CS 6730 Data Visualization Principles

M1: Project Topic and Goals

Team Name: Vizzlers

Team Members: Aparna Shree Sivanandam, Daanish Mohammed, Sahithi Mattapalli, Kartik Sharma

Topic: Global Energy Consumption over the years

What is the problem being addressed?

Energy helps economies flourish and sustains societies. Energy production and consumption is the largest contributor to global warming. There has been a steadily growing trend of switching to renewable sources of energy to help save the climate and deal with depleting conventional energy sources.

The dashboard will help provide an overview on global trends of energy consumption, usages of renewable energy sources, correlate global CO_2 emissions (carbon footprint) statistics with the energy consumption data to study how these energy sources release greenhouse gasses and also study how cost corresponds to energy demands and consumption.

Why would someone use your visualization?

- To understand the factors (GHG emissions, cost) that have led to change in the source of energies across the globe.
- To see the impact that energy production and consumption from different sources has on the country-level GHG emissions.
- To see how there has been a shift globally from conventional to renewable sources of energy.

Where is the data coming from and what are the data characteristics (How many attributes? What type? How many items? etc.)? Include a link if it's available online.

- World Energy Consumption
  - https://www.kaggle.com/datasets/pralabhpoudel/world-energy-consumption (Original source: https://ourworldindata.org/energy)
  - The dataset has around 120 attributes

    - It includes data on energy consumption (per capita and growth rates) across 240 countries over the years
- CO_2 emissions
    - https://data.worldbank.org/indicator/EN.ATM.CO2E.PC
    - Contains data about the CO_2 emissions (in metric tons) per capita for every country over the period from 1990-2019
    - Data is stored as a time-series for each country.
- Greenhouse Gas Emissions
    - https://www.iea.org/data-and-statistics/data-product/greenhouse-gas-emissions-from-energy-highlights
    - Contains a list of datasets which tells the amount of greenhouse gas emissions from various fuel combustion sources like coal, oil and gas for around 200 countries.
    - Includes per-capita emissions by sector by various countries

Who would be interested in understanding more about this data?

The interactive dashboard can be used by policy makers to identify how countries worldwide have switched to renewable sources, analyze CO_2 emissions globally and see what steps can be taken to curb emissions by following measures taken by other countries. It can also be used by researchers who are studying fuel consumption, and wish to obtain insights on how the GHG emission has changed over the years. Furthermore, it can be used by anybody that wishes to learn more about statistics related to energy consumption.

What questions would these people want to ask, and how would your vis help them answer those questions?

- What has been the change in the global energy consumption in different countries over the years ? Which countries have led the trend to shift to renewable sources ? Which countries lag behind ?
    - This can be understood using the dynamic visualization showing trends worldwide.
- Has the shift in energy sources helped in reducing emissions in the countries ? Which countries have not seen a drop in emissions at par with drop in production from non-renewable sources ? What could be the reason for this ?
    - Plotting emissions against energy consumption and sources on the map will help analysis. Coming up with a normalized metric to compare the relative drop in emissions per energy source will provide insights. Identifying other causes that may have led to increased GHG emissions for some countries (like oil spills etc.).

- What has been the driving force for shift in sources of energies across the globe ? Is it the cost or the emissions ?
    - Plotting the economic and emission factors separately along with the energy data would help understand what pushed the countries to switch to cleaner alternatives.
- How much does the source of energy depend on the geographical properties of those countries ?
    - Collecting global data such as availability of fossil fuels or water sources or the terrain type and relating it with the distribution of renewable energy sources harvested in those countries will provide insight on how geography impacts renewability.
- How does the consumption of energy and emissions relate to the total population of a country?
    - Demand is what causes surges in consumption of energy, and in turn emission of GHG. Demand is a reflection of the population, and visualizing trends of increased demands would highlight the underlying impact of population.