

Design Summary

Renewable energy has been a heated topic for a long time. This dashboard unites global renewable energy and power plants data to serve as an interactive resource for users possessing a basic to intermediate understanding of the subject matter. It utilizes a spectrum of visualization techniques to present various data metrics effectively and intuitively.

This dashboard is segmented into two main pages: “Global Overview” and “Country Details.”

Global Overview

The “Global Overview” page is designed to offer a broad, high-level insight into the global renewable energy profile. It employs a choropleth basemap to represent the proportion of energy sourced from renewable fuels in different countries. Power plants are overlaid on this basemap as circles, with their radius corresponding to the plant’s capacity. A combined bar and line chart depict the global trends in renewable and fossil energy, offering a clear visual representation of the evolving energy sector. Furthermore, a scatter plot provides comparative insights into the top CO2 emitting countries and their renewable energy capacities. The sizes and colors of the symbols in this plot are proportional to the CO2 emission volumes. These design choices offer users an intuitive perception of the relative scales of emissions.

Country Details

The “Country Details” page is tailored to present more focused, country-specific data so that users can explore the energy profile of individual nations more deeply. It features two infoboxes that concisely present a country’s performance regarding GDP per capita and its global ranking in renewable energy capacity. A radar chart has been integrated to visualize the intricate interplay between low carbon energy, renewable energy and electricity accessibility. Lastly, a treemap displaying further details on power plants aims to provide users with a deeper understanding into the energy production profile.

Interactivity and User Control

Enhanced with multiple reactive components and filters, the dashboard offers a high level of interactivity. The “Year” and “Primary Fuel Type” filters on the sidebar impact both pages, while the “Country” filter exclusively influences the “Country Details” page but can be updated through interactions on the “Global Overview” page.

Color Choices

Colors schemes have been carefully chosen to maintain semantic resonance and to facilitate intuitive interpretations, as illustrated in Figure 1.



Figure 1

Appendix

Source

Global Renewable Energy Data

<https://www.kaggle.com/datasets/anshtanwar/global-data-on-sustainable-energy>

Global Power Plants Data

https://www.kaggle.com/datasets/ramjasmaurya/global-powerplants?select=powerplants+%28global%29+-+global_power_plants.csv

Countries Codes and Coordinates(Country) and 50m.geojson

https://github.com/eparker12/nCoV_tracker/tree/master/input_data

Visualization chart

<https://plotly.com/r/>

Shinydashboard

<https://rstudio.github.io/shinydashboard/structure.html>

Colors Source

<https://www.computerhope.com/htmcolor.htm>

<https://www.colorhexa.com/>

Icons

<https://fontawesome.com/>

Notes

To facilitate the data analysis and visualization, global renewable energy, power plant and country datasets were pre-processed prior to loading into R. Below is a concise summary of the preprocessing applied. It is imperative to note that throughout this process, the utmost care was taken to ensure that no alteration compromised the genuine meaning or value of any datapoint in order to preserve the data integrity.

1. The country names across the renewable energy, power plant, and country datasets were aligned to ensure consistency with the 50m dataset.
1. To optimize processing speed for this dashboard, unused columns in renewable energy and power plant data were dropped. For example: attributes such as “Financial flows to developing countries (US \$)” and “Access to clean fuels for cooking (% of population)” were removed from the renewable energy dataset. Similarly, columns like “geolocation_source”, “wepp_id”, “url”, “generation_gwh_2013”, “generation_gwh_2014”, etc., were removed from power plant dataset.
2. Numerical values with more than two decimal places within the renewable energy dataset were rounded to two decimal places to maintain uniform precision across the dataset.

3. A “primary_fuel” column was added in the power plant dataset to group the diverse range of fuel types into three overarching groups:
Renewable: Hydro, Solar, Wind, Biomass Wave and Tidal, Geothermal
Fossil: Gas, Coal, Petcoke, Oil
Other: Other, Nuclear, Waste, Storage, Cogeneration