

## CATEGORY:

Data analytics with Tableau

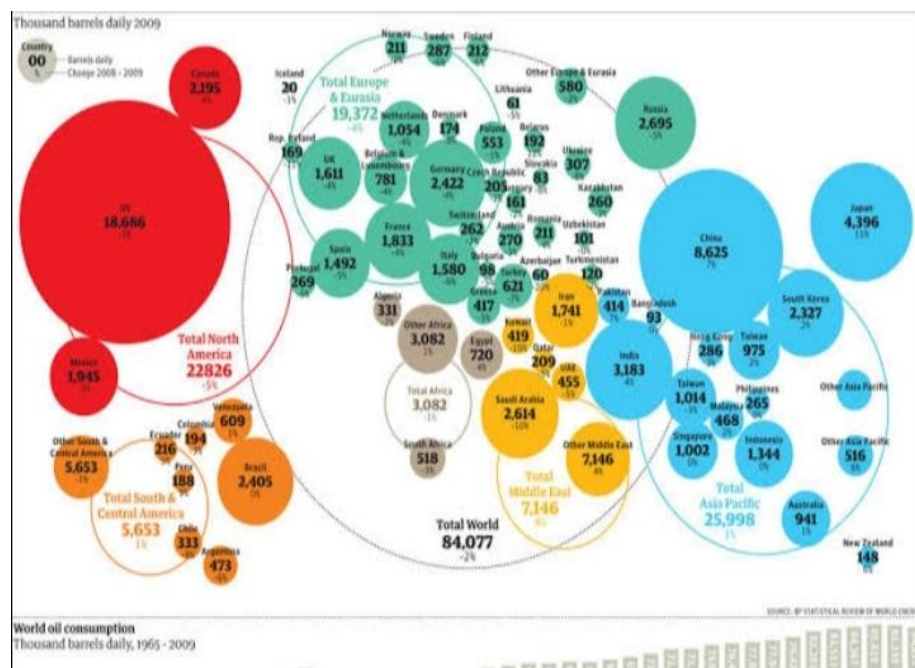
## PROJECT TITLE:

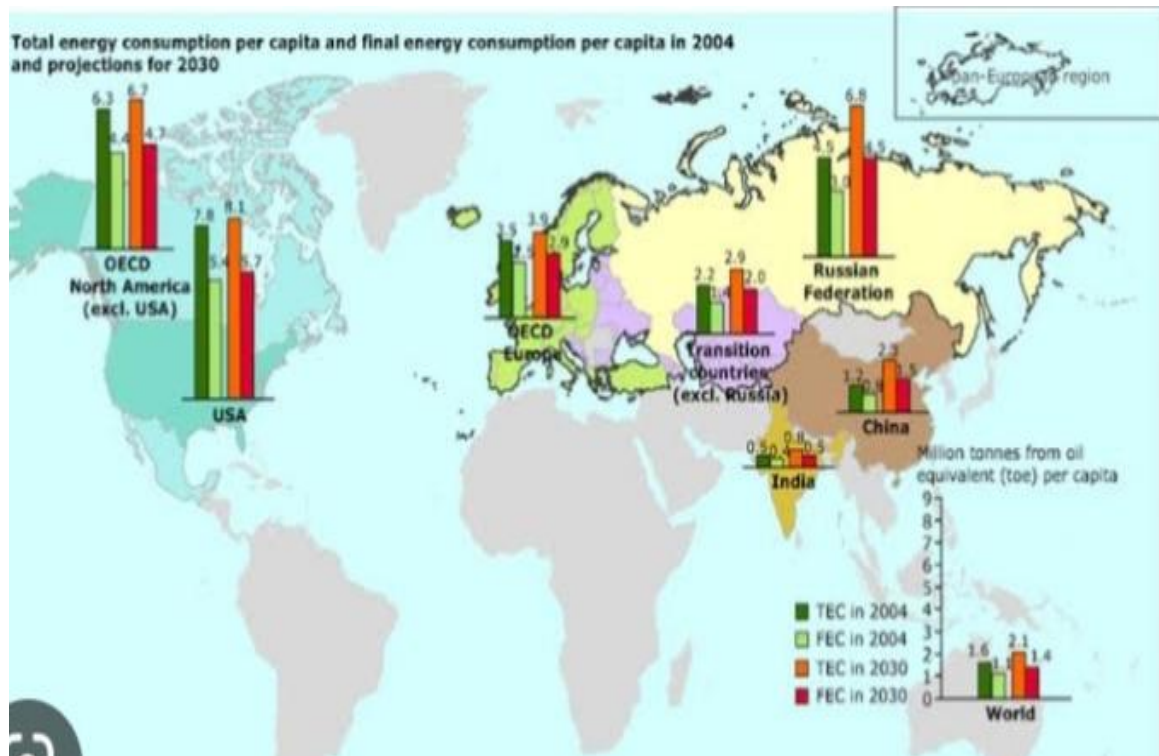
Plugging into a future – An Exploration of Electricity Consumption

## INTRODUCTION:

**1.1. Overview:** Electric energy consumption is [energy consumption](#) in the form of [electrical energy](#). About a fifth of global energy is consumed as electricity: for residential, industrial, commercial, [transportation](#) and other purposes.

**1.2. Purpose:** Electricity consumption represents the same amount of electrical energy that has been consumed over a specific time, units of Wh (or KWh), electricity demand represents that rate at which the electrical energy is consumed for a needed output rating in units of W (or KW).





## PROBLEMS DEFINITIONS & DESIGN THINKING:

### 2.1. Empathy Map



## Strengths, weaknesses, opportunities, & threats (SWOT)

Use this framework to analyze your organization, or a specific product, service, project, or policy. Dividing your analysis into these four parts helps clarify the existing forces that will affect your organization's future.

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### Need some inspiration?

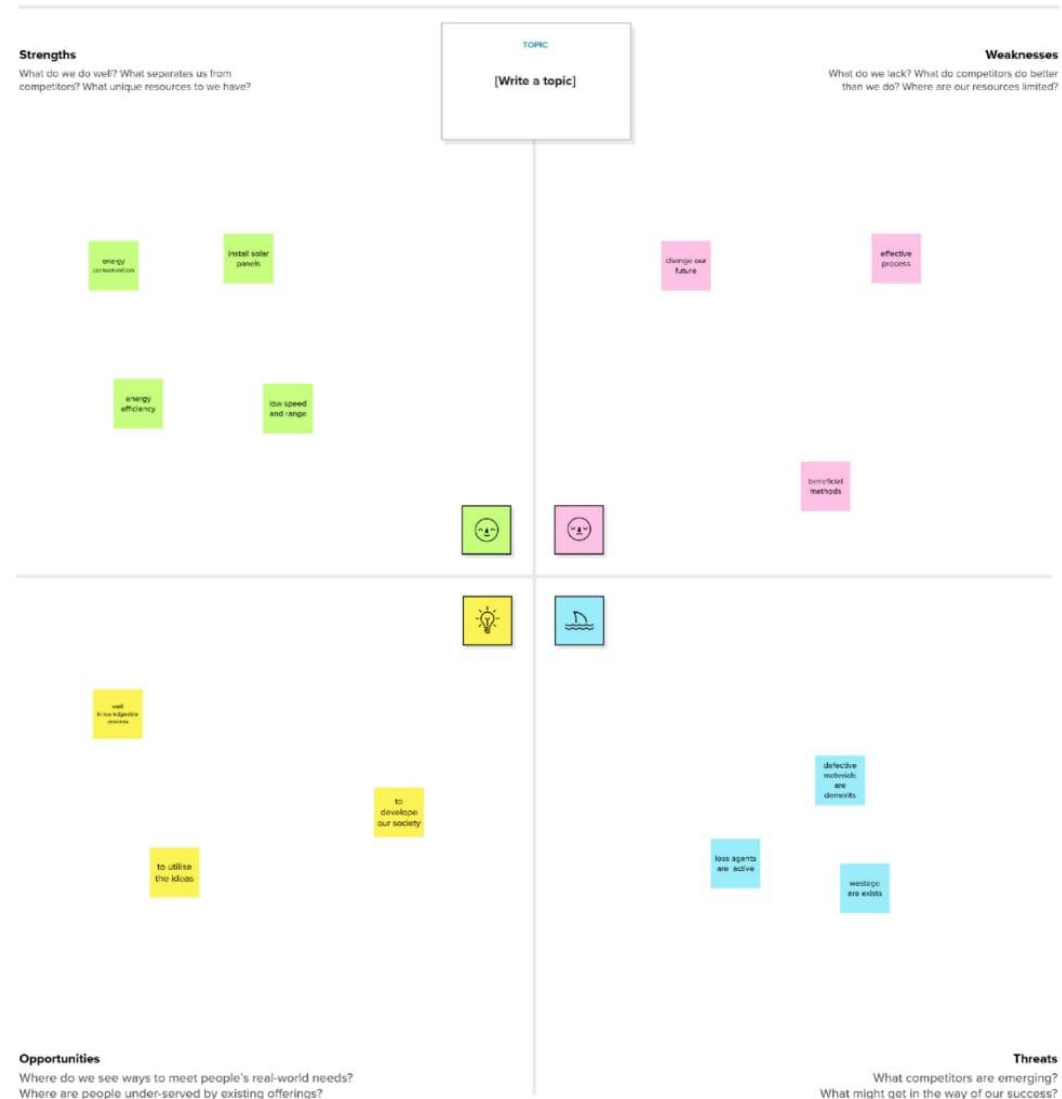
See a finished version of this template to kickstart your work.

[Open example](#) →




## Analyze one topic in four ways

On individual sticky notes, write the strengths, weaknesses, opportunities, and threats to your organization, product, or service. Cluster related notes, then give each theme a sentence-like label.



## 2.2. Ideation & Brainstorming map

Template



### Brainstorm & idea prioritization

Use this template in your own brainstorming sessions so your team can unleash their imagination and start shaping concepts even if you're not sitting in the same room.

🕒 10 minutes to prepare  
🕒 1 hour to collaborate  
👤 2-8 people recommended

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➔

**Before you collaborate**

A little bit of preparation goes a long way with this session. Here's what you need to do to get going.

🕒 10 minutes

A

**Team gathering**

Define who should participate in the session and send an invite. Share relevant information or pre-work ahead.

B

**Set the goal**

Think about the problem you'll be focusing on solving in the brainstorming session.

C

**Learn how to use the facilitation tools**

Use the Facilitation Superpowers to run a happy and productive session.

[Open article](#) ➔

1


**Define your problem statement**

What problem are you trying to solve? Frame your problem as a How Might We statement. This will be the focus of your brainstorm.

🕒 5 minutes

PROBLEM

How might we [your problem statement]?



#### Key rules of brainstorming

To run on smooth and productive session

🗨️ Stay in topic.


💡 Encourage wild ideas.

⏸️ Defer judgment.

👂 Listen to others.

🗣️ Go for volume.

👁️ If possible, be visual.



**Need some inspiration?**

See a finished version of this template to kickstart your work.

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2

## Brainstorm

Write down any ideas that come to mind that address your problem statement.

⌚ 10 minutes

### TIP

You can select a sticky note and hit the pencil [switch to sketch] icon to start drawing!

#### Person 1

solar wireless electric vehicle	e-bike speed controller system	peizo waste vibrator
power efficient	automated smoking zone	smart portable cellphone
voice switching without harmonics	AC power controller	haltpower supply

#### Person 2

industry power	smart lock controller device	switching load by touch
emergency auto test light	power cycle with auto switching	video coding smartphone stand
test boring gear	monthly electricity bill warning display	electronic consumption

#### Person 3

plant moisture monitoring system	laser operator timer	ultrasonic locking system
power motor stalling pulse load	remote radio powered security system	controlling solar charge
using solar panels	solar appliances, usage	advanced wireless power transfer system

#### Person 4

over voltage under voltage protection	submersible detector alarm	commercial power saver
device load monitor	load shedding time management	smart chair controlling data
system to increase solar energy	AC power when left controller system	smart generation system

#### Person 5


#### Person 6


#### Person 7


#### Person 8




3

### Group ideas

Take turns sharing your ideas while clustering similar or related notes as you go. Once all sticky notes have been grouped, give each cluster a sentence-like label. If a cluster is bigger than six sticky notes, try and see if you can break it up into smaller sub-groups.

⌚ 20 minutes

#### TIP

Add customizable tags to sticky notes to make it easier to find, browse, organize, and categorize important ideas as themes within your mural.

The general objective of the study is to plugging into the future-An exploration of electricity consumption based on our group ideas are:

1. To using solar appliances.
2. To installing solar panels.
3. To using energy efficient appliances.

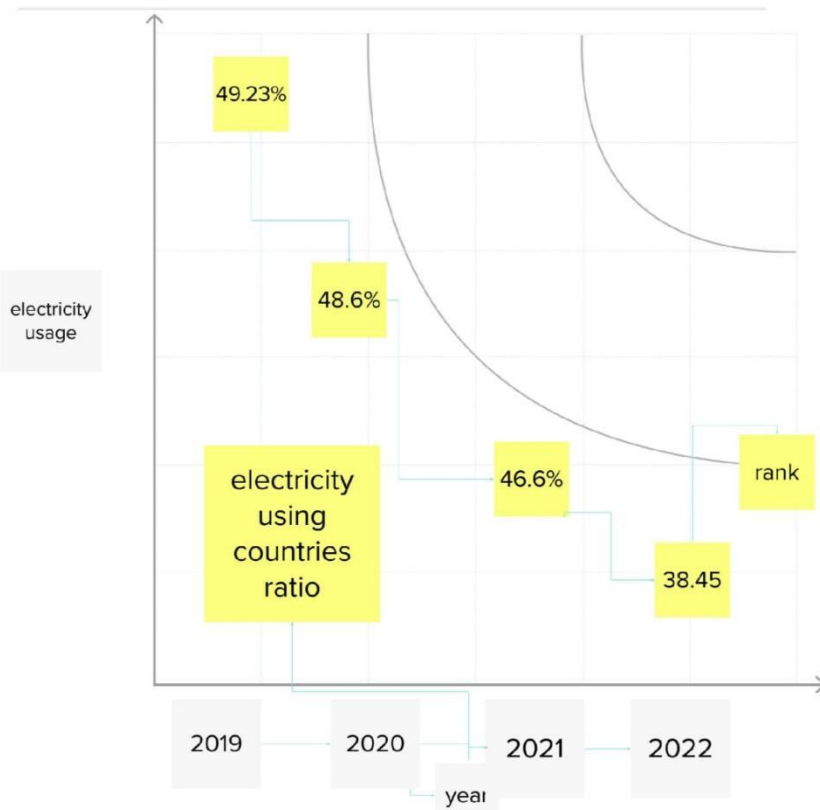


4

**Prioritize**

Your team should all be on the same page about what's important moving forward. Place your ideas on this grid to determine which ideas are important and which are feasible.

20 minutes



→

**After you collaborate**

You can export the mural as an image or pdf to share with members of your company who might find it helpful.

**Quick add-ons**

- A Share the mural**  
Share a view link to the mural with stakeholders to keep them in the loop about the outcomes of the session.
- B Export the mural**  
Export a copy of the mural as a PNG or PDF to attach to emails, include in slides, or save in your drive.

**Keep moving forward**

- Strategy blueprint**  
Define the components of a new idea or strategy.  
[Open the template →](#)
- Customer experience journey map**  
Understand customer needs, motivations, and obstacles for an experience.  
[Open the template →](#)
- Strengths, weaknesses, opportunities & threats**  
Identify strengths, weaknesses, opportunities, and threats (SWOT) to develop a plan.  
[Open the template →](#)

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**RESULTS:**

Final findings(Output) of the project

**DISSCUSSED PROBLEM:**



## Problem 1: Countries with Rank based electricity consumption

China consumes by far the most electricity of any country in the world, with more than 7.8 terawatt-hours consumed in 2021. The United States ranked as the second-leading electricity consumer that year, with nearly 4,000 terawatt hours consumed. India followed, but by a wide margin.

## Problem 2: Average electrical consumption per capita

It is useful to know how many kWh a house uses per day. It might be that you just want to know the **average kWh daily usage** to see how much you will pay for electricity, or you might be thinking about how to size solar panels adequately.

## Problem 3: Industrial electricity consumption

Energy is used in the industrial sector for a wide range of purposes, such as process and assembly, steam and co generation, process heating and cooling, and lighting, heating, and air conditioning for buildings. Industrial sector energy consumption also includes basic chemical feed stocks.

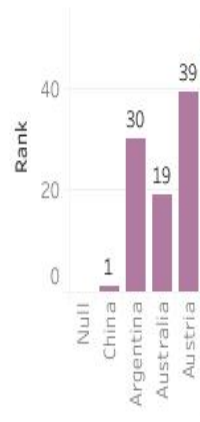
## Problem 4: Household electricity consumption

After processing the data, the results are below for household monthly electricity use and monthly cost, and the cost on a per kilowatt hour basis. The averages hide a lot of variation in the states. Surprisingly, Louisiana had the highest monthly electricity consumption at 1200 kWh per residential customer, and equally surprisingly Hawaii had the lowest at 537 kWh. So the highest is more than twice as high as the lowest! Remember that the US average is 900 kWh.

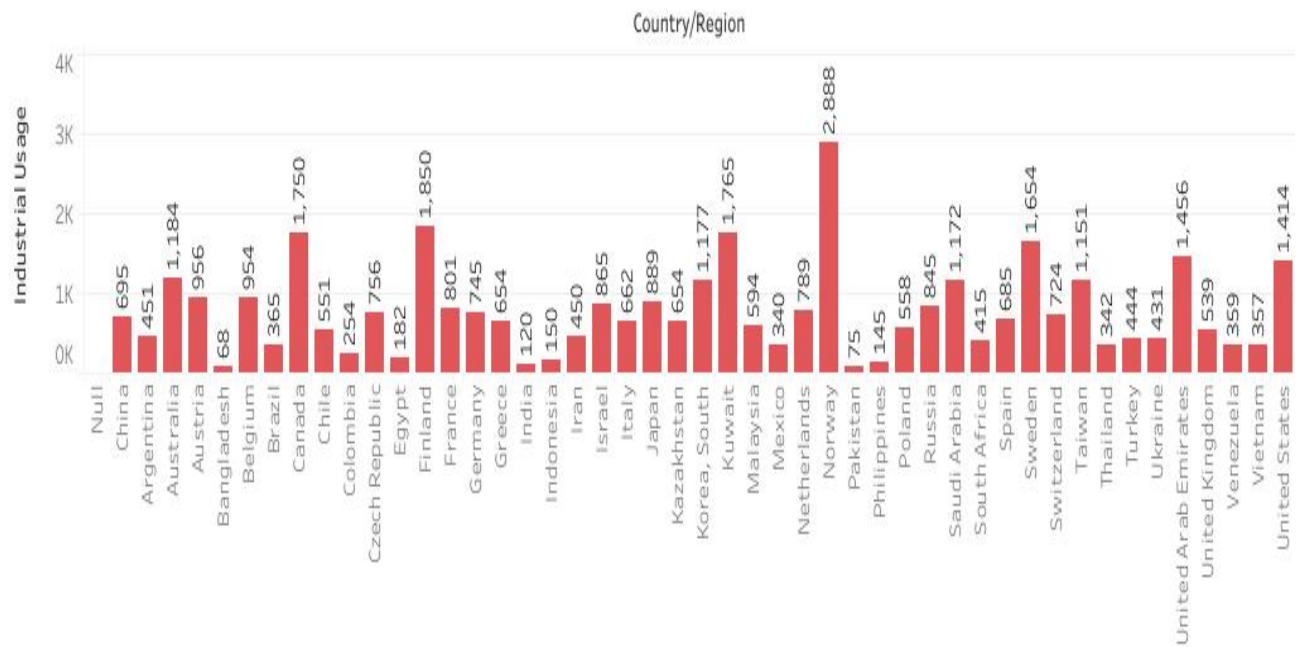
State	Average Electricity Use Daily	Average Electricity Use monthly	Average Electricity Use Yearly	Average monthly Bill
Alabama	37 kWh	1,145 kWh	13,737 kWh	\$144

Alaska	18 kWh	552 kWh	6,628 kWh	\$125	
Arizona	36 kWh	1,114 kWh	13,364 kWh	\$137	
Arkansas	34 kWh	1,060 kWh	12,720 kWh	\$110	
California	20 kWh	605 kWh	7,259 kWh	\$120	
Colorado	23 kWh	711 kWh	8,533 kWh	\$88	
Connecticut	23 kWh	703 kWh	8,433 kWh	\$154	
DC	20 kWh	631 kWh	7,567 kWh	\$74	
Delaware	30 kWh	935 kWh	11,214 kWh	\$116	
Florida	37 kWh	1,142 kWh	13,698 kWh	\$129	
Georgia	35 kWh	1,081 kWh	12,974 kWh	\$130	
Hawaii	17 kWh	537 kWh	6,446 kWh	\$163	
Idaho	31 kWh	955 kWh	11,463 kWh	\$95	
Illinois	23 kWh	698 kWh	8,376 kWh	\$89	
Indiana	30 kWh	938 kWh	11,259 kWh	\$120	
Iowa	28 kWh	865 kWh	10,380 kWh	\$108	
Kansas	28 kWh	883 kWh	10,598 kWh	\$114	

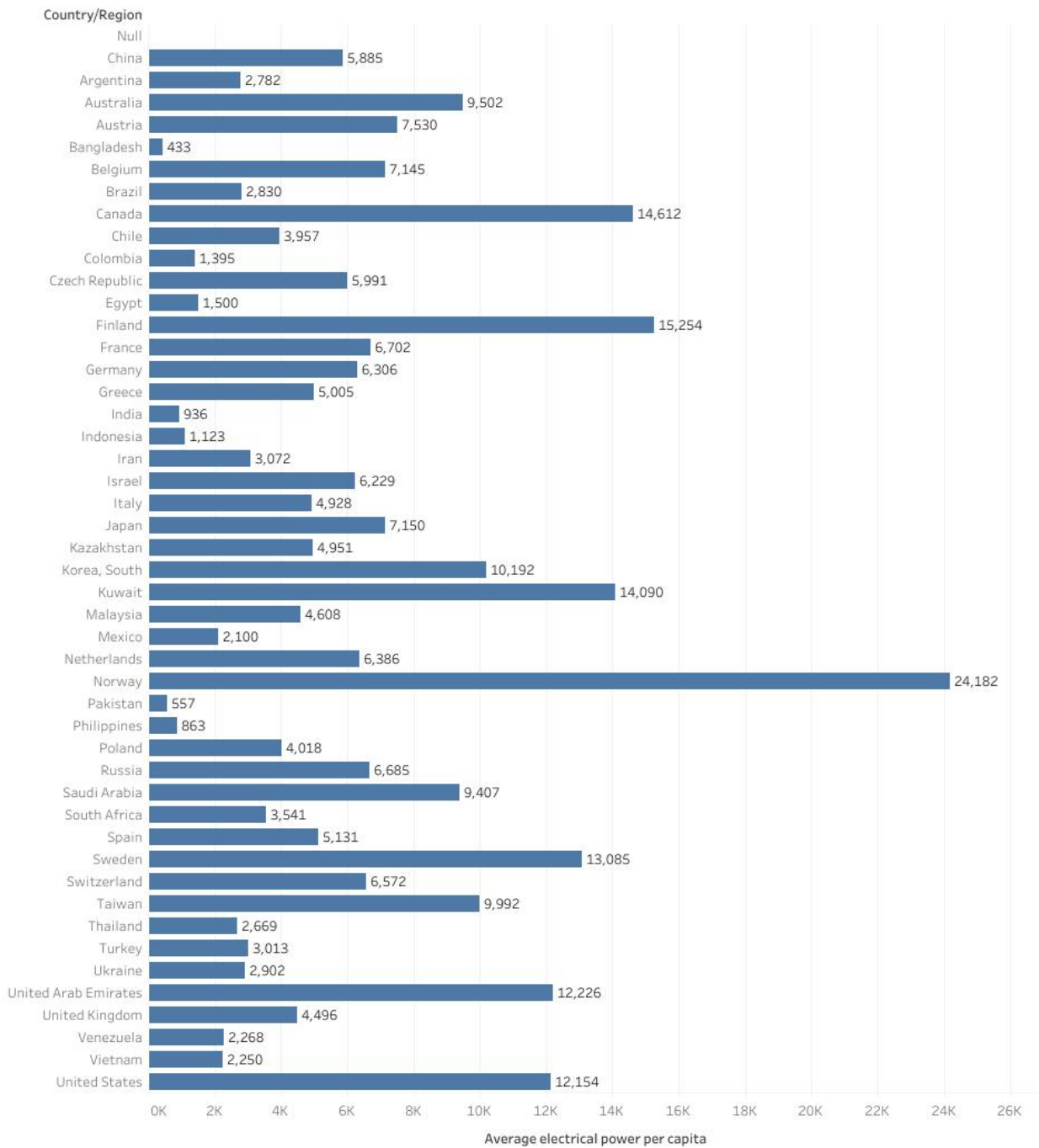
Sheet 1



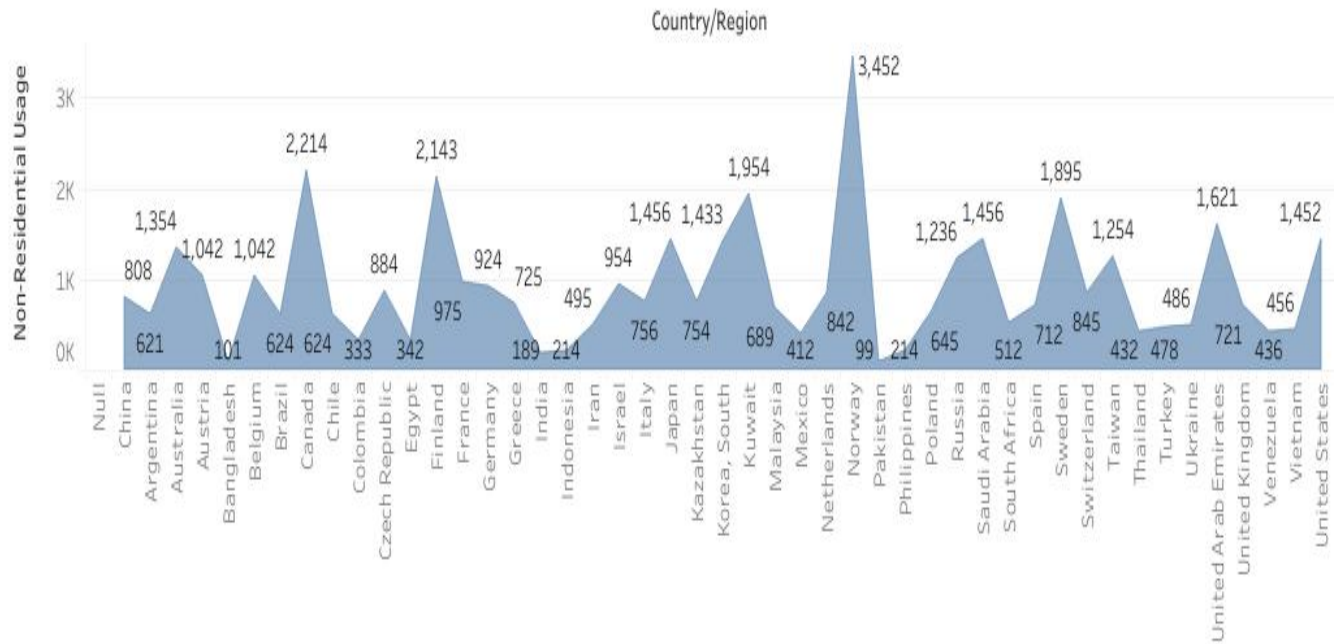
Sheet 4



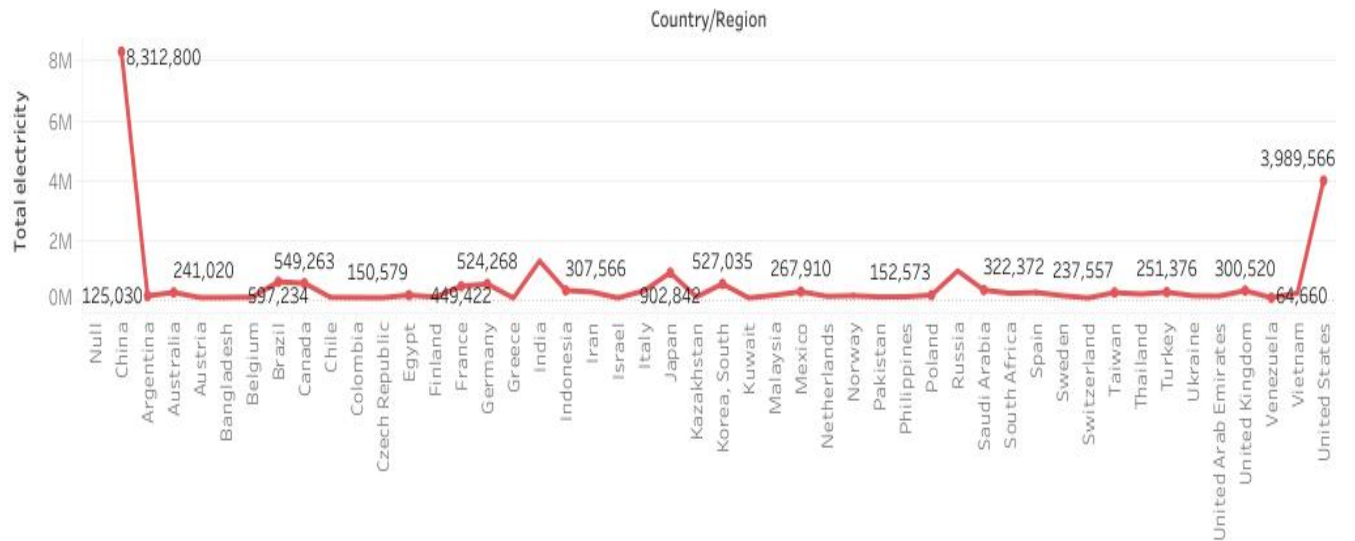
## Sheet 2



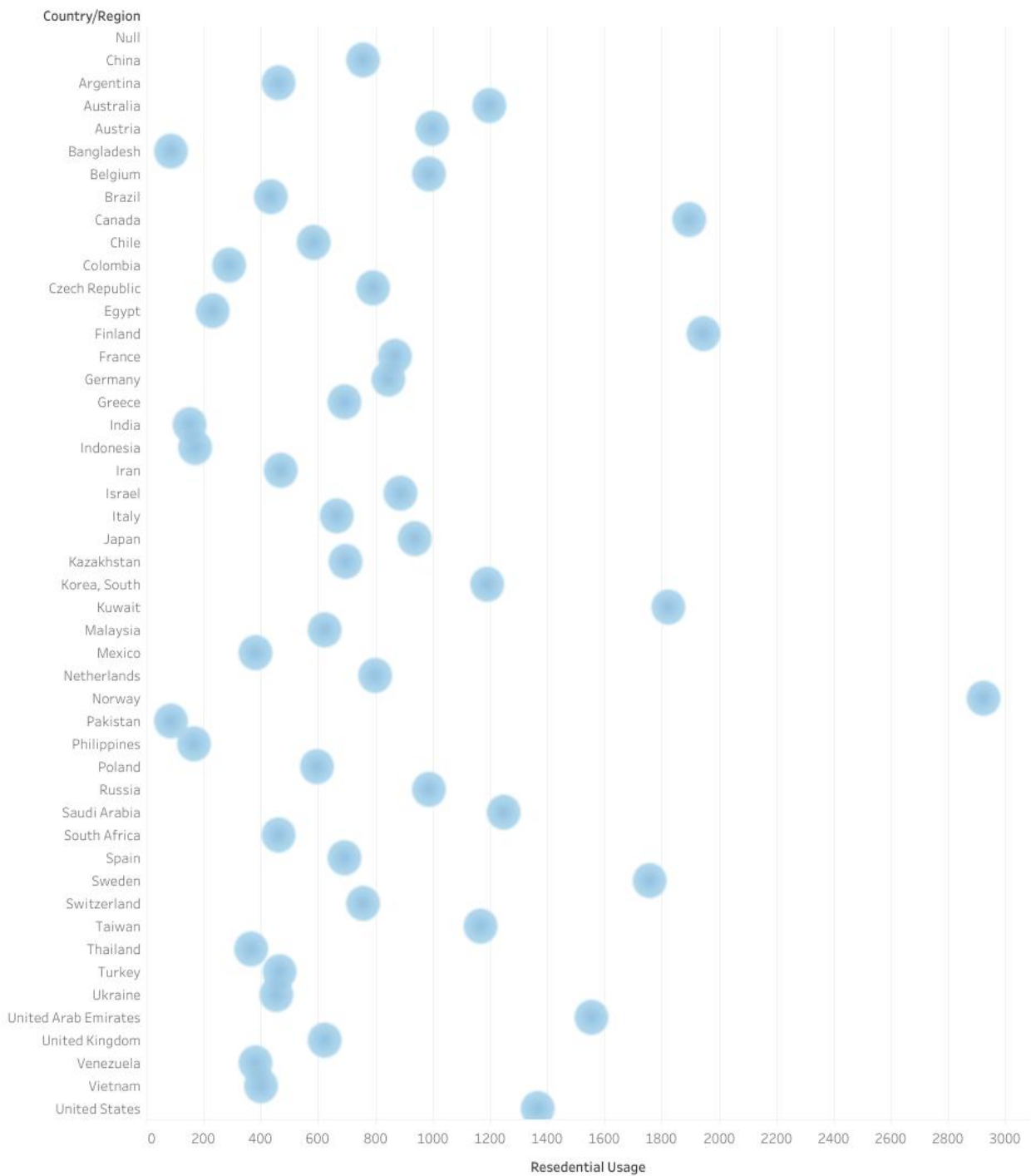
## Sheet 6



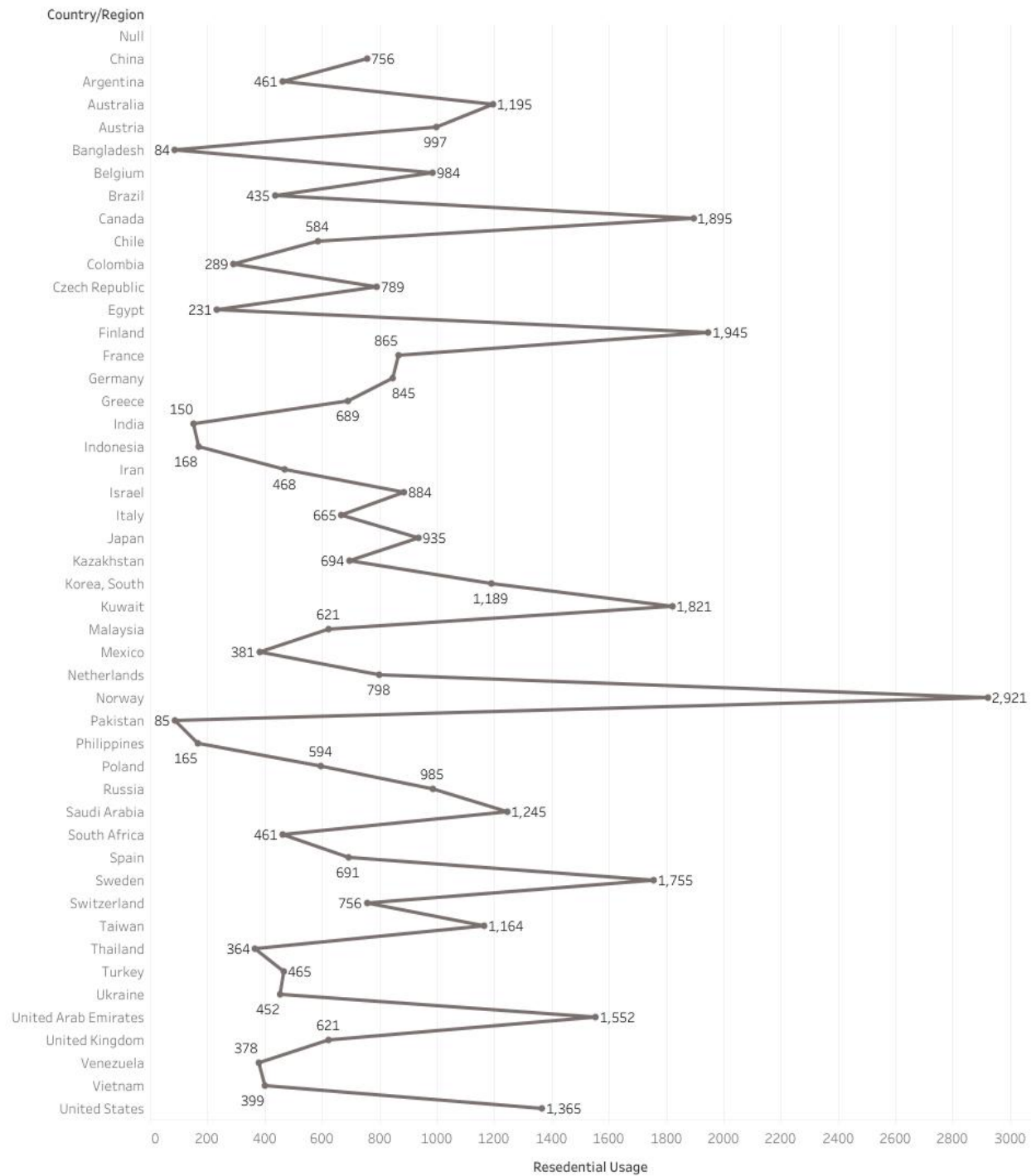
## Sheet 8



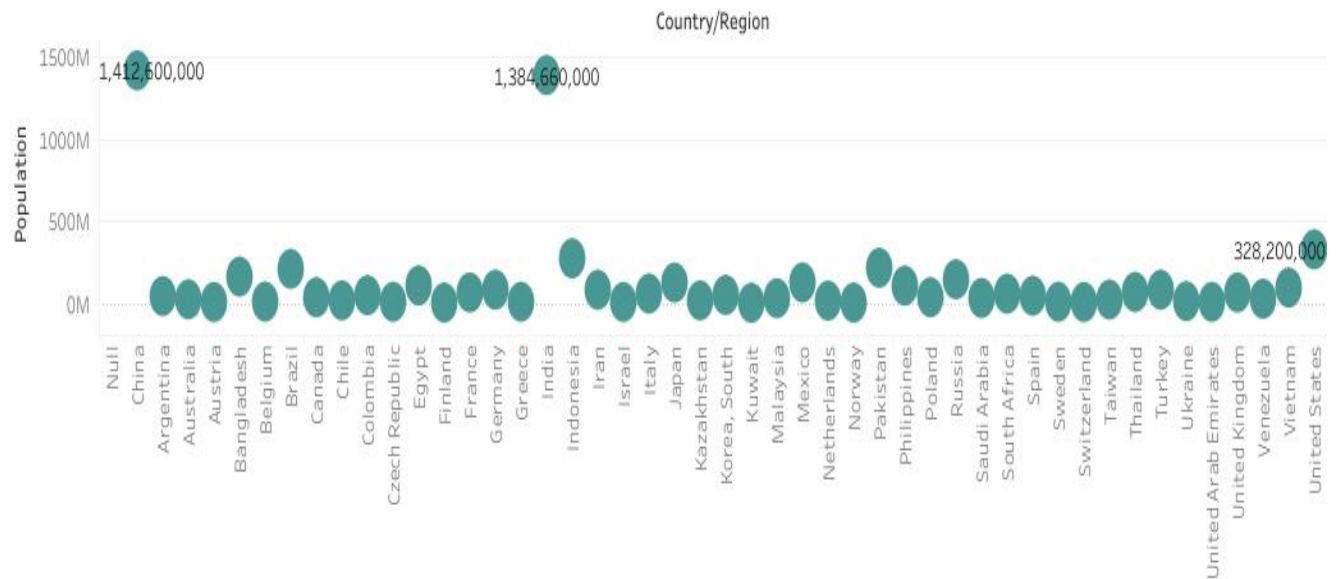
## Sheet 7



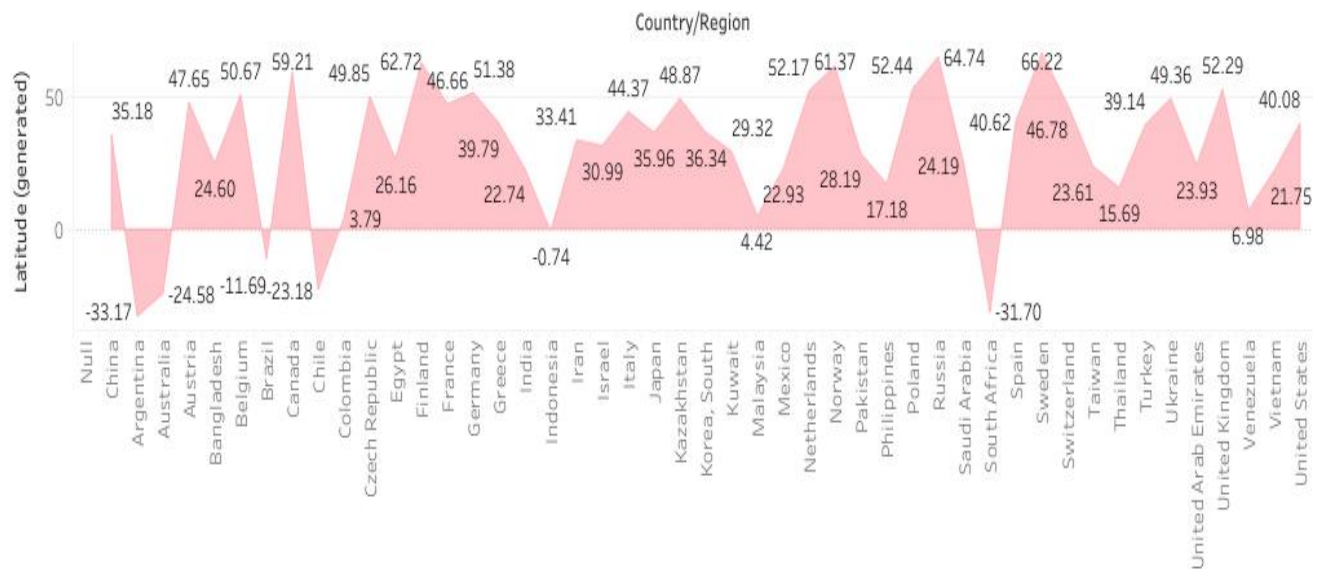
# Sheet 7



Sheet 3










Sheet 9



DATA ANALYSIS IN EXCEL SHEET:



Rank	Country/Region	Total electricity consumption	Year of data	Population
1	 China	8,312,800	2021	1,412,600,000
2	 United States	3,989,566	2019 est.	328,200,000
3	 India	1,296,300	2021 est.	1,384,660,000
4	 Russia	965,156	2019 est.	146,700,000
5	 Japan	902,842	2019 est.	126,860,000
6	 Brazil	597,234	2019 est.	210,000,000
7	 Canada	549,263	2019 est.	37,534,000
8	 Korea, South	527,035	2019 est.	51,710,000
9	 Germany	524,268	2019 est.	83,695,430
10	 France	449,422	2019 est.	66,980,000
11	 Saudi Arabia	322,372	2018 est.	33,413,000
12	 Indonesia	307,566	2021	273,879,750
13	 United Kingdom	300,520	2019 est.	66,800,000
14	 Italy	297,150	2019 est.	60,244,000
15	 Mexico	267,910	2019 est.	127,580,000
16	 Iran	254,724	2018 est.	82,913,910
17	 Turkey	251,376	2019 est.	83,429,620
18	 Spain	241,563	2019 est.	47,076,780
19	 Australia	241,020	2019 est.	25,364,310
20	 Taiwan	237,557	2019 est.	23,775,000
21	 Vietnam	216,994	2018 est.	96,462,110
22	 South Africa	210,304	2019 est.	59,392,250
23	 Thailand	185,852	2018 est.	69,625,580
24	 Egypt	150,579	2018 est.	109,262,178
25	 Ukraine	128,806	2019 est.	14,385,150
26	 Poland	152,573	2019 est.	38,036,118
27	 Malaysia	147,209	2018 est.	31,949,780
28	 Sweden	131,798	2019 est.	10,285,450
29	 Norway	131,931	2022 est.	5,455,582
30	 Argentina	125,030	2018 est.	44,938,710
31	 Netherlands	110,682	2019 est.	17,332,850
32	 United Arab Emirates	119,455	2018 est.	9,770,530
33	 Philippines	93,354	2019 est.	108,116,620
34	 Kazakhstan	91,668	2018 est.	18,513,930
35	 Pakistan	90,000	2020 est.	216,565,320
36	 Finland	84,207	2019 est.	5,520,310
37	 Belgium	82,051	2019 est.	11,484,060
38	 Venezuela	64,660	2018 est.	28,515,830
39	 Austria	66,849	2019 est.	8,877,070
40	 Chile	74,992	2019 est.	18,952,040

41	 Czech Republic	63,920	2019 est.	10,669,710
42	 Colombia	70,203	2018 est.	50,339,440
43	 Israel	56,391	2018 est.	9,053,300
44	 Switzerland	56,353	2019 est.	8,574,830
45	 Bangladesh	70,594	2018 est.	163,046,160
46	 Kuwait	59,278	2018 est.	4,207,080
47	 Greece	53,635	2019 est.	10,716,320

Average electrical power per capita expressed in		Industrial Usage	Residential Usage	Non-Residential Usage	
		KWh		KWh	
5,885	671	695	756	808	
12,154	1,387	1,414	1,365	1,452	
936	107	120	150	189	
6,685	763	845	985	1,236	
7,150	816	889	935	1,456	
2,830	323	365	435	624	
14,612	1,667	1,750	1,895	2,214	
10,192	1,163	1,177	1,189	1,433	
6,306	719	745	845	924	
6,702	765	801	865	975	
9,407	1,073	1,172	1,245	1,456	
1,123	128	150	168	214	
4,496	513	539	621	721	
4,928	562	662	665	756	
2,100	240	340	381	412	
3,072	350	450	468	495	
3,013	344	444	465	478	
5,131	585	685	691	712	
9,502	1,084	1,184	1,195	1,354	
9,992	1,140	1,151	1,164	1,254	
2,250	257	357	399	456	
3,541	404	415	461	512	
2,669	305	342	364	432	
1,500	171	182	231	342	
2,902	331	431	452	486	
4,018	458	558	594	645	
4,608	526	594	621	689	
13,085	1,462	1,654	1,755	1,895	
24,182	2,758	2,888	2,921	3,452	
2,782	317	451	461	621	
6,386	728	789	798	842	
12,226	1,395	1,456	1,552	1,621	
863	99	145	165	214	
4,951	565	654	694	754	
557	64	75	85	99	
15,254	1,740	1,850	1,945	2,143	
7,145	815	954	984	1,042	
2,268	259	359	378	436	
7,530	859	956	997	1,042	
3,957	451	551	584	624	

5,991	683	756	789	884
1,395	159	254	289	333
6,229	711	865	884	954
6,572	750	724	756	845
433	49	68	84	101
14,090	1,607	1,765	1,821	1,954
5,005	571	654	689	725

## **ADAVANTAGES & DISADVANTAGES**

List of advantages and disadvantages of the proposed solution.

### **Advantages and Disadvantages of Electricity consumption**

#### **Advantages:**

Electric power has many advantages domestically and industrially, as most of the equipment run by electric power. Brightness in the night is only possible by the use of electricity. Almost all the factories and industries are running due to electric power. The advantage of electric power is its reliable and uninterrupted supply runs the equipment efficiently and continuously. The transportation of electricity is easy once the transmission lines are functional. They work for years and need no or very less maintenance. The invention of electric power is one of the best inventions which have changed human life drastically. It allows people to do more leisure activities.

#### **Disadvantages:**

In the conventional system to generate electric power, coal is burnt to generate heat which boils the water to produce steam. The steam produced is used to run the turbines which in turn generate the electricity. This is a very old method to generate electricity which produces too much air pollution as a by-product. Due to the burning of coal, carbon monoxide, carbon dioxide, different oxides of sulphur and nitrogen are pumped into the atmosphere which pollutes it badly. As carbon dioxide is the greenhouse gas and its excessive presence in the atmosphere raises the earth's temperature.



### Electric Power Industry:

Commercial production of electric power was started from 1882. Earlier, distribution of **electric power** was in a limited area, but when the distribution lines started its use also increased exponentially. The main objective the electric power industries are to generate electricity, transmit and distribute over long distances and sale. Nowadays, electrical transmission lines are the artilleries of the growing economies.

Power plants generate electric power. This is transmitted to power substations through transmission lines. These power substations then distribute to end-users through distribution lines. The combination of this transmission and distribution network is known as the electric power grid. In India, it is the National Grid.

Electrical power transmission is done at the high voltage at a range of 2 kV to 35 kV to minimize the transmission losses. Then this voltage is reduced to distribute to end-users by using step-down transformers. These transformers reduce the voltage from 2 kV to 220 V. In India, most of the domestic electrical equipment works at this voltage. Excessive voltage can damage the equipment.



## **Benefits of Energy Efficiency:**

Using [energy more efficiently](#) is one of the fastest, most cost-effective ways to save money, reduce greenhouse gas emissions, create jobs, and meet growing energy demand. The many benefits of energy efficiency include:

### **Environmental:**

Increased efficiency can lower greenhouse gas (GHG) emissions and other pollutants, as well as decrease water use.

### **Economic:**

Improving energy efficiency can lower individual utility bills, create jobs, and help stabilize electricity prices and volatility.

#### Utility system benefits:

Energy efficiency can provide long-term benefits by lowering overall electricity demand, thus reducing the need to invest in new electricity generation and transmission infrastructure.

#### Risk Management:

Energy efficiency also helps diversify utility resource portfolios and can be a hedge against uncertainty associated with fluctuating fuel.

#### Local Government Operations:

Energy costs can be a significant line item in a local government's annual operating budget. By investing in energy efficiency, local governments can achieve substantial energy cost savings across their facilities, and demonstrate energy and environmental leadership. In addition to improving the efficiency of existing and new facilities, local governments can incorporate energy efficiency criteria into product procurement decisions.

- Municipal water and wastewater facilities are typically the largest consumers of energy in municipal operations.





### Residentials:

Helping homeowners improve energy efficiency in their homes can be an effective strategy for local governments to reduce energy demand, help households save money, improve comfort and reduce greenhouse.

### Utilities and energy efficient program:

By working with electric and gas utilities, regional energy efficiency alliances, and other organizations dedicated to improving energy efficiency, local governments can leverage resources and capitalize on the expertise and unique abilities of utilities and alliances to improve energy efficiency among end users in their jurisdictions.

## APPLICATIONS:

When we talk about residential uses of energy, these are the most basic uses of energy. They include watching television, washing clothes, heating and lighting the home, taking a shower, working from home on your laptop or computer, running appliances and cooking.



To reduce electricity usage in our life as follows:

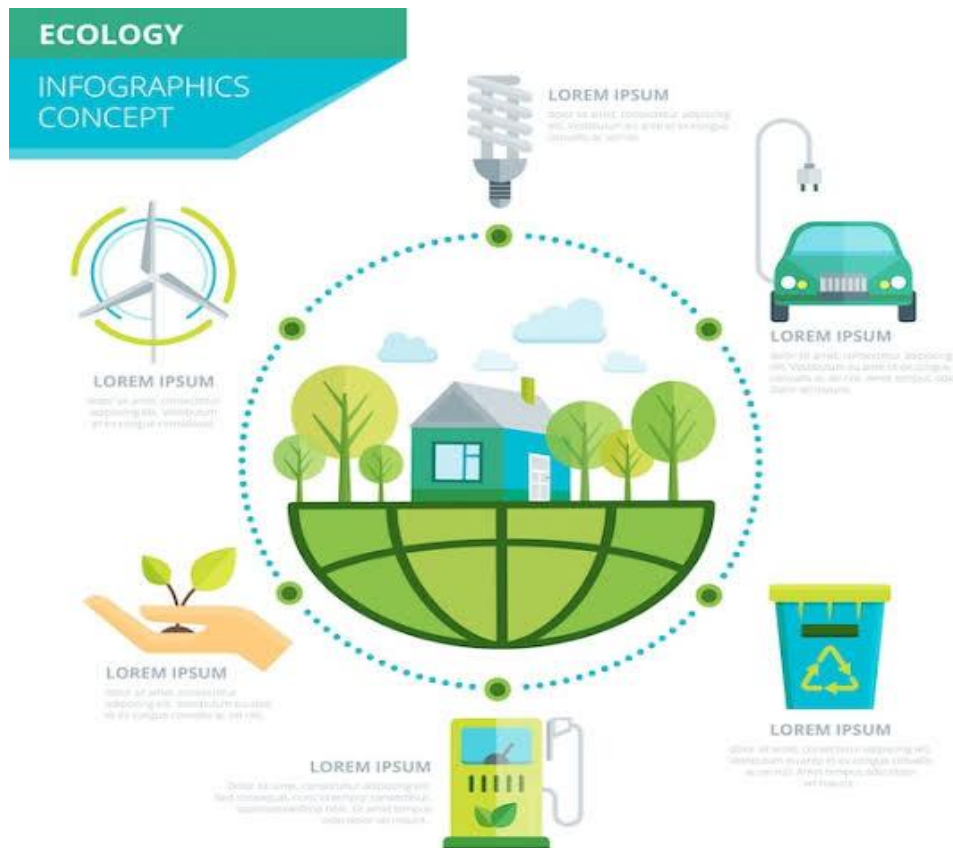
- Cooling and heating: 47% of energy use.
- Water heater: 14% of energy use.
- Washer and dryer: 13% of energy use.
- Lighting: 12% of energy use.
- Refrigerator: 4% of energy use.
- Electric oven: 3-4% of energy use.
- TV, DVD, cable box: 3% of energy use.
- Dishwasher: 2% of energy use.

Turning off the light when you leave the room, unplugging appliances when they're not in use and walking instead of driving are all



examples of energy conservation. The two main reasons people conserve energy are to gain more control over their energy bill and reduce the demand on the earth's natural resources.

## CONCLUSION:



In the conclusions, current through a given area of a conductor is the net charge that passes per unit time through the conductor. To keep up a gradual current, we must have a circuit within which an electrical phenomenon occurs from lower to higher mechanical energy. Generally speaking, electricity consumption grows after when the industrialization process develops quickly and goes down rapidly when industrialization is completed. Electricity is a crucial aspect of modern living and the economy. Electricity is a collection of physical phenomenon related to the presents and motion of matter with an electric charge.

