Tracking Energy Production Through GDP Per Capita

By Ethan Ericson

DESCRIPTION

The gross production of energy is the total amount of energy a country can generate. The gross domestic product per person, otherwise known as the GDP per capita, is an indicator of a country's development. This exploratory data analysis examines the relationship between a country's total amount of energy production, measured in Terra-watt hours, and its developmental status, measured by GDP per capita, to explore correlations between gross energy production and GDP per capita.

DATA SOURCES

- UN Energy Statistics – Total Electricity

- UN World Development Indicators – GDP Per Capita, PPP

DESCRIPTIVE MODEL

- UN Energy Statistics:
  - # of Samples: 7017
  - # of Features: 5
  - Target Feature: Quantity
- UN World Development Indicators – GDP Per Capita, PPP:
  - # of Samples: 7243
 - # of Features: 3
  - Target Feature: Value

FEATURE DEFINITION

▶ UN Energy Statistics:

1. Country or Area: The country from which the data was collected.

2. Commodity – Transaction: The type of electricity data collected.

3. Year: The year the collected data represents.

4. Quantity: The quantity of energy in Terra-watt hours.

▶ UN World Development Indicators – GDP Per Capita, PPP:

1. Country or Area: The country from which the data was collected.

2. Year: The year the collected data represents.

3. Value: The GDP per capita measured in international $.

METHODS

- Data cleaning using Excel
  - Creating merged table and converting to Terra-watt hours
- Visualization with pandas, matplotlib, and seaborn
  - Importing modules through conda python environment
  - Reading excel sheet with pandas
 - Sorting Data
  - Visualizing Data with matplotlib and seaborn
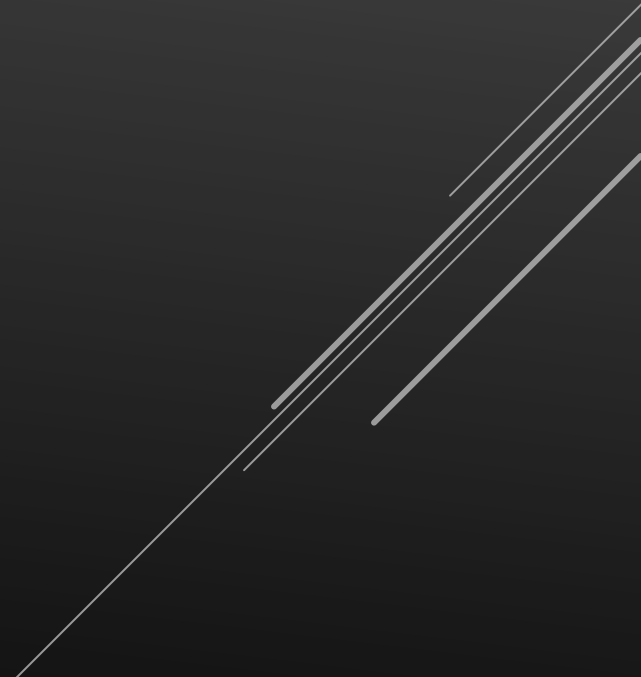
Gross Energy Production by Country in Africa, 1990 - 2020
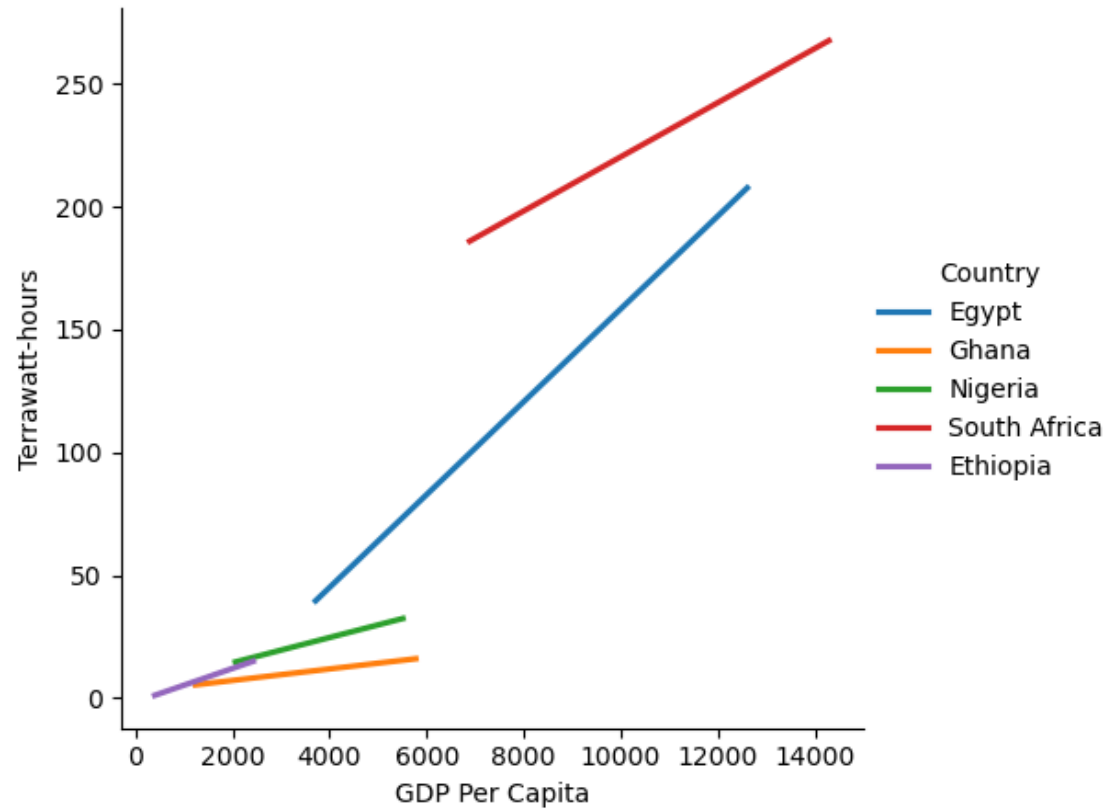
DATA ANALYSIS

- Length of line indicates level of growth.

- Slope of line indicates the proportional growth between GDP per capita and energy production. This is the level of economic resources that are being invested in energy production.

- # Years define length of the regression line.

- Overall, in this graph, higher GDP per capita = higher gross energy production.

Gross Energy Production by Country in Asia, 1990 - 2020
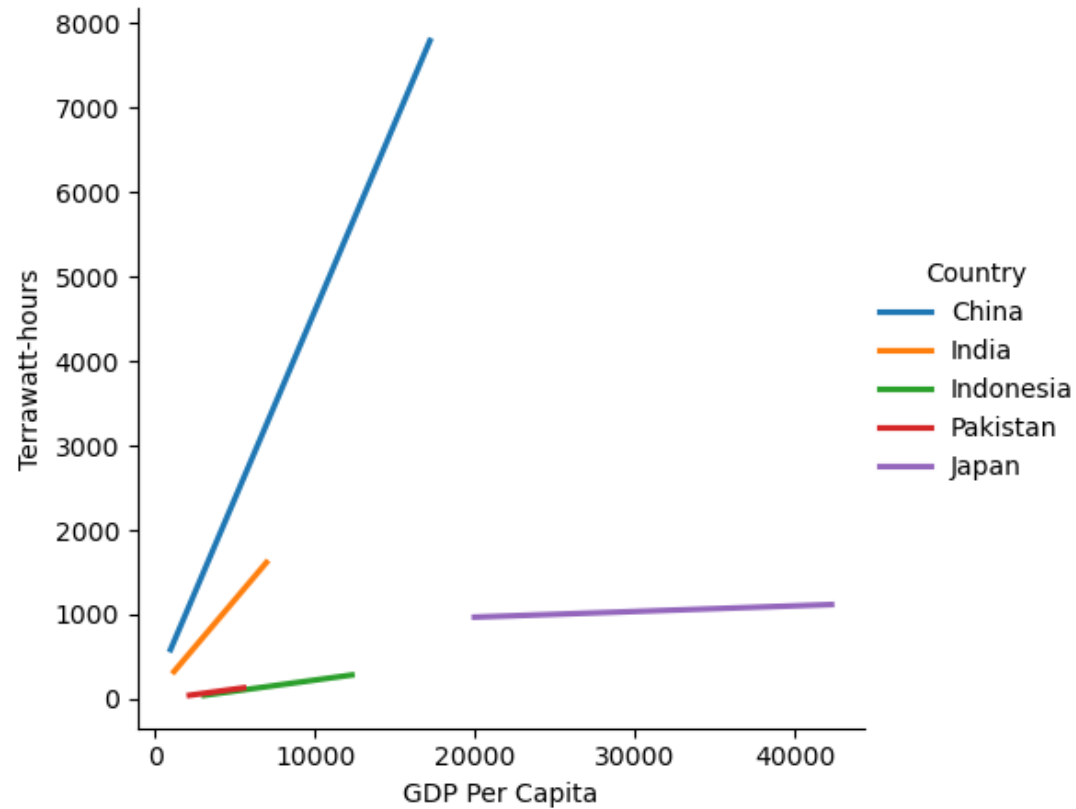
DATA ANALYSIS

▸ Notice that a positive correlation still does exist for every country, but GDP per capita for Japan starts high and does not increase gross energy production.

▸ Indicates that other things influence gross energy production other than GDP per capita.

▸ India starts lower in energy production but surpasses Japan due to higher dedication of economic resources to gross energy production than Japan.

DATA ANALYSIS

Gross Energy Production by Country in Europe, 1990 - 2020
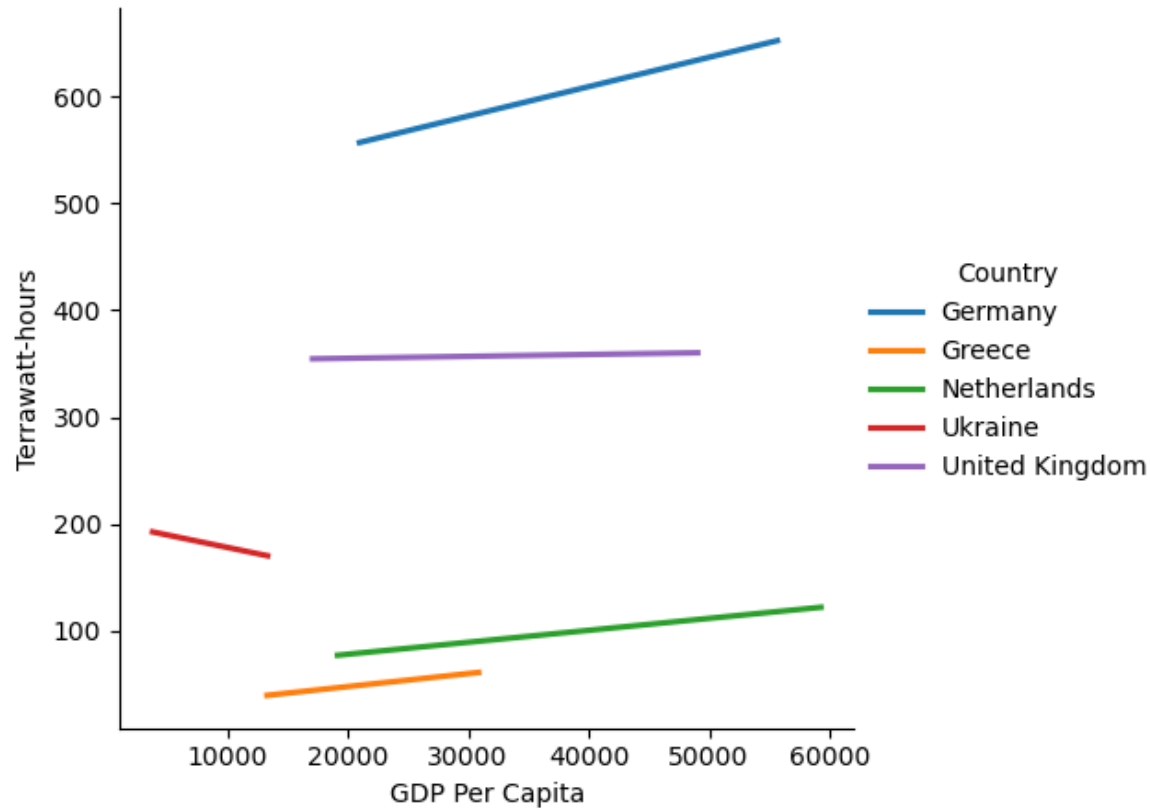
- Two anomalies exist in this plot: Ukraine and the similar GDP per capita of the Netherlands, United Kingdom, and Germany.

- Ukraine: The negative slope is the result of the Russian gas shut off of 2009. This left Ukraine without gas power for 13 days. The negative slope is also the result of the Russian annexation of the Crimean Peninsula in 2014 deprived Ukraine of 80% of its oil and natural gas deposits in the Black Sea.

- Three Countries: This is evidence of a steeper slope before 1990 that got that country to their specific point in 1990. This means that the countries had significantly varying levels of dedication of economic resources to gross energy production prior to the 1990.

CONCLUSIONS

▶ For countries investing a significant portion of their economic resources, represented by GDP per capita, into energy production, gross energy production will be positively correlated and proportional with GDP per capita.

▶ Countries can choose not to invest a significant portion of their economic resources into energy production, weakening the relationship between GDP per capita and gross energy production.

▶ Factors other than GDP per capita have effects on gross energy production within a country, such as the space available for energy producing facilities and the loss or gain of territory containing materials used in the production of energy.

REFLECTIONS

- Define a problem and search for a solution instead of search for only a relationship.

- Work with smaller datasets