

Global Renewables

A satellite view of Earth from space, showing the curvature of the planet and city lights at night. The image is dark, with the Earth's surface appearing as a blue and black arc against the black background of space. Numerous bright yellow and orange lights are scattered across the surface, representing city lights and urban areas. The lights are more concentrated in some regions, particularly along the equator and in the Northern Hemisphere. The overall effect is a sense of global scale and connectivity.

In which countries would renewable energy investment be a good idea if we wanted to see the highest renewable electrical return for our investment?

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Global Solar & Wind Energy Trends (2016 - 2020)

The global energy transition from historical use of fossil fuel based electrical generation to renewable generation has increased in pace over the past decade with the advancement in technology, access to capital, and climate change affecting all life in real time. As a potential investor in future solar and wind generation projects we want to understand/analyze global trends in electrical production by solar energy, wind energy, and the investment in these generation capacities via answering the following questions:

1. During the years 2016 and 2020 what countries produced the most electricity by solar and wind technologies?
2. During the years 2016 and 2020 what countries received the most investment in renewable energy overall?
3. During these same years does the highest amount of solar and wind electricity correspond to the highest investment in renewables?
4. With the results of the above three questions, where might renewable energy investment be a good idea in the near future if we wanted to see the most solar/wind electrical return for our investment?

Data Sources

The following datasets were used:

1. UN Energy Statistics Database, Solar Electricity
2. UN Energy Statistics Database, Wind Electricity
3. International Renewable Energy Agency (IRENA) Database, Renewable Public Investment 2022

Solar & Wind Analysis

Our data set has 4 columns [Country or Area, Year, Solar Quantity (kWh, Million), Wind Quantity (kWh, Million)]. We trimmed the data down to only include years 2016 and 2020 as we were trying to find countries in which solar and wind production has been increasing the most over that time period. The solar and wind quantity columns have figures that show how much electricity is produced in said country via solar power or wind power. The quantity measurement (kWh, Million) is a million kilowatt-hours and while its a bit hard to explain, know that this is what the energy sector uses as a measurement of electrical output. Your personal, local energy bill is usually in kWh, so this is just on a much bigger scale.

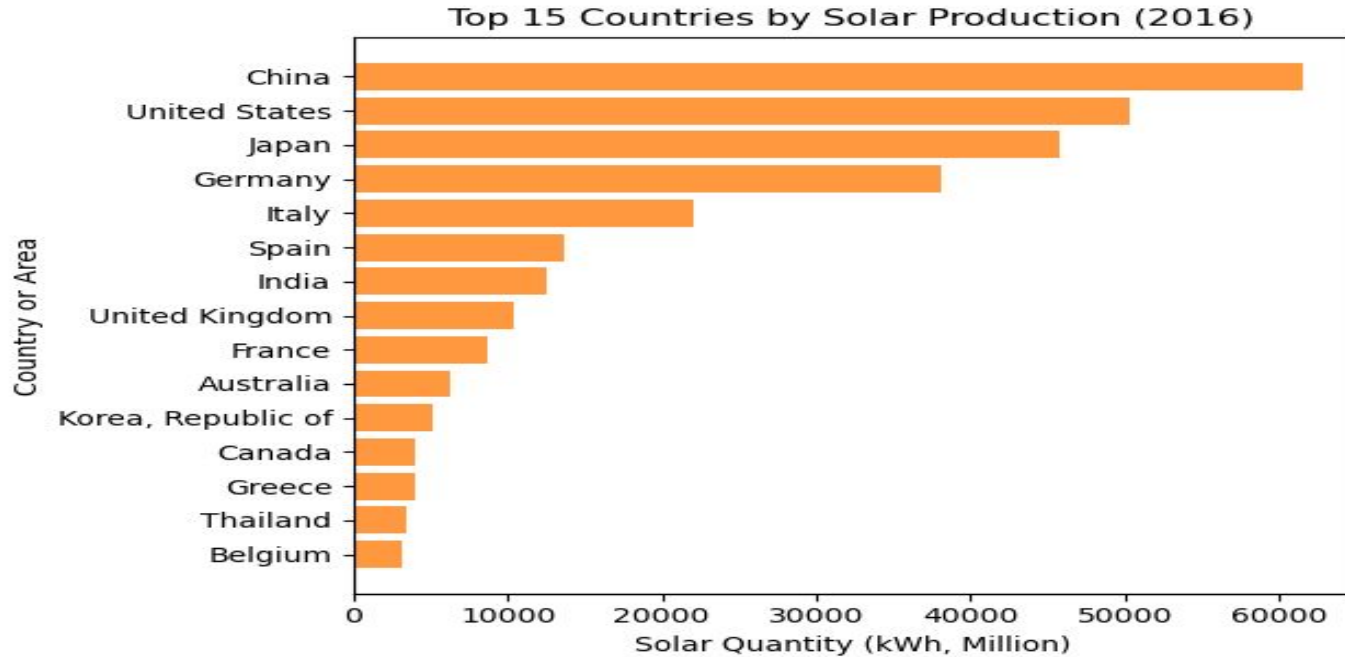


Investment

Our data set has 3 columns [Country or Area, Year, Investment(USD Million)]. Same as our Solar and Wind data set, the data has been trimmed to years 2020 and 2016. The investment(usd million) column is a summation of all renewable energy investments per country for each of those years. While wind and solar are the most talked about renewable energy technologies, they are just a part of the whole renewable energy industry. While we were looking through the raw investment data we came to realize that investment numbers on just wind and solar were inconsistent; lots of nulls or missing data, and then there were also investments that were marked as multiple renewables. So, to make a cleaner dataset for us to work with we decided to include all renewable investments.

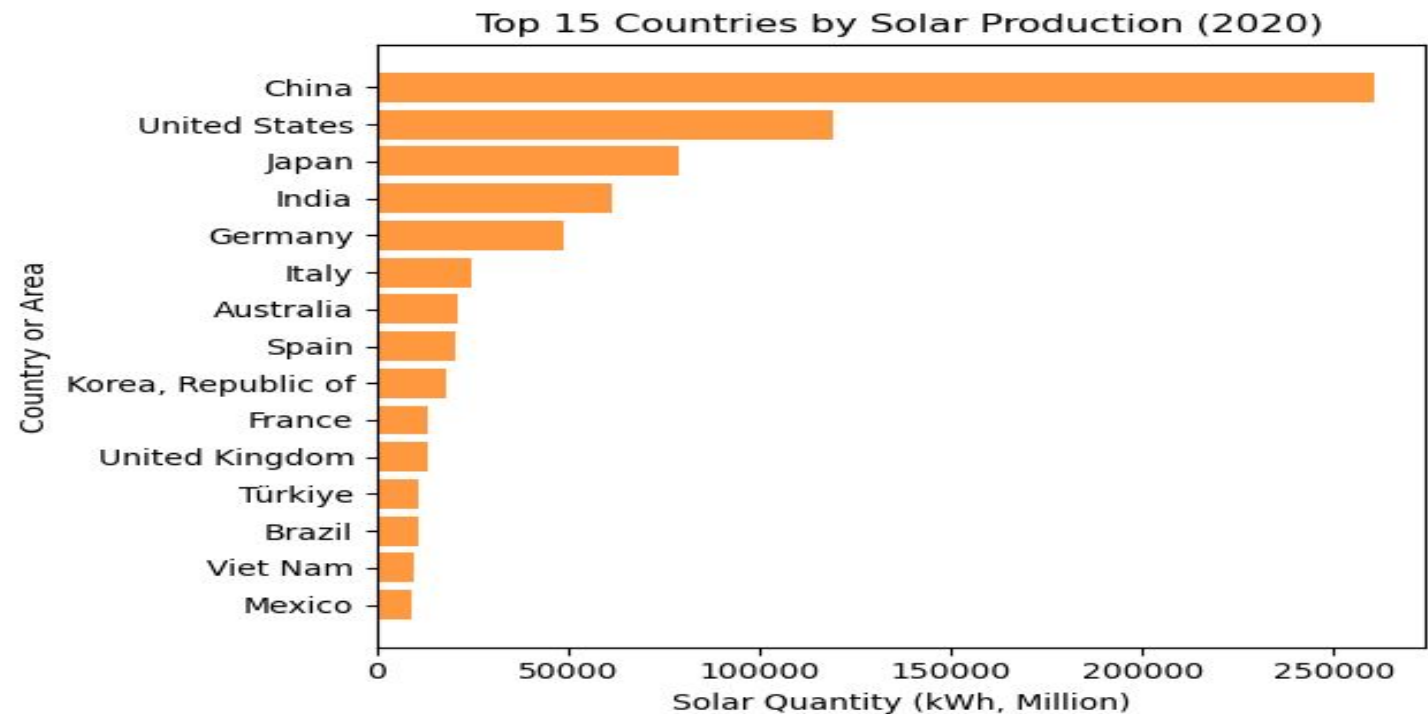


Top 15 Solar Producers 2016



In 2016, the Top 5 countries in Solar Energy Production were China, US, Japan, Germany, and Italy, respectively.

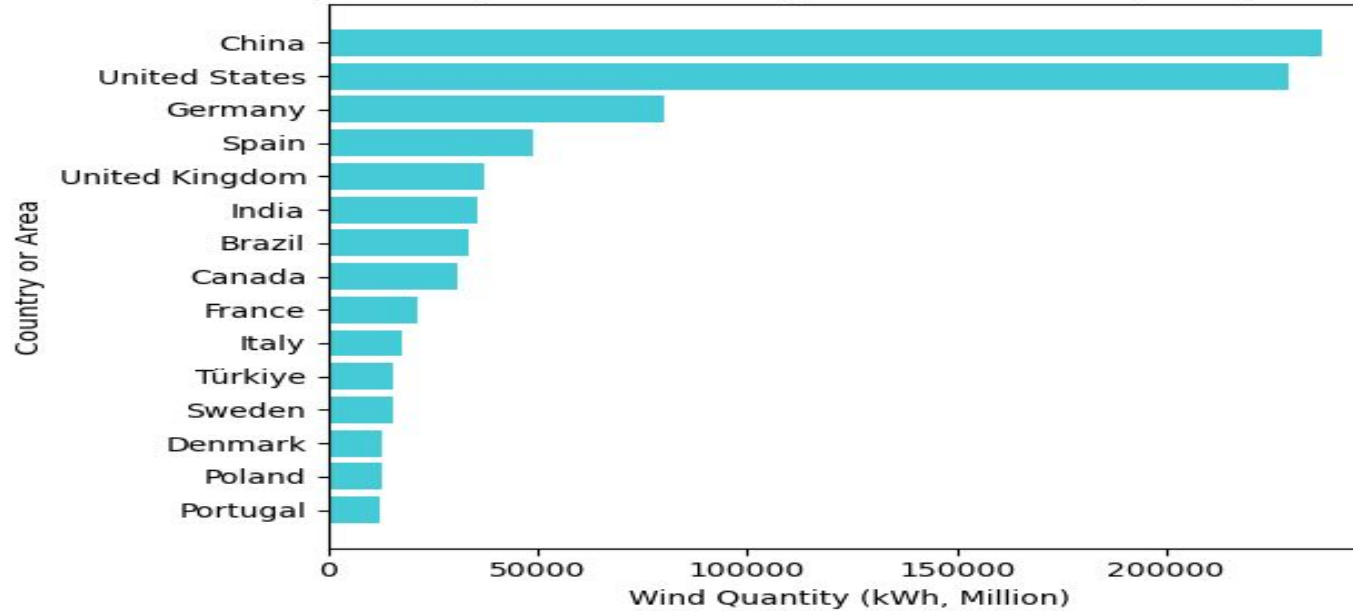
Top 15 Solar Producers 2020



In 2020, the Top 5 countries in Solar Energy Production were China, US, Japan, India, and Germany, respectively.

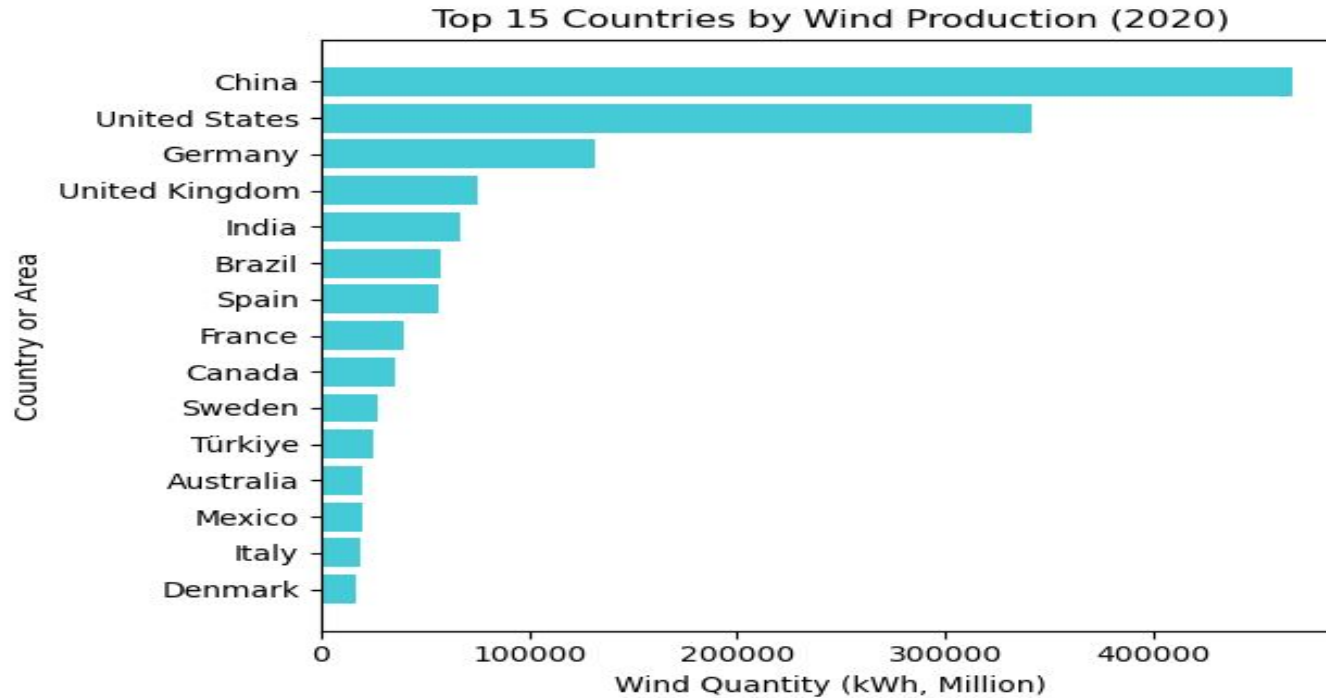
Top 15 Wind Producers 2016

Top 15 Countries by Wind Production (2016)



In 2016, the Top 5 countries in Wind Energy Production were China, US, Japan, Spain, and UK, respectively.

Top 15 Wind Producers 2020

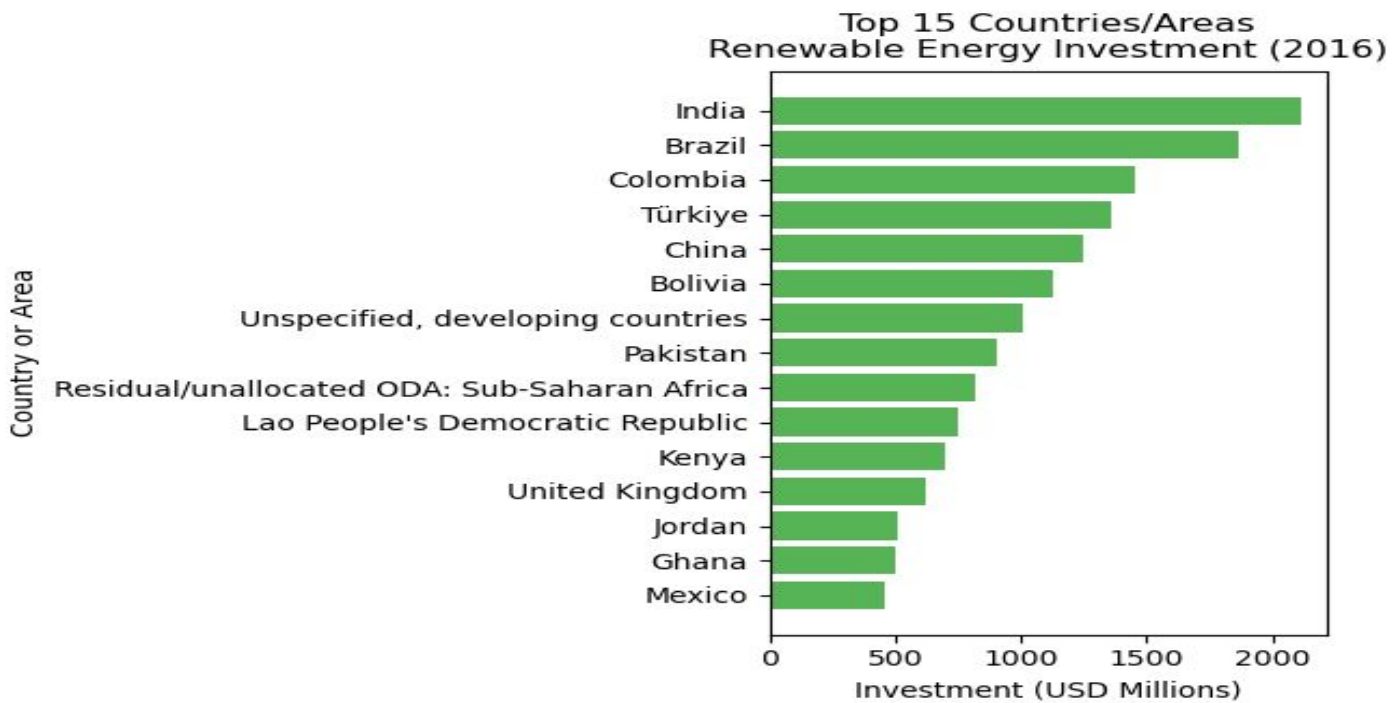


In 2020, the Top 5 countries in Wind Energy Production were China, US, Germany, UK, and India, respectively.

Investments

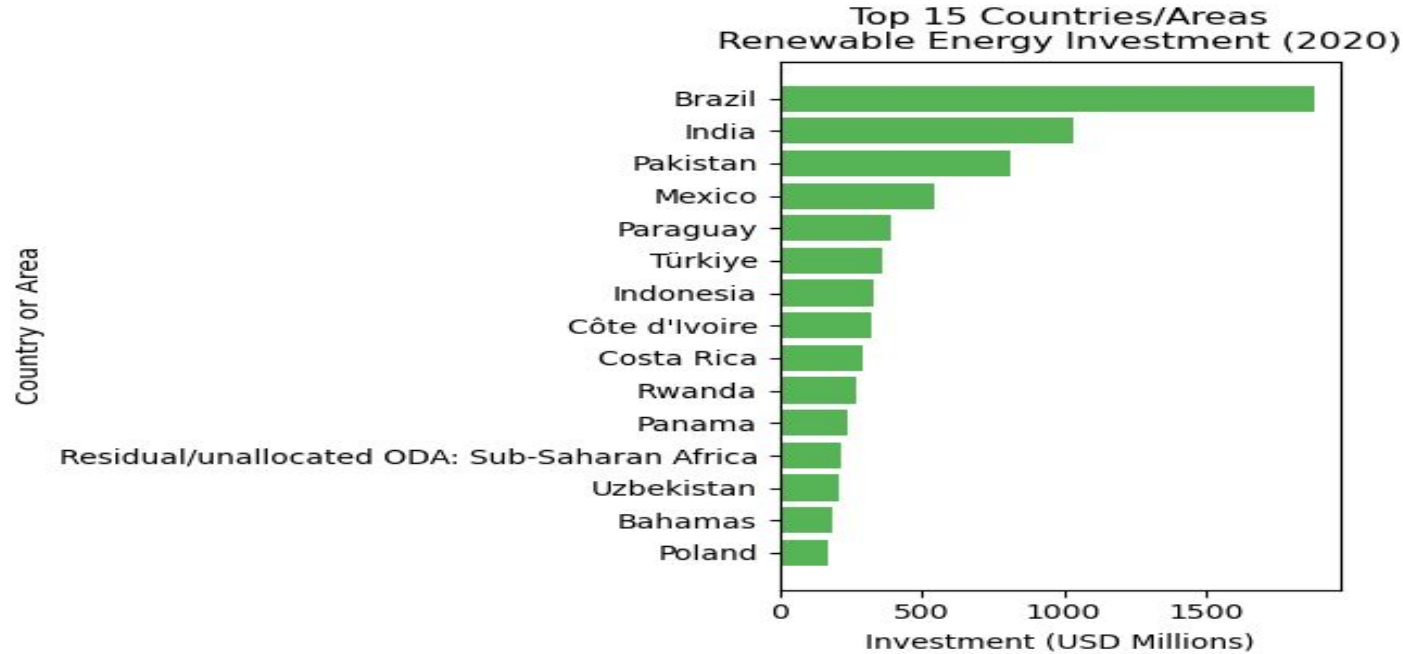


Top 15 Countries/Areas of Renewable Energy Investment (2016)

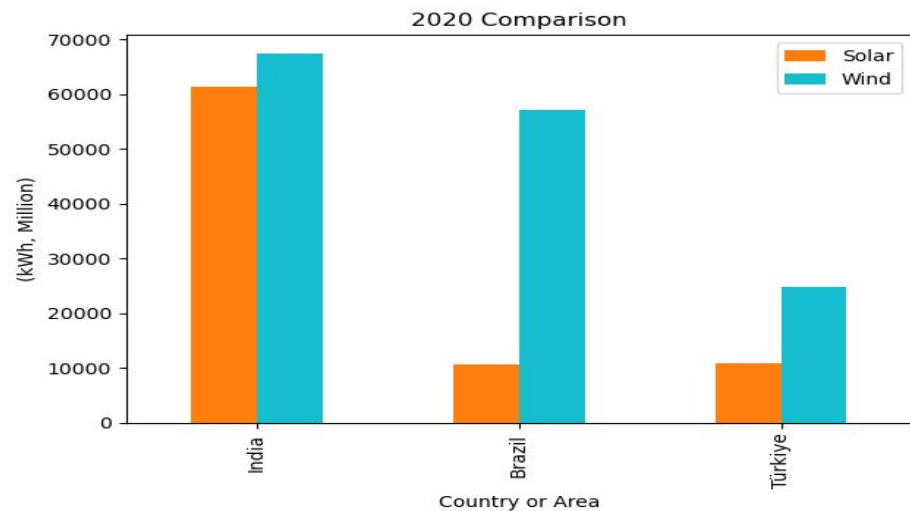
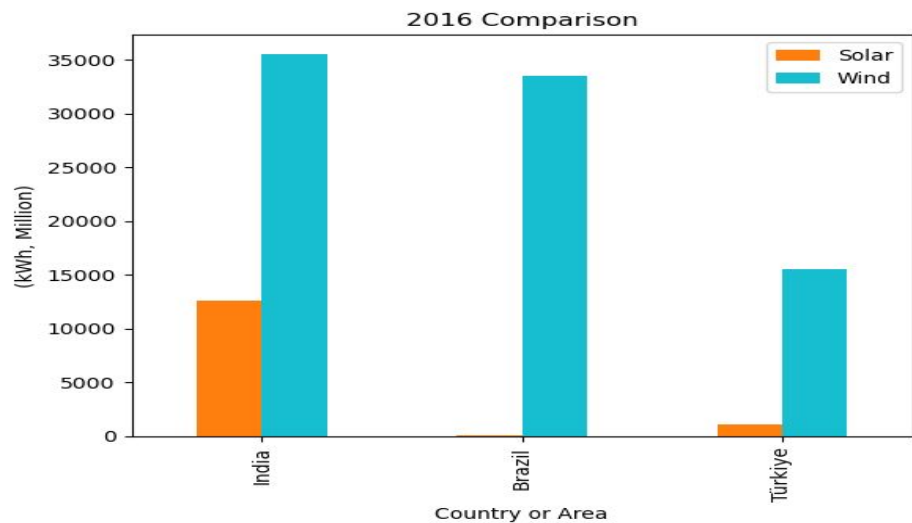


In 2016, the Top 5 countries in Renewable Energy Investment were India, Brazil, Colombia, Türkiye and China, respectively.

Top 15 Countries/Areas of Renewable Energy Investment (2020)

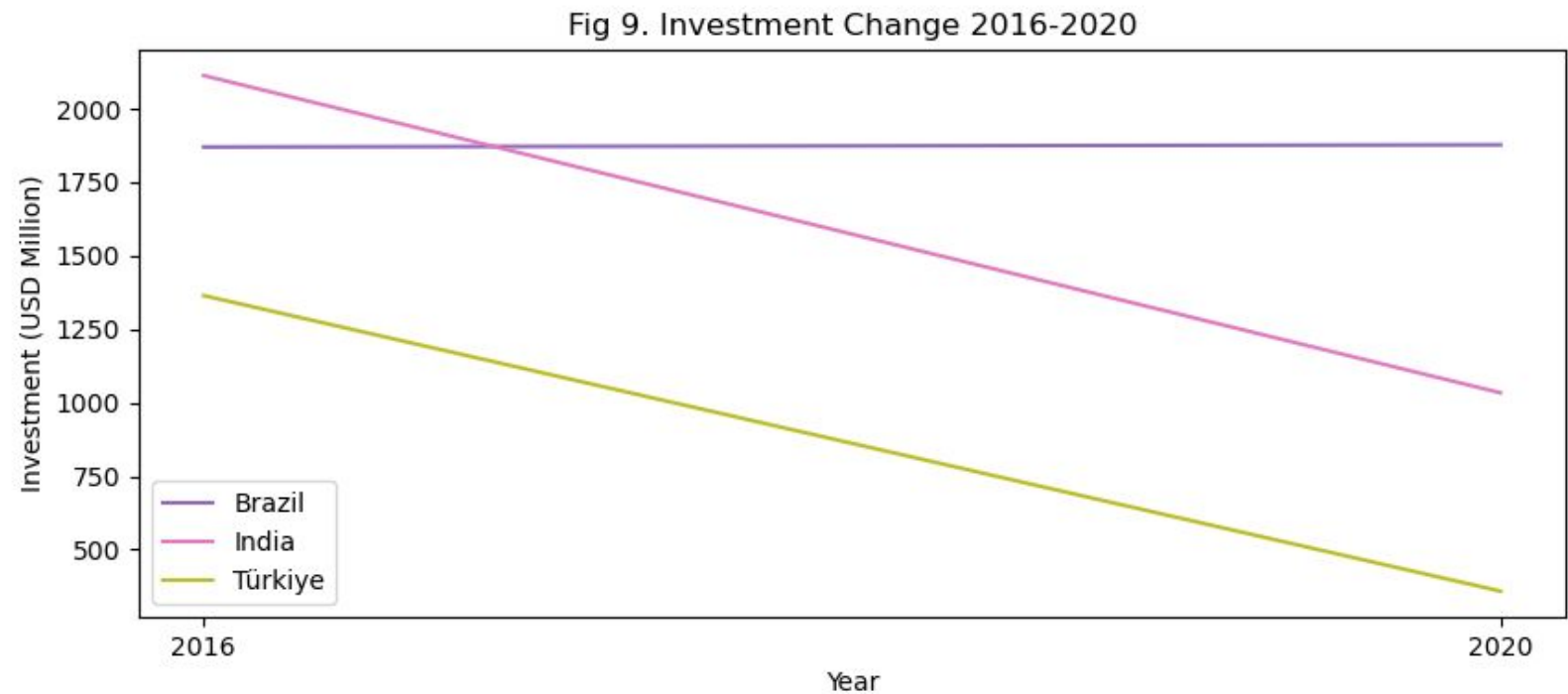


In 2020, the Top 5 countries in Renewable Energy Investment were Brazil, India, Pakistan, Mexico, and Paraguay, respectively.



India, Brazil, Türkiye all invested more money in Wind Energy. Wind Turbines harness about 50% of the energy that passes through them, compare with the 20% efficiency of the top solar panels.

Investment Change 2016-2020



Turkey and India decline investments in renewable energy from 2016-2020.

Conclusion

- Brazil investments in renewable energy stay steady. We personally would invest in Brazil.
- During the years 2016 and 2020 China, US, Japan, Germany, and India produced the most electricity by solar technologies.
- During the years 2016 and 2020 China, US, Japan, Spain, UK, Germany, and India produced the most electricity by wind technologies.
- During the year 2016 India, Brazil, Colombia, Turkiye, and China received the most renewable investment
- During the year 2020 Brazil, India, Pakistan, Mexico, and Paraguay received the most renewable investment

