

Global Trends in Electricity Access: Progress and Challenges (2000–2022)

TDI SQL Capstone Project
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Introduction

- Electricity is essential for economic growth and improved living standards. Access to electricity is a key social and economic indicator, extending beyond availability to include safe energy use and minimum consumption thresholds, which vary by region and evolve over time.
- This analysis examines global electricity access trends from 2000 to 2022, highlighting regional disparities, key influencing factors, and the link between electricity availability and socio-economic development.
- By restructuring and analyzing country-level data, the study provides insights into progress, challenges, and opportunities for expanding access.

Dataset Overview

- Six Primary Tables & One Supplementary Table:
 1. Electricity Generation Sources (Renewables, Nuclear, Fossil Fuels)
 2. Annual Change in Primary Energy Consumption
 3. Total Electricity Generation
 4. Primary Energy Consumption
 5. Population Access to Electricity
 6. GDP Per Capita (USD)
- Supplementary Table:
 1. Country Codes and Continents

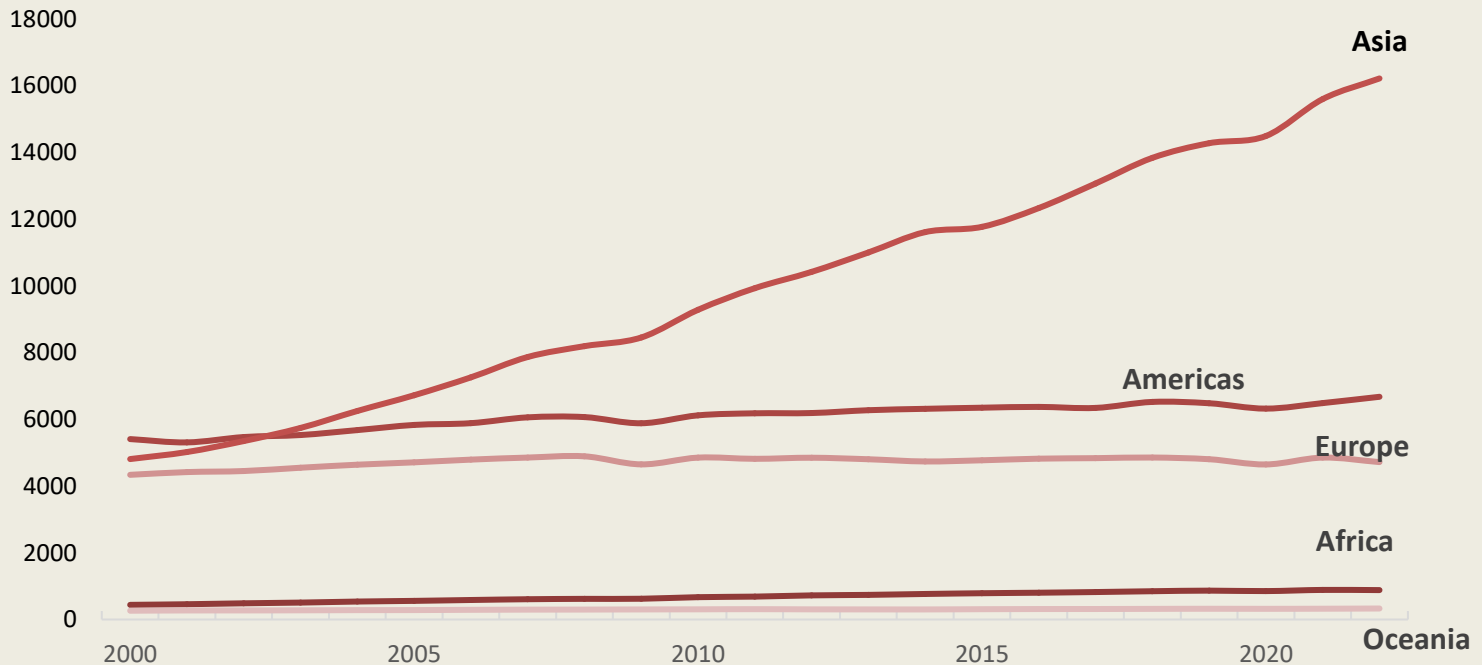
Methodology

1. Data Cleaning & Preparation and Transformation: Microsoft SSMS was used to achieve these.
2. Exploratory Data Analysis (EDA): Understanding data distributions.
3. Formulating research questions
4. Extracting insights.
5. Visualization: Using Microsoft Excel for graphical representation of findings.

Research Questions

1. What is the trend of electricity generation per continent for the period considered?
2. How does access to electricity correlate with energy generation types?
3. Trends in renewable, nuclear, and fossil fuel electricity generation.
4. Top 10 countries by electricity generation in 2022.
5. Relationship between GDP per Capita and Electricity Generation/Access.
6. How does annual change in primary energy consumption affect electricity generation sources?

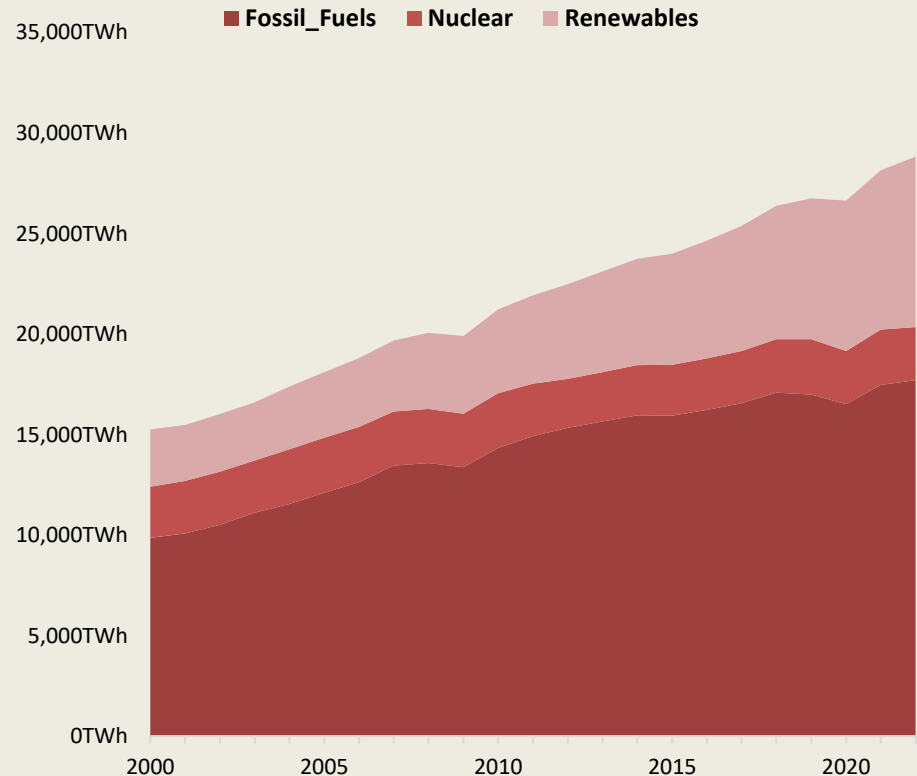
Trends in Electricity Generation



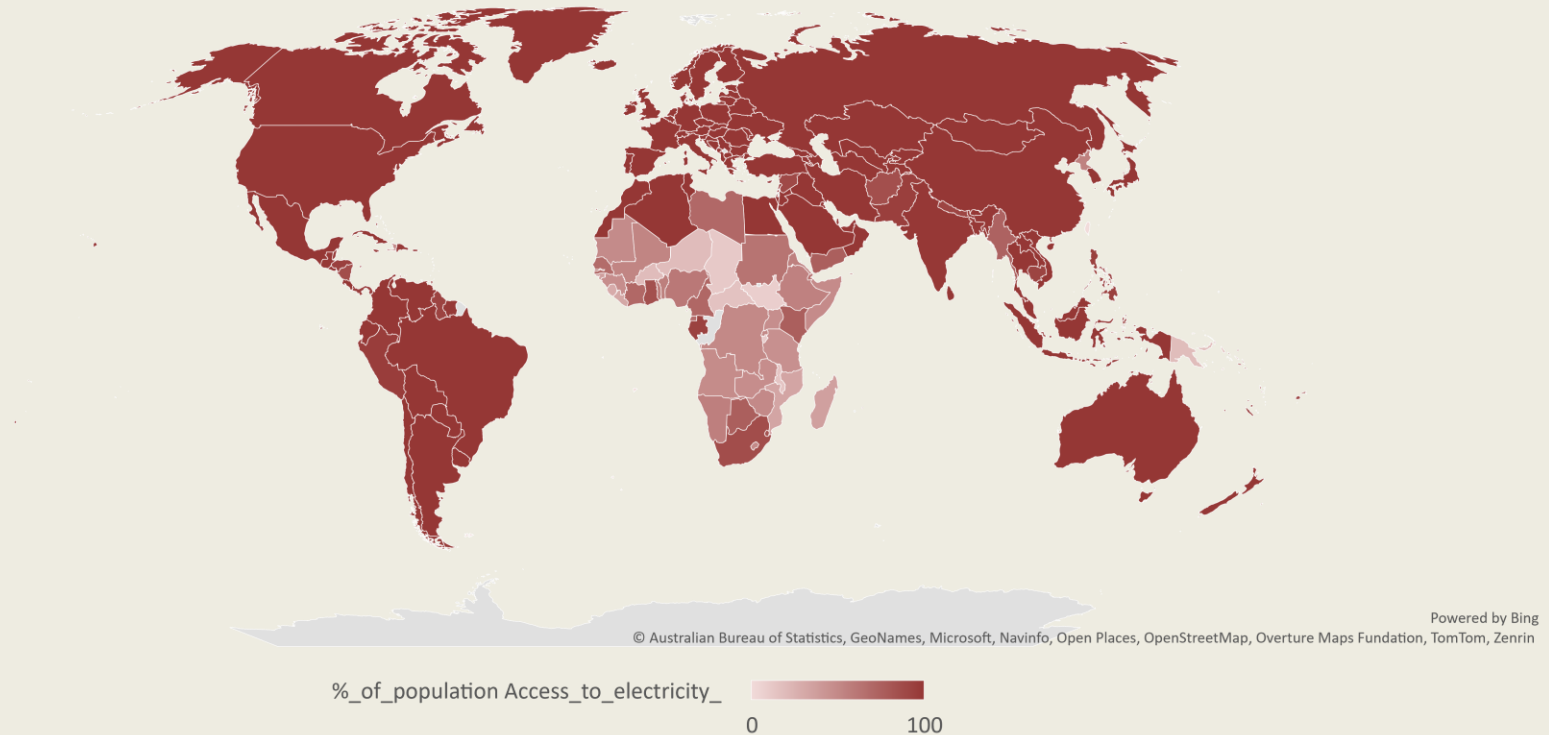
- **Asia** has been increasing its electricity generation over the years compared to other continents. This is majorly contributed by **China and India**

Trends in Electricity Generation

- Over the years, there was a gradual increase in the share of electricity generated from renewable sources, with fossil fuels remaining dominant in many countries.
- Nuclear generation, however, showed little overall growth.



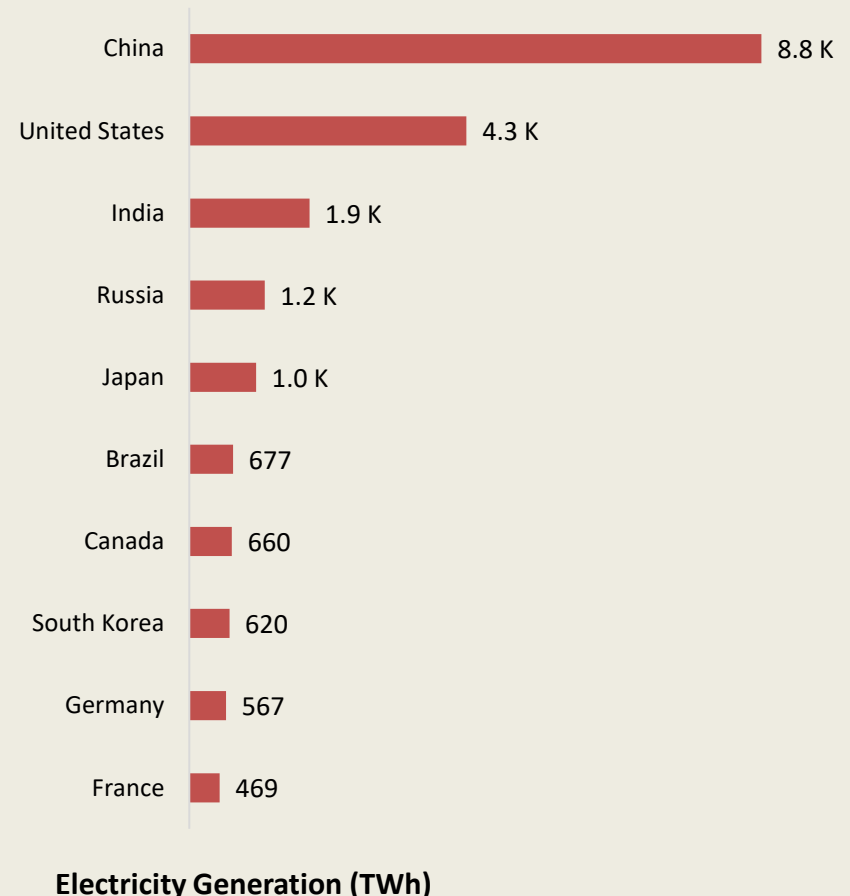
Key Findings - Access to Electricity & Generation



- Countries with **higher access to electricity** (especially those above 90%) tended to have **higher electricity generation** from renewables.
- This correlation is weaker in developing regions with lower access to electricity.

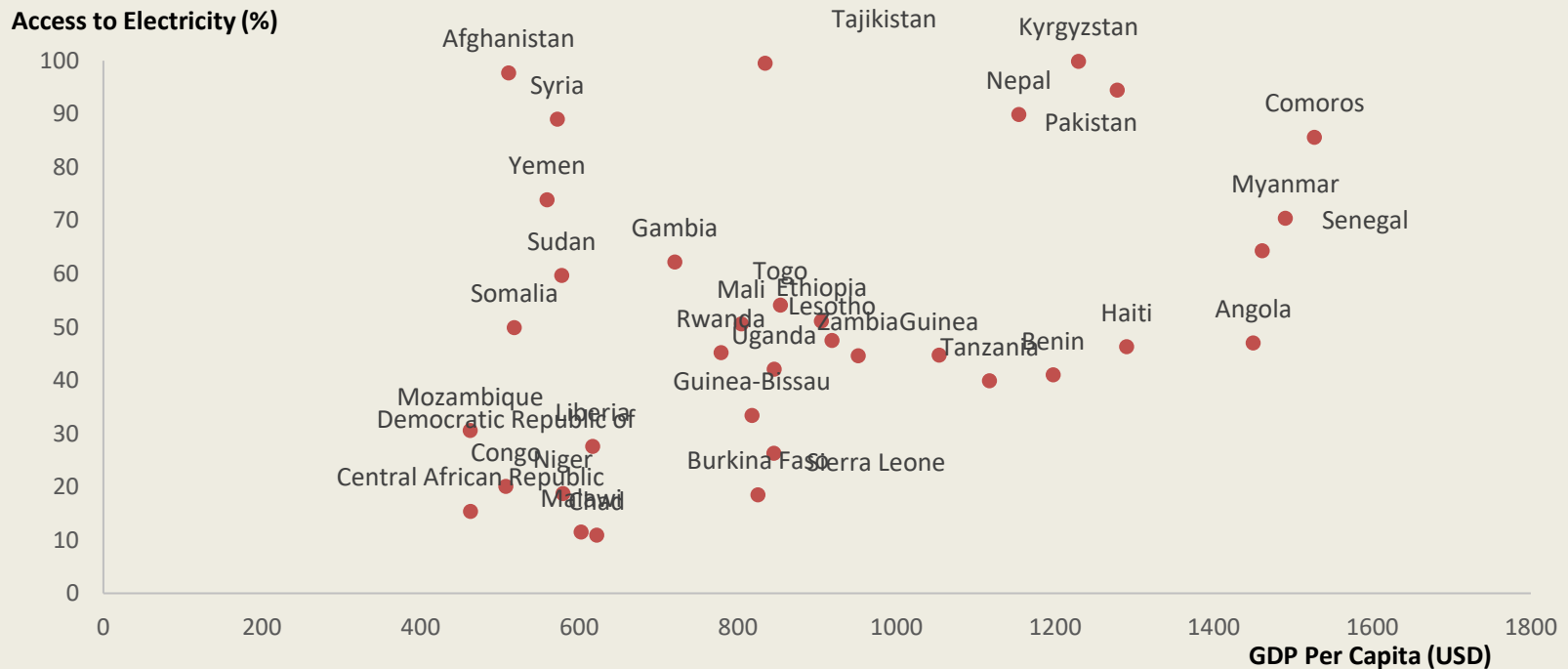
Top 10 Countries in Electricity Generation (2022)

- In 2022, the top countries by electricity generation were primarily industrialized nations, with **China** topping the list.



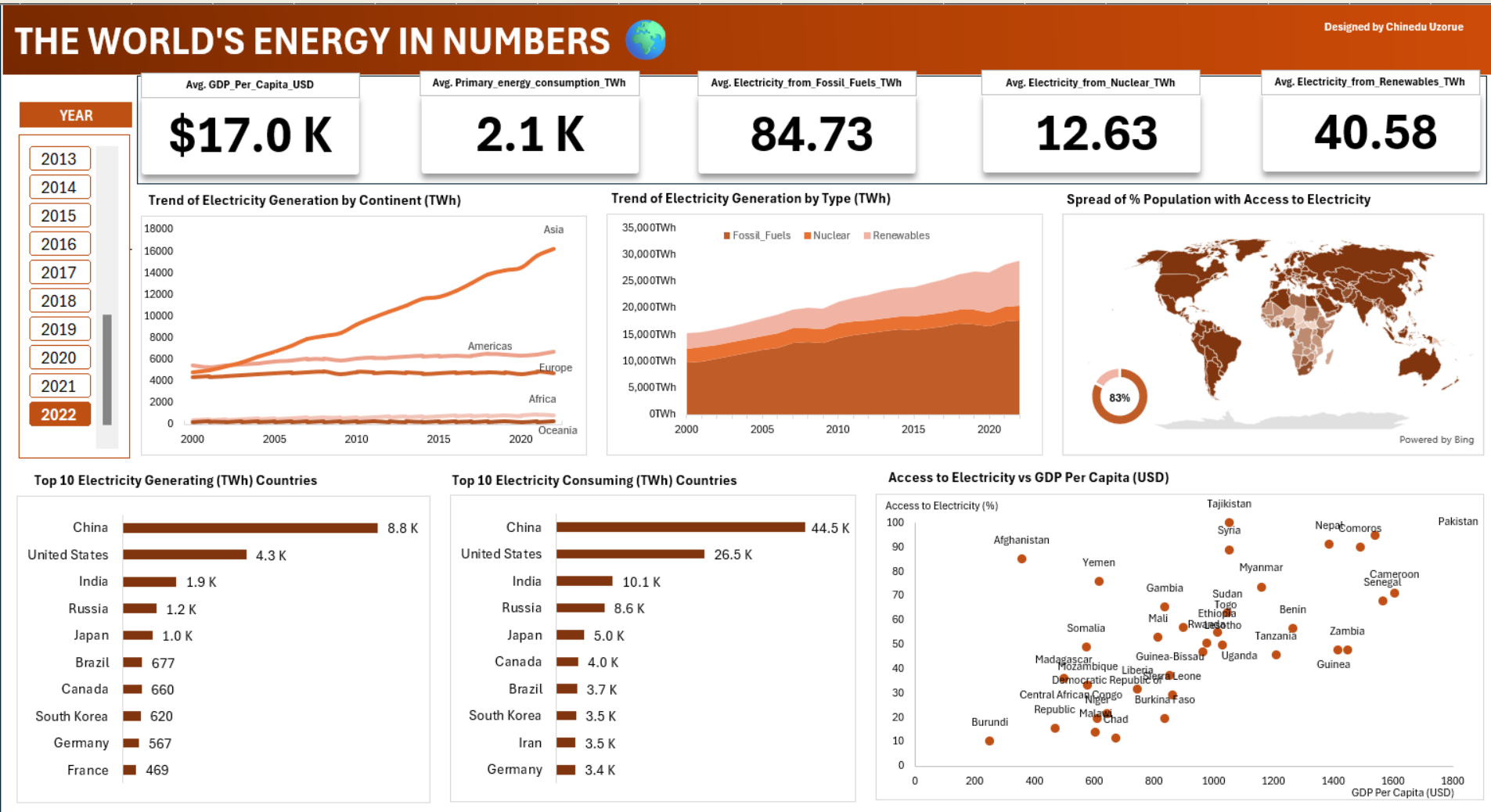
GDP Per Capita & Access to Electricity

Access to Electricity vs GDP Per Capita (USD) , 2022



- **Higher GDP per capita** was found to be positively correlated with **higher % population access to electricity**.
- Wealthier nations have more of their population having access to electricity, and the reverse is the case for poorer nations.

EXCEL Dashboard



Insights

- Countries with larger GDP and access to electricity are more likely to adopt cleaner energy sources.
- Energy efficiency improvements are crucial in balancing demand with environmental concerns.
- Asia's electricity generation has been increasing more than any other continent for the time considered.
- Access to electricity is a significant determinant of economic and social development.
- Africa still has the lowest percentage of population with access to electricity, even after 22 years.

Recommendations

- Promote sustainable energy policies.
- Encourage renewable energy adoption.
- Invest in infrastructure to improve access.
- Countries with low GDP Per Capita need to address this issue as it correlates with electricity generation and access.

Challenges & Solutions

Challenges:

- Missing Data: Filled with appropriate defaults.
- Data Transformation: The GDP Per Capita dataset was in wide format.
- Data Integration: Used CTEs and thorough cleaning.

Solutions:

- Dynamic SQL, Views, and Clean Merges ensured data accuracy.

References & Data Sources

- <https://data.worldbank.org/indicator/NY.GDP.PCAP.CD>
- <https://ourworldindata.org/energy-production-consumption>
- <https://ourworldindata.org/energy-access>
- <https://ourworldindata.org/worlds-energy-problem>

Thank You