P03 – Tab Contents

Introduction tab:

As the world population continues to increase at a rapid pace, so does the demand for food and power. But in order to produce more food and power, huge amounts of greenhouse gases are also generated as a by-product. Coal and gas power plants that produce most of the power in the world (especially in the US where they account for ~80% of the electricity production) also produce millions of tons of CO2, which makes up the highest portion of greenhouse gases in the atmosphere. Livestock around the world emit millions of tons of Methane per year which is said to be “25 times more potent than CO2” (<https://www.epa.gov/gmi/importance-methane>) according to the EPA. As every year that CO2 emissions continue to increase, global warming becomes a much more pressing issue. And as the present methods of renewable energy are plagued with problems such as inefficiency, un-reusable windmills, power storage, and general complexity and cost to setup, an alternative power source to generate electricity is urgently needed.

A viable power source we have identified in our research is nuclear power. While nuclear power is not very common presently, this is largely due to fear-mongering and historic failures of nuclear power plants, along with pro-coal and gas lobbying done by coal and gas power plant supporters. As coal and gas power plants are a massively profitable industry in the US and elsewhere, the adoption of a power production network based of nuclear power has been seriously undermined. And if major changes aren’t made to reduce CO2 emissions, global temperatures will continue to rise unabated and continue to harm both humans and the habitats of our planet.

Through our research, we identified major benefits to switch to nuclear power plants. Two of these are **higher efficiency** and more importantly, **no CO2 emissions**. As nuclear power used radioactive materials and water, the only gas it emits is steam (<https://www.cnet.com/news/how-nuclear-power-plants-could-help-solve-climate-crisis>), which is in no way harmful to the environment. And regarding the harmful radioactive waste nuclear power plants are purported to create, the little waste they do create are highly exaggerated as it is low in amount and stored in safe barrels away from human life. In order to solidify the argument on a change to nuclear power, we analyzed several data sets to learn more about CO2 emissions as well as how efficient nuclear reactors are compared to other types of power generation.

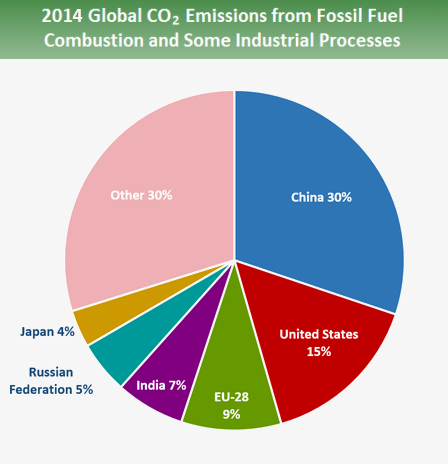
The following are datasets we analyzed:

1. Primary-energy-consumption-from-fossilfuels-nuclear-renewables – In order to understand which countries are switching to nuclear power generation, we plotted the percent change of nuclear power for several countries over time. The data for this set was provided by **OWID.**
2. owid-co2-data – To identify which countries should prioritize nuclear power and move away from coal and gas power production, we used this data set to see which countries have produced the most CO2 emissions over time. The data for this set was provided by **OWID.**
3. global\_power\_plant\_database\_last – Lastly, we used this data set provided by OWID through a Kaggle publication to analyze the efficiency of nuclear power plants compared to other types of power generation.



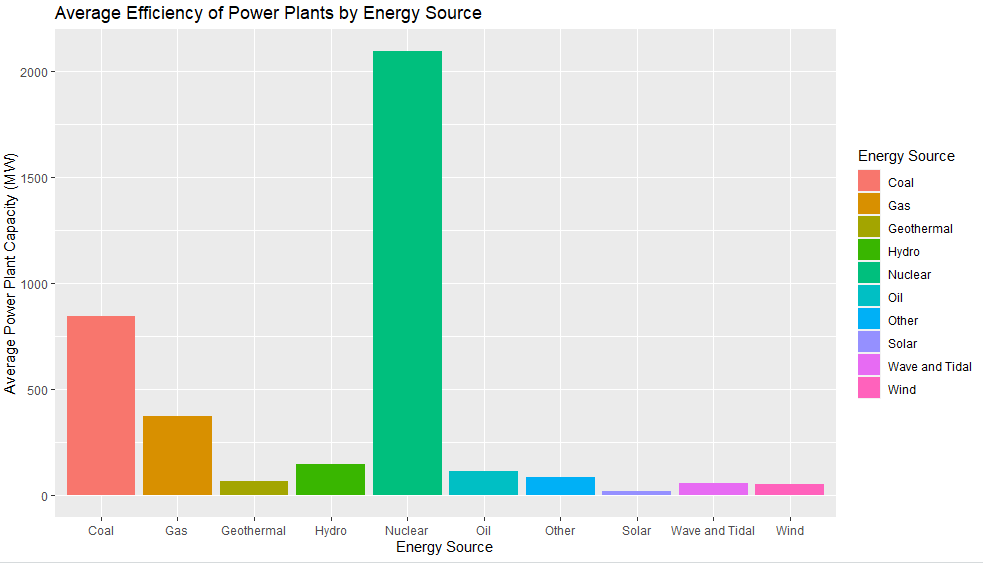
Summary Page:

Through our research and visualizations, we found 3 key insights as to what countries have had the most nuclear power growth, what countries are leading in CO2 emissions as well as the efficiency of nuclear plants compared to other types of power generation. Firstly, through our analysis of what countries have seen the most percent change in nuclear power generation per year, we found that Russia and Brazil have been leading in their adoption of nuclear power. However, a more important insight is seen by looking at the countries with lower percent changes. **USA, China, and India, which are some of the world’s largest countries and are fairly advanced are growing at a much slower rate** at pace along with countries that are still working on their power generation networks such as Pakistan and Mexico. Coupled with our **second key insight of how China, US, and India are leaders in CO2 emissions and largely overshadow many other countries in total emissions** (They make up more than half of the world’s total emissions!)



(<https://www.epa.gov/ghgemissions/global-greenhouse-gas-emissions-data>)

Lastly, a very important insight we found is that **nuclear power is much more efficient compared to other forms of power generation (coal, gas, renewables such as solar, hydro, etc.)**. By aggregating power plant efficiency/capacity data from power plants around the world we found that in terms of Capacity in MW, Nuclear Power plants can reach up to 2000+ MW, the highest among the different capacities for each type of power generation plant. This is also about 1000 MW more than coal power plants.



The implications of this data are extremely important. What it indicates is that not only do we need an adoption of a nuclear power plant network to sustainably produce power, we also need coordination and cooperation amongst countries in order to achieve that network. As The largest populated countries are producing most of the emissions, there needs to be international reform and accountability measures to ensure that those who have the largest negative impacts on the planet are working towards sustainable energy practices. As was seen in our analysis, nuclear power is more than efficient enough and produces no emissions that would speed up global warming. And considering that the claim that they “are extremely expensive and long to set up and maintain”, mostly the same could be said for building coal and gas power plants. What is necessary to understand is we incur a greater cost when we as a society let these gas and coal power plants be built, and we would be better off in the long-term by setting up safe and well-maintained nuclear power plants.

5.0 Findings.  New section.  Given answers to each of your research questions (400 words)