Report - Global Energy Trends

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Project Title: Global Energy Trends: A Comprehensive Analysis of Key Regions and Generation Modes.

1. Purpose of this Report

This report documents the design, implementation and findings of an interactive Power BI analysis of global energy trends. It explains the report structure, data sources, visual design decisions, analytical methods and key business insights intended for policymakers, energy analysts and stakeholders.

2. Executive summary

The project integrates continent, country and source-level energy datasets (TWh) to build a three-page Power BI report, Global Overview, Renewable Deep Dive and Country & Regional Analysis. Key results, renewable generation is growing steadily, hydropower remains the largest renewable contributor in absolute terms, solar shows the fastest growth rate, and a small number of countries/regions account for the majority of global consumption.

3. Target audience

- Energy policy makers and planners.
- Sustainability analysts and academic evaluators.
- Utility/operations managers and decision makers.
- Project assessors/examiners reviewing dashboard design and analysis.

4. Data sources used

Primary CSV files used (all values in TWh):

- Continent_Consumption_TWH.csv: continent-level consumption by year.
- Country_Consumption_TWH.csv: country-level consumption.
- renewablePowerGeneration97-17.csv: renewable generation by source over time.
- renewablesTotalPowerGeneration.csv: total generation by renewable mode.
- nonRenewablesTotalPowerGeneration.csv: total generation by non-renewable mode.
- top20CountriesPowerGeneration.csv: renewables breakdown for top 20 countries.

5. Methodology - data preparation & modelling

- **Power Query cleaning:** remove blank/total rows, trim whitespace, standardize column names, convert

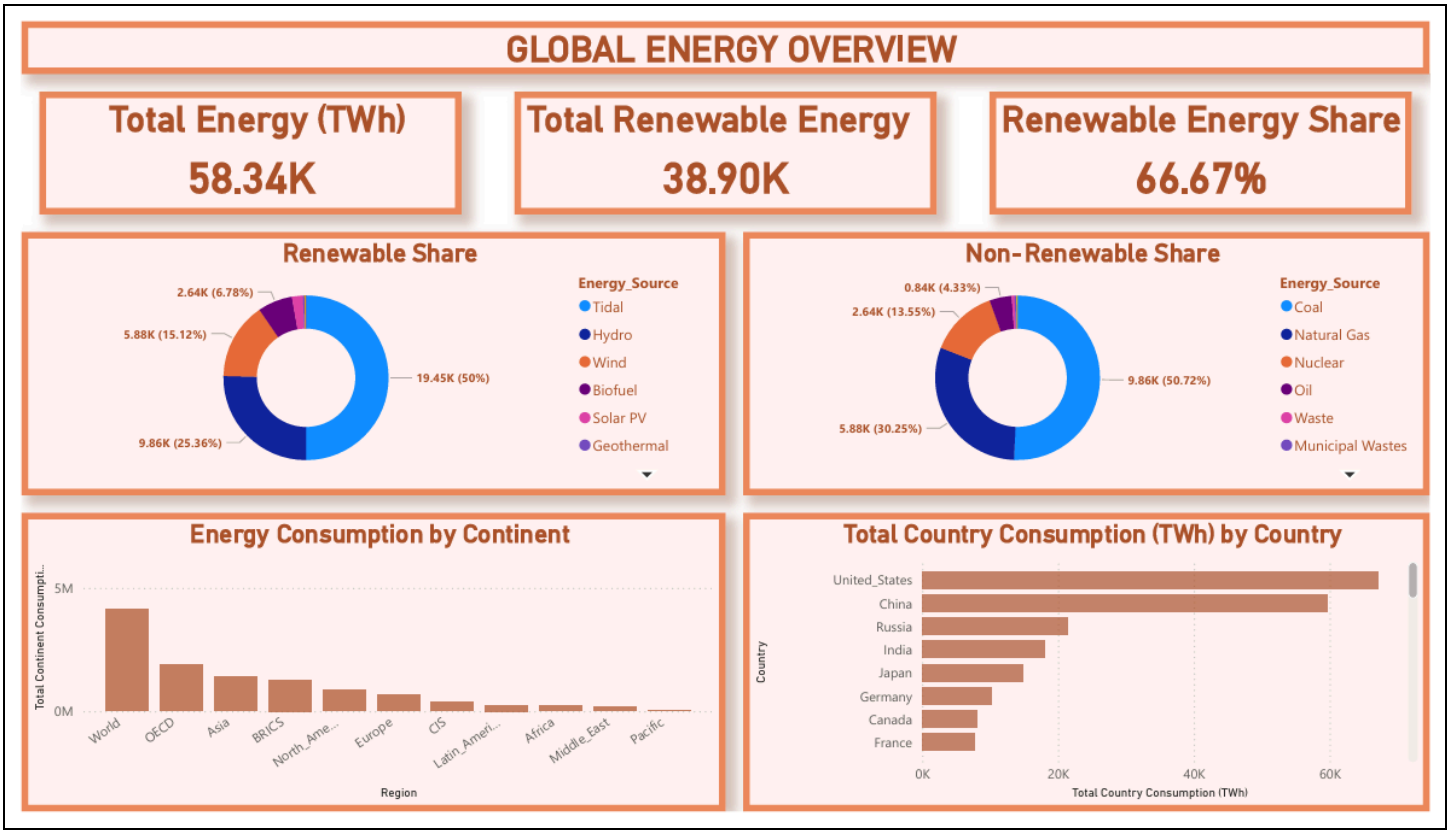
types, unpivot wide tables to long format.

- **Feature engineering:** add Energy_Type flag (Renewable/NonRenewable), compute yearly totals where needed.
- **Data model:** fact tables for renewables, non-renewables, continent and country consumption, optional Dim_Year for time intelligence.
- **Key DAX measures:**Total Renewable (TWh), Total Non-Renewable (TWh), Total Energy (TWh), Renewable Share (%), Renewable Growth (%) (YoY), Total Country Consumption (TWh).

6. Visual inventory

Page 1 - Global Overview

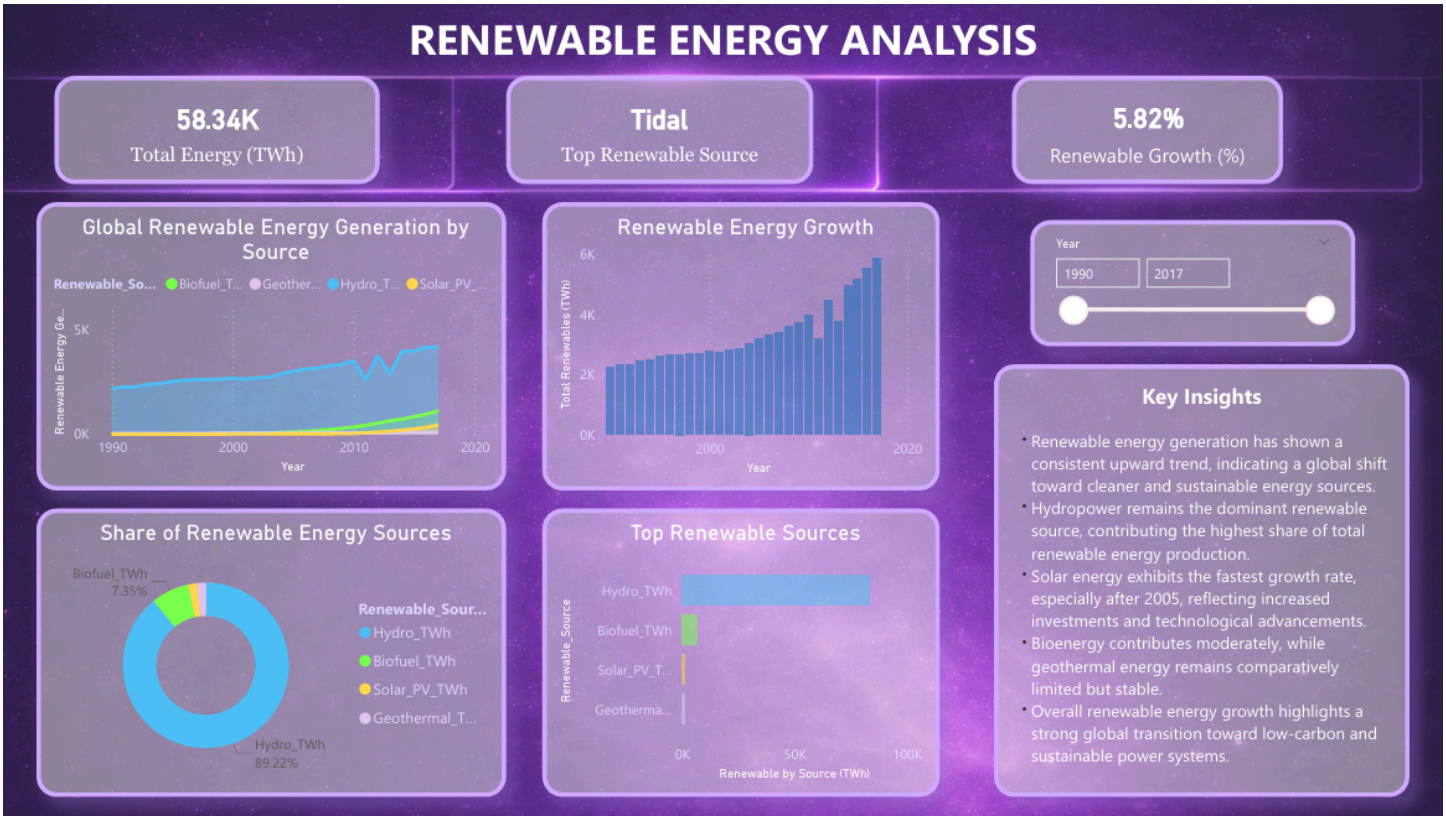
- KPI cards: **Total Energy (TWh)**; **Total Renewable Energy (TWh)**; **Renewable Share (%)** — instant executive snapshot.
- Donut chart: **Renewable vs Non-Renewable** - composition for selected year.
- Column chart: **Energy Consumption by Continent** - regional comparison.
- Horizontal bar: **Total Country Consumption (Top N)** - country ranking.
- Year range slider & Region filter - global controls.



Page 2 - Renewable Deep Dive

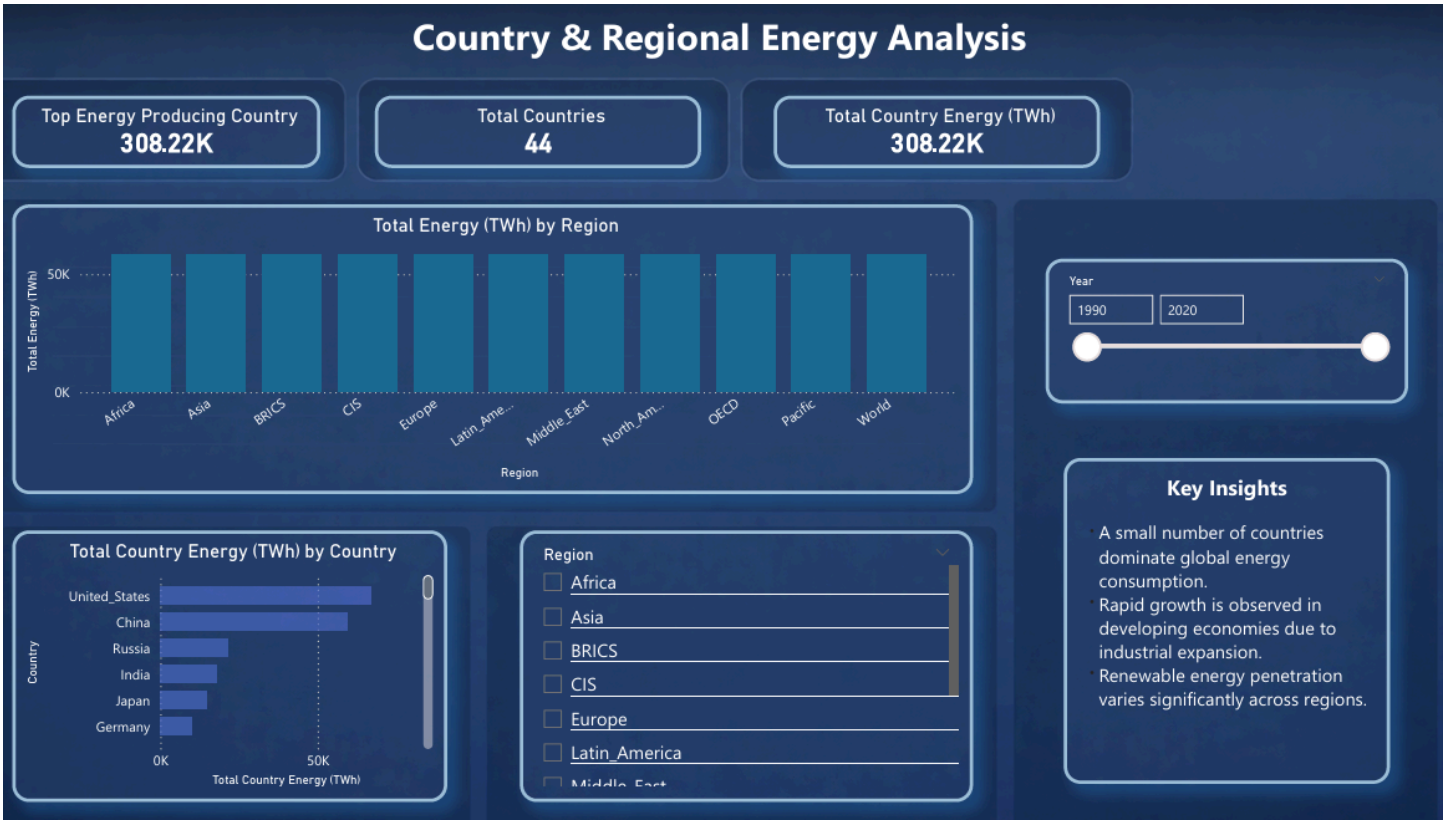
- Multi-line / area chart: **Renewable by Source (TWh)** - trends per source (Hydro, Solar, Biofuel, Geothermal).

- Bar chart: **Renewable Energy Growth (Yearly Totals)** - shows magnitude and acceleration.
- Donut: **Share of Renewable Sources** - composition in selected year.
- Horizontal bar: **Top Renewable Sources (TWh)** - absolute contributions.



Page 3 - Country & Regional Analysis

- Column: **Total Energy (TWh) by Region** - regional totals.
- Horizontal bar: **Total Country Energy (Top Countries)** - top consumers.
- Line: **Country Trend** - selected country consumption over years.
- Stacked bar / donut: **Country Composition (Renewable vs Non-Renewable)** - local mix.
- Filters & drillthrough area: Region checkboxes, Country search.



7. Key findings

- Renewable generation has increased consistently, year-over-year growth accelerates in recent years.
- Hydropower is the single largest renewable source in absolute TWh, solar shows the fastest growth rate.
- Energy consumption is concentrated in a few regions (Asia, OECD) and a few countries (e.g., USA, China) dominate global totals.
- Renewable share varies widely by region and country, significant opportunities exist for scaling solar in fast growing economies.

8. Business insights & recommendations

- **Policy:** Prioritize solar deployment incentives in regions showing rapid growth potential and accelerate grid investments in high-demand countries.
- **Investment:** Target financing for solar, storage and grid modernization in developing regions to accommodate rising renewable capacity.
- **Operations:** Utilities should plan for increased variability, invest in flexibility (storage, demand response) where renewables growth is steep.
- **Further analysis:** Integrate population/GDP datasets for per-capita and energy intensity analysis, add forecasting models for scenario planning.

9. Performance testing & validation

- Slicer responsiveness: average latency (ms) when changing Year/Region filters.
- Data validation checks: sum of renewables & non-renewables is approx to total energy (tolerance), top-country totals vs CSV sums, duplicate detection.
- Visual counts & measures: number of measures, calculated columns, visuals per page (list exact counts).

10. Limitations & assumptions

- Analysis uses absolute consumption (TWh), no per-capita or GDP normalization included.
- Year ranges differ slightly between source files, comparisons use common overlapping years or are annotated.
- Data quality depends on the supplied CSVs, some country-year gaps may exist and are documented in the Data Quality report.