



Climate Change

Exploring the causes and impacts of climate change at the global level through data visualizations.

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Background

- Climate Change has been a cause of major concern worldwide, since many years and the issue has been even raised and discussed by many international organizations.
- Climate Change or Global warming are the terms that are often used interchangeably but more precisely, global warming is referred to, the overall increase in temperatures worldwide, due to human activities and climate change on the other hand, involves precipitation of the glaciers, which are nothing but impacts of global warming.

Dataset

Dataset sources :

Data relating to the sea level changes, glacier mass balance, temperatures, precipitation was collected from different online sources .

Few of them are listed below-

- <https://climateknowledgeportal.worldbank.org/download-data>
- <https://datahub.io/collections/climate-change>
- <http://www.antarcticglaciers.org/glacier-processes/mass-balance/introduction-glacier-mass-balance/>

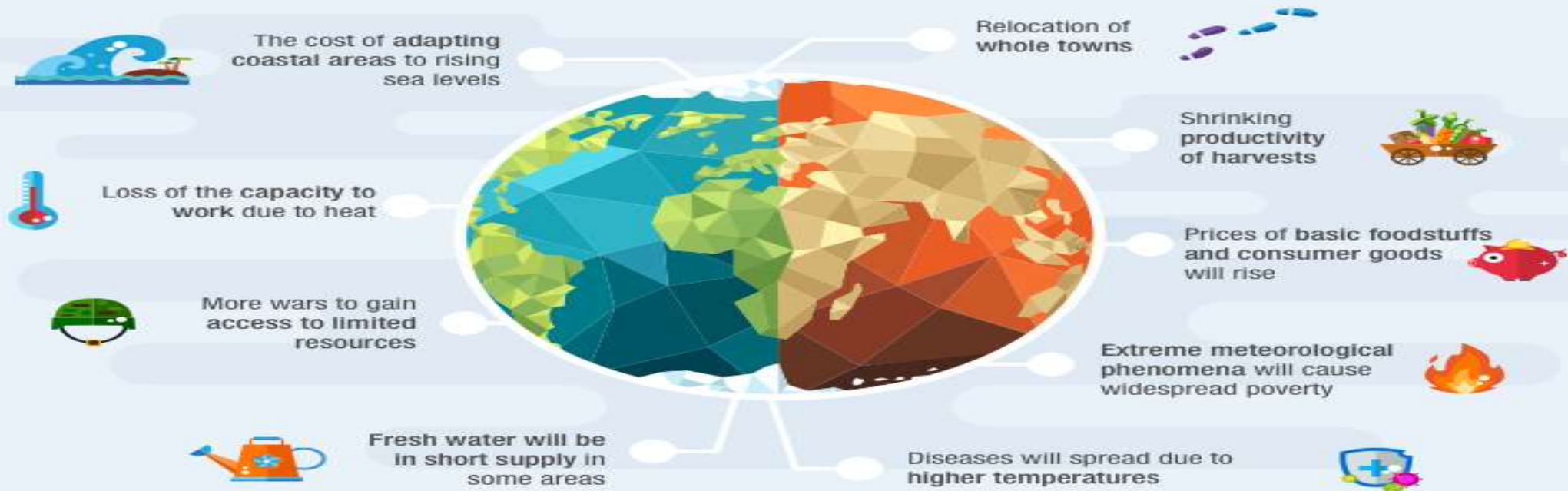
Data Processing :

- Data Cleaning
 - There were rows having multiple null values for the corresponding attributes.
 - Rows having two or more attribute values as null were deleted.
- Data Standardization
 - Attributes like Year and Country were in the String format in the data.
 - Year was converted to Date format and country to Country/Region data type in order to perform suitable visualizations.
 - Certain calculated fields were used on the measures to calculate percentages of certain entities.

What are the impacts of Climate Change?



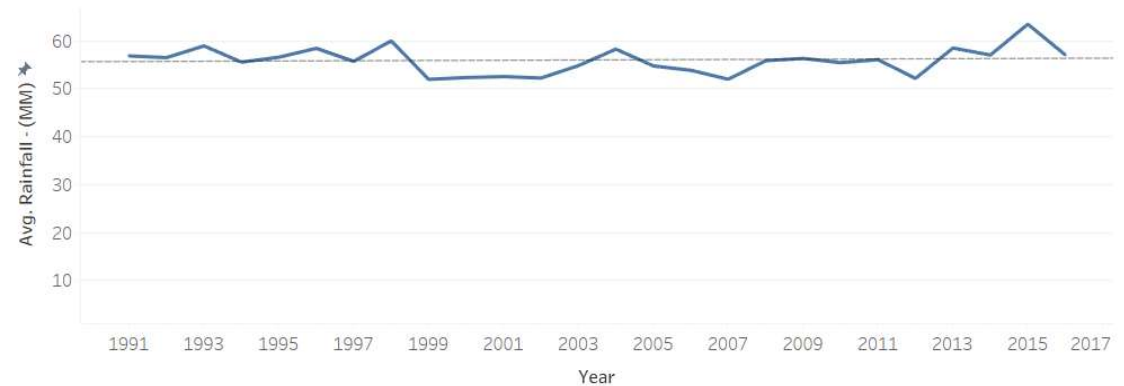
SOCIAL AND ECONOMIC IMPACT OF CLIMATE CHANGE



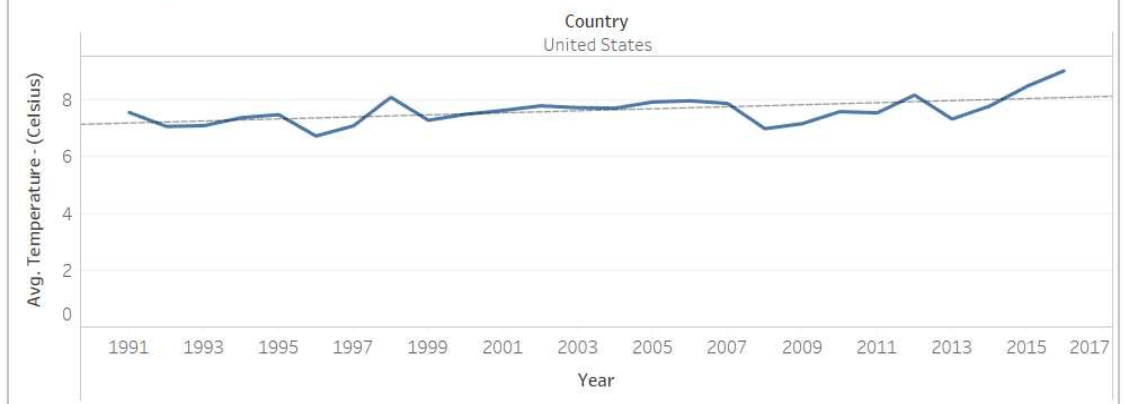
Impacts of climate change.

- Increase in temperatures.
 - Climate change has lead to global temperature rise of 2 to 5 degrees worldwide from the years ranging from 1991 to 2017 as seen in the figure.
- Change in rainfall patterns.
 - There has been a 5% deviation in the overall rainfall patterns from the years ranging from 1991 to 2017.

Trends in rainfall over years



Global temperature trends



Impacts of Climate Change

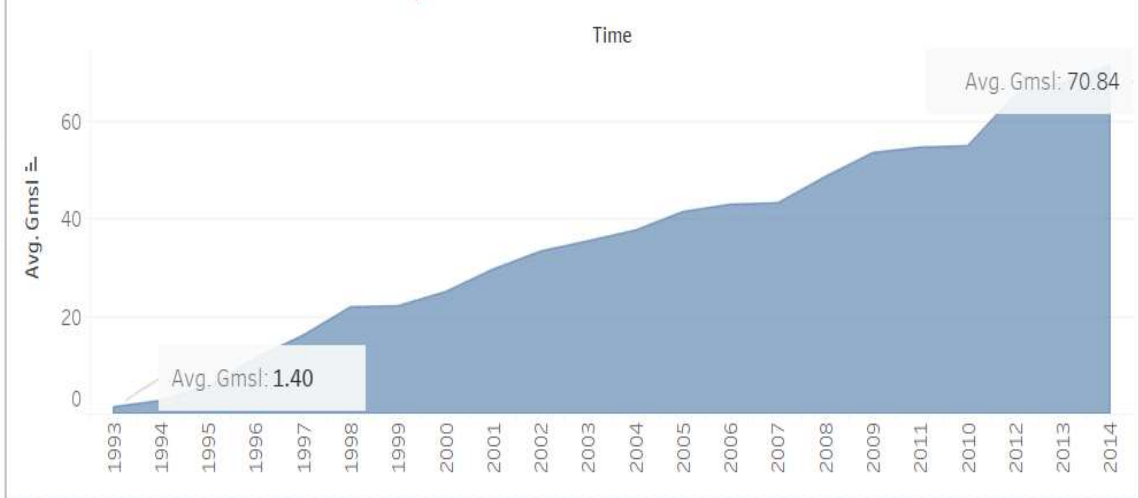
Sea level rise over the years.

- There has been a rise of about 2.8 inches in the sea level from 1993 to 2014. The overall rise is about 6 inches till the current year.
- The NASA has predicted that the sea level may rise up to 4 feet till 2100, thereby bringing major coastal areas and ports under water.

Changes in the glacier mass balance.

- Mass balance is simply the gain and loss of ice from the glacier system.
- Glaciers losing more mass than they receive will be in negative mass balance and so will recede. Glaciers gaining more mass than they lose will be in positive mass balance and will advance.
- It is evident from the visualization that the glacier mass balance has turned negative over the years from 1895 to 2015 and has reached the value of -17000 in the year 2017.

Global Sea level rise over the years



Global Glacier Mass Balance



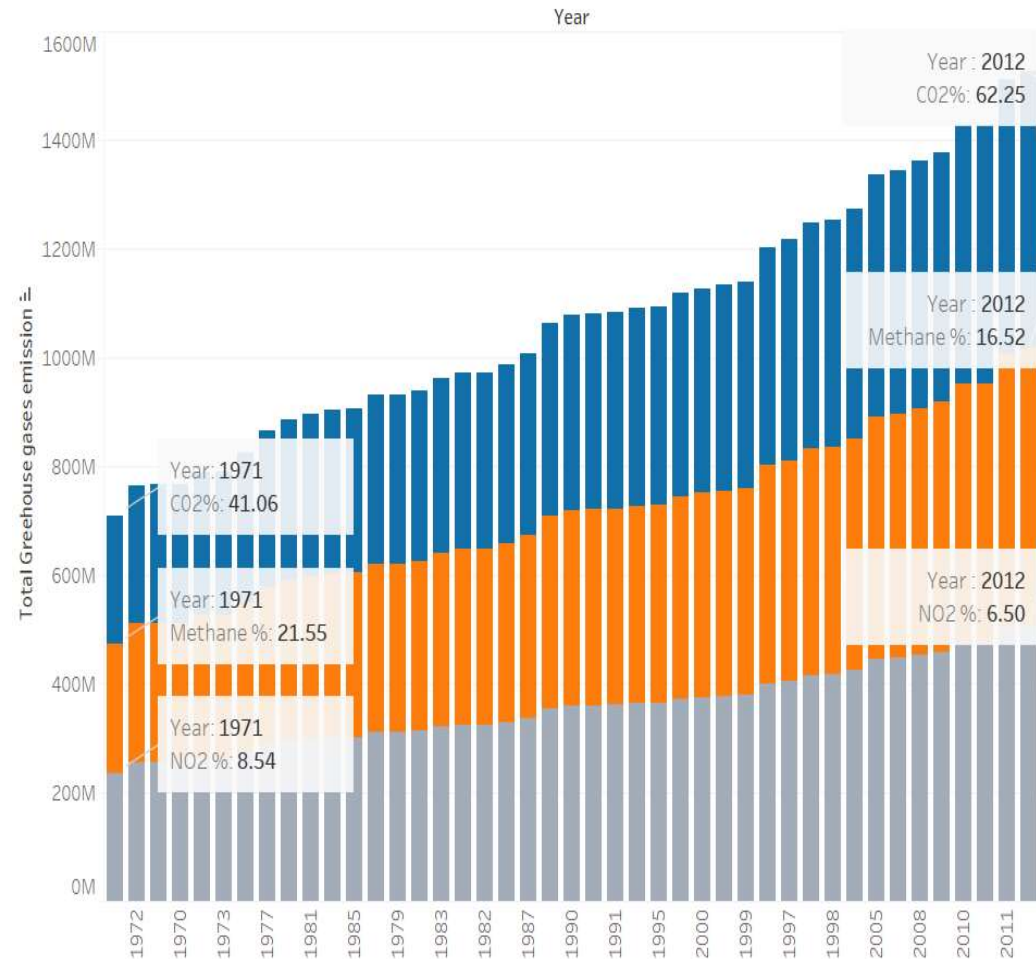
Reasons for Climate Change

- There are various reasons for climate change such as natural and anthropogenic.
- Natural reasons include forest fires, volcanic eruptions etc.
- Anthropogenic reasons involve deforestation, industrialization, use of chemical fertilizers etc.
- Industrialization has specifically lead to the emissions of green house gases like methane, CO₂, NO₂ and CFC's (Chloro Floro Carbons) that are responsible for causing global warming.

Reasons for Climate Change.

1. Increase in the concentrations of green house gases in the atmosphere globally.
- It can be seen from the visualizations that the emissions have increased drastically over the years from 1972 to 2012.
 - CO2 emissions form the highest percentage of all the three green house gases emissions (CO2, Methane, NO2)
 - The percentage of CO2 increased drastically from 41 % in 1971 to 62 % in 2012.
 - Methane and NO2 emissions decreased considerably from 1972 to 2012.
 - Methane decreased by 4-5%.
 - NO2 by 1-1.5%.

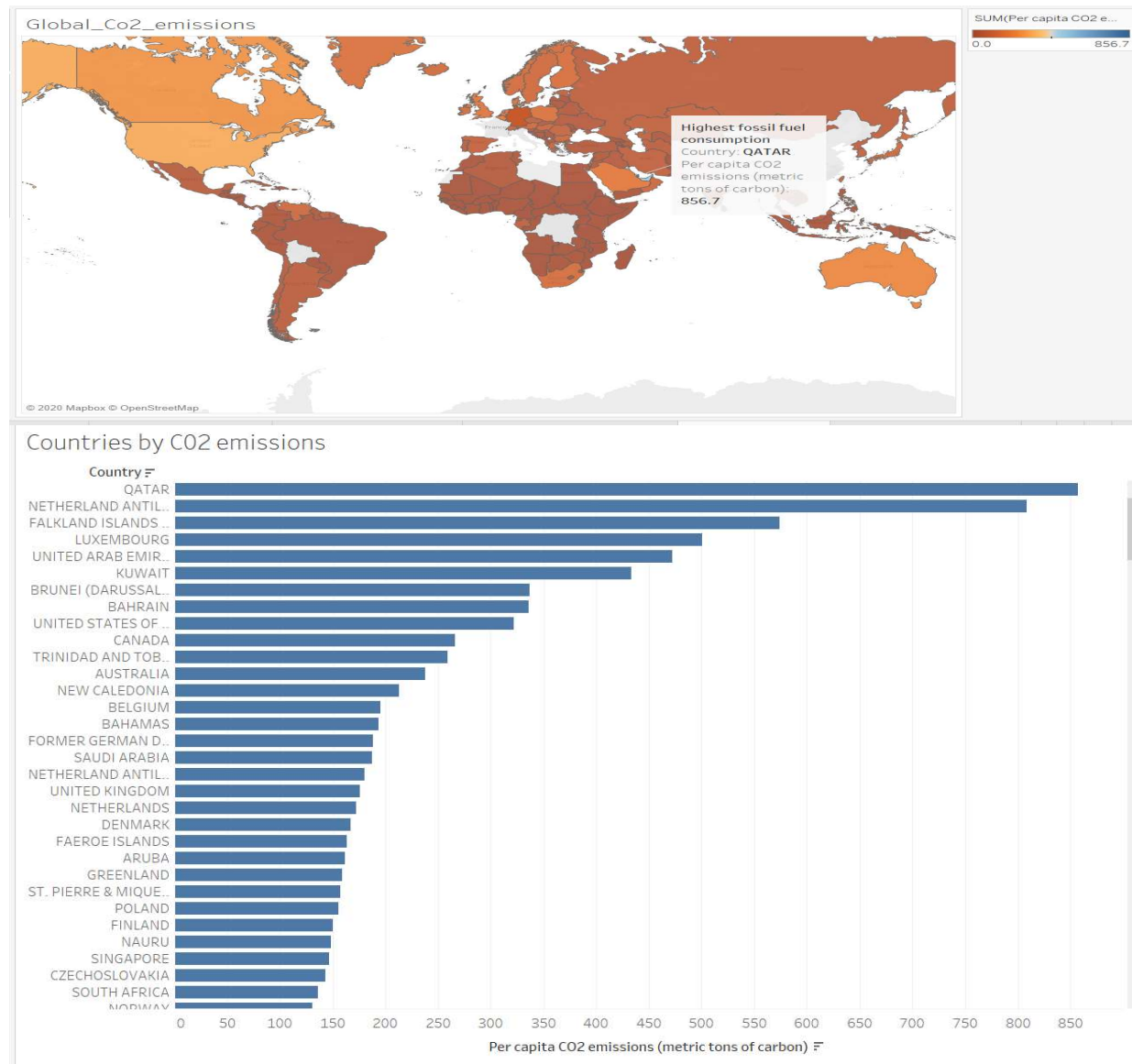
Total Green house gas emissions over the years



Reasons for Climate Change : CO2 emissions per capita

Countries with highest per capita CO2 emissions.

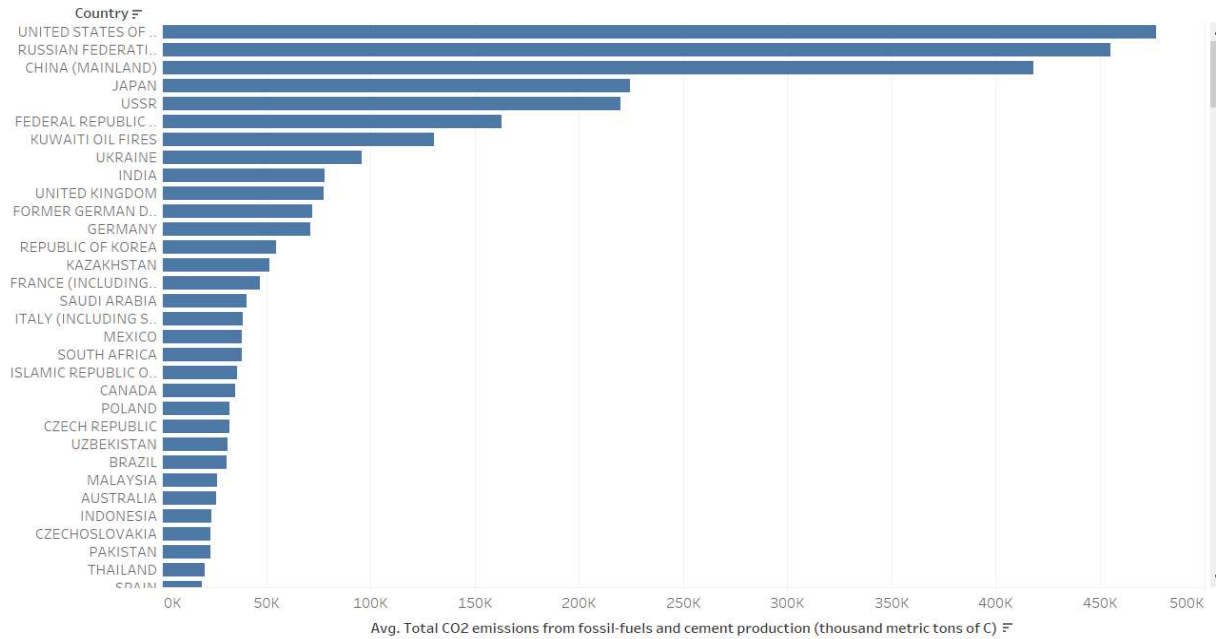
- CO2 emissions per capita are the emissions of carbon in comparison to the density of population of a particular country.
- From the visualization, it can be clearly seen that Qatar has the highest emissions per capita.(856.7 ppm of carbon).
- Other countries like Netherlands, Falkland islands, Luxemborg and United Arab Emirates(UAE), make the top five of the list.
- The data is from year 1813-2014.



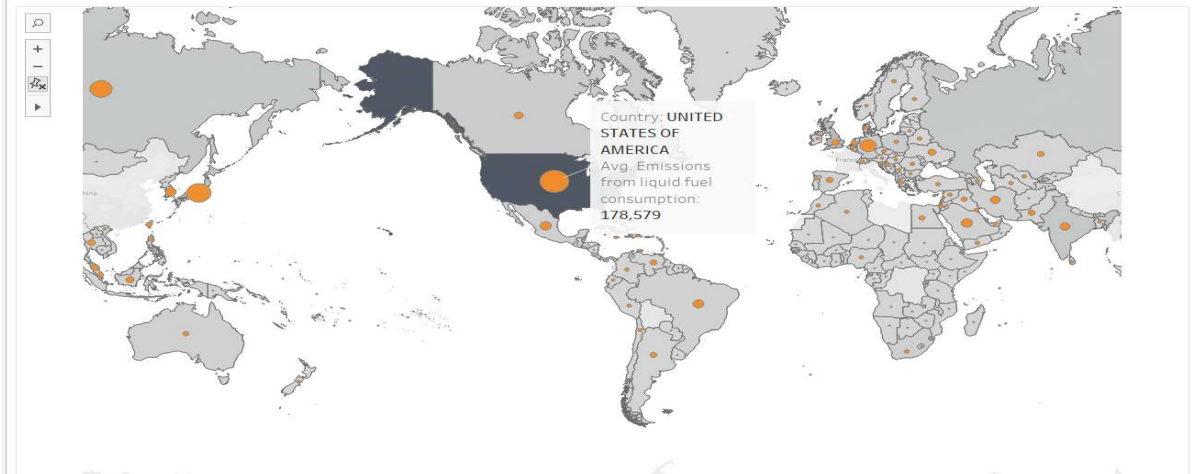
Total CO2 emissions

- USA ranks first in the overall emissions of CO2 worldwide.
- Emissions from liquid form of fossil fuels like gasoline, diesel is maximum making upto 36 % of the total fossil fuel emissions within USA.
- The other countries that form a part of the top five are Russian Federation, China, USSR, Germany, Kuwait.
- The data is from year 1813-2014.

Total Emissions worldwide from fossil fuels consumption



Liquid_fuel_consumption



CO2 emissions from fossil fuels in USA

The visualization shows the trends in various forms of fossil fuels in USA beginning from 1813 and 2014.

CO2 emissions from gas fuel, liquid fuel and solid fuel have risen considerably.

Gas flaring emissions initially showed an upward trend but then considerably decreased.

Emissions from cement production showed a slight increase over time.

Consumption of various kinds of Fossil fuels over years



References

1. <https://data.worldbank.org/indicator/EN.ATM.CO2E.KT>
2. <http://www.earth-policy.org/indicators/C51>
3. <https://www.climate.gov/maps-data/datasets/formats/json/formats/csv>
4. <https://www.epa.gov/ghgreporting/ghg-reporting-program-data-sets>

Thank you!!