This project, utilizing the dataset from the Energy Institute's **2024 Statistical Review of World Energy**, provides an in-depth analysis of global energy production trends from 2020 to 2023. The analysis specifically focuses on the **top 10 energy-producing countries** and examines both **renewable** and **non-renewable energy** sources. Key energy metrics—such as oil, natural gas, coal, and renewable sources like solar, wind, and hydroelectric power—were evaluated. All energy values in this dataset were converted to **Million Tonnes (mil.ton)** for consistency and ease of calculation.

The primary objectives of this project were as follows:

1. Categorize countries by energy source (renewable or non-renewable) and assess both energy production and consumption.
2. Identify the **top 10 countries** in three categories: total energy production, non-renewable energy production, and renewable energy production.
3. Define the global leader in total energy production and identify the energy sources on which they most rely.
4. Identify the **most energy self-sufficient** country and the energy sources contributing to its energy sufficiency.
5. Forecast energy production trends for the next four years and analyze potential changes in global energy patterns.

The **top 10 energy producers** identified in this analysis are: **China**, **United States**, **Russian Federation**, **India**, **Indonesia**, **Saudi Arabia**, **Australia**, **Canada**, **Iran**, and **South Africa**. A common trend across these countries is their heavy reliance on **non-renewable energy sources**. However, countries such as **Brazil** have distinguished themselves by predominantly utilizing renewable energy sources, particularly hydropower.

**China** stands out as the leader in total energy production, with a total output of **19,378.37 million tonnes (mil.ton)**. This country's energy sufficiency is overwhelmingly based on **non-renewable energy**, with coal accounting for **92%** of its non-renewable energy production. Among its renewable sources, **hydroelectricity** is the largest contributor, making up more than **60%** of its renewable energy generation.

The **United States** ranks second in total energy production, with a production of **8,188.76 million tonnes (mil.ton)**, but similarly relies predominantly on **non-renewable energy** sources (96%). In contrast, **Norway** leads in **energy self-sufficiency**, with an average energy sufficiency rate of **11.97%**, meaning it produces significantly more energy than it consumes. This energy self-sufficiency is largely fueled by **oil** (54%) and **natural gas** (46%), although Norway is gradually shifting toward **renewable energy**, with **hydroelectric power** (93%), **wind energy** (6.5%), and minimal contributions from **solar energy**.

Despite the heavy reliance on non-renewable sources by many of the largest energy producers, some countries have made significant strides in increasing **renewable energy production**. **Brazil**, in particular, stands out for its reliance on **renewable energy**, notably **hydropower**, which has enabled the country to maintain a low-carbon energy profile while addressing growing energy demands. Similarly, European nations such as **Germany**, **France**, and **Spain** have been actively reducing their dependency on non-renewable sources to mitigate carbon emissions. **Japan**, despite its geographic limitations in terms of fossil fuel availability, is making notable progress in increasing its renewable energy production through **solar**, **wind**, and **geothermal** energy.

In conclusion, while **non-renewable energy** continues to dominate global energy production, there is a clear and growing trend toward the integration of **renewable energy** across many nations. Countries that are successfully diversifying their energy portfolios to include more renewable sources are positioning themselves for a more sustainable energy future. The transition to cleaner energy sources is critical for addressing climate change, ensuring energy security, and meeting global energy demands in the long term. Future energy strategies must prioritize the continued growth of renewable energy in order to build a sustainable, resilient global energy system.