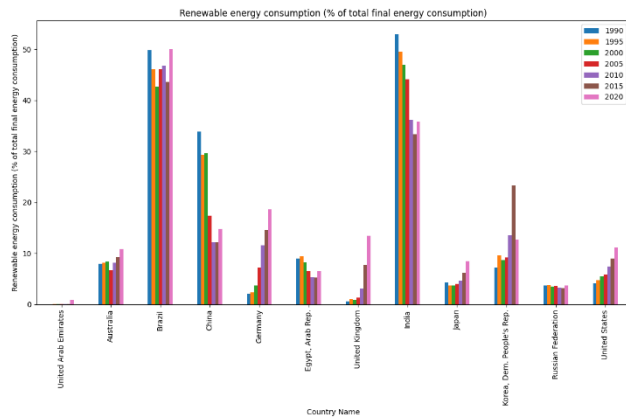
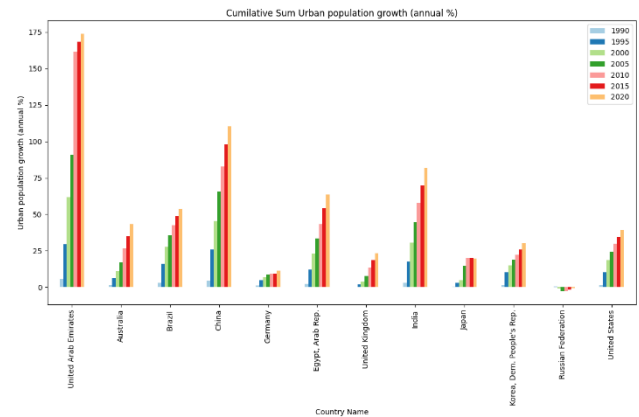


## Climate Change Analysis based on Indicators from World Bank Data

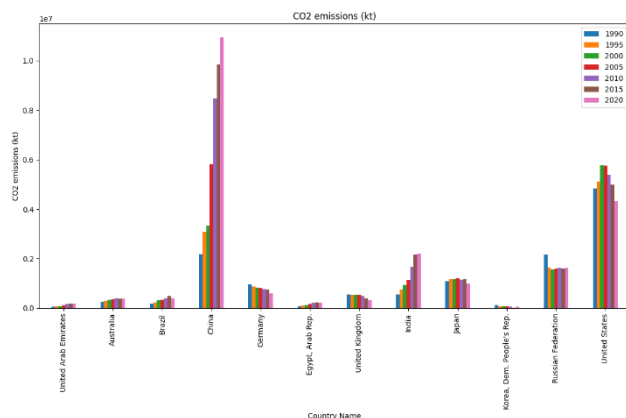
An analysis was conducted on twelve selected countries and correlation of six indicators/factors, namely, Urban Growth, Renewable Energy Consumption, Electric Power Consumption, CO<sub>2</sub> Emission, Forest Area, responsible for climate change was explored. Also, the various Region and Income Group were investigated to have an overview of their contribution.



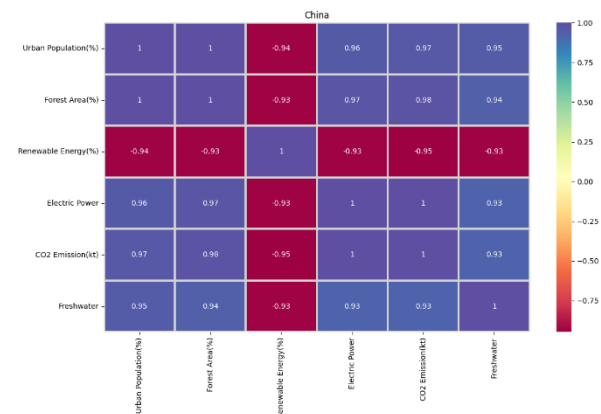
The bar plot depicts the renewable energy consumption in percentage for countries over 5 years increment from 1990 to 2020. China and India's rates have been decreasing exponentially, which can be explained by looking at the urban growth rates from bar graph on the top right. A strong correlation between these factors can be found. Brazil's current, i.e., 2020, energy consumption rate from renewable sources is the highest compared to other countries, with a decent rise in its urbanisation.



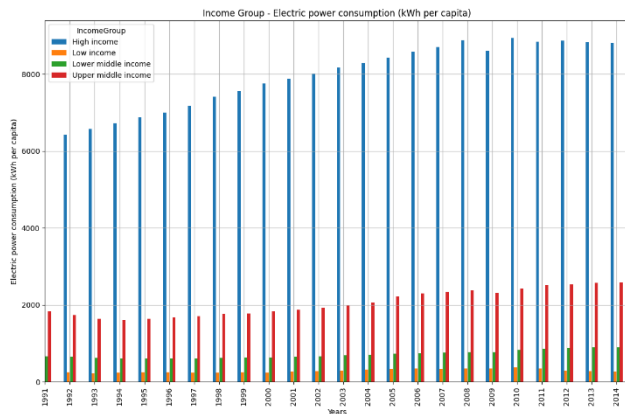
From the above bar graph representing cumulative sum Urban Population Growth, we can surmise United Arab Emirates, has been growing promptly, with almost null renewable energy consumption seen from top left graph. The urban population of Russian Federation is depleting, conversely their renewable energy consumption has almost remained same.



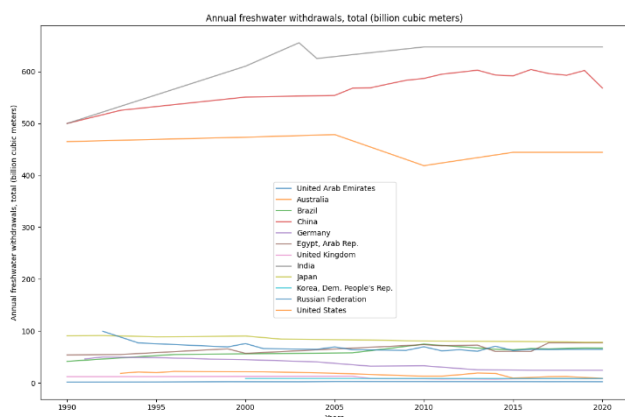
Looking at the CO<sub>2</sub> Emissions in kt, for the same time intervals, China from 2000 onwards, the amount of carbon dioxide emitted can be seen increasing aggressively, which is understandable, due to its urban growth. Even India's carbon emissions have started to boost, which is clearly contributed to lower renewable energy consumptions and its rapid growing urban population. United States have higher emissions compared to other countries excluding China from 2005.



From China's correlation-ship map, we can draw a strong negative dependent on urban population growth with renewable energy consumption and a strong positive dependent on Urban Population Growth with CO<sub>2</sub> Emissions. With urban growth, demand on modern facilities like electricity is increasing, forcing them to use lesser form of clean energy, explaining the rise in carbon emission.

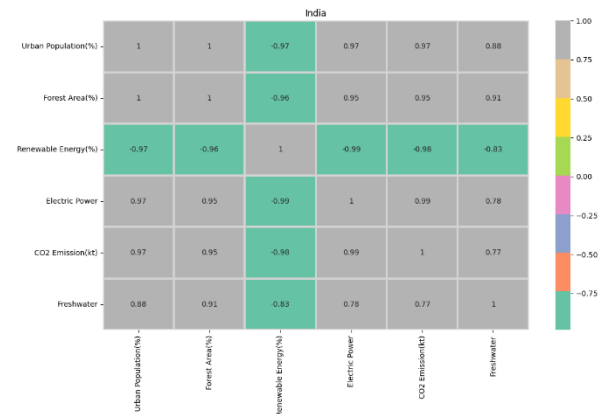


From the above graph of Electric Power Consumption from the year 1991 to 2014 for all countries, it's clear that the higher the income level leads to higher electric consumption. High-income group's electric requirements are almost 10 times higher than low-income group. All income levels electric demands are increasing over the years.

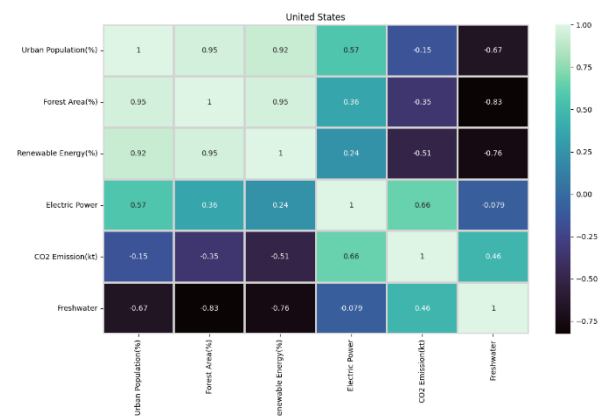


The above line plot over total Annual Freshwater Withdrawals in billion  $m^3$ , tells, India, China and United States draws the most amount of water from various water bodies, according to their needs, like irrigation and live stocking production, direct industrial use, etc. While looking at the urban growth for the top right graph, it evidential that the demand for clean water is increases with population growth, at least for these countries.

➤ [GitHub - Repo Link](#)



Indian dependence map for all the indicators for the climate change, states that Electric Power Consumption and Urban Population Growth has a strong positive relationship and there is strong relationship share between and rest of the indicator except with Renewable Energy Consumption. The freshwater is used to produced renewable energy, but with the growth of urban area swiftly taking a hold on the required freshwater, electricity is produced from the non-renewable sources.



United States's climate changing factor's correlation is shown in the above graph. A strong positive relationship can be found between Renewable Energy and Urban Population Growth and a negative relationship can be seen between CO<sub>2</sub> Emission and Renewable Energy. Also, there is a strong positive dependence among Renewable Energy and Forest Area. These means forest areas are taken over by the renewable energy production plants, increasing the carbon emission.