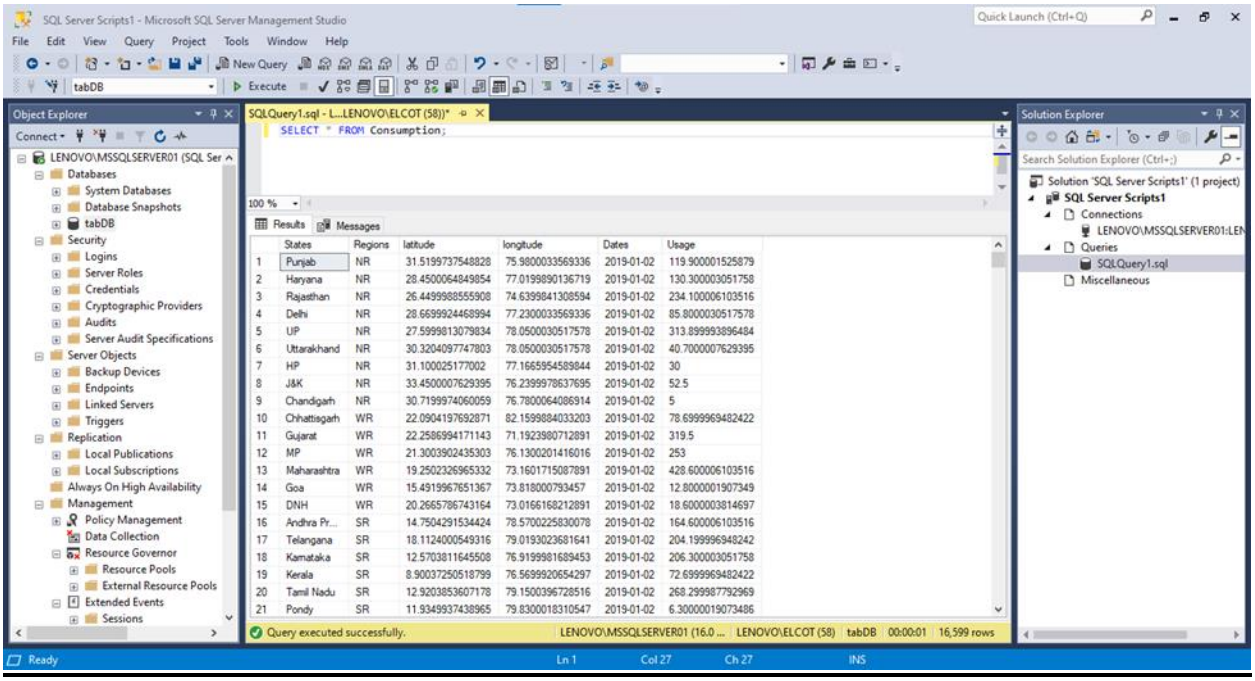
Longitude - Geographical Coordinates of States

Dates - Dates of Usage

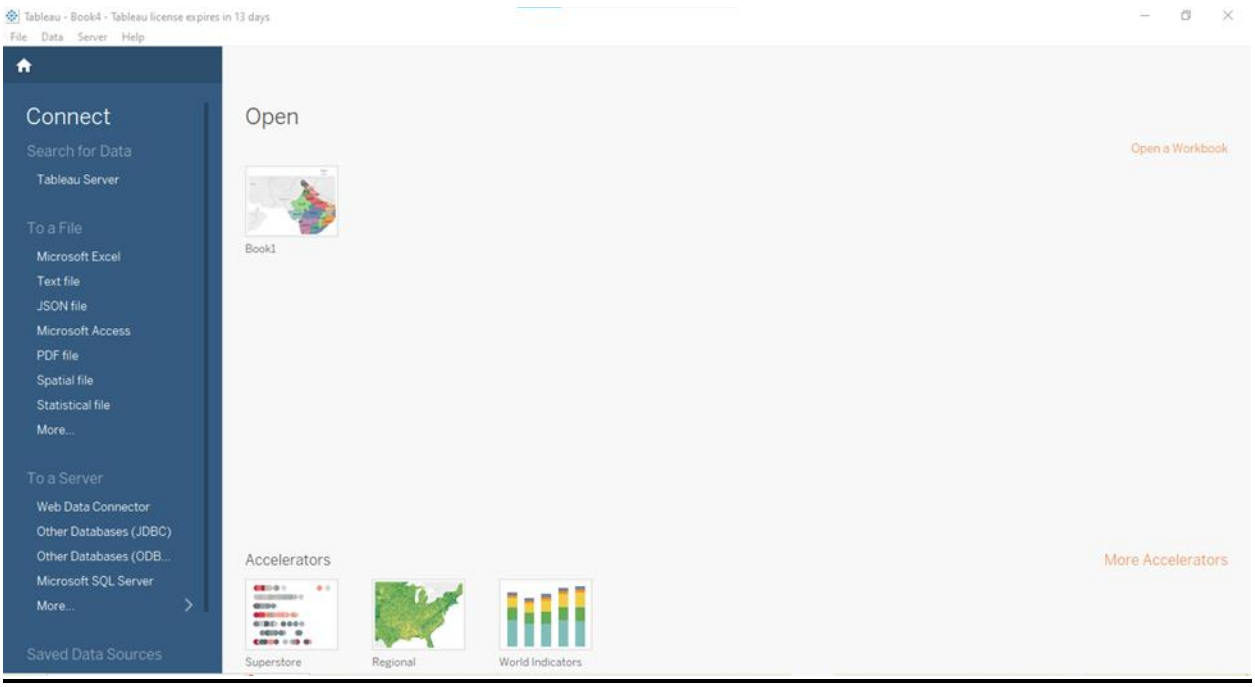
Usage - Power consumed in Mega Units (MU)

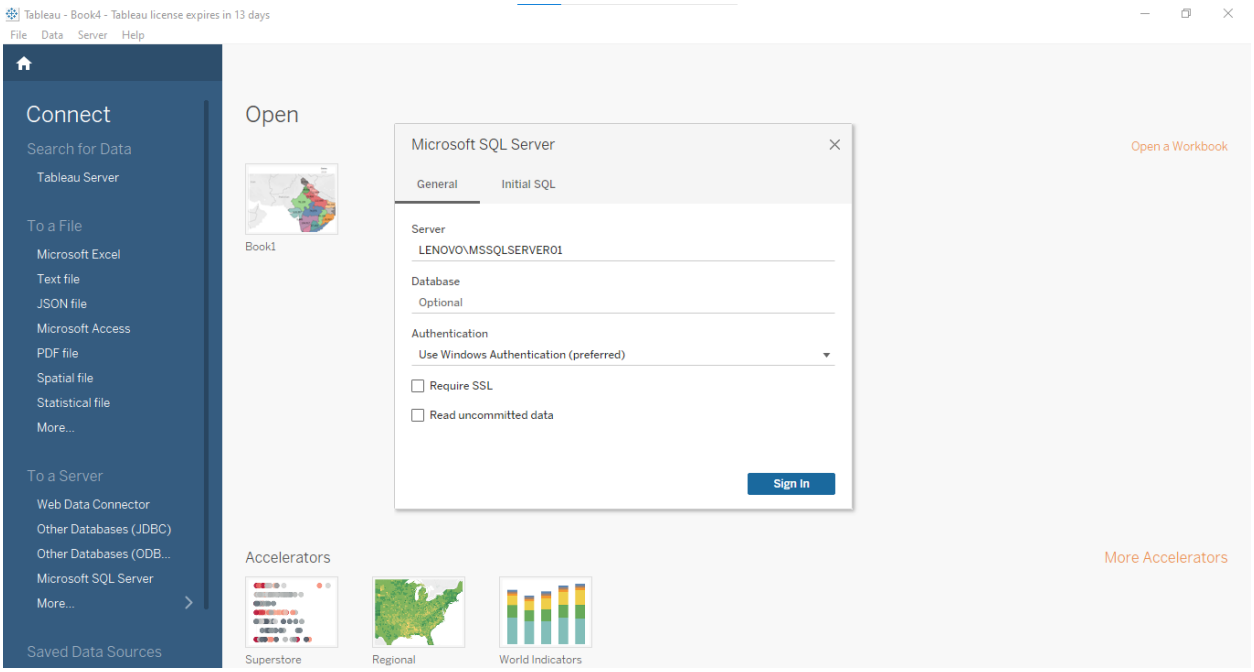
Activity 2: Storing Data in DB & Connect DB with Tableau:

The database is stored and connected in Tableau.



	States	Regions	latitude	longitude	Dates	Usage
1	Punjab	NR	31.5199737548828	75.9800033569336	2019-01-02	119.900001525879
2	Haryana	NR	28.4500064849854	77.0199890136719	2019-01-02	130.300003051758
3	Rajasthan	NR	26.4499988555908	74.6399841308594	2019-01-02	234.100006103516
4	Delhi	NR	28.6699924468994	77.2300033569336	2019-01-02	85.8000030517578
5	UP	NR	27.5999813079834	78.0500030517578	2019-01-02	313.899993896484
6	Uttarakhand	NR	30.3204097747803	78.0500030517578	2019-01-02	40.7000007629395
7	HP	NR	31.100025177002	77.1665954589844	2019-01-02	30
8	J&K	NR	33.4500007629395	76.2399978637695	2019-01-02	52.5
9	Chandigarh	NR	30.7199974060059	76.7800064086914	2019-01-02	5
10	Chhattisgarh	WR	22.0904197692871	82.1599884033203	2019-01-02	78.6999969482422
11	Gujarat	WR	22.2586994171143	71.1923980712891	2019-01-02	319.5
12	MP	WR	21.3003902435303	76.1300201416016	2019-01-02	253
13	Maharashtra	WR	19.2502326965332	73.1601715087891	2019-01-02	428.600006103516
14	Goa	WR	15.4919967651367	73.818000793457	2019-01-02	12.8000001907349
15	DNH	WR	20.2665786743164	73.0166168212891	2019-01-02	18.6000003814697
16	Andhra Pr...	SR	14.7504291534424	78.5700225830078	2019-01-02	164.600006103516
17	Telangana	SR	18.1124000549316	79.0193023681641	2019-01-02	204.199996948242
18	Karnataka	SR	12.5703811645508	76.9199981689453	2019-01-02	206.300003051758
19	Kerala	SR	8.90037250518799	76.5699920654297	2019-01-02	72.6999969482422
20	Tamil Nadu	SR	12.9203853607178	79.1500396728516	2019-01-02	268.299987792969
21	Pondy	SR	11.9349937438965	79.8300018310547	2019-01-02	6.30000019073486

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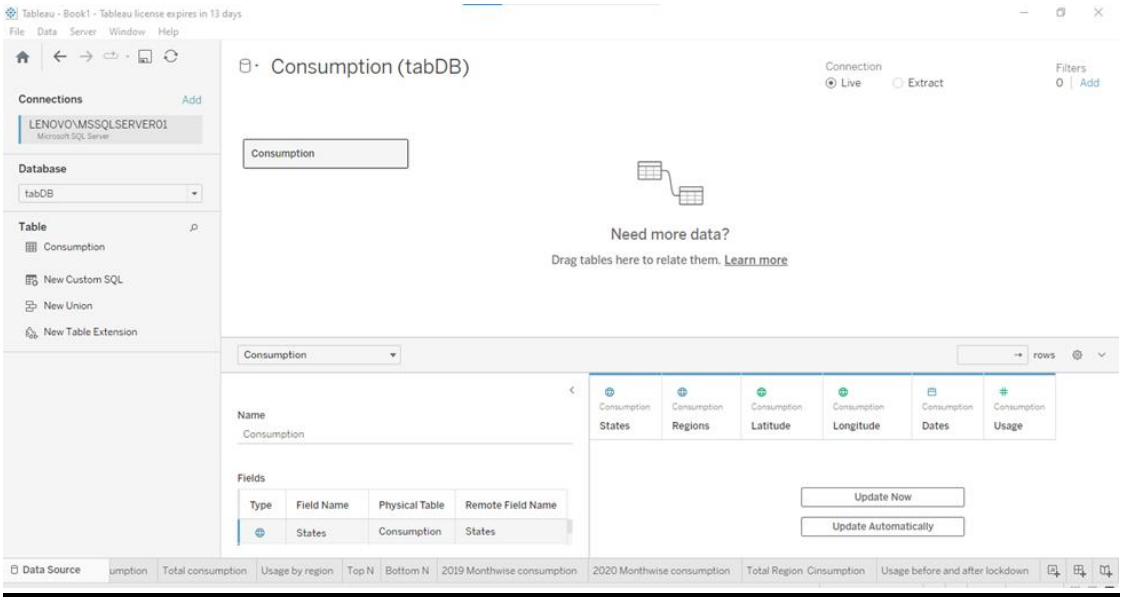
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Total consumption
Usage by region
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2020 Monthwise consumption
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Usage before and after lockdown

Milestone 3: Data Preparation:

Activity 1: Prepare the Data for Visualization:

Preparing the data for visualization involves cleaning the data to remove irrelevant or missing data, transforming the data into a format that can be easily visualized, exploring the data to identify patterns and trends, filtering the data to focus on specific subsets of data, preparing the data for visualization software, and ensuring the data is accurate and complete. This process helps to make the data easily understandable and ready for creating visualizations to gain insights into the performance and efficiency.

This data is preprocessed initially. Lets proceed for visualization.

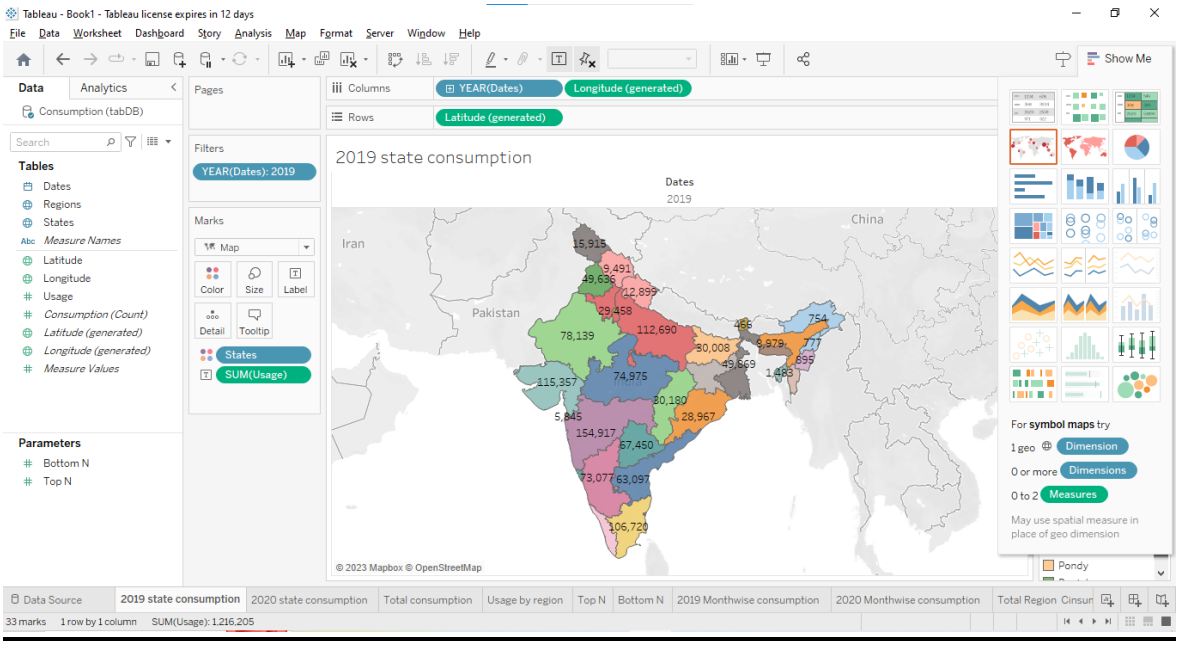
Milestone 4: Data Visualization:

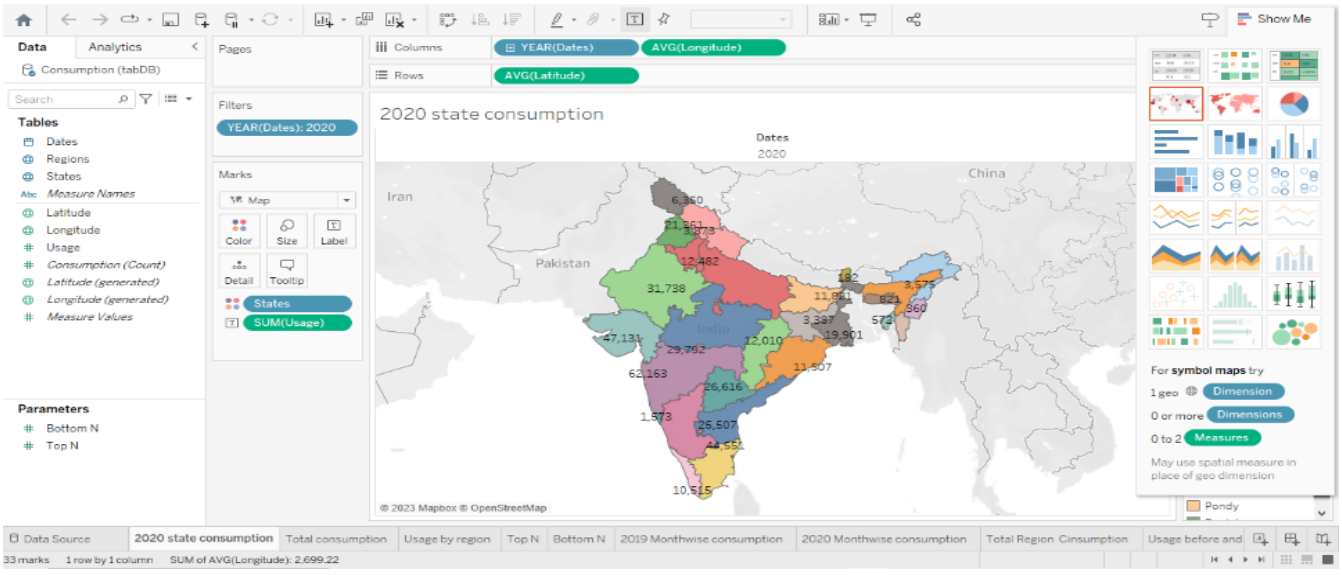
Data visualization is the process of creating graphical representations of data in order to help people understand and explore the information. The goal of data visualization is to make complex data sets more accessible, intuitive, and easier to interpret. By using visual elements such as charts, graphs, and maps, data visualizations can help people quickly identify patterns, trends, and outliers in the data.

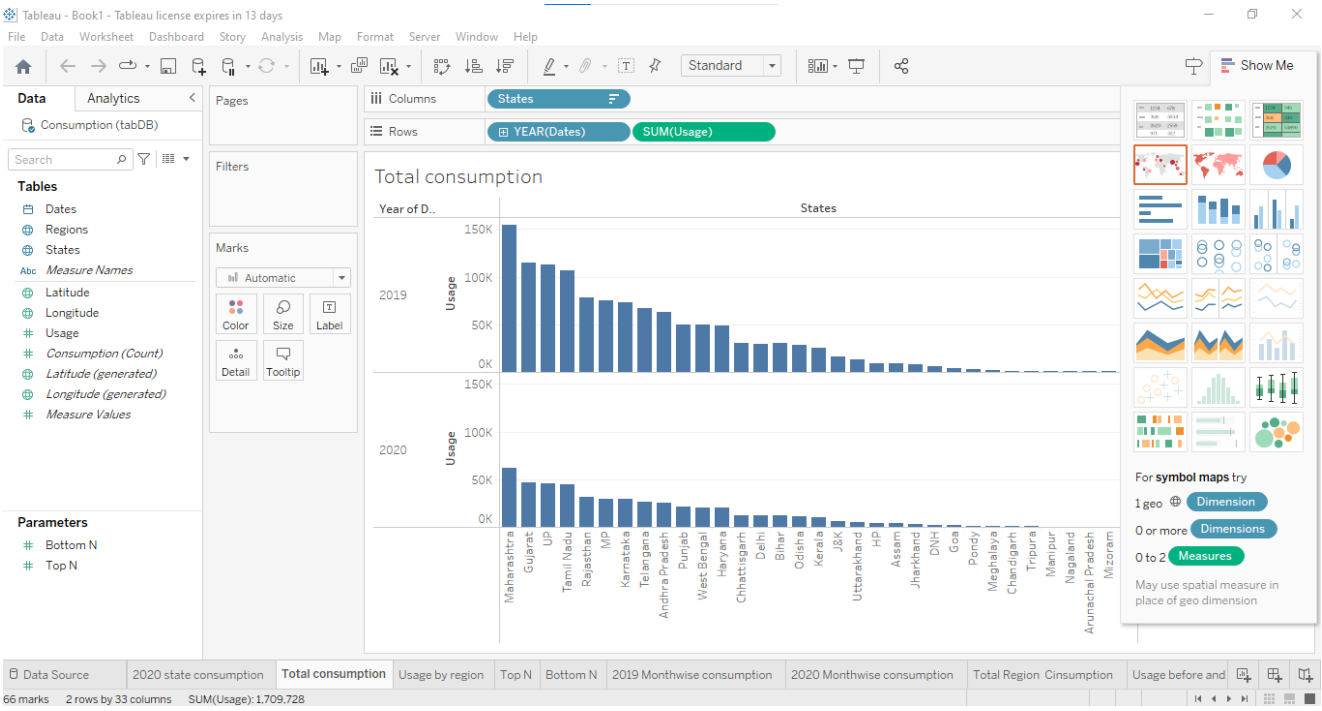
Activity 1: No of Unique Visualizations:

The number of unique visualizations that can be created with a given dataset. Some common types of visualizations that can be used to analyze the performance and efficiency of Radisson Hotels include bar charts, line charts, heat maps, scatter plots, pie charts, Maps etc. These visualizations can be used to compare performance, track changes over time, show distribution, and relationships between variables, breakdown of revenue and customer demographics, workload, resource allocation and location of hotels.

Activity 1.1: To Understand-2019 and 2020 Consumption, Total Consumption, Usage by Region, Top N and Bottom N States:



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Andhra Pradesh
Punjab
West Bengal
Haryana
Chhattisgarh
Delhi
Bihar
Odisha
Kerala
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Tripura
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Arunachal Pradesh
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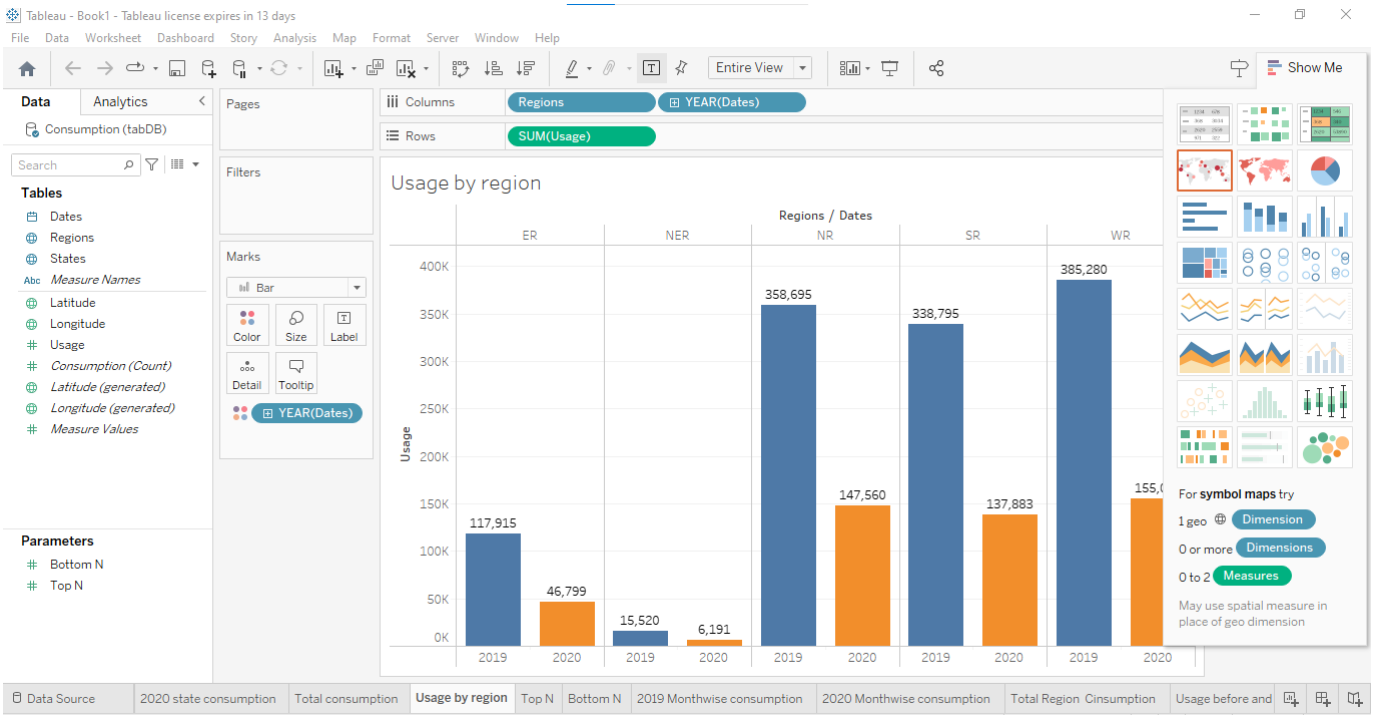
SUM(Usage): 1,709,728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For symbol maps try
1 geo Dimension
0 or more Dimensions
0 to 2 Measures
May use spatial measure in place of geo dimension
Data Source
2020 state consumption
Total consumption
Usage by region
Top N
Bottom N
2019 Monthwise consumption
2020 Monthwise consumption
Total Region Cinsumption
Usage before and

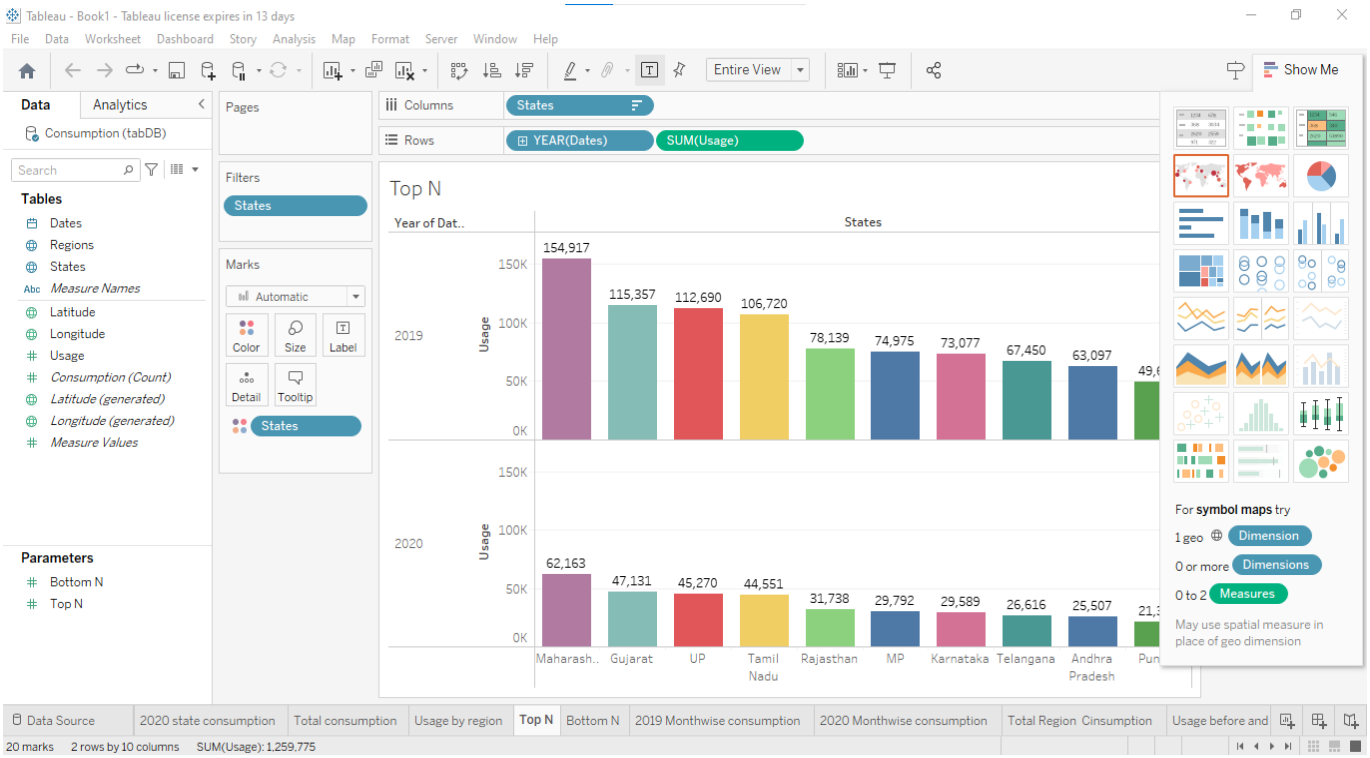
Tableau - Book1 - Tableau license expires in 13 days
File Data Worksheet Dashboard Story Analysis Map Format Server Window Help
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Longitude
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Longitude (generated)
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Detail
Tooltip
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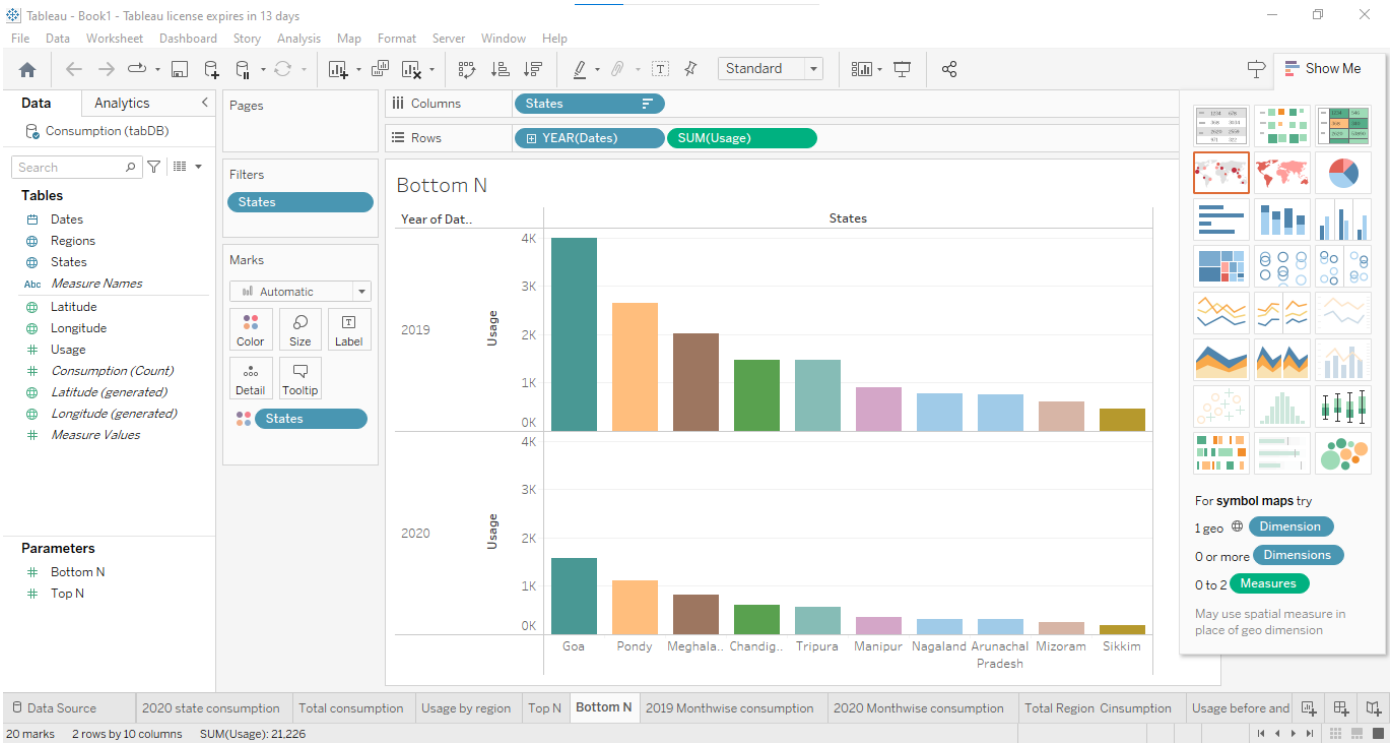
Columns
States
Rows
YEAR(Dates)
SUM(Usage)
Top N
Year of Dat..
States
2019
2020
Usage
150K
100K
50K
0K
154,917
115,357
112,690
106,720
78,139
74,975
73,077
67,450
63,097
62,163
47,131
45,270
44,551
31,738
29,792
29,589
26,616
25,507
Maharash..
Gujarat
UP
Tamil Nadu
Rajasthan
MP
Karnataka
Telangana
Andhra Pradesh
For symbol maps try
1 geo
Dimension
0 or more
Dimensions
0 to 2
Measures
May use spatial measure in place of geo dimension
Data Source
2020 state consumption
Total consumption
Usage by region
Top N
Bottom N
2019 Monthwise consumption
2020 Monthwise consumption
Total Region Cinsumption
Usage before and
20 marks
2 rows by 10 columns
SUM(Usage): 1,259,775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Marks
Automatic
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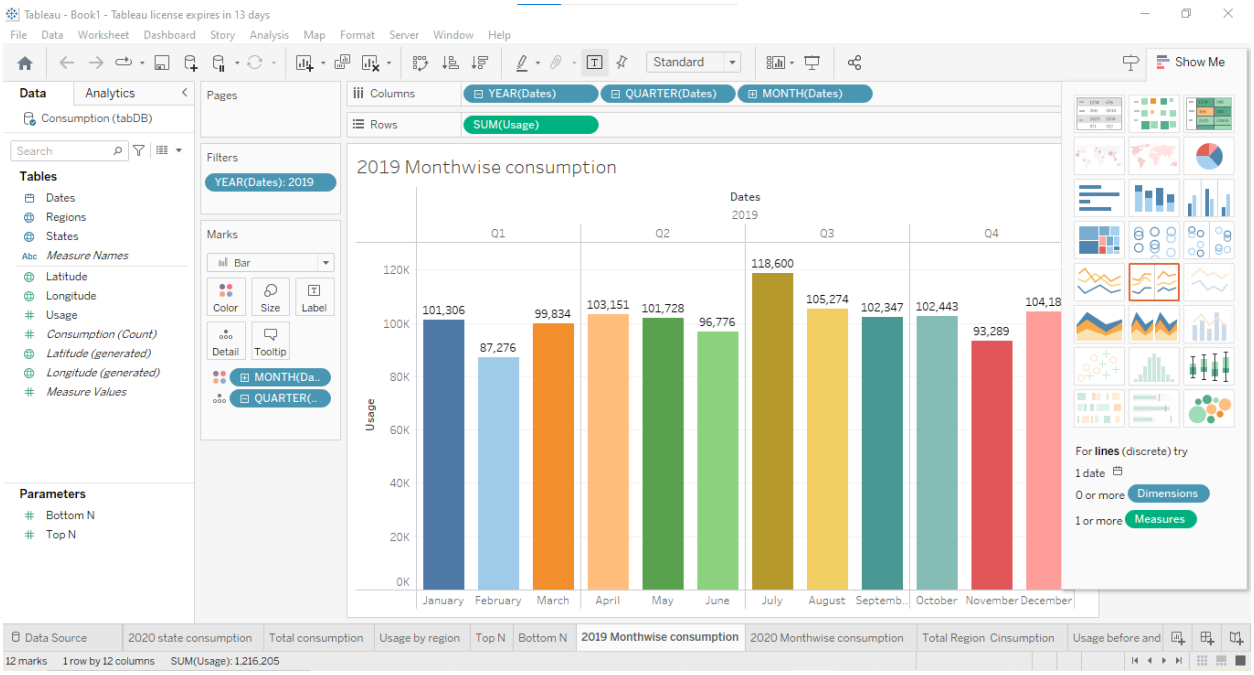
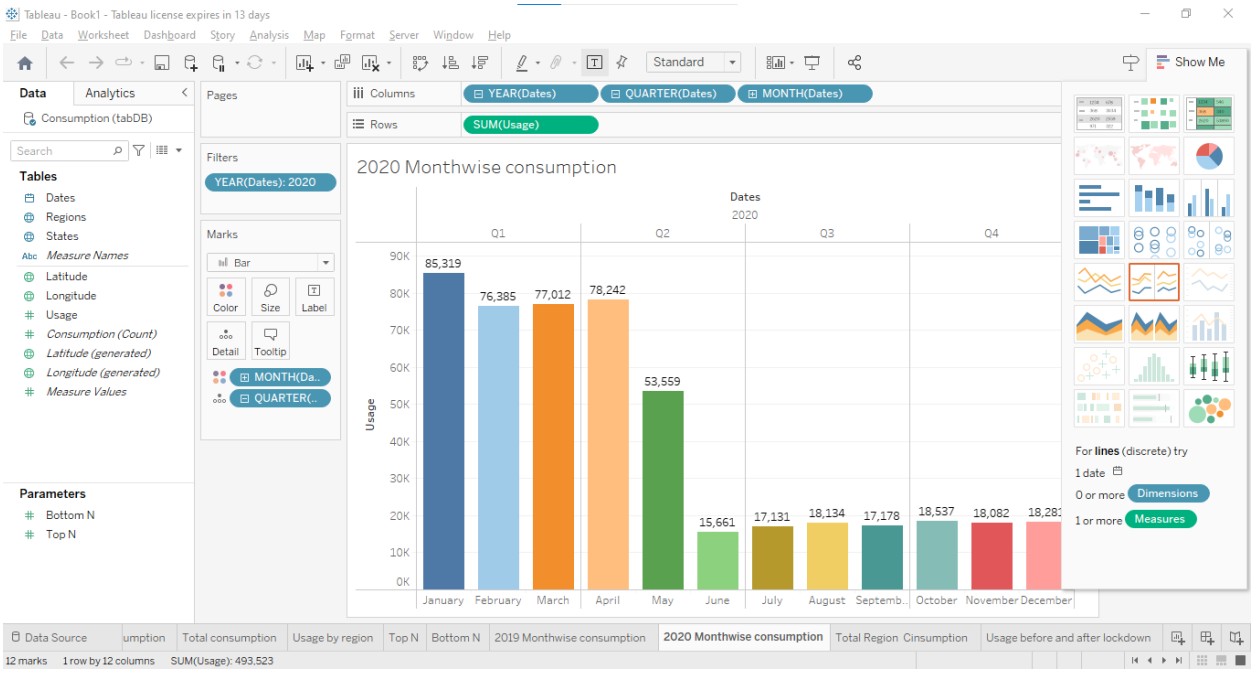
Size
Label
Detail
Tooltip
States
Columns
States
Rows
YEAR(Dates)
SUM(Usage)
Bottom N
Year of Dat..
States
2019
2020
Usage
4K
3K
2K
1K
0K
Goa
Pondy
Meghala..
Chandig..
Tripura
Manipur
Nagaland
Arunachal Pradesh
Mizoram
Sikkim
For symbol maps try
1 geo
Dimension
0 or more
Dimensions
0 to 2
Measures
May use spatial measure in place of geo dimension
Data Source
2020 state consumption
Total consumption
Usage by region
Top N
Bottom N
2019 Monthwise consumption
2020 Monthwise consumption
Total Region Cinsumption
Usage before and
20 marks
2 rows by 10 columns
SUM(Usage): 21,226

Activity 1.2: To Understand-2019 and 2020 Month wise Consumption, Total Consumption by region, Usage Before and After Lockdown:





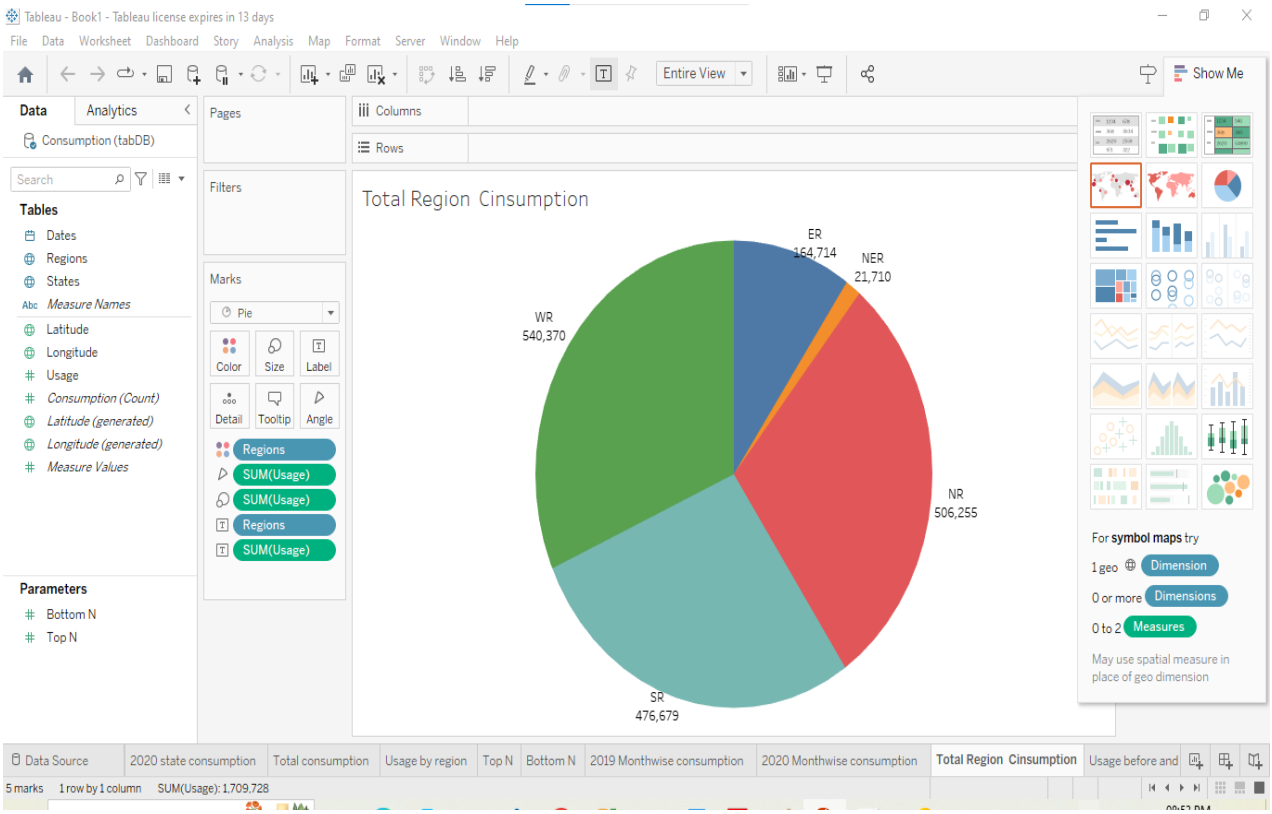


Tableau - Book1 - Tableau license expires in 13 days
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Measure Names
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Longitude
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Consumption (Count)
Latitude (generated)
Longitude (generated)
Measure Values
Parameters
Bottom N
Top N
Pages
Filters
Marks
Pie
Color
Size
Label
Detail
Tooltip
Angle
Regions
SUM(Usage)
SUM(Usage)
Regions
SUM(Usage)
Columns
Rows
Total Region Cinsumption
ER
154,714
NER
21,710
WR
540,370
NR
506,255
SR
476,679
For symbol maps try
1 geo
Dimension
0 or more
Dimensions
0 to 2
Measures
May use spatial measure in place of geo dimension
Data Source
2020 state consumption
Total consumption
Usage by region
Top N
Bottom N
2019 Monthwise consumption
2020 Monthwise consumption
Total Region Cinsumption
Usage before and
5 marks
1 row by 1 column
SUM(Usage): 1,709,728

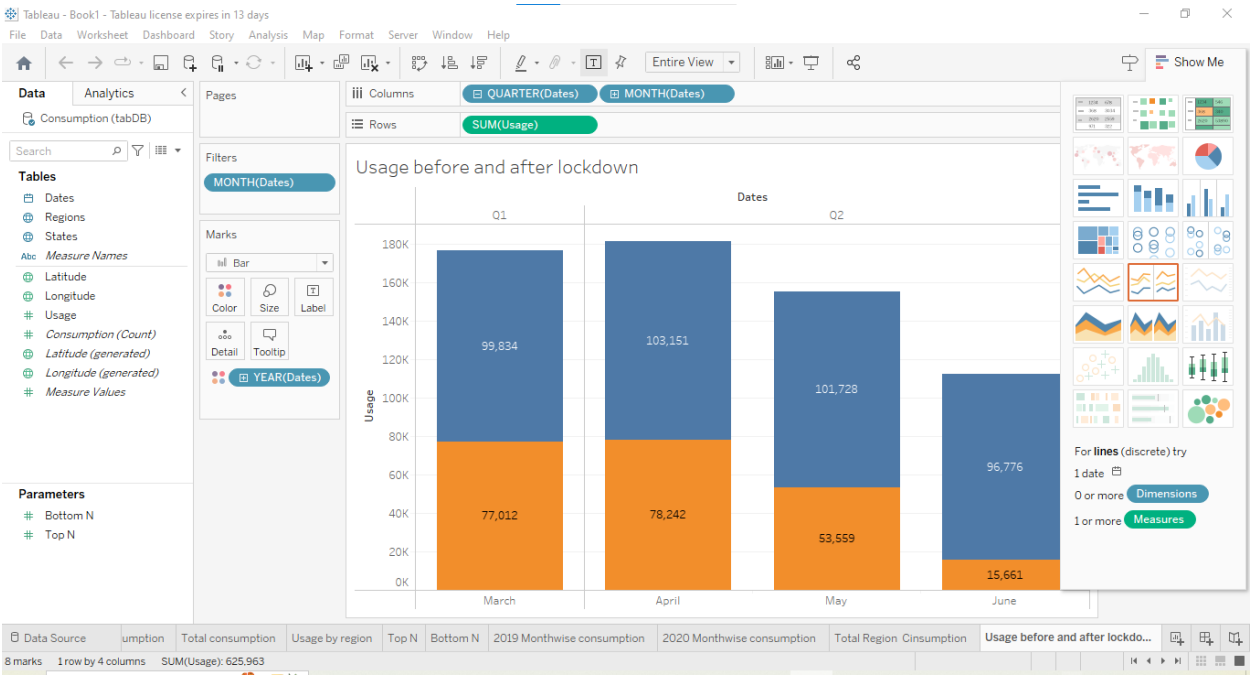
Tableau - Book1 - Tableau license expires in 13 days
File Data Worksheet Dashboard Story Analysis Map Format Server Window Help
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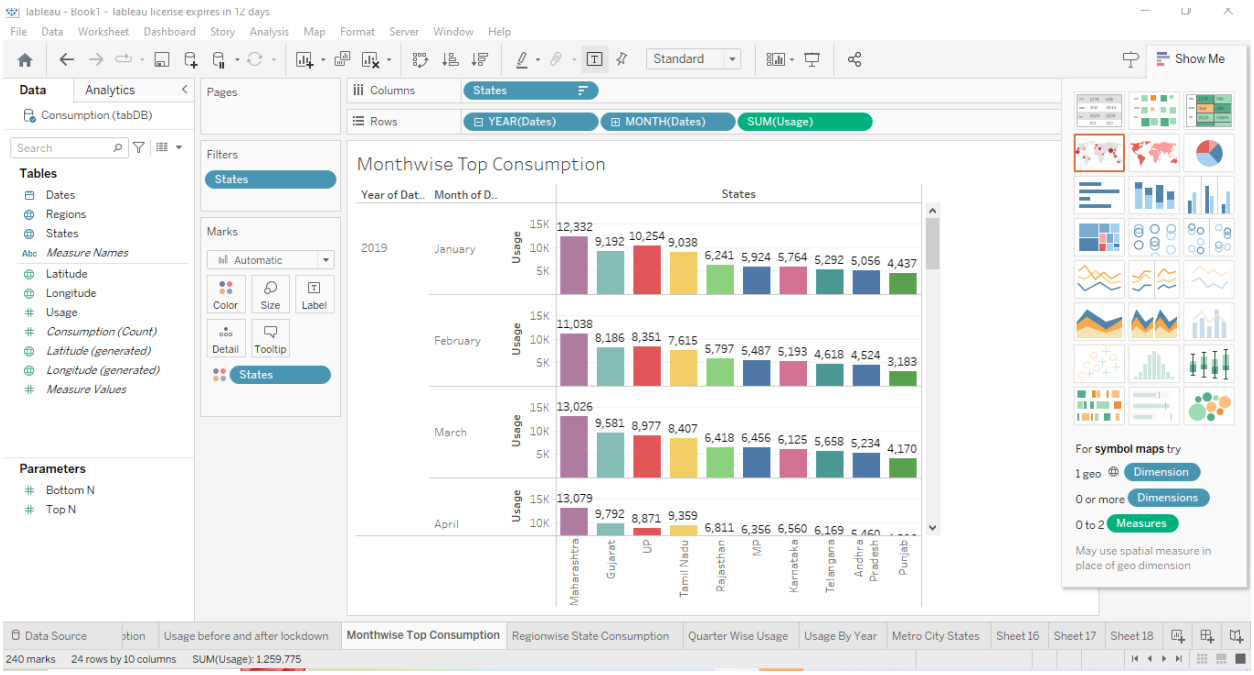
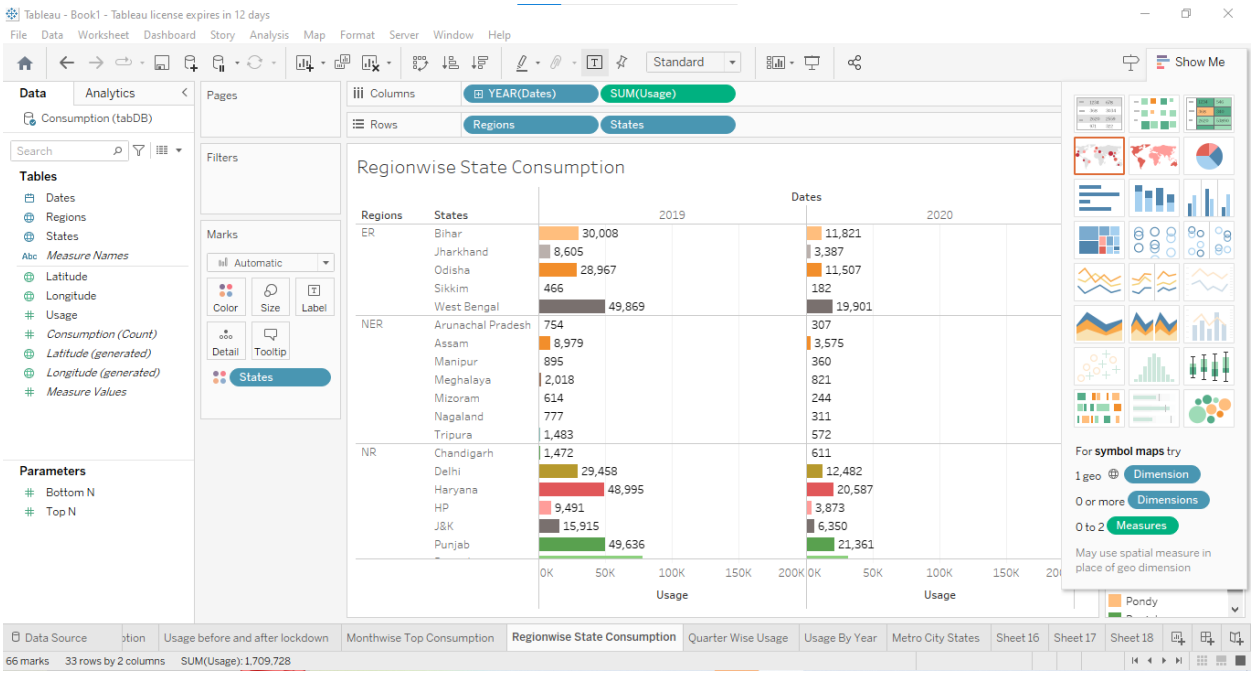
Regions
States
Measure Names
Latitude
Longitude
Usage
Consumption (Count)
Latitude (generated)
Longitude (generated)
Measure Values
Parameters
Bottom N
Top N
Pages
Filters
MONTH(Dates)
Marks
Bar
Color
Size
Label
Detail
Tooltip
YEAR(Dates)
Columns
QUARTER(Dates)
MONTH(Dates)
Rows
SUM(Usage)
Usage before and after lockdown
Dates
Q1
Q2
Usage
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
April
May
June
For lines (discrete) try
1 date
0 or more
Dimensions
1 or more
Measures
Data Source
Total consumption
Usage by region
Top N
Bottom N
2019 Monthwise consumption
2020 Monthwise consumption
Total Region Cinsumption
Usage before and after lockdo...
8 marks
1 row by 4 columns
SUM(Usage): 625,963

Activity 1.3: To understand Region wise State Usage Quarter Usage and Usage by Year:





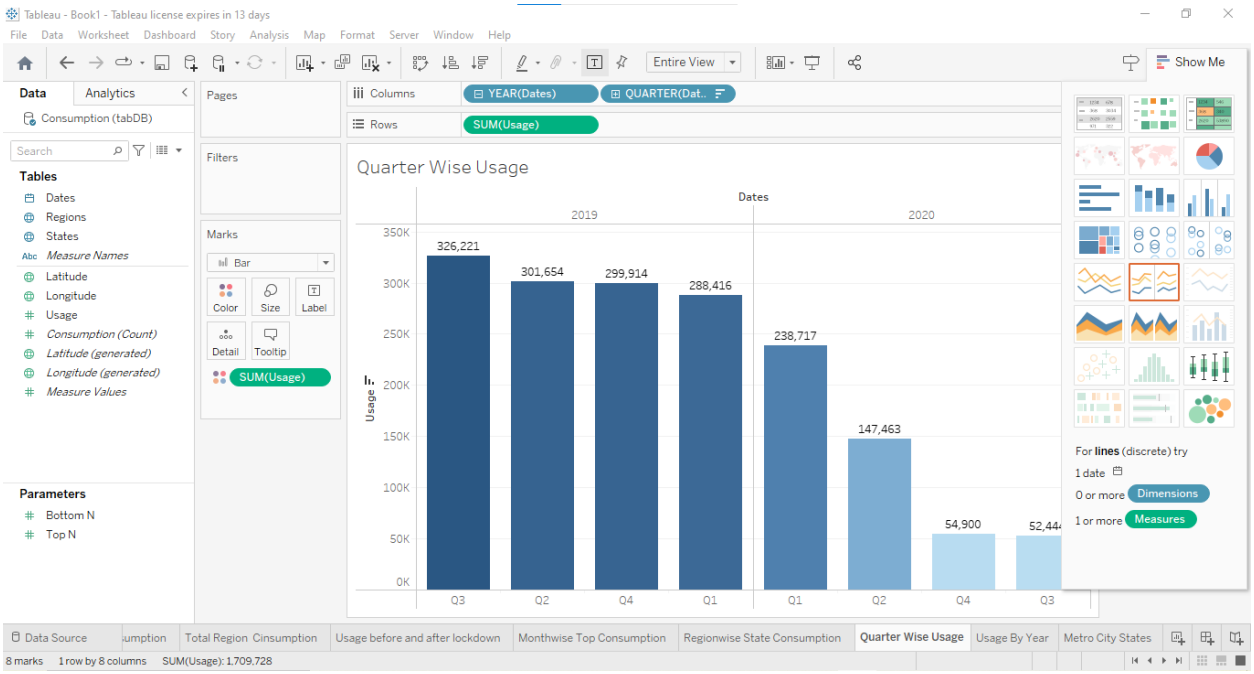


Tableau - Book1 - Tableau license expires in 13 days
File Data Worksheet Dashboard Story Analysis Map Format Server Window Help
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Analytics
Consumption (tabDB)
Search
Tables
Dates
Regions
States
Measure Names
Latitude
Longitude
Usage
Consumption (Count)
Latitude (generated)
Longitude (generated)
Measure Values
Parameters
Bottom N
Top N
Pages
Filters
Marks
Bar
Color
Size
Label
Detail
Tooltip
SUM(Usage)
Columns
YEAR(Dates)
QUARTER(Dat..
Rows
SUM(Usage)
Quarter Wise Usage
Dates
2019
2020
Usage
350K
300K
250K
200K
150K
100K
50K
0K
326,221
301,654
299,914
288,416
238,717
147,463
54,900
52,444
Q3
Q2
Q4
Q1
Q1
Q2
Q4
Q3
For lines (discrete) try
1 date
0 or more Dimensions
1 or more Measures
Data Source
Total Region Cinsumption
Usage before and after lockdown
Monthwise Top Consumption
Regionwise State Consumption
Quarter Wise Usage
Usage By Year
Metro City States
8 marks
1 row by 8 columns
SUM(Usage): 1,709,728

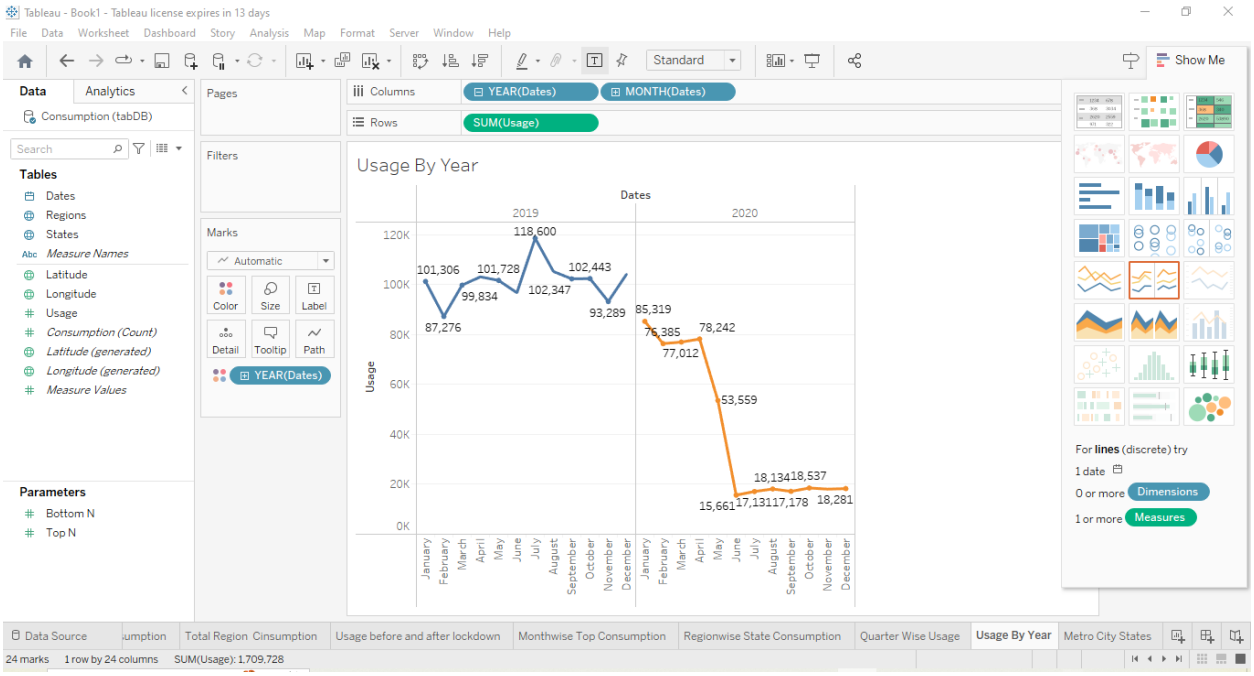
Tableau - Book1 - Tableau license expires in 13 days
File Data Worksheet Dashboard Story Analysis Map Format Server Window Help
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Regions
States
Measure Names
Latitude
Longitude
Usage
Consumption (Count)
Latitude (generated)
Longitude (generated)
Measure Values
Parameters
Bottom N
Top N
Pages
Filters
Marks
Automatic
Color
Size
Label
Detail
Tooltip
Path
YEAR(Dates)
Columns
YEAR(Dates)
MONTH(Dates)
Rows
SUM(Usage)
Usage By Year
Dates
2019
2020
Usage
120K
100K
80K
60K
40K
20K
0K
101,306
87,276
99,834
101,728
118,600
102,347
102,443
93,289
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
For lines (discrete) try
1 date
0 or more Dimensions
1 or more Measures
Data Source
Total Region Cinsumption
Usage before and after lockdown
Monthwise Top Consumption
Regionwise State Consumption
Quarter Wise Usage
Usage By Year
Metro City States
24 marks
1 row by 24 columns
SUM(Usage): 1,709,728

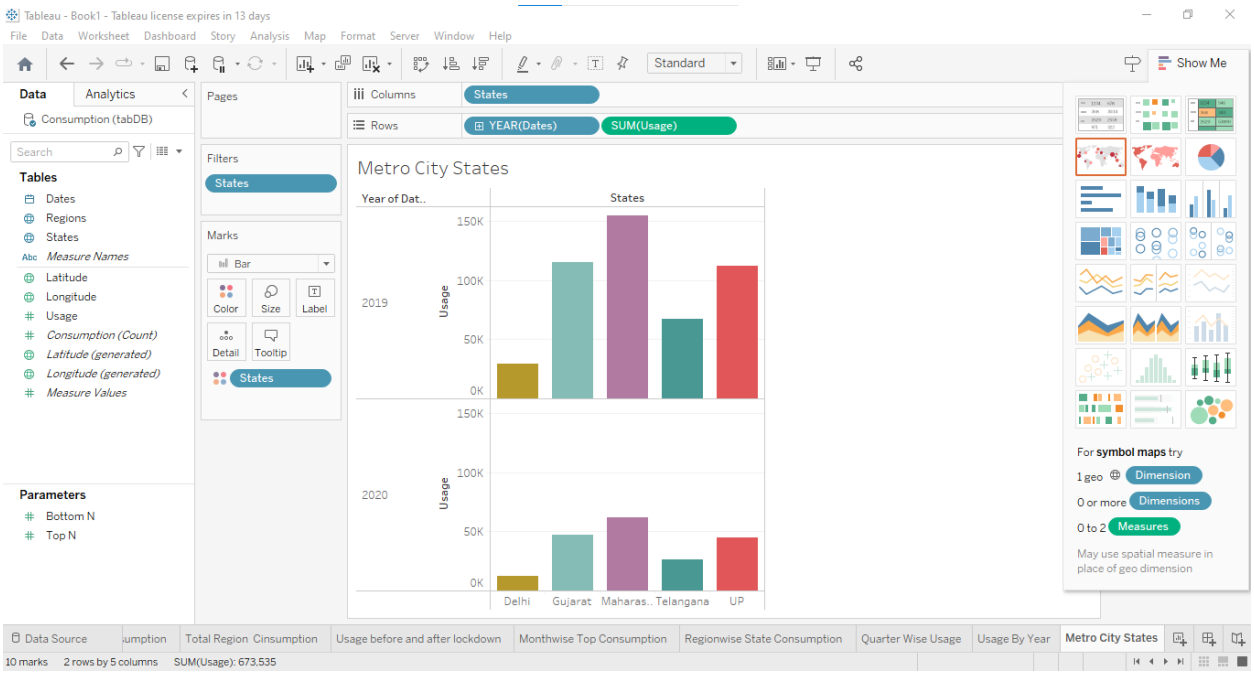
Tableau - Book1 - Tableau license expires in 13 days
File Data Worksheet Dashboard Story Analysis Map Format Server Window Help
Standard
Show Me
Data
Analytics
Consumption (tabDB)
Search
Tables
Dates
Regions
States
Measure Names
Latitude
Longitude
Usage
Consumption (Count)
Latitude (generated)
Longitude (generated)
Measure Values
Parameters
Bottom N
Top N
Pages
Filters
States
Marks
Bar
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
Delhi
Gujarat
Maharas..
Telangana
UP
For symbol maps try
1 geo
Dimension
0 or more
Dimensions
0 to 2
Measures
May use spatial measure in place of geo dimension
Data Source
Total Region Cinsumption
Usage before and after lockdown
Monthwise Top Consumption
Regionwise State Consumption
Quarter Wise Usage
Usage By Year
Metro City States
10 marks
2 rows by 5 columns
SUM(Usage): 673,535

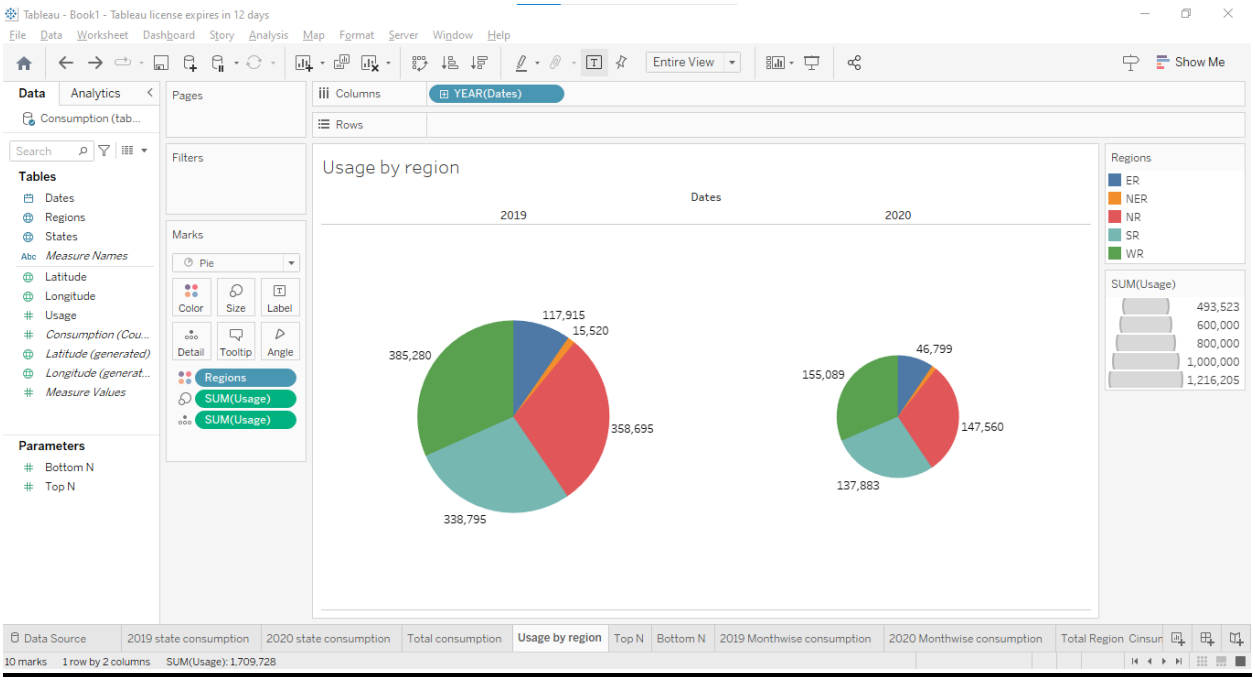
Tableau - Book1 - Tableau license expires in 12 days
File Data Worksheet Dashboard Story Analysis Map Format Server Window Help
Entire View
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Analytics
Consumption (tab...
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Tables
Dates
Regions
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Measure Names
Latitude
Longitude
Usage
Consumption (Cou...
Latitude (generated)
Longitude (generat...
Measure Values
Parameters
Bottom N
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Pages
Filters
Marks
Pie
Color
Size
Label
Detail
Tooltip
Angle
Regions
SUM(Usage)
SUM(Usage)
Columns
YEAR(Dates)
Rows
Usage by region
Dates
2019
2020
117,915
15,520
385,280
358,695
338,795
46,799
155,089
147,560
137,883
Regions
ER
NER
NR
SR
WR
SUM(Usage)
493,523
600,000
800,000
1,000,000
1,216,205
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 Cinsur
10 marks
1 row by 2 columns
SUM(Usage): 1,709,728

Milestone 5: Dashboard:

A dashboard is a graphical user interface (GUI) that displays information and data in an organized easy-to-read format. Dashboards are often used to provide real-time monitoring and analysis of data, and are typically designed for a specific purpose or use case. Dashboards can be used in a variety of settings, such as business, finance, manufacturing, healthcare, and many other industries. They can be used to track key performance indicators (KPIs), monitor performance metrics, and display data in the form of charts, graphs, and tables.

Activity :1- Responsive and Design of Dashboard:

The responsiveness and design of a dashboard for analyzing the performance and efficiency of Radisson Hotels is crucial to ensure that the information is easily understandable and actionable. Key considerations for designing a responsive and effective dashboard include user-centered design, clear and concise information, interactivity, data-driven approach, accessibility, customization, and security. The goal is to create a dashboard that is user-friendly, interactive, and data-driven, providing actionable insights to improve the performance and efficiency of Radisson Hotels.

Once you have created views on different sheets in Tableau, you can pull them into a dashboard.dashboard.

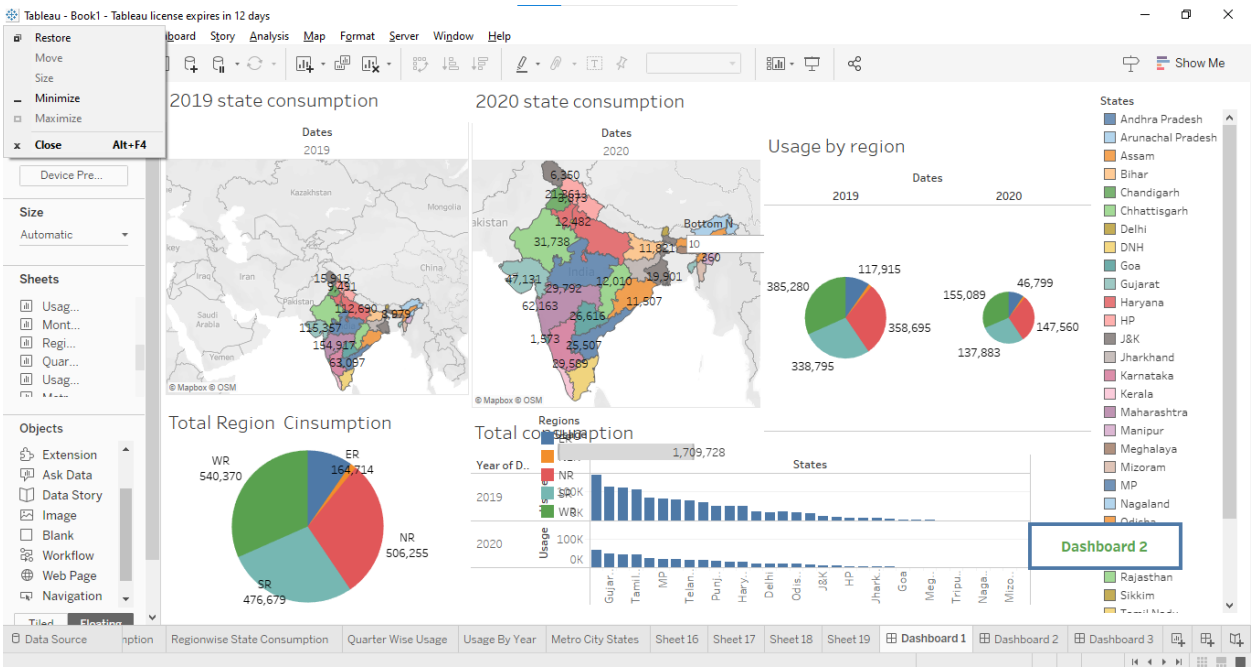


Tableau - Book1 - Tableau license expires in 12 days
Restore
Move
Size
Minimize
Maximize
Close Alt+F4
Show Me
2019 state consumption
2020 state consumption
Dates
2019
2020
Usage by region
States
Andhra Pradesh
Arunachal Pradesh
Assam
Bihar
Chandigarh
Chhattisgarh
Delhi
DNH
Goa
Gujarat
Haryana
HP
J&K
Jharkhand
Karnataka
Kerala
Maharashtra
Manipur
Meghalaya
Mizoram
MP
Nagaland
Rajasthan
Sikkim
Total Region Cinsumption
WR 540,370
ER 164,714
NR 506,255
SR 476,679
Total consumption
Regions
Year of D..
Usage
States
1,709,728
Dashboard 2
Data Source
Regionwise State Consumption
Quarter Wise Usage
Usage By Year
Metro City States
Sheet 16
Sheet 17
Sheet 18
Sheet 19
Dashboard 1
Dashboard 2
Dashboard 3

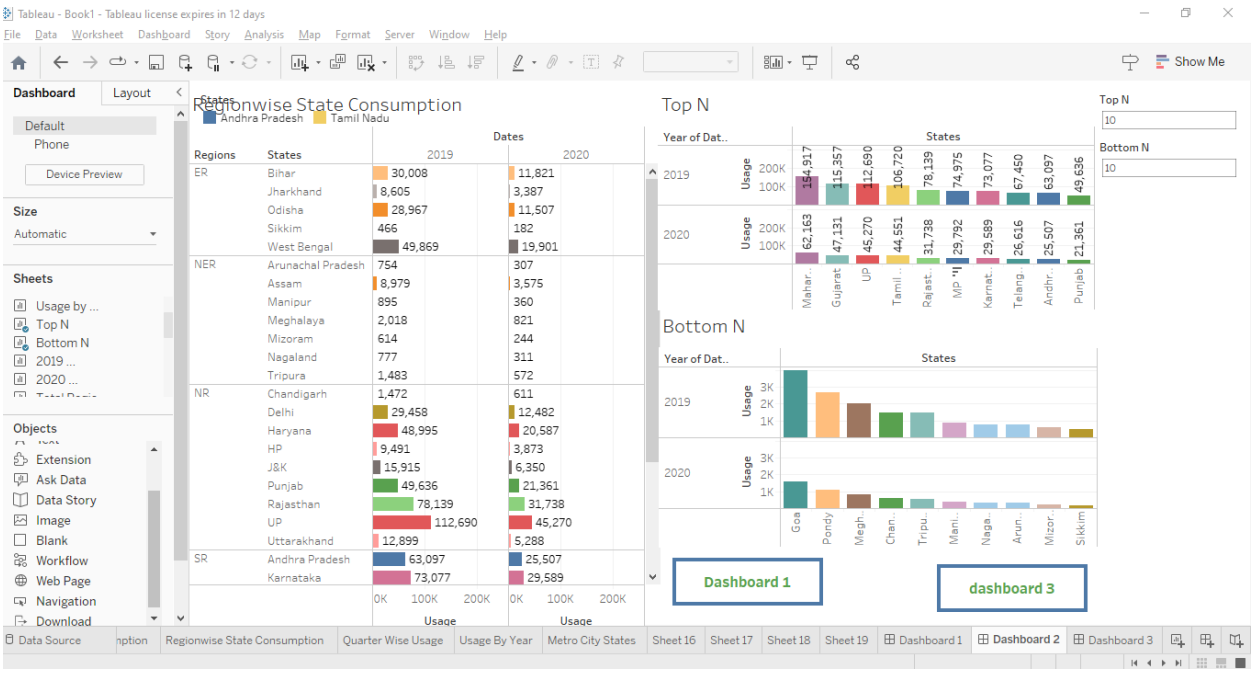
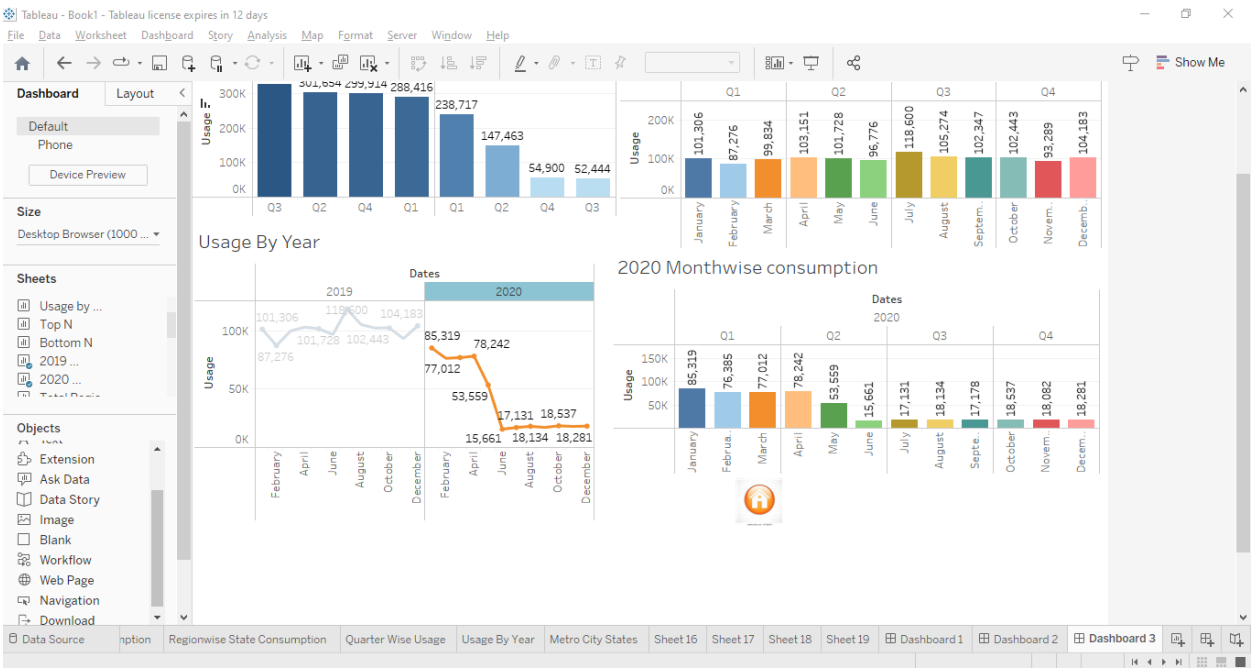


Tableau - Book1 - Tableau license expires in 12 days
Show Me
Dashboard
Layout
Default
Phone
Device Preview
Size
Automatic
Sheets
Usage by ...
Top N
Bottom N
2019 ...
2020 ...
Objects
Extension
Ask Data
Data Story
Image
Blank
Workflow
Web Page
Navigation
Download
Regionwise State Consumption
Andhra Pradesh
Tamil Nadu
Regions
States
Dates
2019
2020
Usage
Top N
Year of Dat..
Bottom N
Dashboard 1
dashboard 3
Data Source
Regionwise State Consumption
Quarter Wise Usage
Usage By Year
Metro City States
Sheet 16
Sheet 17
Sheet 18
Sheet 19
Dashboard 1
Dashboard 2
Dashboard 3

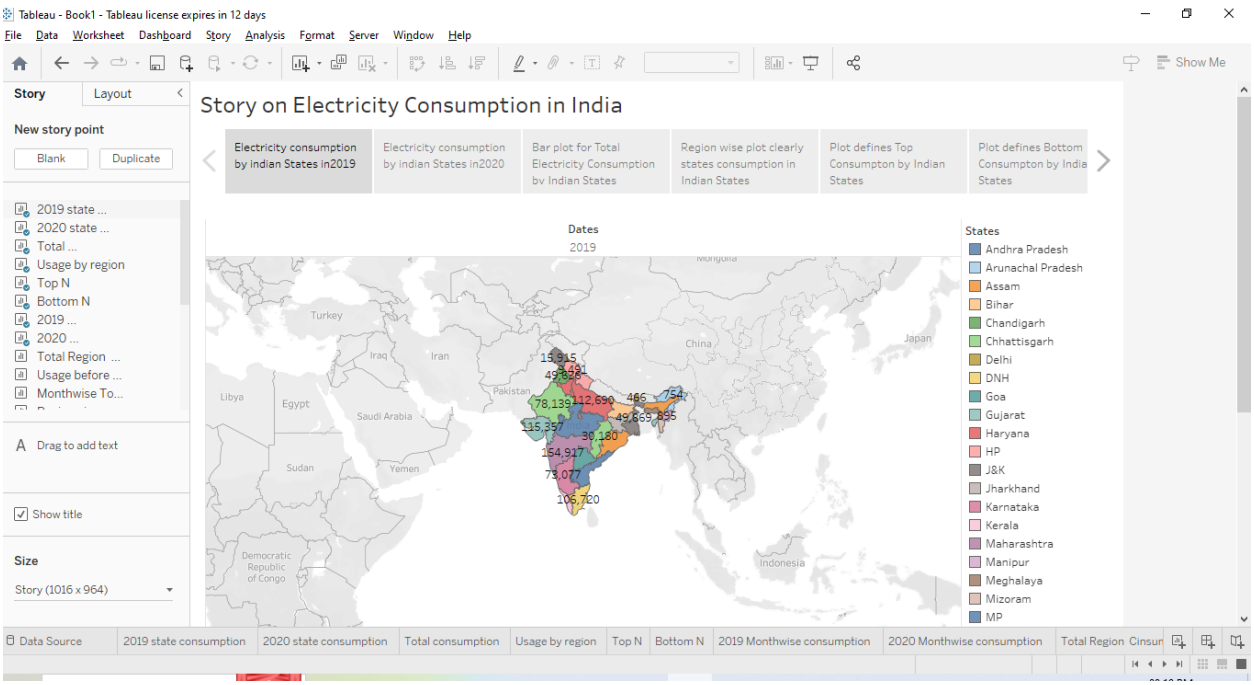


Milestone 6: Story:

A data story is a way of presenting data and analysis in a narrative format, with the goal of making the information more engaging and easier to understand. A data story typically includes a clear introduction that sets the stage and explains the context for the data, a body that presents the data and analysis in a logical and systematic way, and a conclusion that summarizes the key findings and highlights their implications. Data stories can be told using a variety of mediums, such as reports, presentations, interactive visualizations, and videos.

Activity:1- No of Scenes of Story:

The number of scenes in a storyboard for a data visualization analysis of the electricity consumption in india will depend on the complexity of the analysis and the specific insights that are trying to be conveyed. A storyboard is a visual representation of the data analysis process and it breaks down the analysis into a series of steps or scenes.

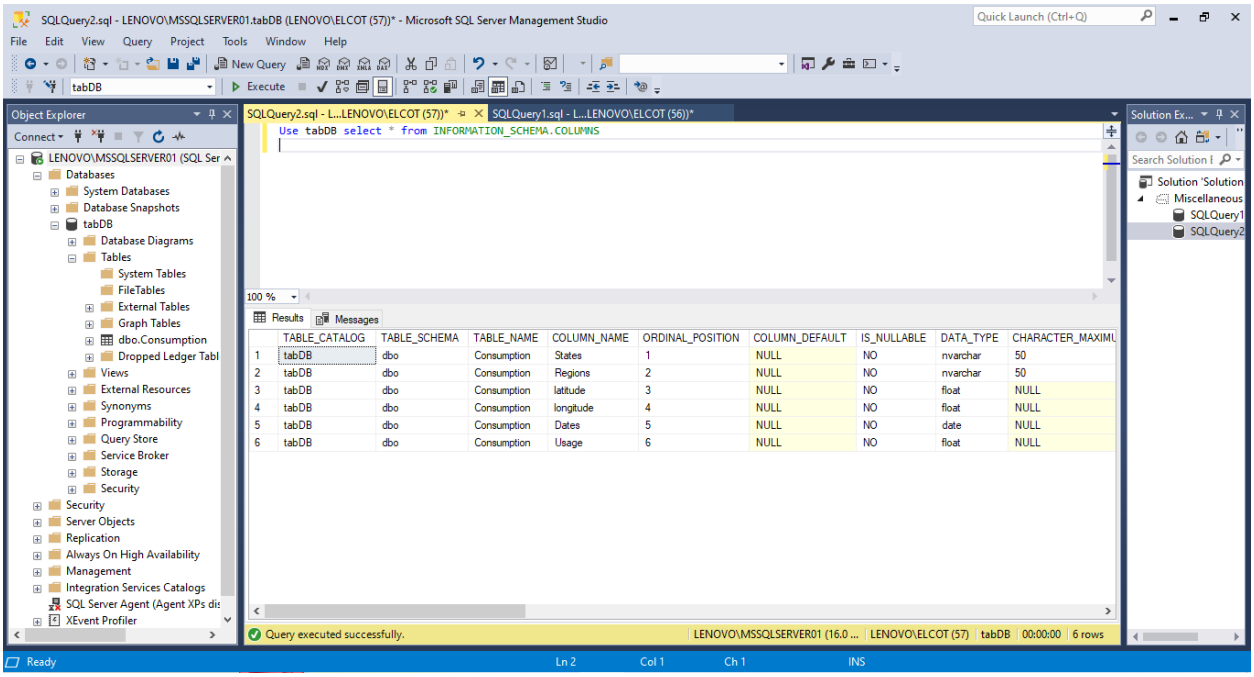


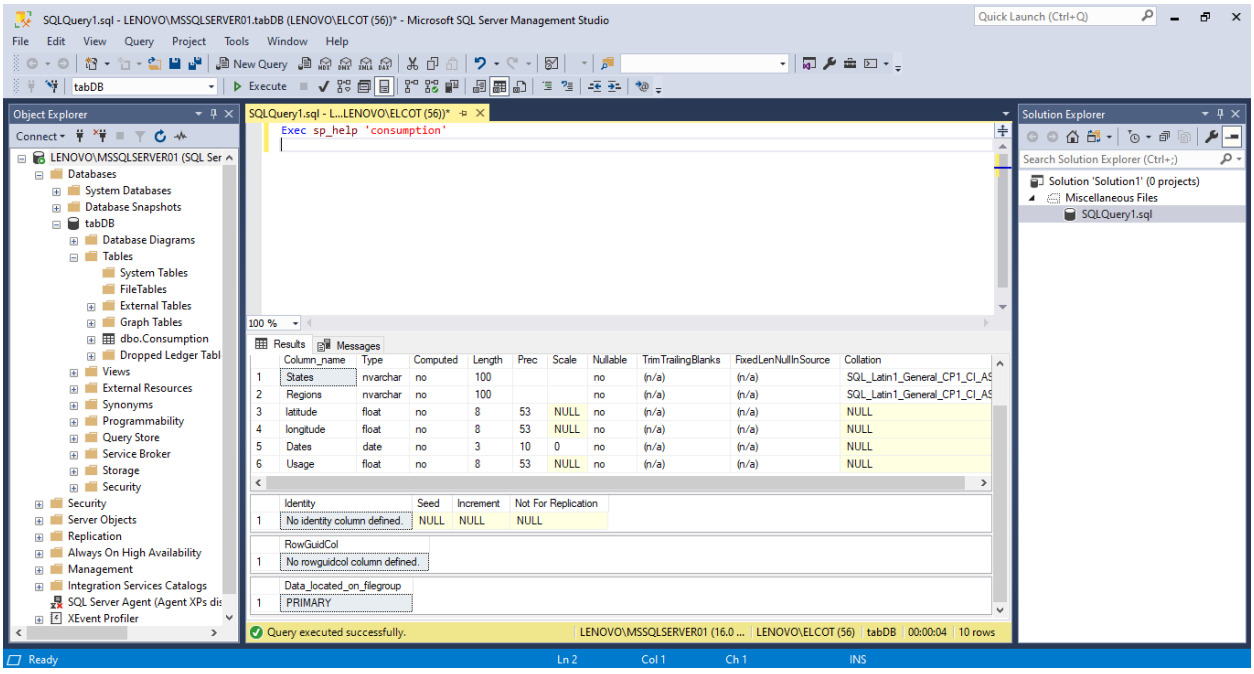
Milestone 7: Performance Testing:

Activity 1: Amount of Data Rendered to DB:

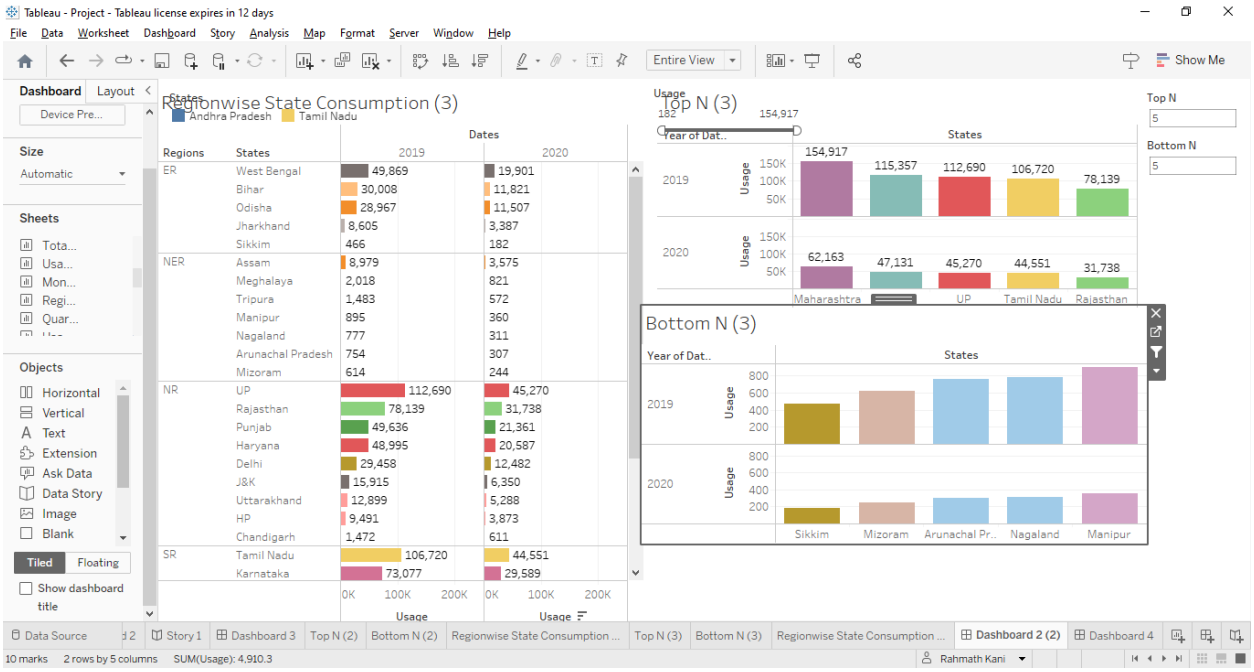
● The amount of data that is rendered to a database depends on the size of the dataset and the capacity of the database to store and retrieve data.

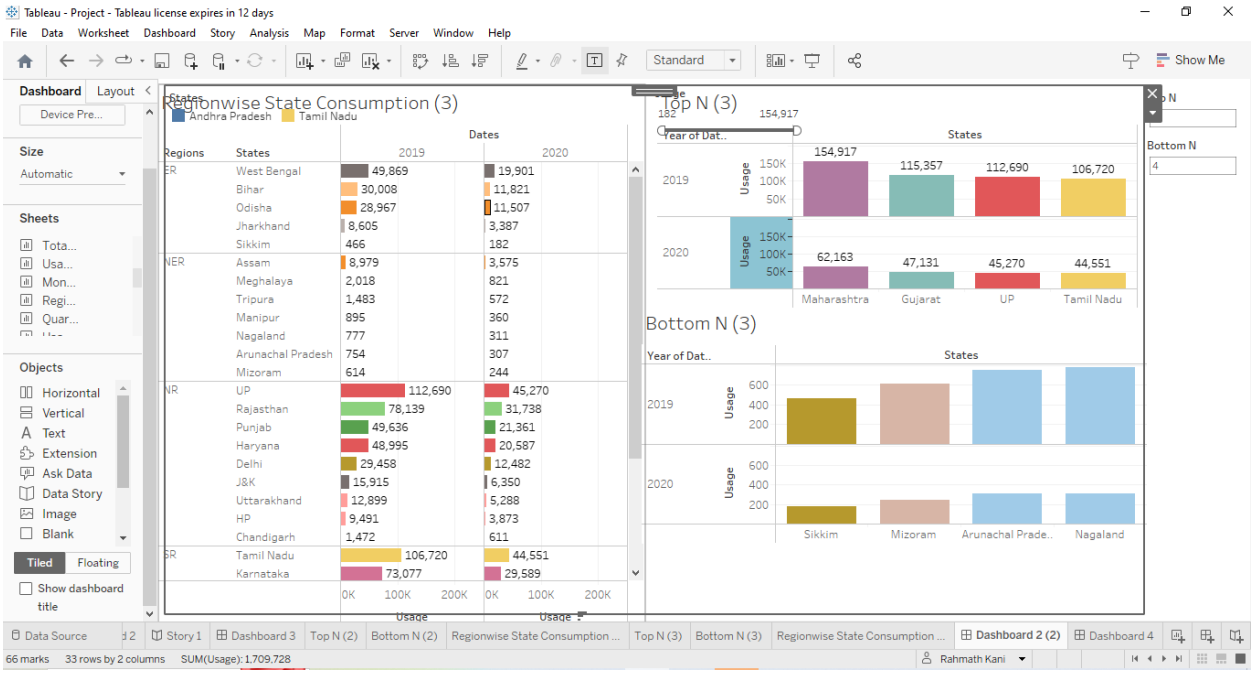
● Open the MySQL Workbench, go to the database then click to expand the tables,select the table and click on (i) button to get the information related to table such as column count,table rows

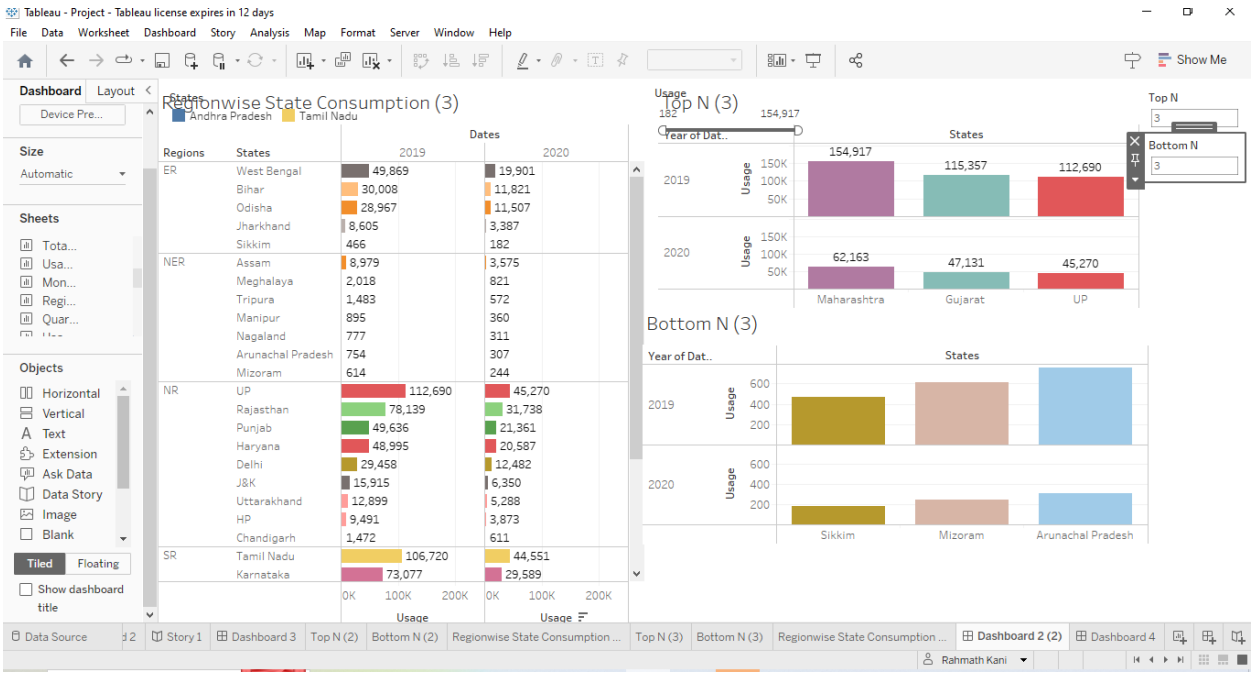

SQLQuery2.sql - LENOVO\MSSQLSERVER01.tabDB (LENOVO\ELCOT (57))* - Microsoft SQL Server Management Studio
Use tabDB select * from INFORMATION_SCHEMA.COLUMNS
Query executed successfully.


SQLQuery1.sql - LENOVO\MSSQLSERVER01.tabDB (LENOVO\ELCOT (56))* - Microsoft SQL Server Management Studio
Exec sp_help 'consumption'
Query executed successfully.

Activity 2:Utilization of Data Filters







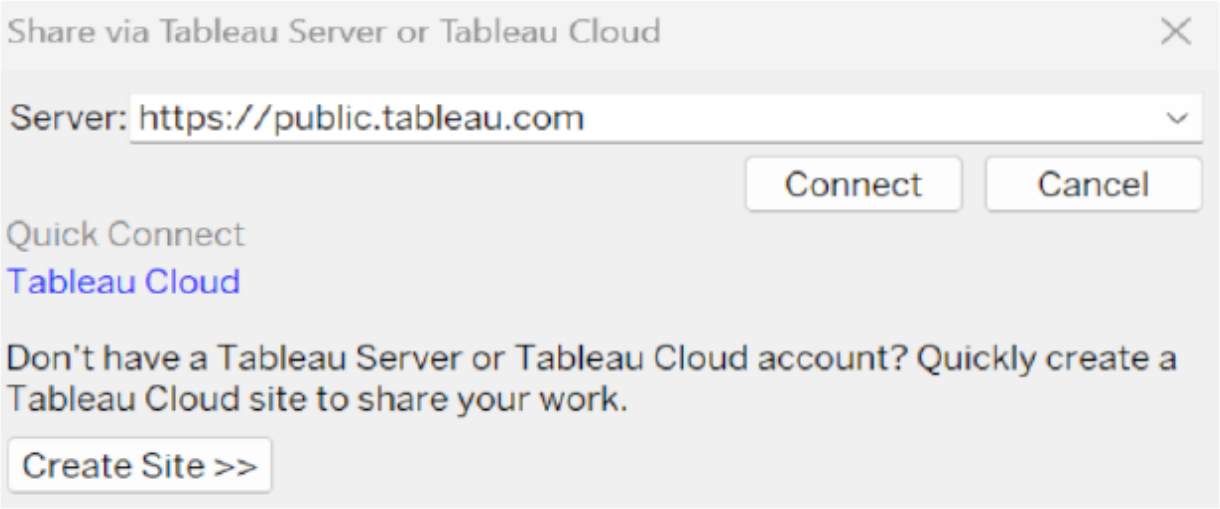
Activity 4: No of Visualizations/ Graphs:

1. 2019 State Consumption.
2. 2020 State Consumption.
3. Total Consumption.
4. Usage By Region.
5. Top N and Bottom N.
6. 2019 and 2022 Month Wise Consumption.
7. Total Consumption Region Wise.
8. Usage Before and After Lockdown.
9. Region wise State Usage.
10. Quarter Usage.
11. Metro city State usage.
12. Usage by year.

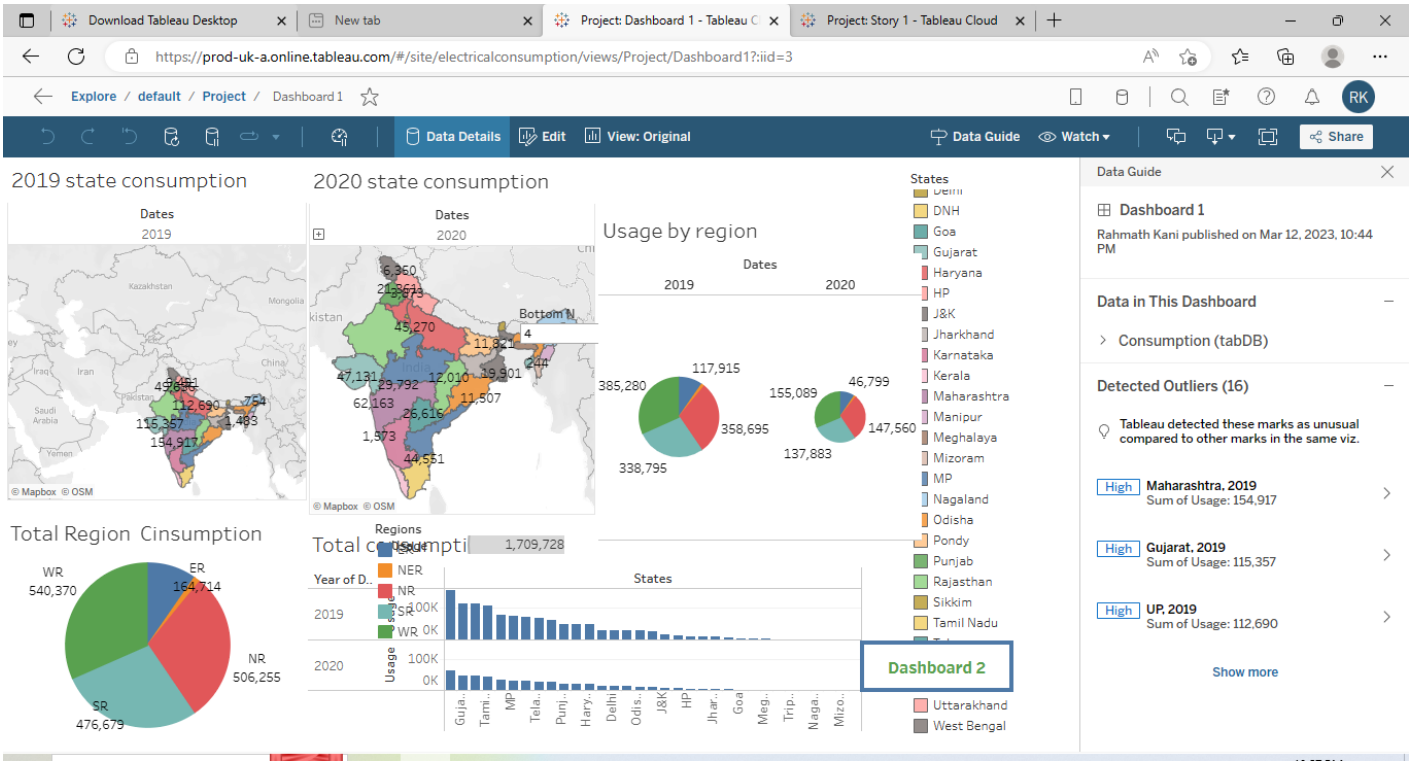
Milestone 8: Web integration:

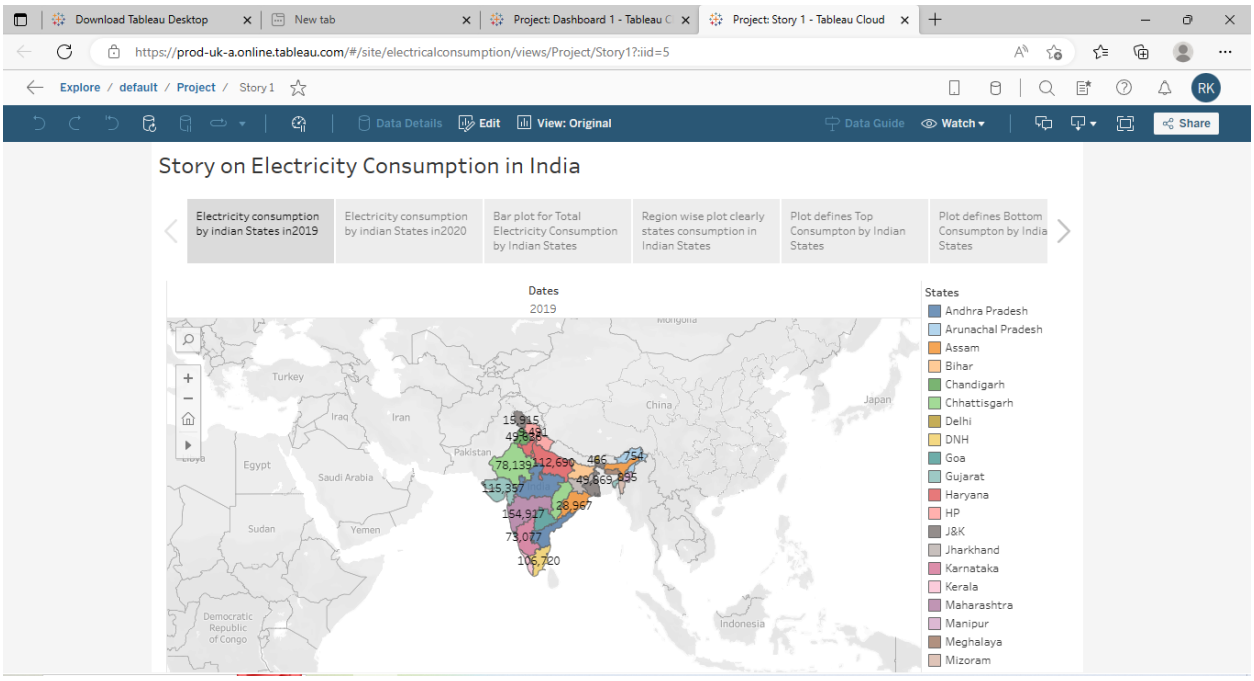
Publishing helps us to track and monitor key performance metrics, to communicate results and progress. help a publisher stay informed, make better decisions, and communicate their performance to others.

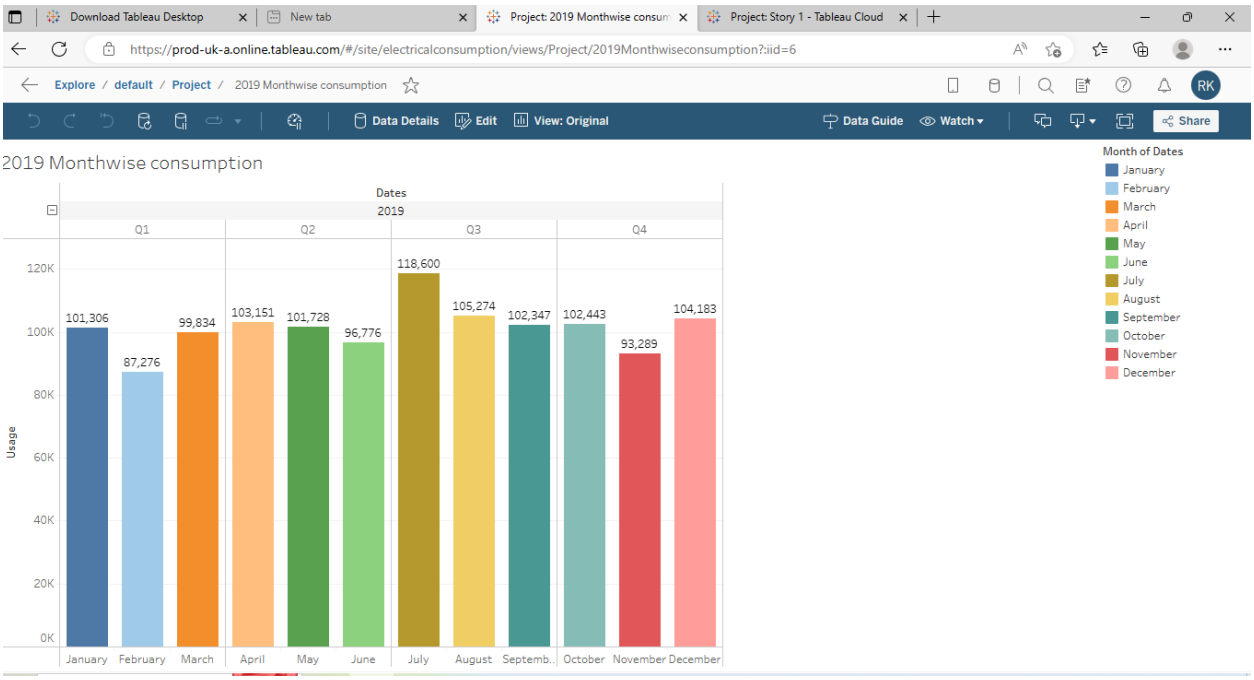
Publishing dashboard and reports to tableau public



Activity 1: Dashboard and Story embed with UI With Flask






Download Tableau Desktop
New tab
Project: 2019 Monthwise consum
Project: Story 1 - Tableau Cloud
https://prod-uk-a.online.tableau.com/#/site/electricalconsumption/views/Project/2019Monthwiseconsumption?:iid=6
Explore / default / Project / 2019 Monthwise consumption
Data Details
Edit
View: Original
Data Guide
Watch
Share
2019 Monthwise consumption
Dates
2019
Q1
Q2
Q3
Q4
Usage
120K
100K
80K
60K
40K
20K
0K
101,306
87,276
99,834
103,151
101,728
96,776
118,600
105,274
102,347
102,443
93,289
104,183
January
February
March
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July
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Septemb..
October
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Month of Dates
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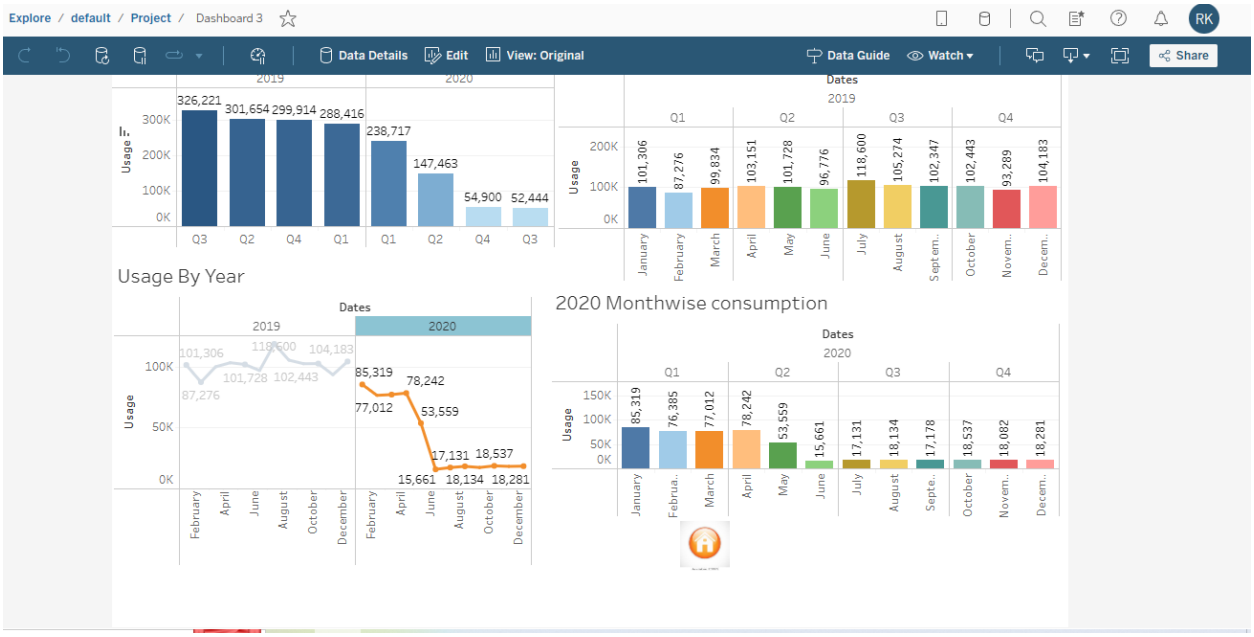
Explore / default / Project / Dashboard 3
Data Details
Edit
View: Original
Data Guide
Watch
Share
2019
2020
Usage
300K
200K
100K
0K
326,221
301,654
299,914
288,416
238,717
147,463
54,900
52,444
Q3
Q2
Q4
Q1
Q1
Q2
Q4
Q3
Dates
2019
Q1
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Q4
200K
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101,306
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Usage By Year
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78,242
53,559
15,661
17,131
18,134
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2020 Monthwise consumption
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Q4
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77,012
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Milestone 9: Project Demonstration & Documentation:

Below mentioned deliverables to be submitted along with other deliverables

Activity 1:- Record explanation Video for project end to end solution

Activity 2:- Project Documentation-Step by step project development procedure