International Energy Consumption Analysis

Formal Proposal

DSAN 5200 04

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Catalog

1. Project Overview

This project aims to create an advanced interactive website that meets the growing demand for information by conducting in-depth research and visualizing the consumption rates and trends of non-renewable and renewable energy on a global scale. This website will target enterprises, non-governmental organizations, and individuals who wish to learn about and improve energy consumption patterns. Provide sufficient information to meet the needs of audiences with different knowledge backgrounds.

While the U.S. Energy Information Administration (EIA) website already hosts a number of simple visualizations, we believe that there is room for further exploration within the data provided. Our goal is to create a website that not only offers greater interactivity but also delves deeper into the subject matter. This initiative aims to facilitate a deeper understanding and engagement with the data, thereby supporting informed decision-making in the energy sector.

2. Data Description

We obtained datasets from eia.gov (Energy Information Administration) official website, which provides up-to-date, detailed energy consumption data on a monthly basis.

This dataset includes information on variables such as coal, natural gas, and solar energy, with data dating back up to 1949, covering very detailed information for our in-depth analysis.

Data	U.S. Energy Information Administration Monthly Detailed Energy Consumption
Source	https://www.eia.gov/totalenergy/data/browser/csv.php
Description	This dataset offers detailed monthly data on U.S. energy consumption dating back to 1949, including consumption figures for a variety of energy sources such as coal, natural gas, and solar energy.

Data	International Primary Energy Monthly Consumption
Source	https://www.eia.gov/international/data/world/petroleum-and-other-liquids/monthly-petroleum-and-other-liquids-production
Description	The dataset provides a historical series of monthly energy data from 1973 to 2021, charting the consumption of various energy consumption including renewable and un-renewable energy.

3. Audience

3.1 Type of Audience

Businesses: By understanding the trends and patterns of energy consumption and gaining insights into the growth of renewable energy consumption, companies can

adjust their product development and market positioning, plan their business strategies and investments, or optimize operational efficiency to reduce costs and carbon footprint.

Non-Governmental Organizations (NGOs): NGOs can use the data to enhance public advocacy or for educational purposes, helping them achieve their goals, drive policy change, and raise social awareness.

Individuals: For the general public, it helps increase their awareness of energy consumption and its environmental impact, promoting more responsible energy use.

3.2 Knowledge Background of Audience

Based on the different knowledge backgrounds of our audience, we categorize them into three groups: knowledgeable, generally aware, and unaware. We believe that there are differences in the information and background they expect:

1. **Knowledgeable**: We assume the target audience already understands the basic differences between non-renewable and renewable energy sources and the importance of transitioning to sustainable energy.

Information and background provided: They understand the basic impact of different types of energy on the environment, so they do not need too much additional information. We need to deliver more detailed analyses to help them gain insights that are not available in the simple data presentations on the official website.

2. **Generally Aware**: We believe the audience may have a general understanding of energy consumption trends, but they need more details about the consumption rates of specific types of energy and how these trends impact the economy and environment.

Information and background provided: They may need to understand the energy consumption patterns of specific regions or countries, the growth rate of renewable energy, and how policies affect the energy market dynamics. We need some designs to help them more smoothly understand the information conveyed by the website, and provide customized data views according to their interests

3. **Unaware**: The audience might not be familiar with in-depth data analysis, the complex dynamics of the energy market, or advanced methods for predicting future energy consumption trends.

Information and background provided: They may lack background knowledge about energy, such as production and consumption data for different types of energy, import and export data, and price fluctuations, as well as the potential societal impacts. For most of the public, their goal is more to get an overview rather than delve deep. We will provide them with enough background information to aid their understanding.

4. Analytical Tools and Contextual Deliberation

Our website will employ a variety of data visualization methods to ensure that users can intuitively understand complex energy data. This includes, but is not limited

to, line charts, bar graphs, and pie charts, which are widely used to display time series data and categorical data. Additionally, to uncover long-term trends and cyclical patterns in the data, our platform integrates trend lines and various trend analysis models. Users can utilize these tools to identify key data trends and quickly grasp changes in data magnitude.

We will also provide a range of interactive elements to enhance user experience, such as hover tooltips, clickable legends, zoom and scroll functionalities, and data filtering tools, enabling users to explore the data in depth according to their individual needs.

To achieve the above objectives, we believe that **HoloViz** and **Plotly** can greatly assist us in implementation. Moreover, we plan to use **JavaScript** to supplement the necessary components that are lacking.

5. Narrative Genre

Our goal is to develop a reader-driven website to provide users with more interactivity. The annotated style is likely the most suitable narrative approach for this purpose. This style emphasizes the inclusion of detailed annotations and explanations within data visualizations, making it easier for users to understand complex information or data points. This helps encourage users to delve deeper into and understand the various dynamics of energy consumption.

This interactive and guided experience makes the annotated style an ideal choice for developing user-centered websites, especially when dealing with complex datasets. By engaging users in the exploration and understanding of data, the annotated style enhances the educational value and user satisfaction of the website, making it an effective way to convey complex energy data.

6. Milestone

TODO	Dates	Detail
Data Collection	02/28/2024	Select which datasets to use
Data EDA	03/09/2024	Determine the direction and choice of variables to be studied for visualization, explore the relationship between energy consumption and geographic location, and determine the consumption of different energy types
Analytic Tool selection	03/15/2024	Determine the methodology to be used for storytelling based on the results of the EDA
Storytelling design	04/15/2024	Observe the relationship between energy consumption and other variables and to present them in detail through various visualization methods, explaining the problem in a rational way
Presentation	04/28/2024	Final presentation to show the story