

# Can Renewable Energy Be Relied Upon For Sustainable Economic Development?

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## Introduction

The renewable energy sector is experiencing rapid growth globally, and accurately determining the optimal capacity required to fully harness its potential is a critical challenge. This data analytic project aims to address this problem by analyzing and predicting the necessary renewable energy generation capacity while considering variables such as energy consumption, GDP (Gross Domestic Product), population, and renewable installed capacity plants.

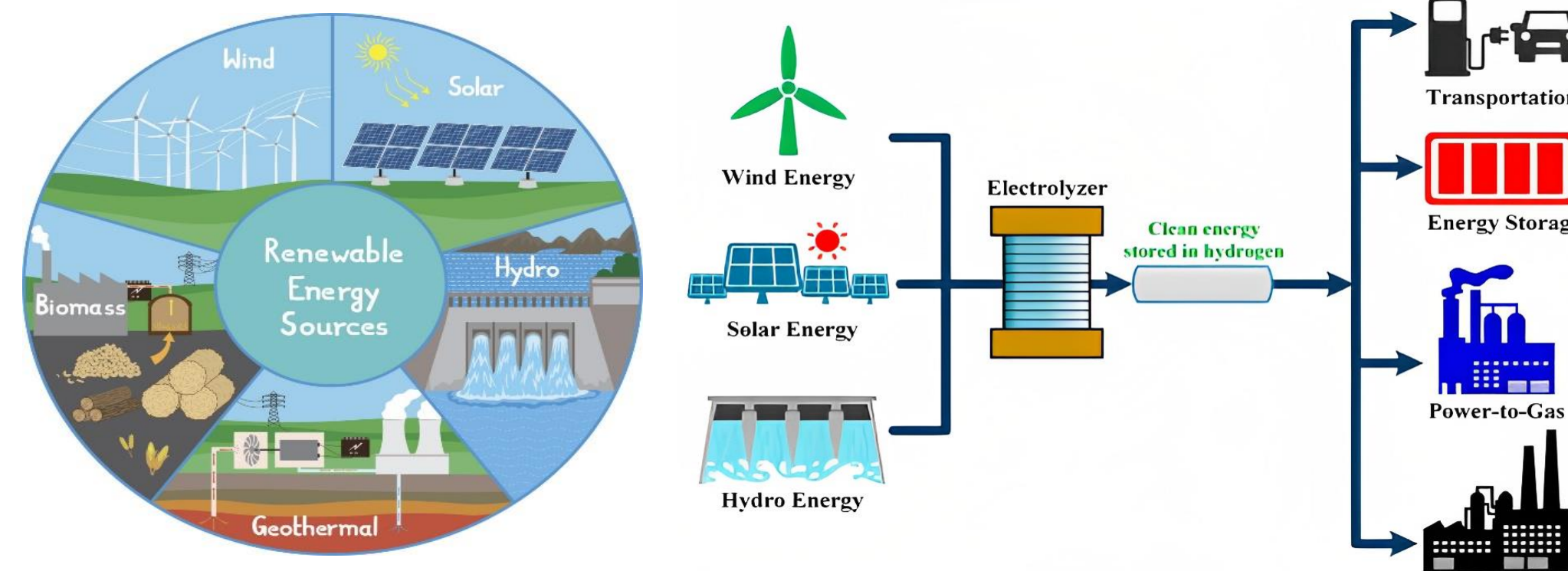


Figure 1. Renewable Energy Sources.

Figure 2. Renewable Energy Sources & Consumption.  
Adapted from (Yodwong and Guilbert, 2010).

## Data Collection & Analysis

We analyzed global renewable energy production and energy consumption using two Kaggle datasets. Additionally, we integrated GDP and population data for a more comprehensive analysis. This allowed us to draw meaningful insights and make informed recommendations for sustainable energy planning and policy development.

## Main Findings

After analyzing global renewable energy production, energy consumption, GDP, and population data, we have uncovered essential insights on sustainable energy practices worldwide. Our findings offer valuable information for policymakers, energy planners, and stakeholders. This introduction outlines key discoveries from our comprehensive study, shaping a sustainable and greener future.

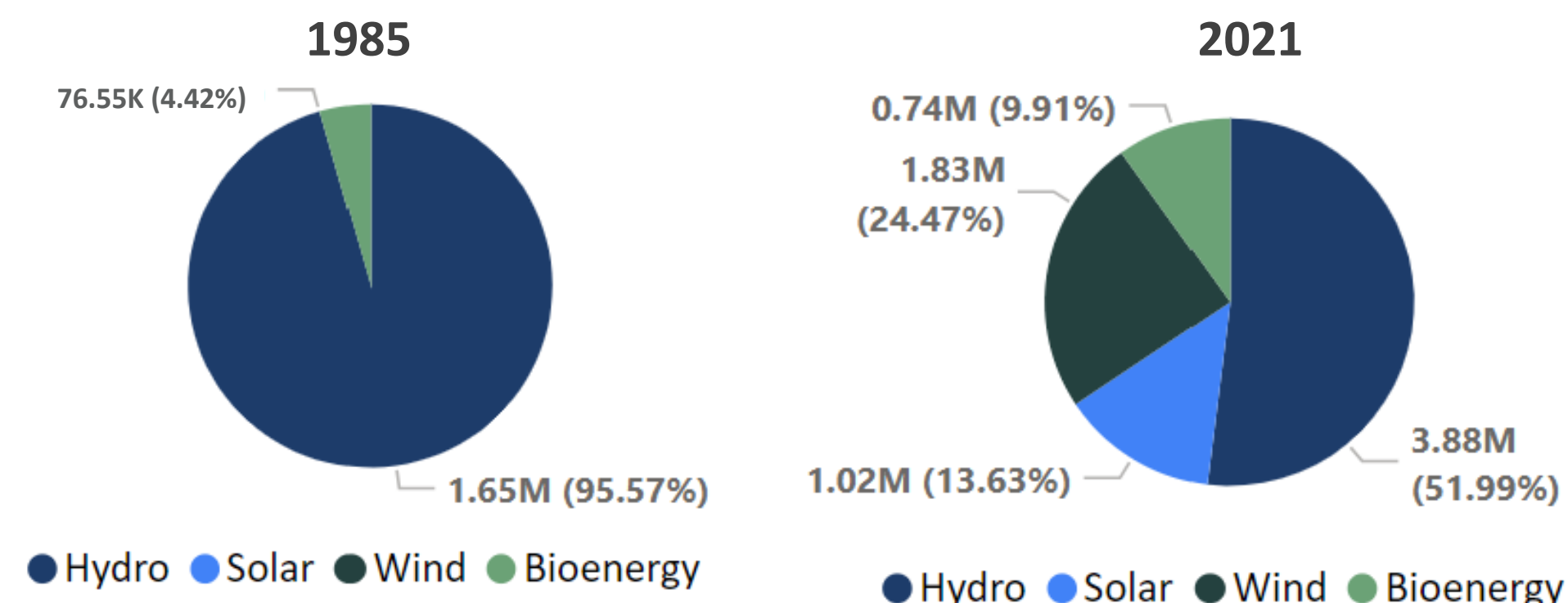


Chart 1. Renewable Energy Sources Production For The Years 1985 & 2021.

## Main Findings – continuous

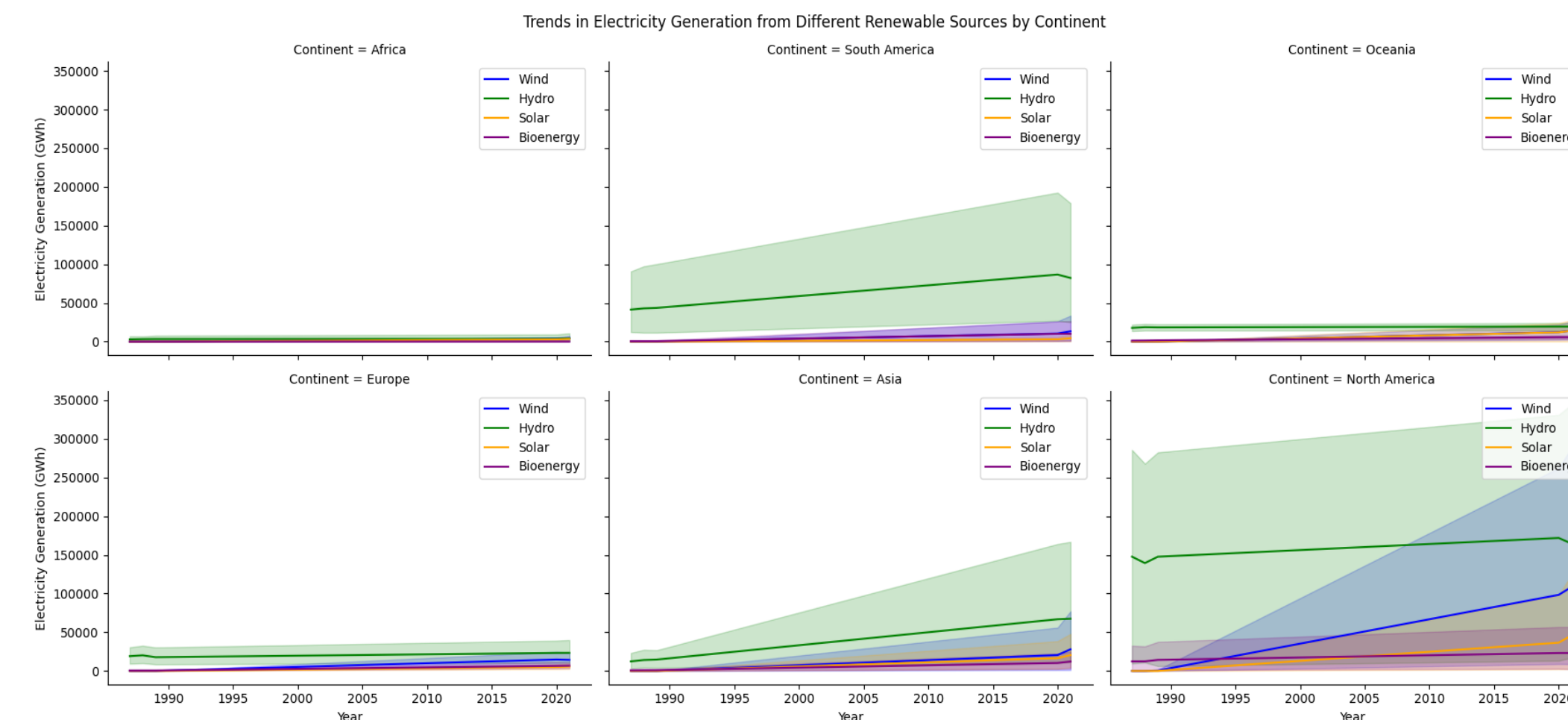


Chart 2. Renewable Energy Sources Generation By Continent Over Years.

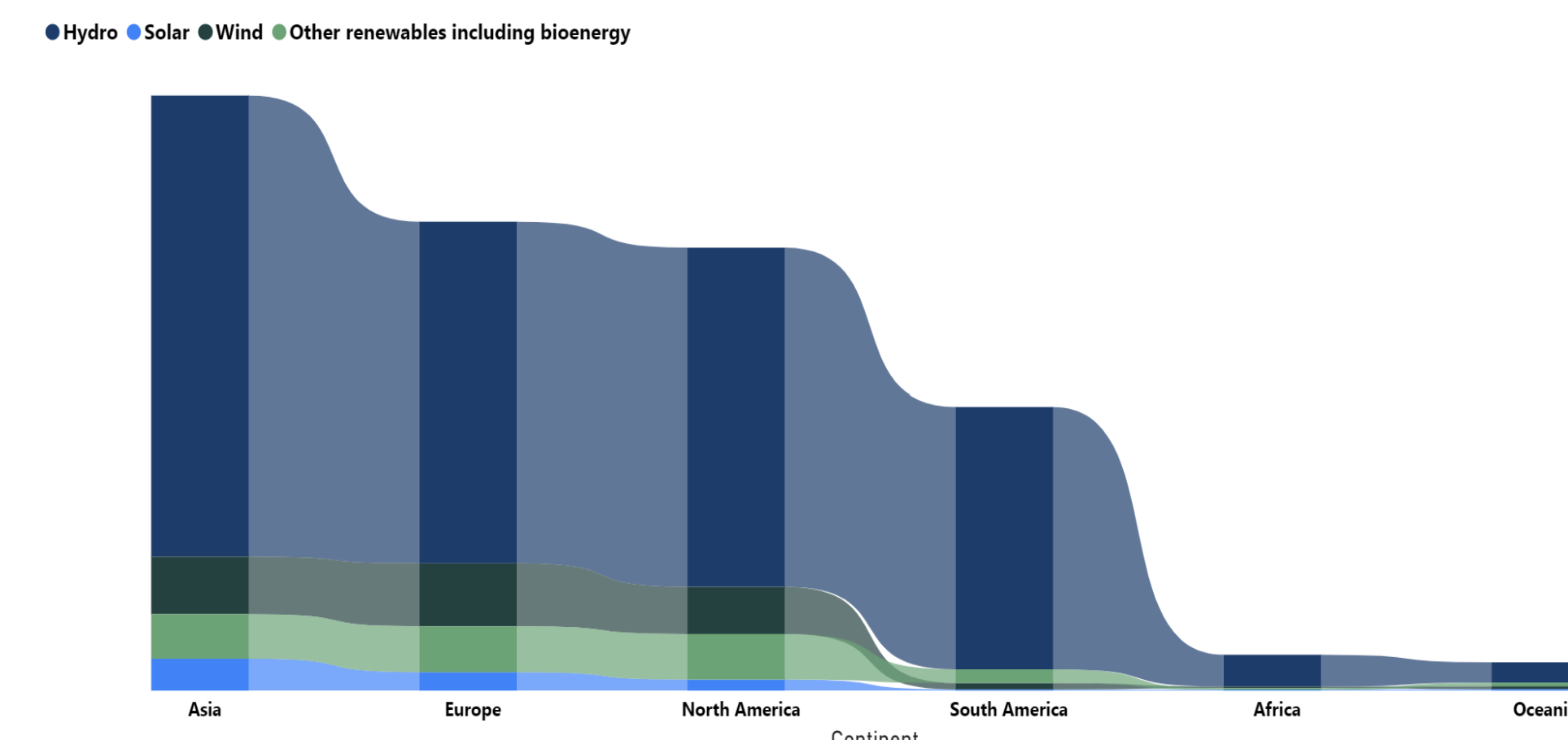


Chart 3. Renewable Energy Sources Generation By Continent.

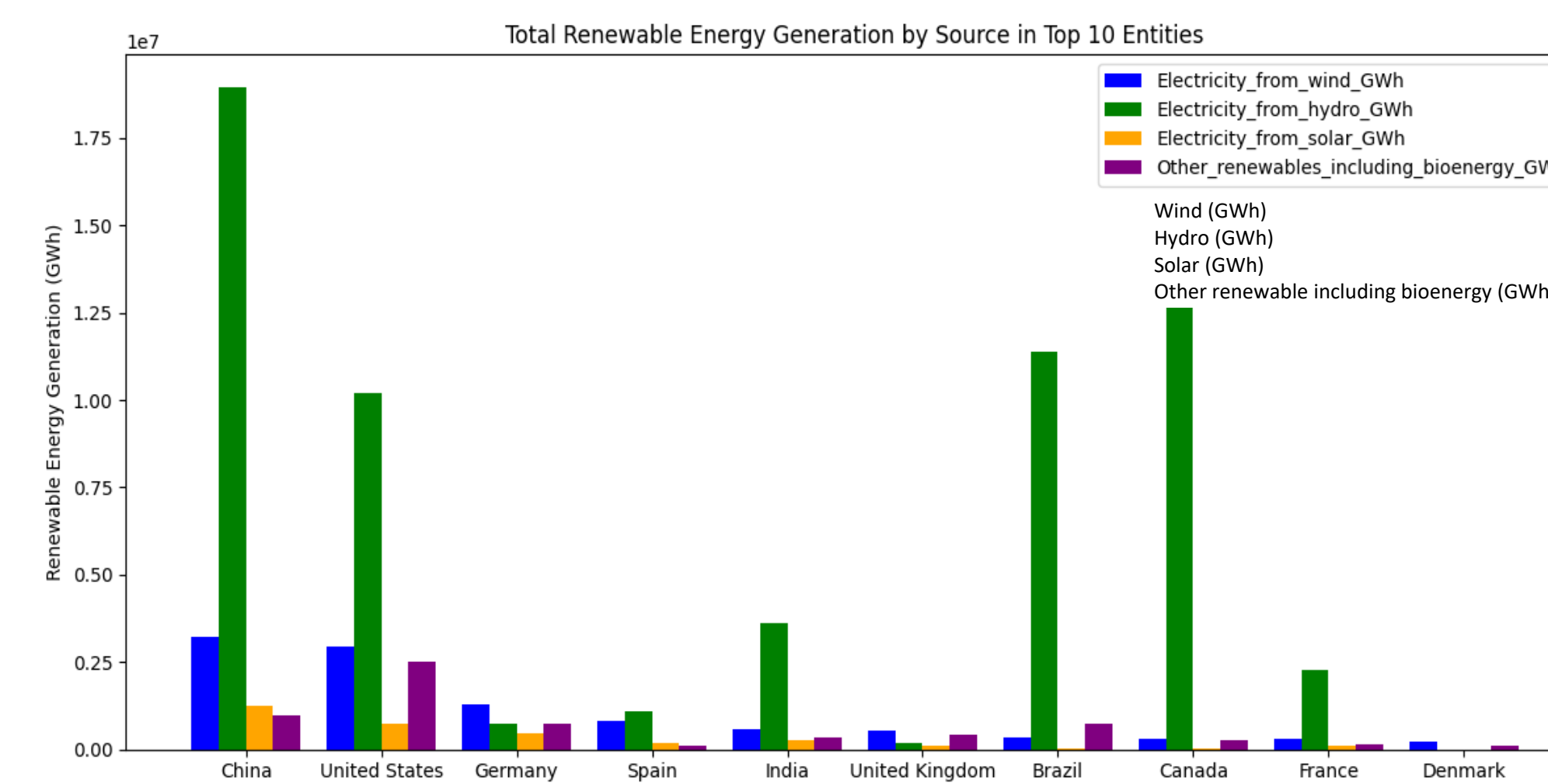


Chart 4. Top 10 Countries in Renewable Energy Generation.

## Model

We constructed a predictive model to estimate the percentage of renewable energy in each country based on specific features for that country, including electricity production from wind, solar, and hydro, energy consumption, population, GDP and area in square kilometers. To evaluate the model's performance, we split the dataset into 70% for training and 30% for testing. To make predictions, we employed linear regression along with Lasso and Ridge regularization techniques. To ensure better performance, we normalized the dataset. As a result, the linear regression model demonstrated the most favorable outcome among the three methods.

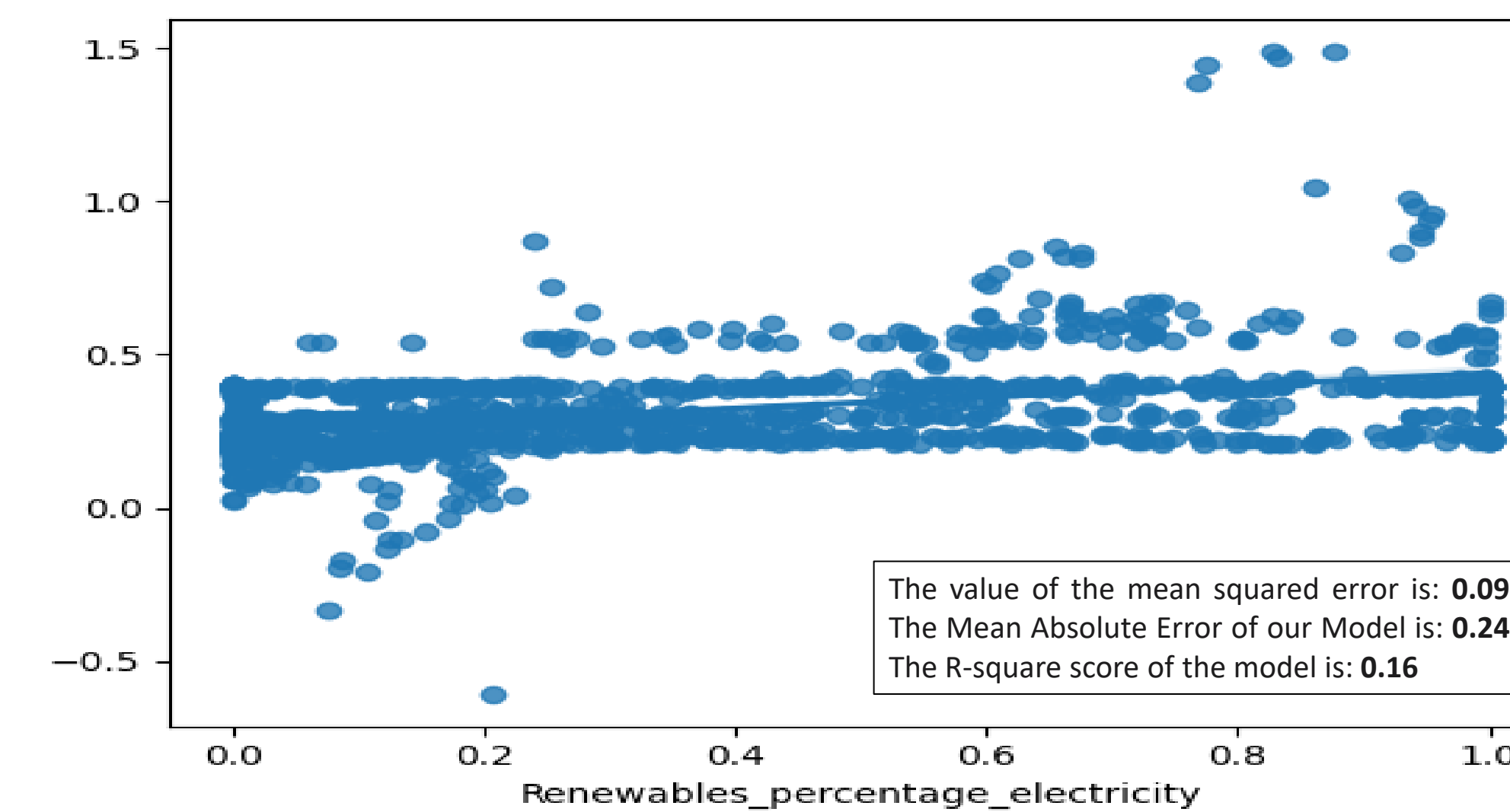


Chart 5. The difference between the data test and the real data.

## Highlights



Figure 3. Renewable Energy Production Highest & Lowest Continent.



Figure 4. Hydroelectric Energy.

## Highlights - Energy Data 2021

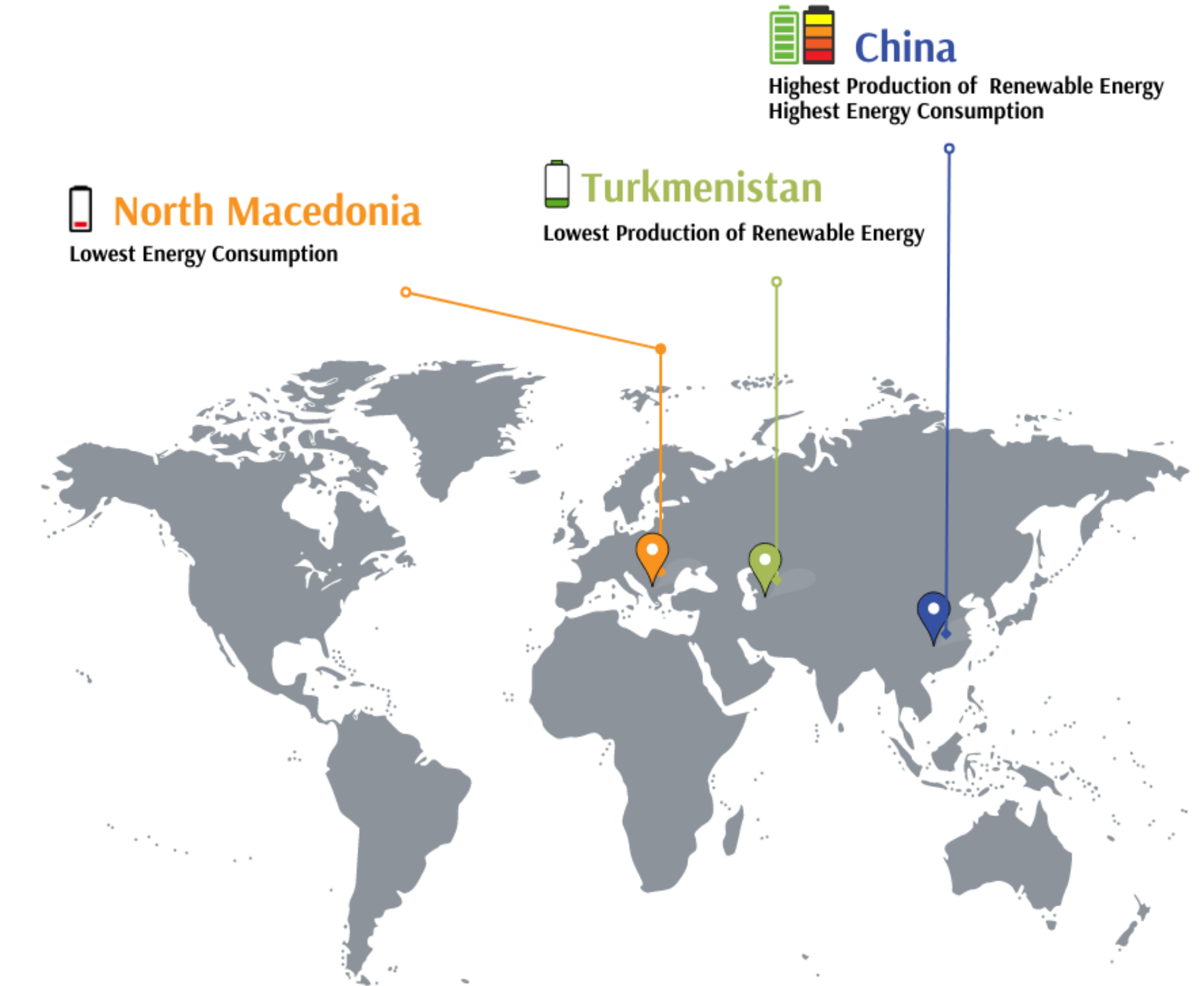


Figure 5. Highest & Lowest countries in Generate Renewable Energy and Consuming Energy.

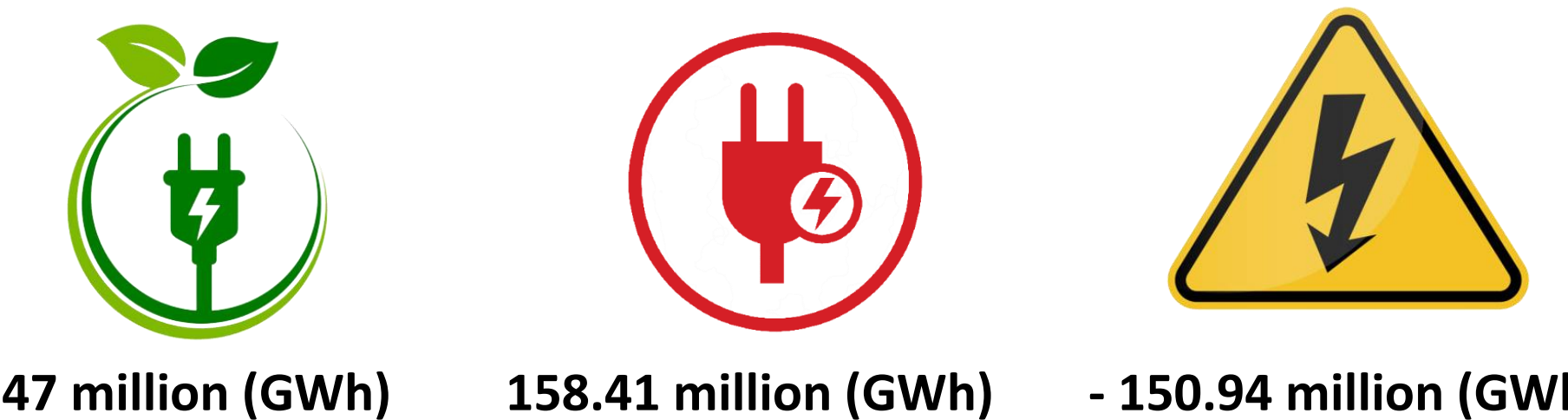


Figure 6. Global Energy Consumption & Renewable Energy Production & the deficit in 2021.

## Conclusions

In conclusion, it can be said that the world is not yet fully prepared for a complete or partial transition to renewable energy while continuing to achieve sustainable economic development. A complete shift or heavy reliance on renewable energy remains challenging with the current capabilities. The consumption, population, and economic growth are outpacing the growth of renewable energy production, resulting in a significant gap between renewable energy production and consumption. However, the potential of renewable energy is substantial, and with companies and governments racing to develop new technologies that enable higher energy production and storage in high-capacity batteries, the dream of the world's dependence on clean energy becomes closer. #RenewableRevolution