Project - 3

Global Energy Production and Consumption

Data Visualization Track

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Project Overview

The Energy Data Visualization Project contains three interactive visualizations related to global energy consumption:

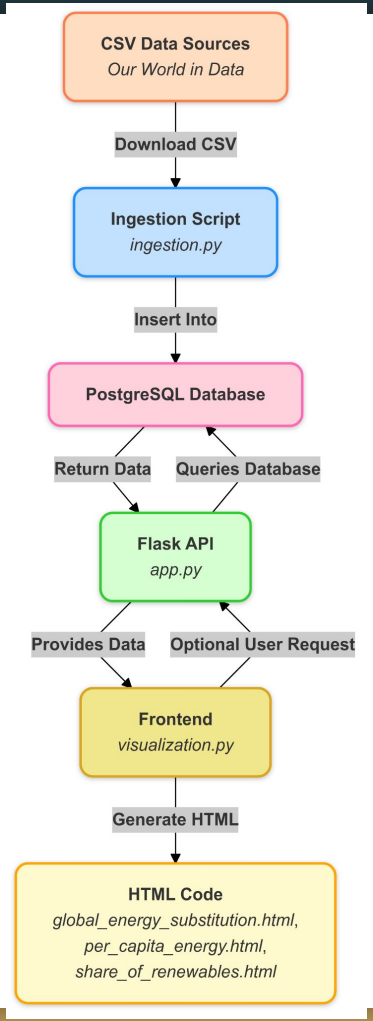
1. **Global Primary Energy Consumption by Source**
2. **Per Capita Primary Energy Consumption by Source**
3. **Share of Electricity Production from Renewables**

Our goal is to automate the data ingestion process, expose this data through a Flask API, and present it on an intuitive HTML frontend for easy exploration.

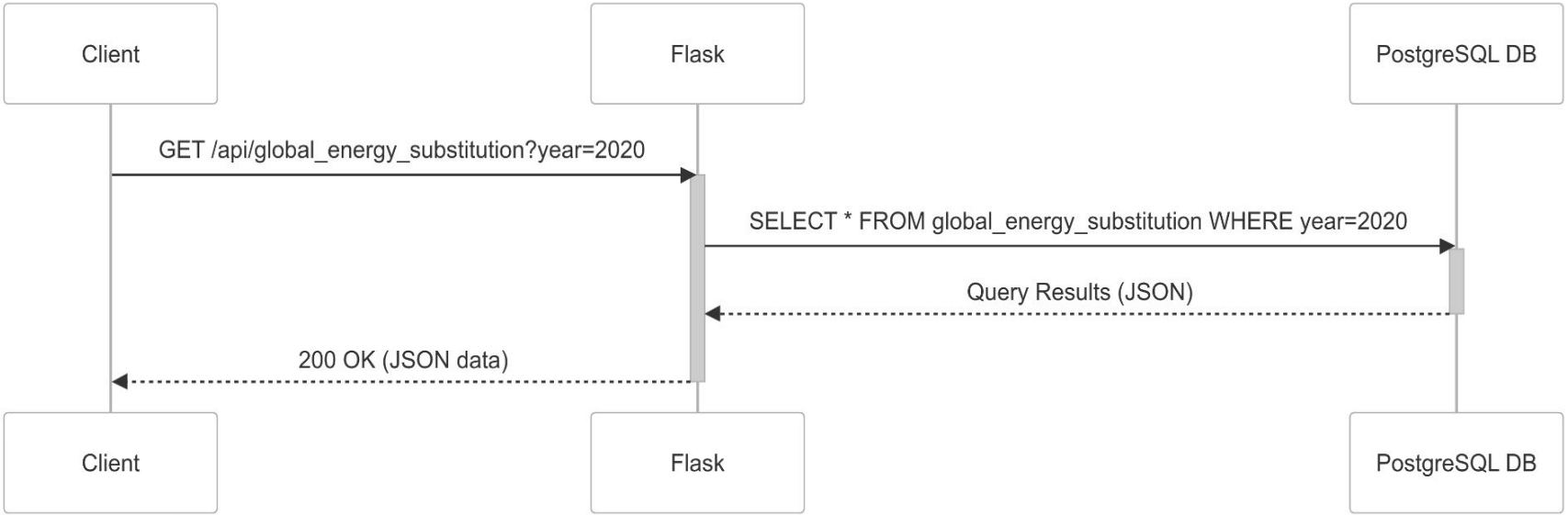
Ethical Considerations

This project prioritizes ethical data usage and transparency. All datasets used are sourced from reputable institutions and publicly available data repositories to ensure accuracy and avoid unauthorized use. Additionally, visualizations are designed to present data without misleading representations, focusing on clarity and avoiding distortions that could misinform viewers. Efforts have been made to respect privacy and avoid inclusion of personally identifiable information (PII) by utilizing only aggregated data. In terms of accessibility, interactive visualizations include labels and hover text to improve interpretability for a wide audience.

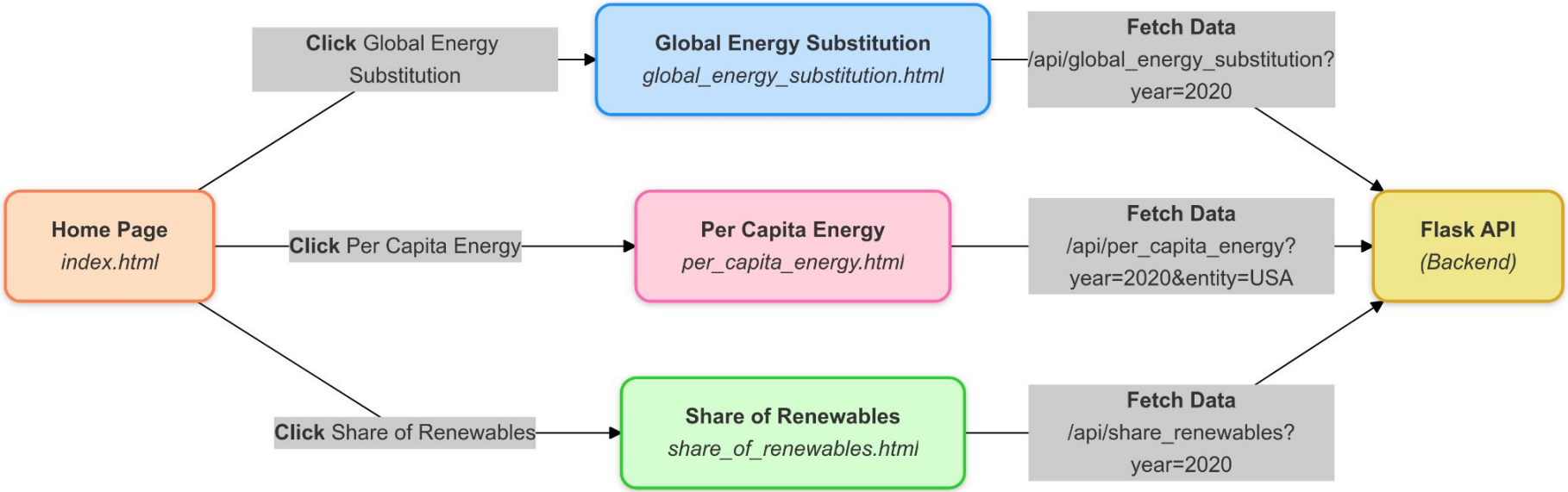
System Architecture Diagram



API Interaction



Frontend Navigation/Interaction Diagram



Energy Visualizations

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Welcome to the Future of Energy Insights

Discover interactive charts and data that illuminate our energy landscape—past, present, and future.

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Global Energy Substitution

Explore the evolution of primary energy consumption by source from 1800–2023.

View Chart

Per Capita Energy

Compare per capita energy consumption by country, focusing on top consumers.

View Chart

Share of Renewables

See how renewable energy adoption varies across the globe with an interactive map.

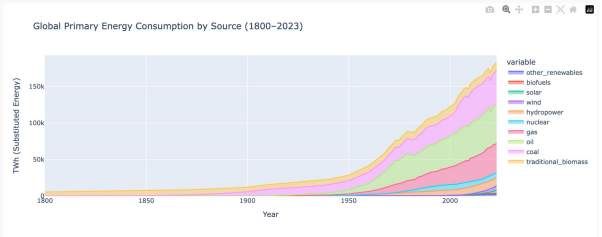
View Map

What We Offer

Our platform compiles global datasets to help you explore trends in energy consumption, renewable adoption, and overall energy production. Dive into our visualizations to understand how coal, oil, gas, solar, wind, and more have shaped—and continue to shape—our world.

We aim to make complex energy data accessible, engaging, and actionable for everyone. Each chart draws on historical and current data to shed light on energy's impact—both locally and globally.

Energy Visualizations



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Share of Renewables

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Return to the homepage to explore more content or learn more.

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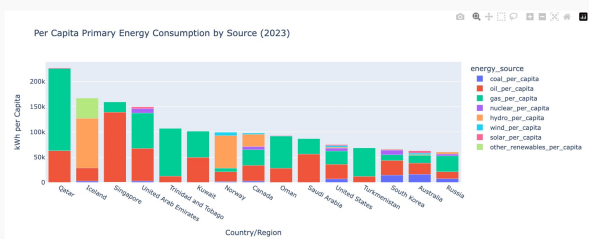

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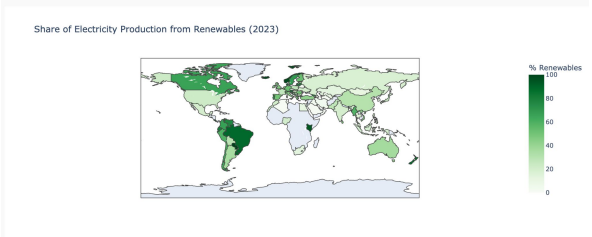

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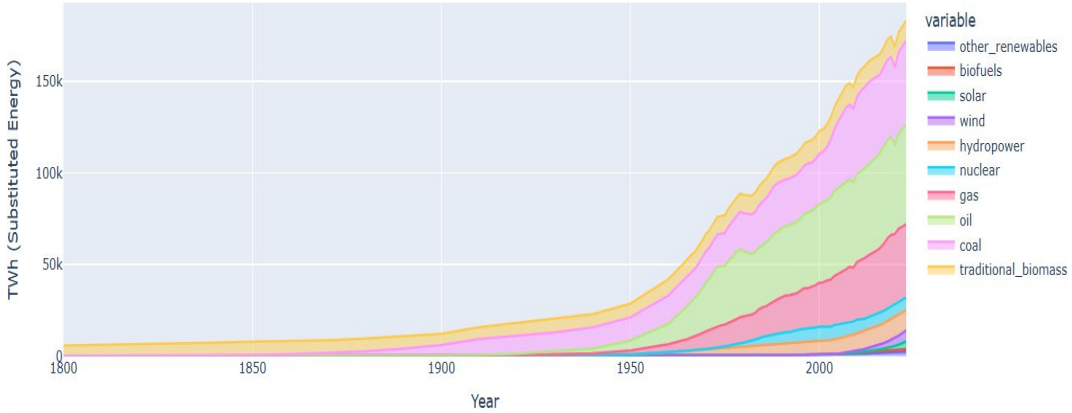
Global Primary Energy Consumption by Source (1800–2023)



Interpretation:

- Energy transition efforts remain insufficient to curb rising emissions.
- Developing nations' increasing energy demands highlight a need for tailored solutions.

Recommendations:

1. Invest in large-scale renewable infrastructure projects.
2. Support developing nations with green funding initiatives.
3. Enhance global cooperation to meet decarbonization targets.

Key Insights:

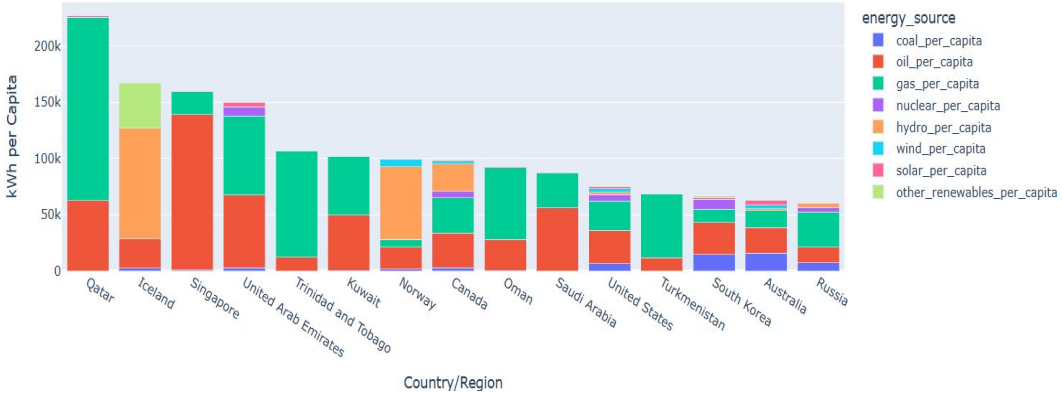
- **Historical Growth:** Global primary energy consumption has surged, especially post-1950, due to industrialization and population growth.
- **Dominance of Fossil Fuels:** Despite the rise of renewables, fossil fuels (oil, coal, gas) continue to dominate.
- **Recent Trends:** In 2023, fossil fuel consumption reached record highs, pushing global emissions over **40 gigatonnes of CO_2**.

Energy Emissions Hit Record High

Supporting Data:

- **13% Growth in Renewable Generation (2023):** Read More
- **Europe's Fossil Fuel Reduction:** Read More
- **Fossil Fuel Demand Growth in India and China:** Read More

Per Capita Primary Energy Consumption by Source (2023)



Interpretation:

- Resource availability drives per capita consumption patterns.
- Nations with renewable resources benefit from lower emissions and energy independence.

Recommendations:

1. Promote energy efficiency programs in high-consumption nations.
2. Expand renewable energy investments, especially in resource-rich regions.
3. Develop long-term policies to reduce per capita fossil fuel reliance.

Key Insights:

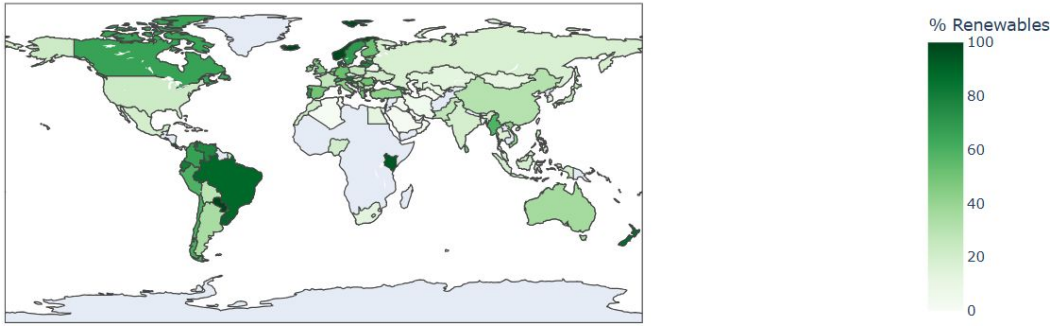
- Countries like Qatar, Iceland, and Singapore have high per capita energy use.
- Fossil fuels dominate in Qatar and Saudi Arabia.
- Iceland and Norway have high shares of renewable energy due to geothermal and hydropower.

Fossil Fuels: Is a Decrease in Demand in Sight?

Supporting Data:

- Qatar's per capita energy consumption: Read More
- Iceland's renewable share: Read More

Share of Electricity Production from Renewables (2023)



Key Insights:

- Latin American countries (e.g., Brazil) and Europe lead in renewable shares.
- The U.S., Russia, and Middle East show slower adoption of renewable energy.

More Clean Energy is Needed

Interpretation:

- Policy incentives and abundant renewable resources have boosted renewable adoption.
- Slower adoption in other regions stems from limited infrastructure or political barriers.

Supporting Data:

- Brazil's renewable growth: Read More
- Norway's hydropower dominance: Read More

Recommendations:

1. Strengthen policy frameworks to incentivize renewable investments.
2. Invest in grid modernization and renewable energy storage.
3. Foster cross-border collaboration to share renewable best practices.

Thank You