Data Visualization Project

Fundamental Analysis on 10 US Clean Energy companies

Group 6
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Outline

Project Objective

Overall, transformed raw data into visual analysis by fetching data using API, performing data cleaning and preparation with Python Pandas, and creating interactive visualization for fundamental analysis on ten US clean energy companies.

Aiming to answer the following three questions:

1. How does financial health vary among the selected clean energy companies?

2. Which Companies in the clean energy sector are positioned for Long-term growth?

3. Which clean energy companies offer the best balance between income generation and financial stability?

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DATA

Data Acquisition

Source

Financial Modeling Prep API

- Fetched financial key metrics using FMP API for 10 US Clean Energy companies
- Time range: 2019 to 2023

Data Summary

Data was saved in 50 JSON files:

- By company and by calendar year

Data Ethics

Financial Modelling Prep offering tiered based subscription package on up -to –date, and accurate market price and financial statement data for US listed companies

Data Preparation

Step 1

Combing all the key metrics files into a single DataFrame

Step 2

Data Cleaning:

- Drop columns with more than 50% missing values
- Identify numeric columns only
- Fill remaining missing values with the median of numeric columns
- Ensure all numeric columns are of numeric type
- Drop any rows with missing values that couldn't be filled

Step 3

Filter the Columns of Metrics needed for analysis by only keeping the columns that needed for the subsequent fundamental analysis

Step 4

Prepare unique sets of datasets for each of the five charts:

- Radar chart
- Line chart
- Scatter plot
- Bubble chart
- Bar chart

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Data Preparation

Step 4

Financial Health Analysis

- Select relevant columns for financial health analysis
- Convert DataFrame to a format suitable for Chart.js (radar chart format)
- Metrics (excluding 'symbol' and 'calendarYear')
- Filter out the symbol and calendarYear and calculate the mean for numeric columns only
- Prepare the final JSON structure
- Save to JSON file

Long term growth analysis

- Prepare data for line chart showing Revenue and Net Income Per Share Growth over multiple years, create a DataFrame containing related columns
- A list of dictionaries prepared for generating a line chart in Chart.js, extract and prepare the revenue and net income data for each symbol
- Save to JSON file
- Prepare data for scatter plot showing ROIC vs. ROE
- A list of dictionaries prepared for generating a scatter plot in Chart.js, Calculate the mean values of ROIC and ROE for each symbol
- Save to JSON file

Income Generation vs Financial Stability

- Prepare data for bubble chart showing Dividend Yield vs. Free Cash Flow Per Share
- A list of dictionaries prepared for generating a bubble chart in Chart.js, Calculate the mean values for each symbol.
- Save to JSON file
- Prepare data for bar chart showing Payout Ratio and Current Ratio, A dictionary structure for generating a bar chart in Chart.js, containing labels and datasets, Calculate the mean values for each symbol.
- Save to JSON file

Data Visualization

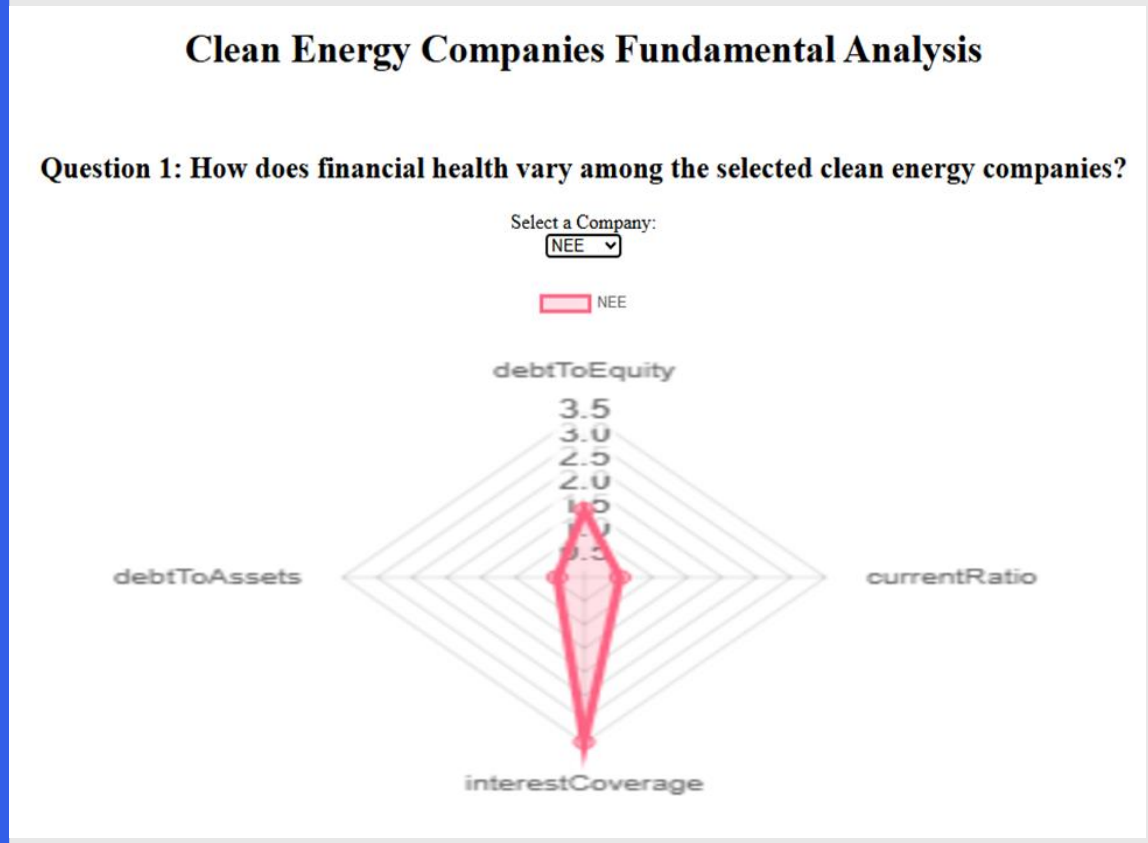
- HTML is used to structure a web page for visualizing datasets related to clean energy companies. The page includes multiple ‘canvas’ elements, each serving as a placeholder for different types of charts (radar, line, scatter, bubble, and bar charts).

- JavaScript, with the help of the Chart.js library, was employed to create the interactive charts. The datasets were predefined in JavaScript as objects containing data points for various financial metrics.

- Event listeners and functions were implemented to allow user interaction, such as selecting a company from a dropdown menu

01

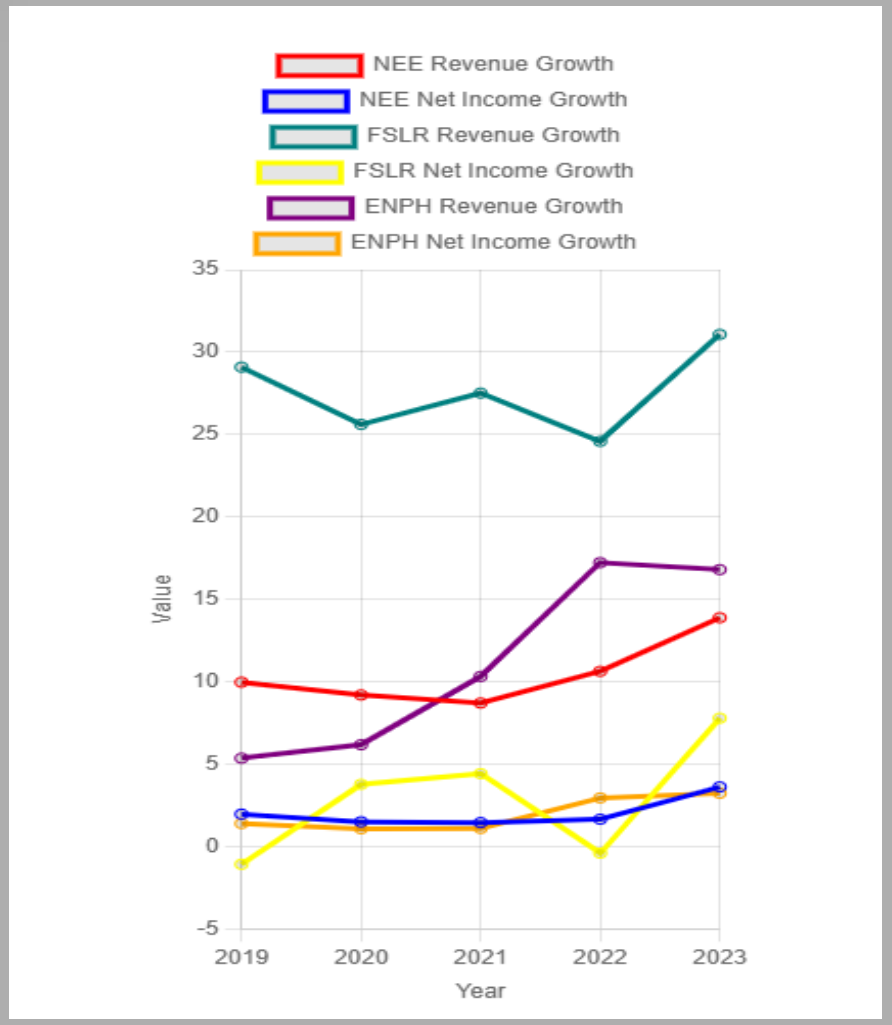
How does financial health vary among the selected clean energy companies?

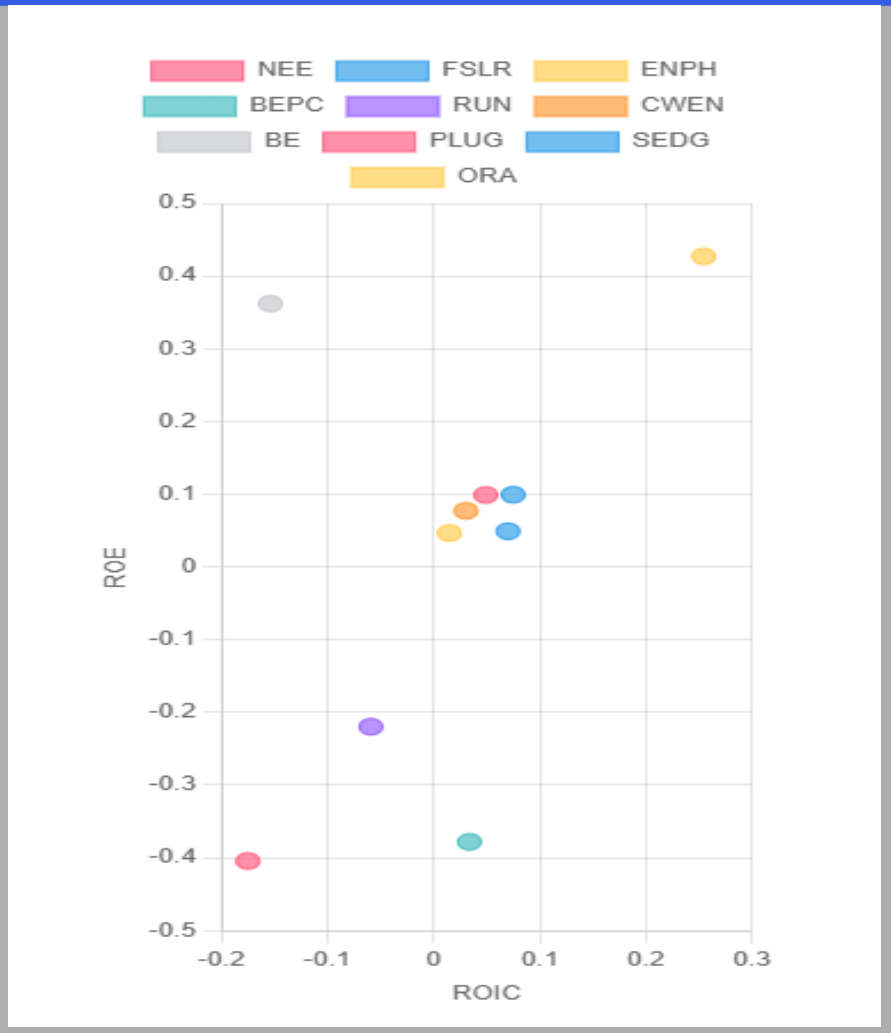


To gauge financial health, radar charts highlighted the relative strength of each company's balance sheet, focusing on debt management and liquidity. For instance, companies like FSLR and ENPH showed strong financial health with low debt-to-equity ratios and high-interest coverage, indicating robust balance sheets.

02

Which Companies in the clean energy sector are positioned for Long-term growth?

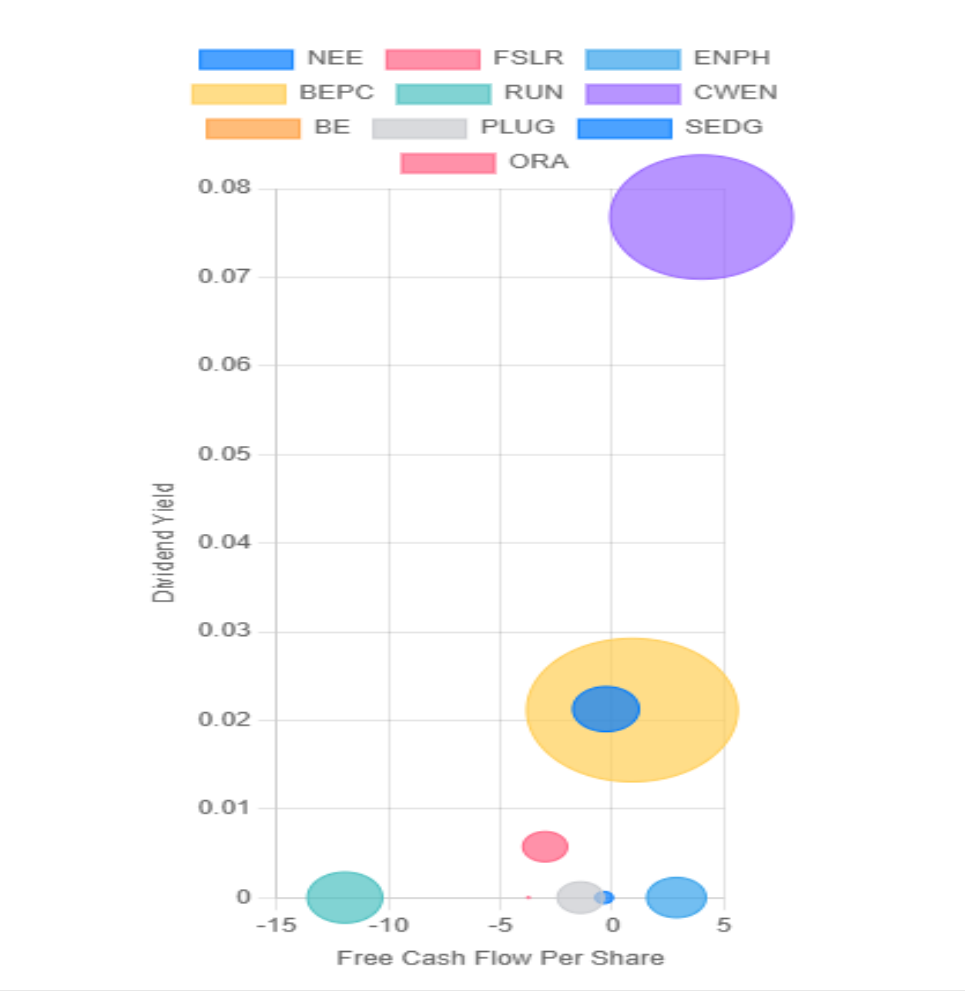


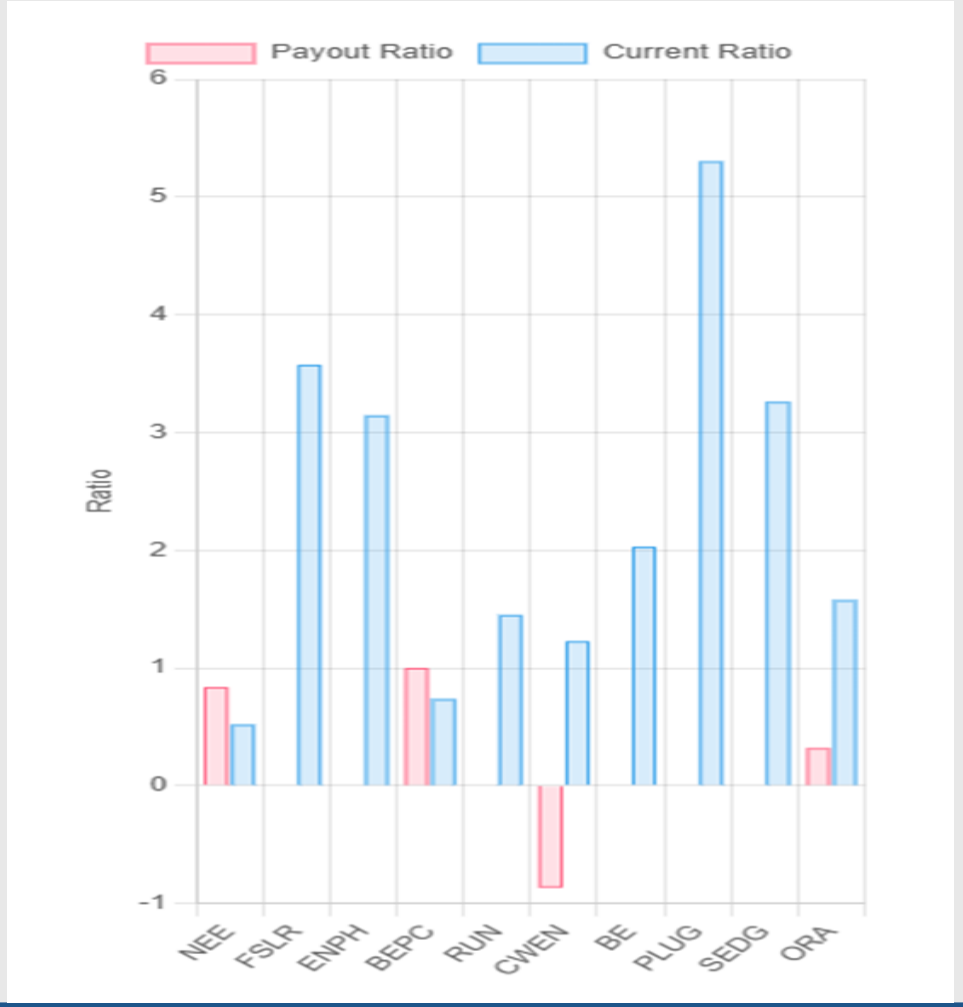


The long-term growth potential was evaluated through line charts showing trends in revenue and net income growth over a five-year period. Companies such as ENPH and FSLR exhibited consistent growth in revenue and net income, suggesting they are well-positioned for future expansion within the clean energy sector.

02

Which clean energy companies offer the best balance between income generation and financial stability?





The balance between income generation and financial stability was analyzed using bubble charts to compare dividend yield and free cash flow per share. Companies like BEPC demonstrated a favorable balance with steady cash flows and reasonable debt levels, making them attractive for income-focused investors.

Thank you for your time!

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Resources for the project:

- https://site.financialmodelingprep.com/developer/docs
- https://www.chartjs.org/docs/latest/samples/information.html
- https://github.com/FinancialModelingPrepAPI/Financial-Modeling-Prep-API
- https://github.com/chartjs/Chart.js
- https://pandas.pydata.org/docs/index.html
- https://stackoverflow.com/questions/44990517/displaying-json-data-in-chartjs
- http://microbuilder.io/blog/2016/01/10/plotting-json-data-with-chart-js.html