COVER PAGE

INTRODUCTION TO DATA MANAGEMENT   PROJECT REPORT

(Project Semester August-December 2020)

RENEWABLE ELECTRICITY PRODUCTION

Submitted by

Gatla Akanksh

Registration No: 11812121

Programme and Section: B.Tech CSE and KM073

Course Code INT-217

Under the Guidance of

Miss. Ashu U.Id 23631 Assistant Professor

Discipline of CSE/IT

Lovely School of Computer science and engineering

Lovely Professional University, Phagwara

CERTIFICATE

This is to certify that Gatla Akanksh bearing Registration no.11812121 has completed INT-217 project titled, **"Renewable Electricity Production***"* under my guidance and supervision. To the best of my knowledge, the present work is the result of his/her original development, effort and study.

Signature and Name of the Supervisor

Designation of the Supervisor

School of Computer Science and Engineering

Lovely Professional University

Phagwara, Punjab.

Date: 1-12-2020

DECLARATION

I, Gatla Akanksh, student of Introduction to Data Management under CSE/IT Discipline at, Lovely Professional University, Punjab, hereby declare that all the information furnished in this project report is based on my own intensive work and is genuine.

Date: 1-12-2020   Signature

Registration No: 11812121   Gatla Akanksh

Acknowledgement

The success and the outcome of this project requires a lot of guidance and assistance which I got from my faculty. All that I have done of this project is only due to such supervision and assistance of her and for that I obviously need to thank her.

I respect and thank my faculty, for providing me with this opportunity to perform the **Data Management Project** and giving me all support and guidance, which helped me to complete the project successfully. I am extremely thankful to her for providing such a good support and guidance all through the semester.

Gatla Akanksh

Table of Contents:

1. Introduction

I have undertaken a project titled "Renewable Electricity Production". In this project I have used various topics which I had learnt from this course all through the semester. This dataset named "Renewable Electricity Production" contains all the information of every country production of energy via different renewable sources like wind, solar, hydro, geothermal, biomass.

This dataset contains energy extracted by 217 countries. It wholly contains 20 columns which give enough information regarding the energy extracted compared to energy extracted by renewable sources.
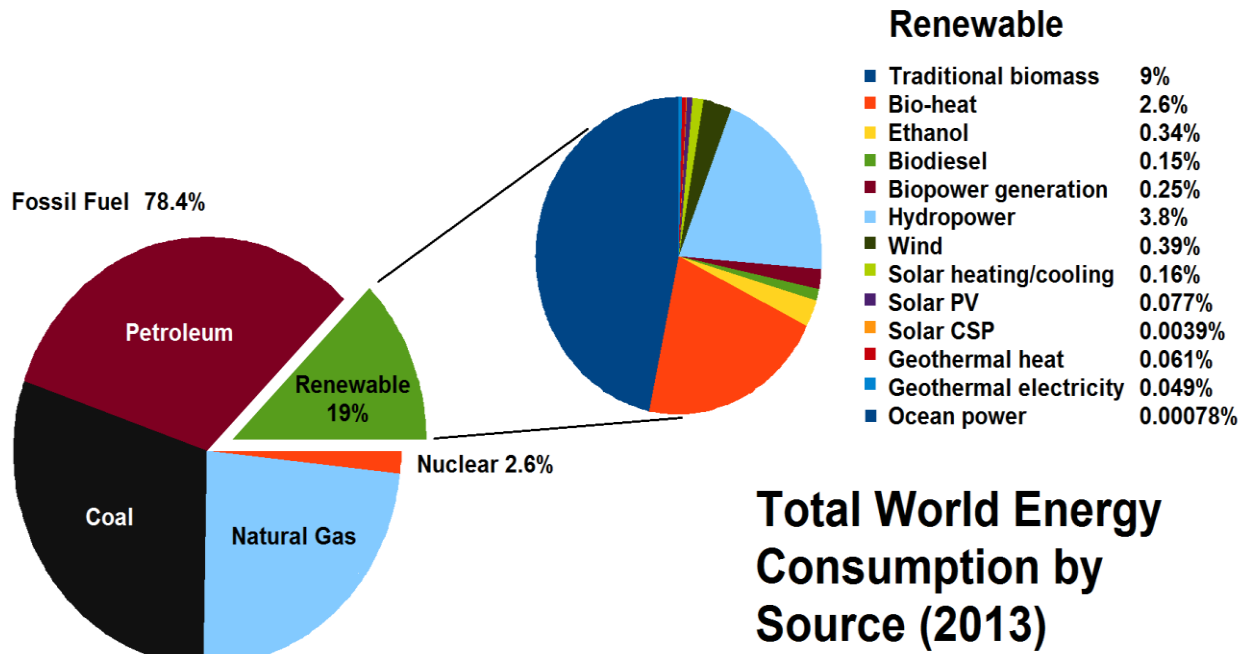
Some Introduction of Renewable Energy Production:

As in future generations, The only way to live is with renewable energy, it is ultimately the only source for us , so I got an idea to get to know in which country the energy is extracted more and how do they utilize with sources with equal distribution for their country growth for their better future.

I too feel like our country should even learn to produce more efficiently after looking at their stats which will help them to overcome future growth sustainably.

Electricity is not freely available in nature, so it must be "produced" (that is, transforming other forms of energy to electricity). Production is carried out in power stations (also called "power plants"). Electricity is most often generated at a power plant by electromechanical generators, primarily driven by heat engines fueled by combustion or nuclear fission but also by other means such as the kinetic energy of flowing water and wind. Other energy sources include solar photovoltaics and geothermal power.

By 2040, renewable energy is projected to equal coal and natural gas electricity generation. Several jurisdictions, including Denmark, Germany, the state of South Australia and some US states have achieved high integration of variable renewables. For example, in 2015 wind power met 42% of electricity demand in Denmark, 23.2% in Portugal and 15.5% in Uruguay. Interconnectors enable countries to balance electricity systems by allowing the import and export of renewable energy. Innovative hybrid systems have emerged between countries and regions

Renewable

■ Traditional biomass	9%
■ Bio-heat	2.6%
■ Ethanol	0.34%
■ Biodiesel	0.15%
■ Biopower generation	0.25%
■ Hydropower	3.8%
■ Wind	0.39%
■ Solar heating/cooling	0.16%
■ Solar PV	0.077%
■ Solar CSP	0.0039%
■ Geothermal heat	0.061%
■ Geothermal electricity	0.049%
■ Ocean power	0.00078%

Total World Energy Consumption by Source (2013)

General Description of the Dataset:

This project dataset consists of 17 columns namely: Country, Year, Total, Total RE, % of RE in Total   [H] GWh, % of total [H], % of RE [H], GWh [W], % of total [W], % of RE [W], GWh [B & W], % of total [B & W], % of RE [B & W], GWh [S], % of total [S], % of RE [S], GWh [G], % of total [G], % of RE [G].

Using this dataset, I have created a DASHBOARD which contains some dynamic charts of

      1. Renewable source of wind energy country wise

      2. Top 10 country in terms of solar energy

      3. Charts of geothermal energy country wise

      4. Graph Total amount of energy extracted by Each Country vs Amount of Energy Extracted from renewable

      5. Hydro Energy Generation and Biomass Energy Source Country Wise

And created a clear information of release years by using a Slicer.

I have also used HYPERLINKING which gives us a clear information regarding the data set.

2. Objectives/Scope of the Analysis:

The main objectives of the dataset are:

 a. Clean the dataset if necessary.

 b. To show the different type of sources used to generate energy for electricity

 c. To show the most active countries.

 d. To show stats of every country comparison via wind , solar, geothermal, etc.

 e. To show the country and plotting the graphs immediately using SLICER.

 f. To show the comparison of energy extracted using renewable in all countries.

 g. And finally, to show a DASHBOARD which contains all these neatly and clearly.

3. Source of dataset:

Country or territory	Year	Total (GWh)	Total R (GWh)	RE % of total	Hydropower			Wind power			Biomass and waste			Solar power			Geothermal		
					GWh	% of total	% of RE	GWh	% of total	% of RE	GWh	% of total	% of RE	GWh	% of total	% of RE	GWh	% of total	% of RE
Afghanistan	2016		1,071		1,035		96.70%	0.1		0.00%			0.00%	35.5		3.30%			
Albania	2016	7,782	7,784	100%	7782	100.00%	100.00%		0.00%	0.00%		0.00%	0.00%	1.9	0.00%	0.00%			
Algeria	2016	70,997	430.5	0.60%	72	0.10%	16.70%	19.4	0.00%	4.50%		0.00%	0.00%	339.1	0.50%	78.80%			
Angola	2016	10,361	7,282	70.30%	7109	68.60%	97.60%		0.00%	0.00%	155	1.50%	2.10%	18.3	0.20%	0.30%			
Anguilla	2016		2.4				0.00%			0.00%			0.00%	2.4		100.00%			
Antigua and Barbuda	2016		5.5				0.00%			0.00%			0.00%	5.5		100.00%			
Argentina	2016	1,47,220	31,700	21.50%	30,134.80	20.50%	95.10%	554.1	0.40%	1.70%	1,820	1.20%	5.70%	14.5	0.00%	0.00%			
Armenia	2016	7,315	2,354	32.20%	2351.2	32.10%	99.90%	1.8	0.00%	0.10%		0.00%	0.00%	1.2	0.00%	0.10%			
Aruba	2016		148.5				0.00%	130.3		87.70%	8.9		6.00%	9.2		6.20%			
Australia	2016	2,56,563	37,205	14.50%	15,318	6.00%	41.20%	12,199	4.80%	32.80%	3722	1.50%	10.00%	6209	2.40%	16.70%	1	0.00%	0.00%
Austria	2016	68,351	50,772	74.30%	42,919	62.80%	84.50%	5235	7.70%	10.30%	4603	6.70%	9.10%	1096	1.60%	2.20%			
Azerbaijan	2016	24,953	2,192	8.80%	1,959	7.90%	89.40%	22.8	0.10%	1.00%	174.5	0.70%	8.00%	35.3	0.10%	1.60%			
Bahamas	2016		1.9				0.00%			0.00%			0.00%	1.9		100.00%			
Bahrain	2016	28,510	9.5	0.00%		0.00%	0.00%	1.2	0.00%	12.60%		0.00%	0.00%	8.3	0.00%	87.40%			
Bangladesh	2016	64,327	1183	1.80%	946	1.50%	80.00%	5.1	0.00%	0.40%	7.7	0.00%	0.70%	224.3	0.30%	19.00%			
Barbados	2016		29.6				0.00%	0.1		0.30%			0.00%	29.5		99.70%			
Belarus	2016	33,566	392	1.20%	141.9	0.40%	36.20%	74.8	0.20%	19.10%	147.2	0.40%	37.60%	28.1	0.10%	7.20%			
Belgium	2016	85,520	14,168	16.60%	1489	1.70%	10.50%	5436	6.40%	38.40%	5276	6.20%	37.20%	3086	3.60%	21.80%			
Belize	2016		383.1		260.5		68.00%			0.00%	117.4		30.60%	5.3		1.40%			
Benin	2016	355	11.2	3.20%	1	0.30%	8.90%		0.00%	0.00%		0.00%	0.00%	10.2	2.90%	91.10%			
Islands	2016		38.2				0.00%	35.1		91.90%			0.00%	3.1		8.10%			
Bhutan	2016		7,962		7959		100.00%	1.8		0.00%			0.00%	0.7		0.00%			
Bolivia	2016	9,409	1,937	20.60%	1,720	18.30%	88.80%	34.9	0.40%	1.80%	176.2	1.90%	9.10%	5.7	0.10%	0.30%			
Bosnia and Herzegovina	2016	17,767	5,591	31.50%	5,587	31.40%	99.90%	0.8	0.00%	0.00%	36.1	0.20%	0.60%	13.4	0.10%	0.20%			

4. ETL Process:

ETL is a process that extracts the data from different source systems, then transforms the data (like applying calculations, concatenations, etc..) and finally loads the data into the Data Warehouse system. Full form of ETL is Extract, Transform and Load. It's tempting to think of creating a Data Warehouse which is simply extracting data from multiple sources and loading into database of a Warehouse. This is far from the truth and requires a complex ETL process. The ETL process requires active inputs from various stakeholder including developers, analysts, testers, top executives and is technically challenging.

Step 1: Extraction:

In this step, data is extracted from the source system into the staging area. Transformations if any are done in staging area so that performance of source system in not degraded. Also, if corrupted data is copied directly from the source into Data warehouse database, rollback will be a challenge. Staging area gives an opportunity to validate extracted data before it moves into the Data warehouse.

Step 2: Transformation:

Data extracted from source server is raw and not usable in its original form. Therefore, it needs to be cleansed, mapped and transformed. In fact, this is the key step where ETL process adds value and changes data such that insightful BI reports can be generated. In this dataset I had to change the Coolum names as few columns are repeated as it is should be different to perform pivot tables. Renaming and cleaning the data set.

Step 3: Loading:

Loading data into the target Data Warehouse database is the last step of the ETL process. In a typical Data warehouse, huge volume of data needs to be loaded in a relatively short period (nights). Hence, load process should be optimized for performance.

5. Analysis on Dataset (for each analysis):

Introduction:

   I have undertaken a project titled "Renewable electricity production". In this project I used various topics that I have learnt from this course. This project named "Renewable electricity production" is about the   trending topic in future for sustainable energy production for electricity. So, this data set will help where our country is lacking and make use of them and start producing accordingly.

From this dataset some information is taken into consideration and with using the topics taught by our faculty we have made an analysis report which explains you regarding the topics taken. Here I provide the screenshots of what the analysis I have done regarding the topics wise.

1ˢᵗ Analysis:

Firstly, here you can see the screenshot of both the data table and the dynamic chart performed on it. It provides you the information of top 10 renewable energy with wind energy sources with respect to country stats and can change with the help of dashboard.
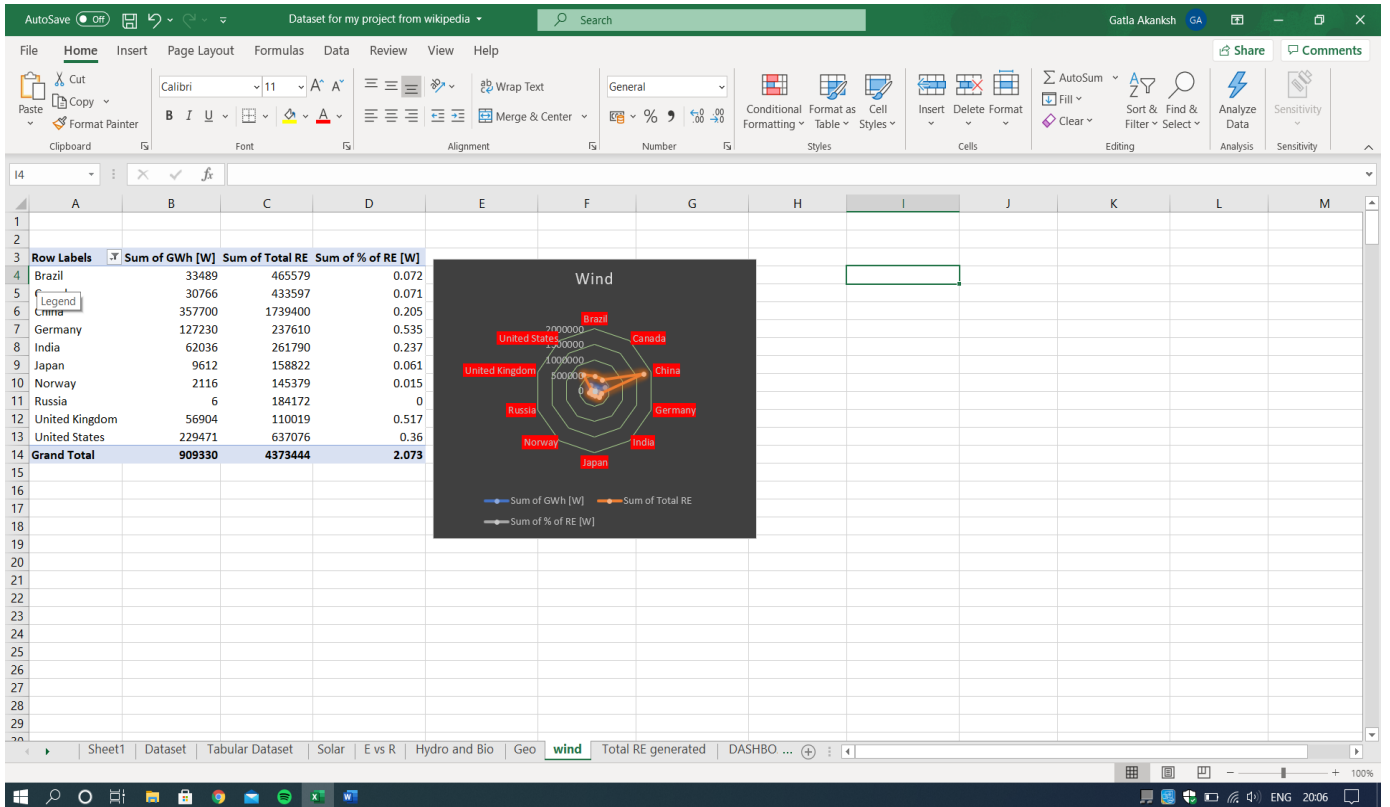
General Description:

Here in the first analysis I have taken the column of values which are generating by wind source and row labels are country and generated a radar chart.

Specific Requirements, functions and formulas:

Here I have used the topic of Pivot table in showing the sum of renewable wind source energy as per country and their grand total. And I have used the topic of Dynamic charts i.e radar chart for the representation of the pivot table which is called Data visualization which is very much useful in the analysing of the data given.

Data visualization:

2nd Analysis:

Here in the second analysis you can see the screenshot of both the data table and the chart of the analysed data regarding top 10 country in terms of solar energy.
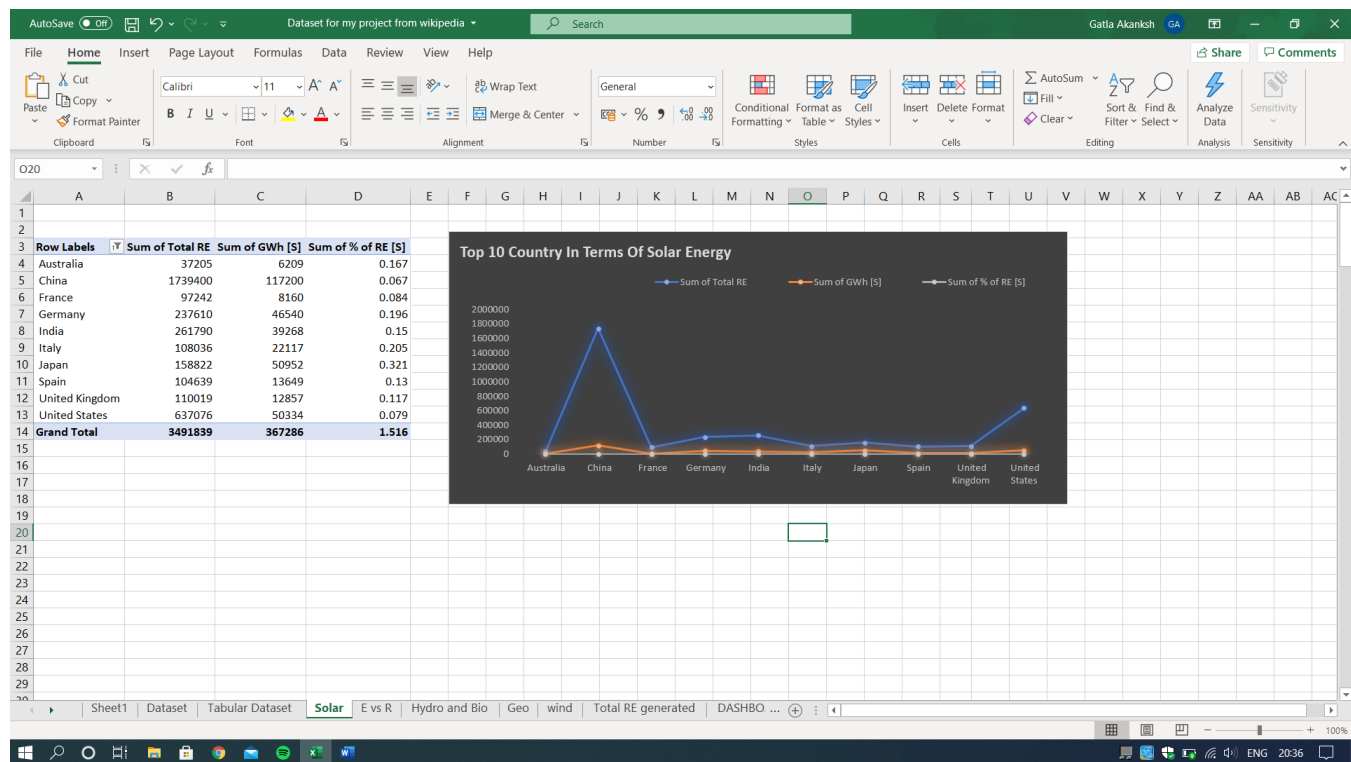
General description:

Here in the second analysis I have taken the column of the country where I showed the sum of re the most active countries using solar energy source.

Specific requirements, functions and formulas:

Here I have used the topic of pivoting in showing the most 10 active countries in terms of solar energy and used the concept of Data visualization in showing the analysis more clearly and can change via dashboard.

Data visualization:

3rd Analysis:

Here in the third analysis you can see the screenshot of both the data table and the Dynamic chart performed, which shows geothermal energy country wise.
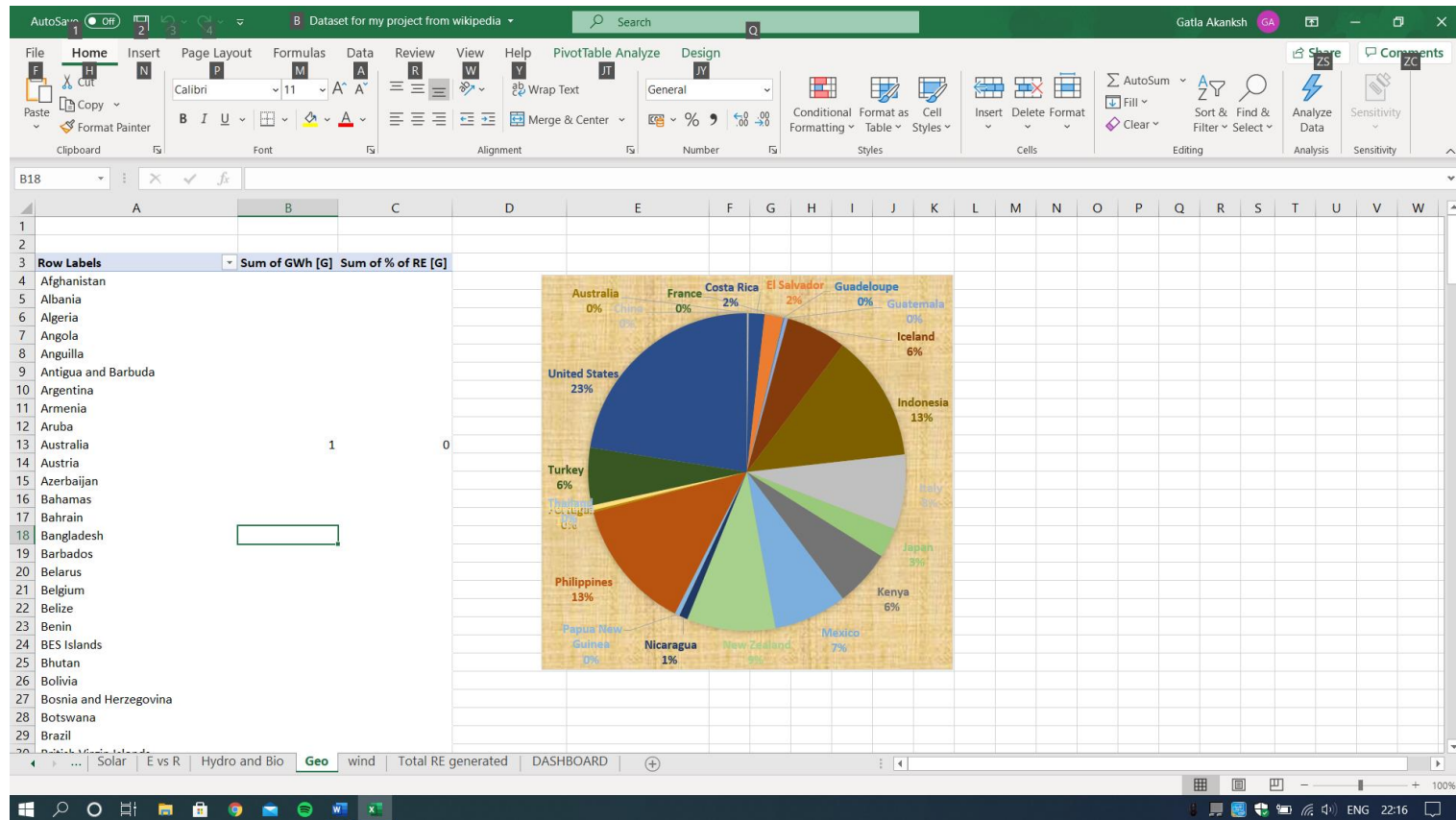
General description:

Here in the third analysis I have taken the column as values generated in percentage country wise as row labels.

Specific requirements, functions and formulas:

Here I have used the topic of pivot table which gives geothermal energy which is produced I few country with their percentage how much its is extracted representing these I have used the concept of charts of data visualization.

Data visualization:

4th analysis:

Here in the fourth analysis you can see the screenshot having a world map with details which shows the total amount of energy extracted by each country.
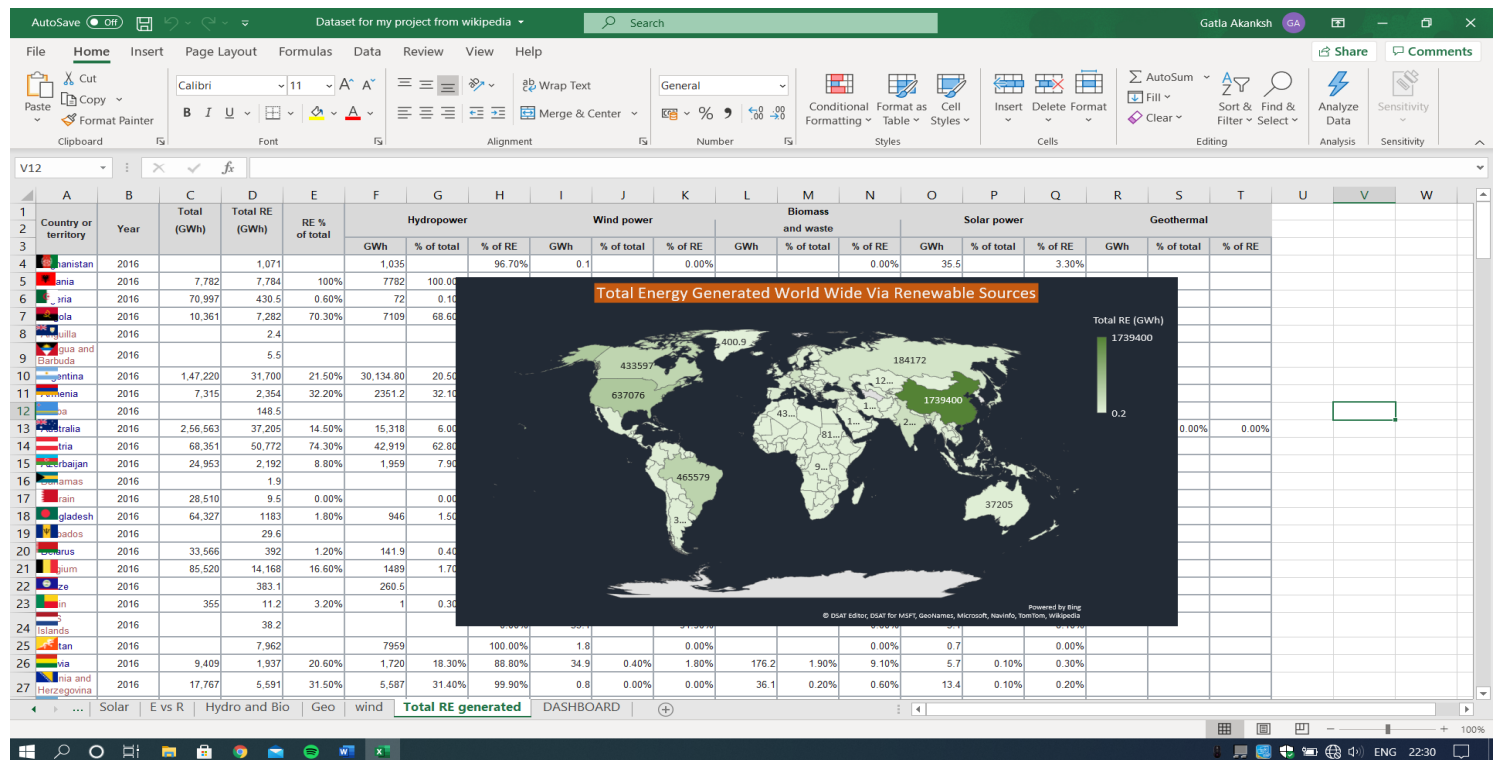
General description:

Here in the fourth analysis with the help of dataset I have put a map with the option present.

Specific requirements, functions and formulas:

Here I have used the topic of normal data usage and making use of it in the form and creating a map with major energy extracted.

Data visualization:

5th analysis:

Here you can see the screenshot of both the data table and the dynamic chart performed on it. It provides you the information of the hydro energy generation and bio mass energy source country wise.

General Description:

Here in the fifth analysis I have taken the columns as values of energy generation and rows as country name using Dynamic charts.

Specific Requirements, functions and formulas:

Here I have used the topic of Pivot table in showing Hydro energy Generation and Biomass Energy Source Progression. And used the topic of dynamic charts for the Data visualization which is very much useful in the analysing of the data given.

Data visualization:
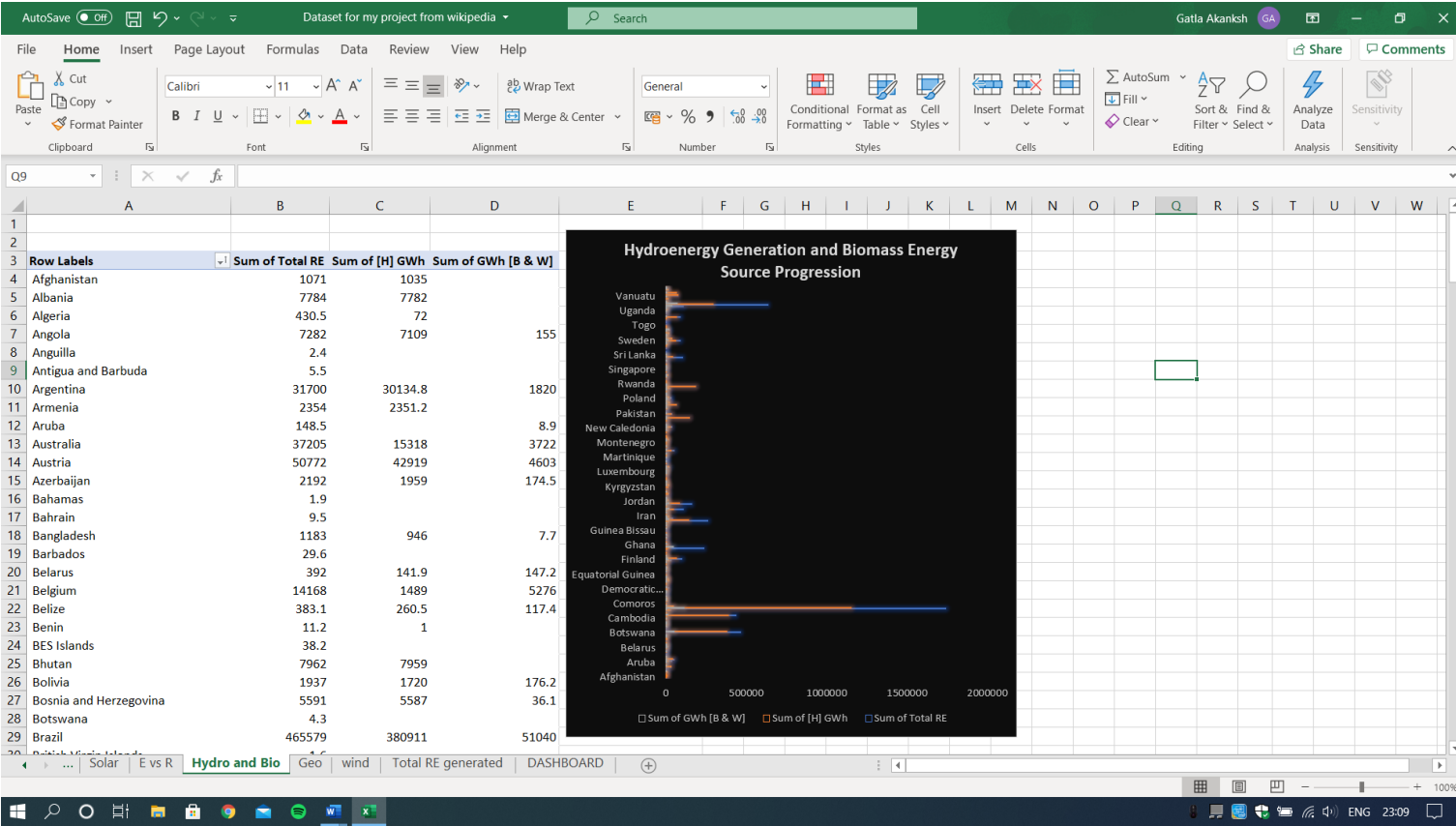
Here you can see the screenshot of the DASHBOARD which contains all the information of what I have performed in this project of the information of

1. Renewable source of wind energy country wise

2. Top 10 country in terms of solar energy

3. Charts of geothermal energy country wise

4. Graph Total amount of energy extracted by each country vs amount of energy extracted from renewable

5. Hydro energy generation and biomass energy source country wise.

Here you can also see the table of the release year which is created by using SLICER which shows the countries where we can select to get the information and get stats.

Here in this dashboard you can see the pivot tables which are very much helpful in analysing the data and also helps in filtering the data according to the rows, columns what we have taken into consideration.

Here we use the SLICER by, on the home tab we go to insert and there to slicer. In the insert slicers dialog box, select the check boxes for the fields we want to display then click on Ok. A slicer will be created for every field that we selected. Clicking on slicer will apply that filter to the pivot table.

6. Dashboard:
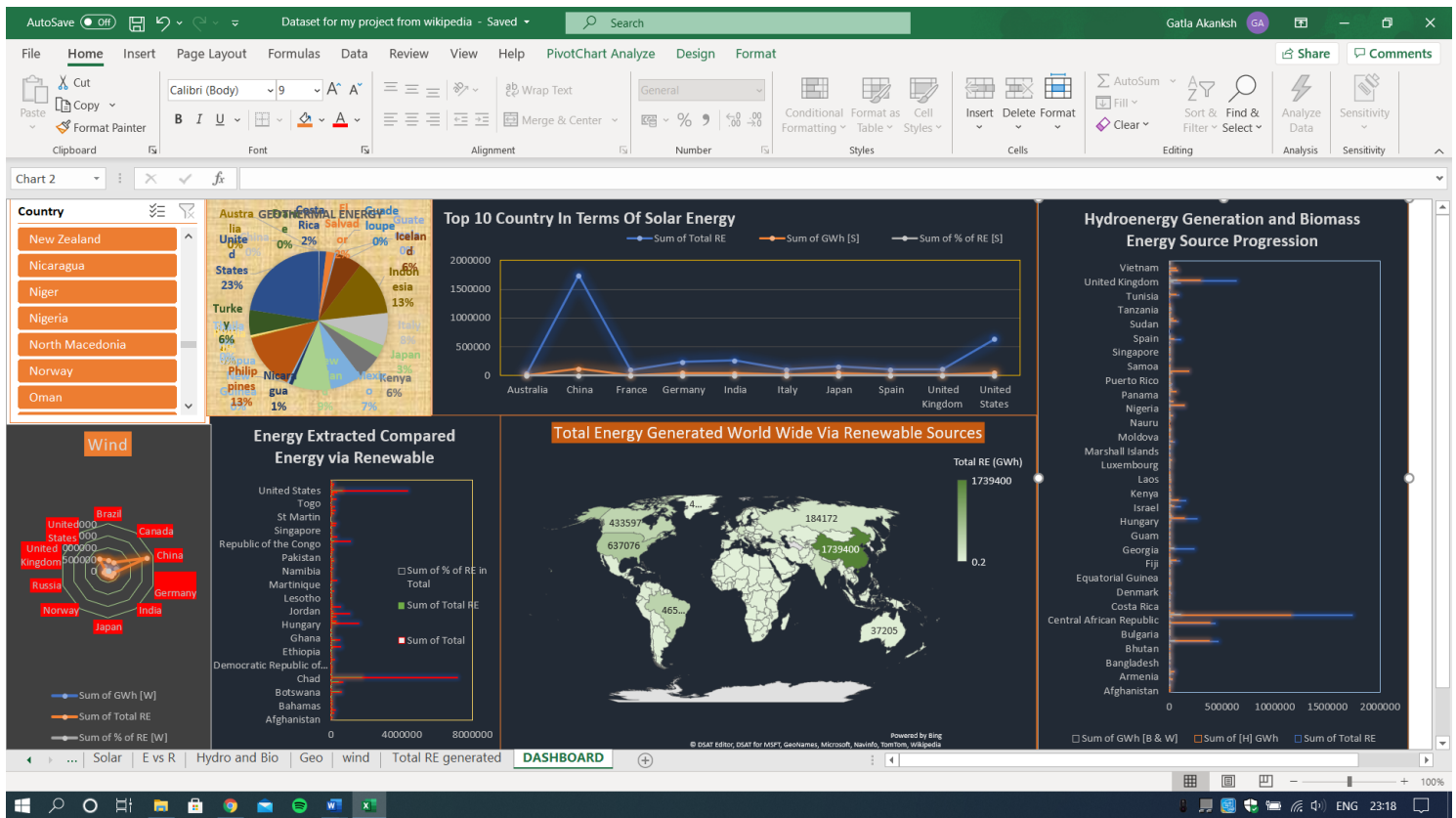
7. References:

https://en.wikipedia.org/wiki/List_of_countries_by_renewable_electricity_production

-----------------------Thank You-----------------------