Analysis of Power Generation and Classification of Census Regions of United States Power Plants

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**Abstract**

Power plants are an engineering marvel that are extremely vital to the general population as they are the primary generators of manmade electricity. According to the EIA [1], “about 4, 116 billion kilowatthours (kWh) or 4.12 trillion kWh” were generated by United States utility-scale electricity generation facilities in 2021. The term “utility scale” refers to electricity generation with at least 1 MW or megawatt of generating capacity. Around “61% of this electricity generation was from fossil fuels—coal, natural gas, petroleum, and other gases. About 19% was from nuclear energy, and about 20% was from renewable energy sources”[1]. The three major fossil fuels that contribute to this 61% as mentioned previously are Natural Gas, Coal, and Petroleum whereas the renewable sources are contributed by Wind, Hydropower, Solar (including photovoltaic and thermal), Biomass (Wood, Landfill Gas, Biogenic waste, other kinds of biomass), and Geothermal. With this incredible generation capacity of just the United States alone to be able to supply electricity to the continually growing electric demands of the general population and technology, the major overhead cost the planet pays for is in the form of CO2, NO2, and SO2 emissions into the atmosphere. In 2020 the EIA reported that “all energy sources resulted in the emission of 1.55 billion metric tons—1.71 billion short tons—of carbon dioxide (CO2)” [2]. Even with the increasing awareness of harmful emissions produced from industrial factories and cars, coal, natural gas, and Considering power plants, globally, are The goal of this project has been to analyze the net electricity

Boxplots of net generation in megawatt hours of nonrenewable fuels sources for years 2018-2021

Chart, histogram

Description automatically generated

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Chart, box and whisker chart

Description automatically generated

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Instead of looking at distribution of net accumulated generation of each power plant, lets look at the accumulation for each power plant per fuel type since this gives a better view of outliers, spread, and significance of data.

Because there is no significant variation and changes in the boxplots between consecutive years, this might be an indication that we might be able to predict the net generation of power plants irrespective of year

References:

[1] <https://www.eia.gov/tools/faqs/faq.php?id=427&t=3>

[2] https://www.eia.gov/tools/faqs/faq.php?id=74&t=11#:~:text=In%202020%2C%20total%20U.S.%20electricity,CO2%20emissions%20per%20kWh.