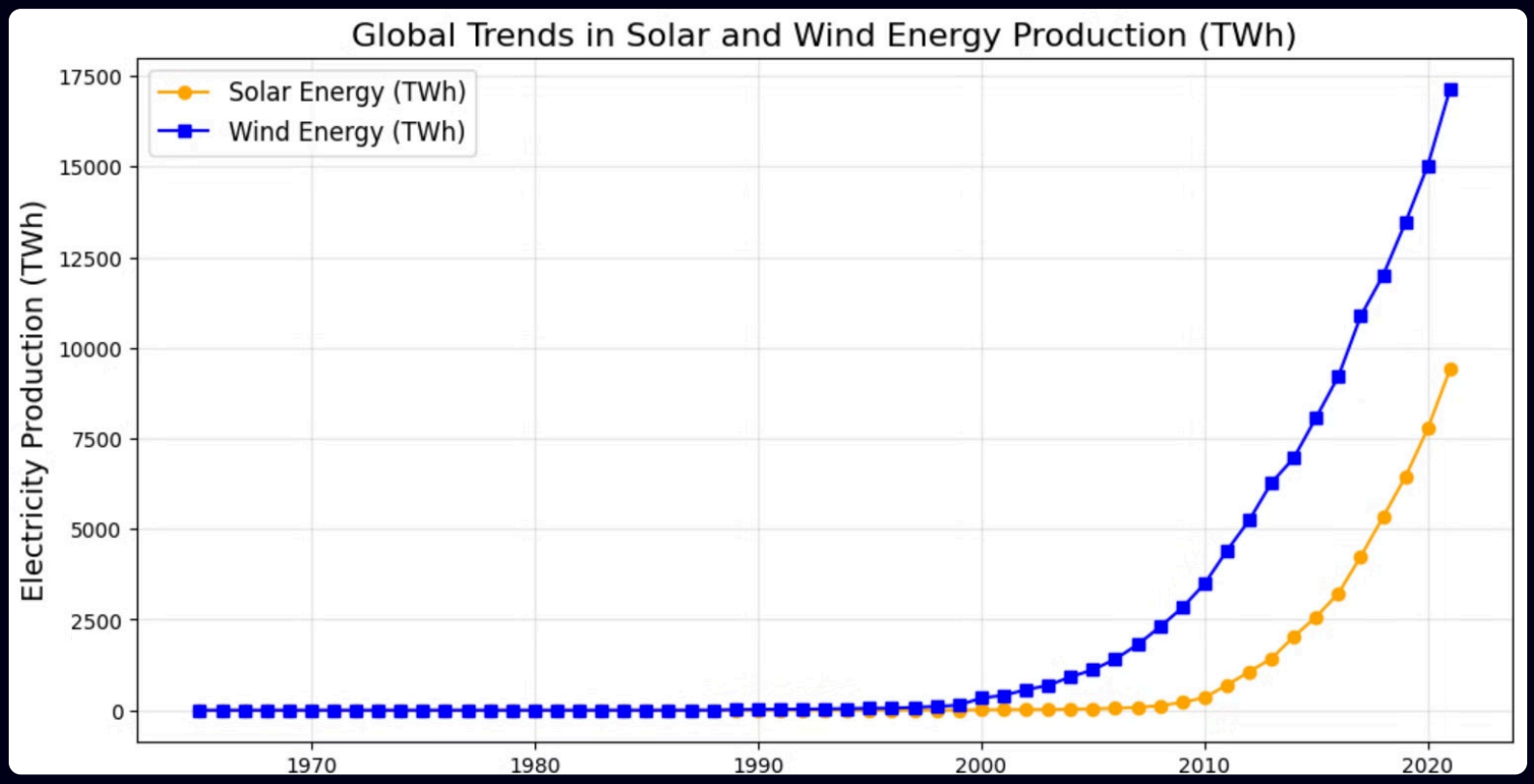
Renewable Energy Analysis: Solar and Wind Power Trends

This presentation examines global and Brazil-specific trends in solar and wind energy production. We'll analyze data on electricity generation from these renewable sources, compare growth rates, and visualize key insights using various charts and maps.

Global Trends in Solar and Wind Energy

Analysis of global data reveals significant growth in both solar and wind energy production over time. Solar energy shows rapid expansion, especially after 2010, indicating major investments in solar technology and infrastructure. The exponential rise reflects falling costs of solar panels and increasing global adoption.

Wind energy also experienced consistent growth, with a more established base by 2000 compared to solar. The increase is steady but more linear than solar's exponential rise.



1 **Pre-2000**

Wind energy established, solar minimal

2 **2000-2010**

Steady growth in wind, solar emerging

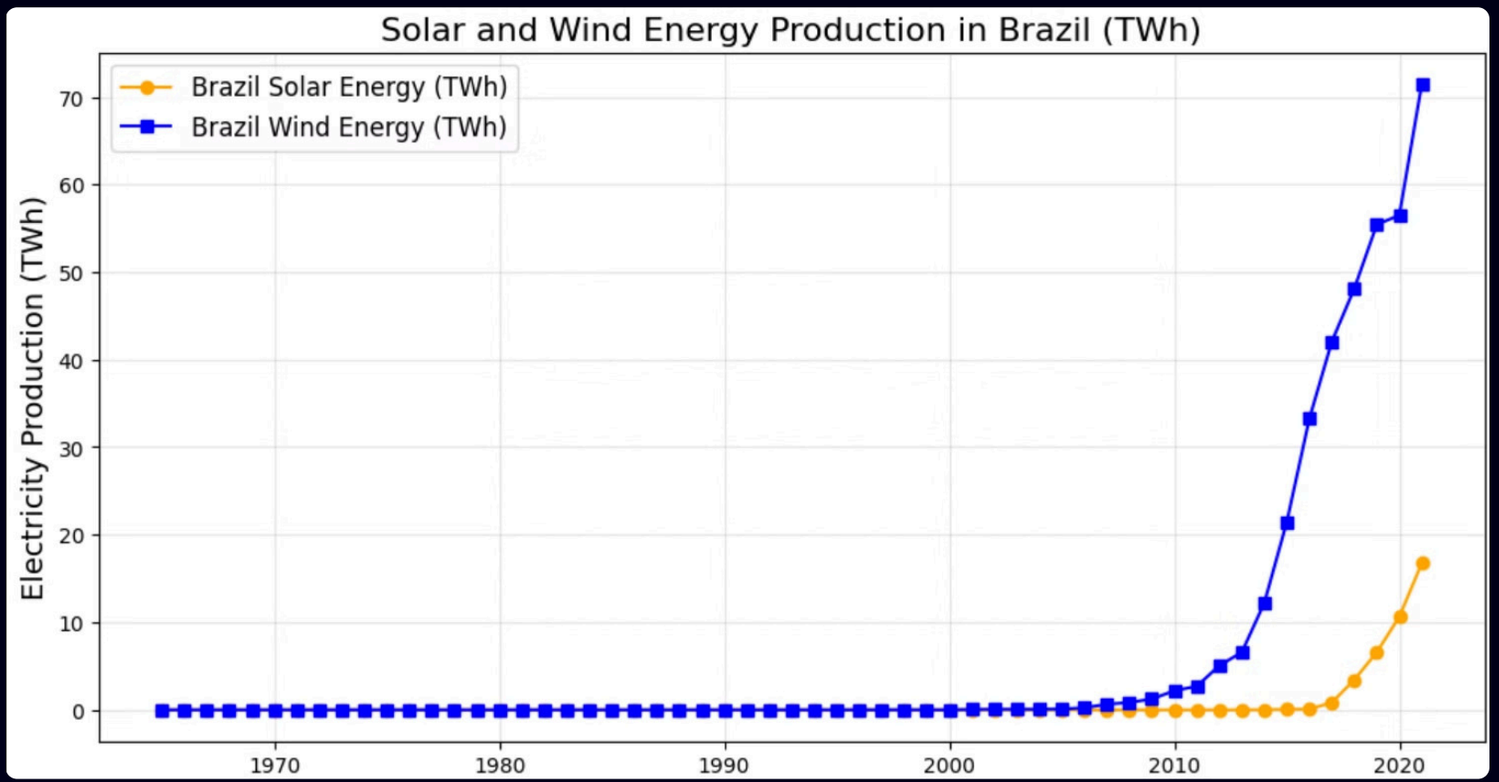
3 **Post-2010**

Rapid solar expansion, wind continues steady growth

Brazil's Renewable Energy Journey

Brazil's adoption of solar and wind energy began later than global trends, starting around 2010. However, both sources have shown significant growth since then. Wind energy in Brazil had an earlier start and higher production levels compared to solar, but solar energy is showing rapid growth in recent years.

The growth patterns in Brazil mirror global trends, with wind energy maintaining a steady increase and solar energy experiencing exponential growth, particularly after 2015.



2010

Initial adoption of wind and solar

2010-2015

Steady growth in wind energy

Post-2015

Rapid expansion of solar energy

Growth Rates: Solar vs Wind in Brazil

Analysis of annual growth rates reveals interesting patterns. Solar energy in Brazil shows extremely high growth rates in its early years, with rates exceeding 900% in 2017. This reflects the rapid adoption of solar technology from a very low base.

Wind energy, while showing lower percentage growth rates, has maintained steady growth over a longer period. Recent years show growth rates between 15-30% for wind energy, indicating continued expansion of this more established renewable source.

	Year	Electricity from solar (TWh)	Growth Rate (%)
1097	2017	0.83	938.0
1098	2018	3.44	314.0
1099	2019	6.59	92.0
1100	2020	10.64	61.0
1101	2021	16.75	57.0

	Year	Electricity from wind (TWh)	Growth Rate (%)
1104	2012	5.05	87.0
1105	2013	6.58	30.0
1106	2014	12.21	86.0
1107	2015	21.47	76.0
1108	2016	33.24	55.0
1109	2017	42.06	27.0
1110	2018	48.12	14.0
1111	2019	55.43	15.0
1112	2020	56.48	2.0
1113	2021	71.50	27.0

Solar Energy

Extremely high initial growth rates (>900% in 2017), moderating in recent years but still significant

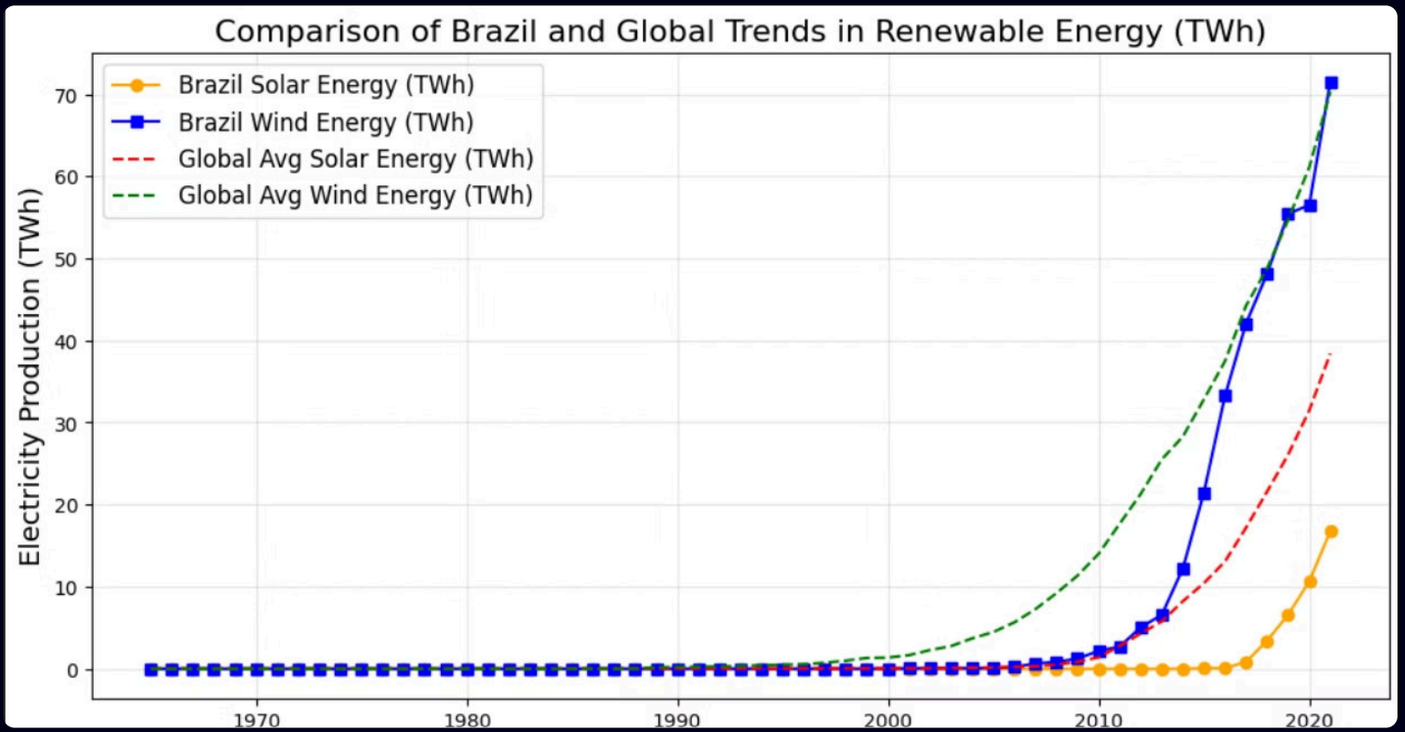
Wind Energy

More stable growth rates, typically 15-30% in recent years, reflecting a more mature industry

Brazil vs Global Averages

Comparing Brazil's renewable energy production to global averages provides context for the country's progress. Brazil's wind energy production has consistently outpaced the global average, indicating strong investment and favorable conditions for wind power in the country.

Solar energy production in Brazil started below the global average but has shown rapid growth in recent years, narrowing the gap. This trend suggests increasing focus on solar energy development in Brazil, aligning with global shifts towards this renewable source.



Wind Energy

Brazil consistently above global average

Solar Energy

Initially below global average, rapid recent growth

Overall Trend

Brazil closing gap with global leaders in renewables

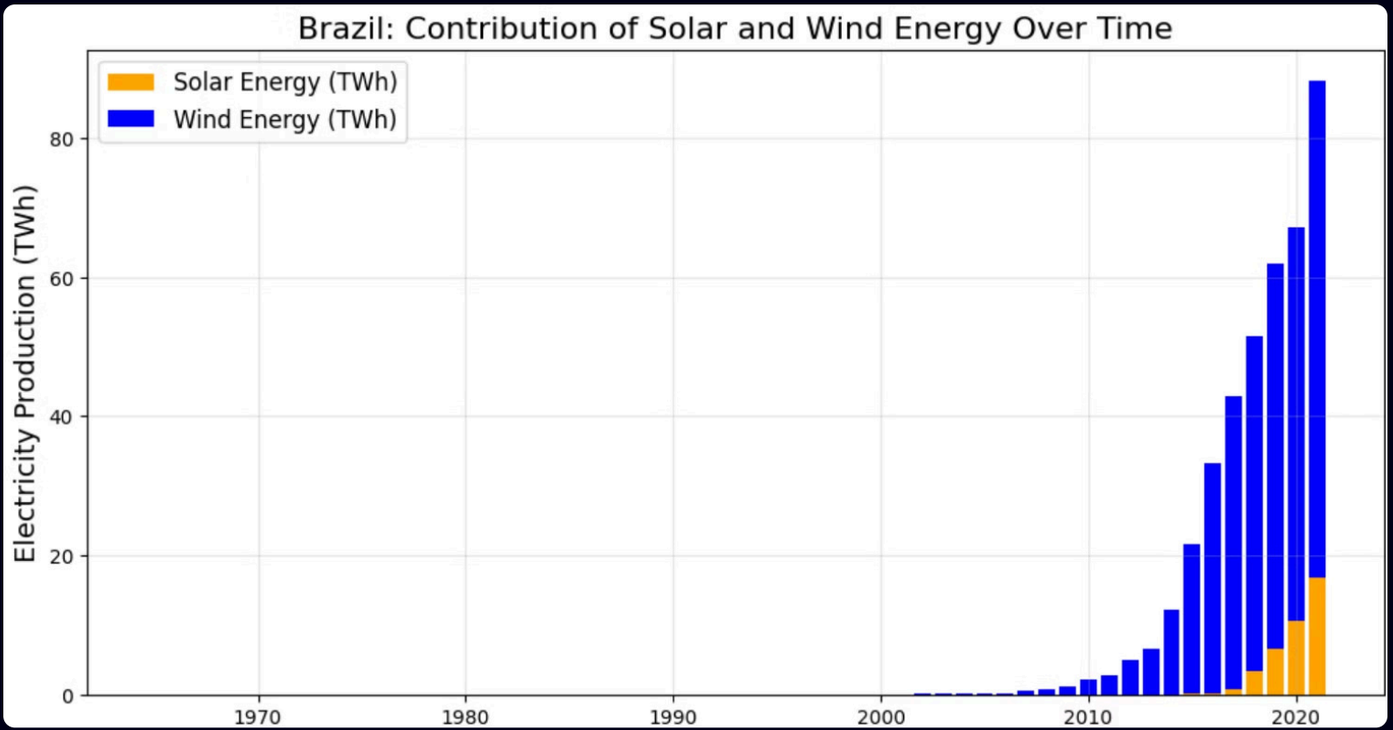
Top Years for Renewable Energy in Brazil

The analysis identifies the top years for solar and wind energy production in Brazil. For solar energy, the top 5 years are all recent: 2021, 2020, 2019, 2018, and 2017, with production increasing each year. This reflects the rapid recent growth of solar energy in the country.

Wind energy's top production years are also recent, but show a longer established trend: 2021, 2020, 2019, 2018, and 2017. The consistent presence of both energy sources in recent years indicates Brazil's growing commitment to renewable energy.

Year	Solar (TWh)	Wind (TWh)
2021	16.75	71.50
2020	10.64	56.48
2019	6.59	55.43
2018	3.44	48.12
2017	0.83	42.06

Contribution of Solar and Wind to Brazil's Energy Mix



A stacked bar chart visualization emphasizes the contribution of solar and wind energy to Brazil's total renewable electricity production over the years. The chart clearly shows the dominance of wind energy in Brazil's renewable mix, contributing almost 4 times more power than solar energy.

However, the rapid growth of solar energy in recent years is evident, with its contribution becoming increasingly significant. This trend suggests a diversifying renewable energy portfolio in Brazil, with both wind and solar playing important roles.

Solar Energy

Rapidly growing contribution

Wind Energy

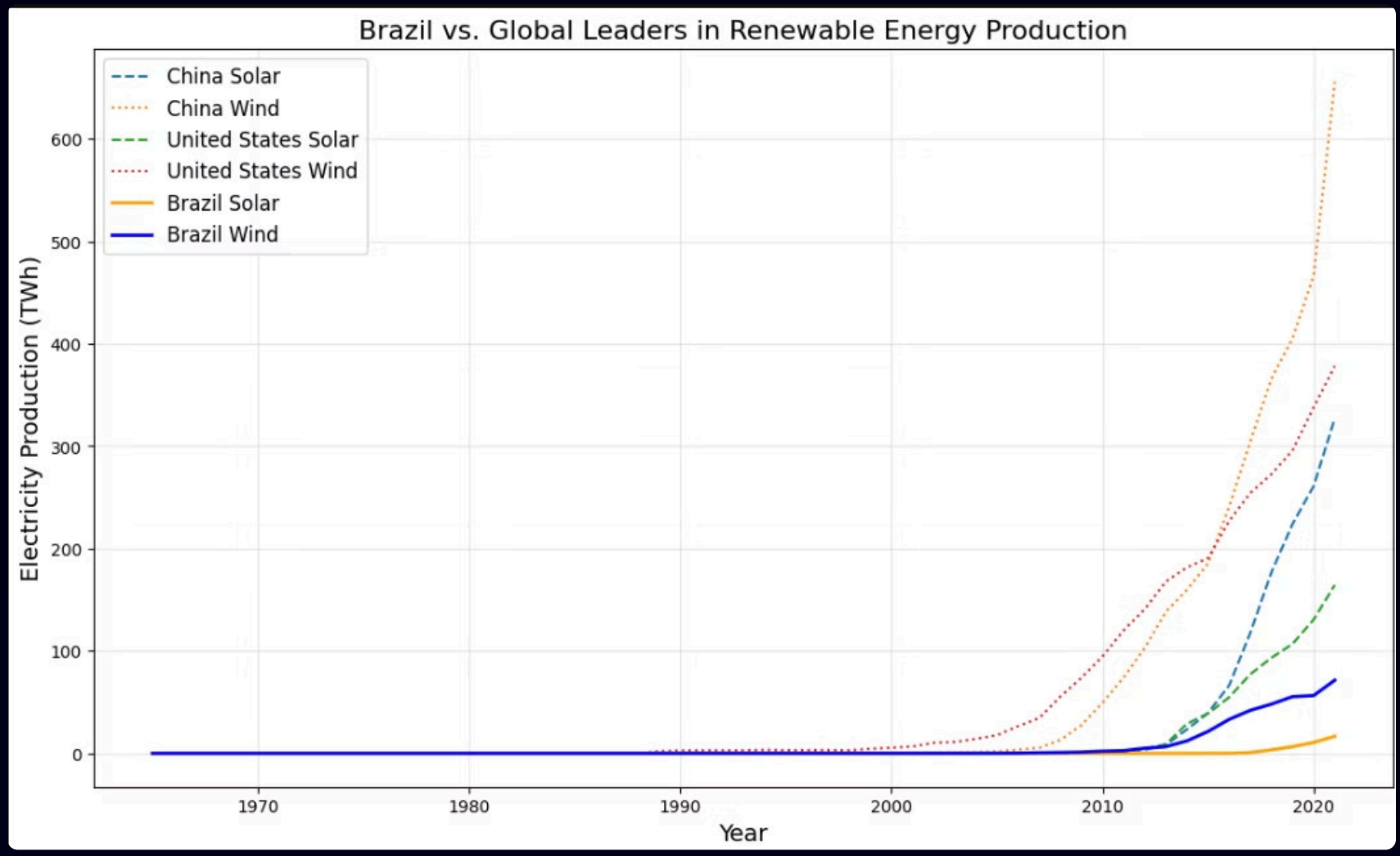
Dominant renewable source

Trend

Diversifying energy mix

Brazil vs Global Leaders in Renewable Energy

Comparing Brazil's renewable energy growth to global leaders like China and the United States provides perspective on the country's progress. The visualization shows a significant gap between Brazil and these superpowers in terms of total production, which is understandable given differences in population, GDP, and land area.



However, Brazil's growth trends, particularly in wind energy, show promising trajectories. While not matching the absolute production levels of global leaders, Brazil's commitment to renewable energy development is evident in the consistent upward trends for both solar and wind energy production.

1 Scale Difference

Significant gap in total production between Brazil and global leaders

2 Growth Trends

Brazil shows promising upward trajectories, especially in wind energy

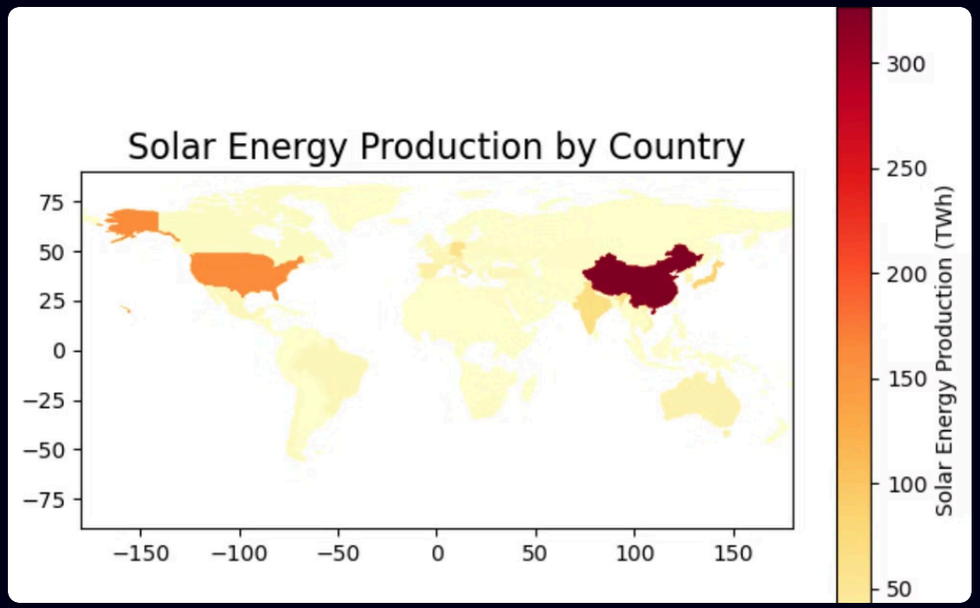
3 Commitment

Consistent growth indicates Brazil's dedication to renewable energy development

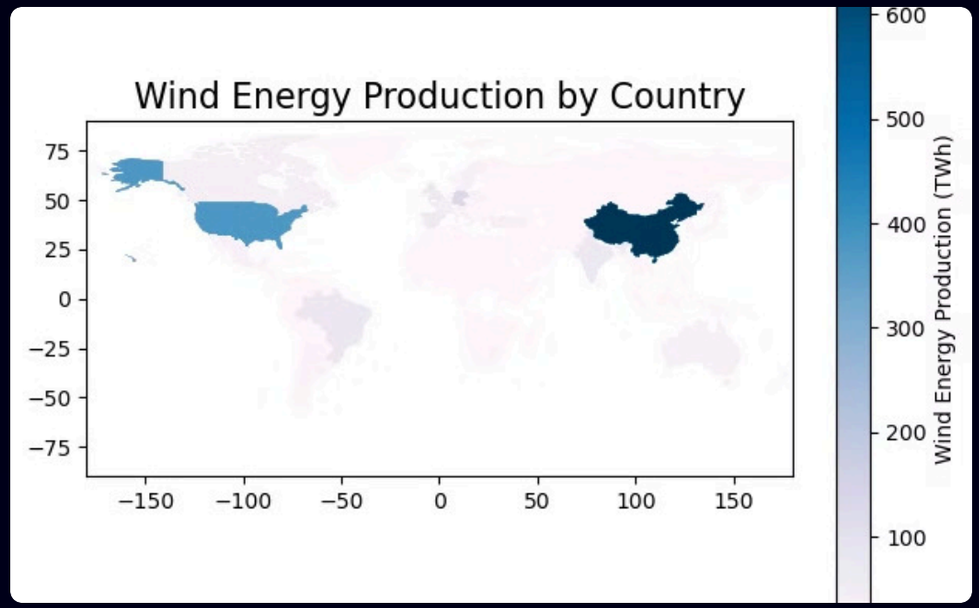
Global Distribution of Renewable Energy Production

World maps visualizing solar and wind energy production by country provide a global perspective on renewable energy distribution. These maps highlight China as the leading producer of both solar and wind energy, with its production levels far exceeding other countries.

The maps also reveal regional patterns in renewable energy adoption. Europe shows strong production in both solar and wind, while North America has significant wind energy production. Brazil stands out in South America for its wind energy production, aligning with earlier observations about its stronger focus on wind compared to solar energy.



Solar Energy Distribution



Wind Energy Distribution

As we can see above, both in solar and wind energy, China and USA have the biggest production. Europe, India, Japan, Australia and Brazil follow behind.