# Final Project

Comprehensive Analysis of Profitability and Carbon Emissions (2020–2022)

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**Purpose :** This project investigates the relationship between **corporate profitability and carbon emissions** (Scope 1, 2, and 3) from 2020 to 2022.
**By industry and country** explore shifts in emissions and profitability over time, and provide actionable insights to guide businesses and policymakers toward low-carbon practices.

**Quetions:**

- Which industries achieve high profitability with low emissions, and which struggle to reduce emissions while maintaining profits?
- How do emissions and profitability trends evolve from 2020 to 2022?
- What are the policy and business implications of these findings?

**Used Data :** Public profit and emission database which contains
Emission data for the top 250 companies (Scope 1-2 data for 209 of them)
& Economic data from Forbes Global 2000 List

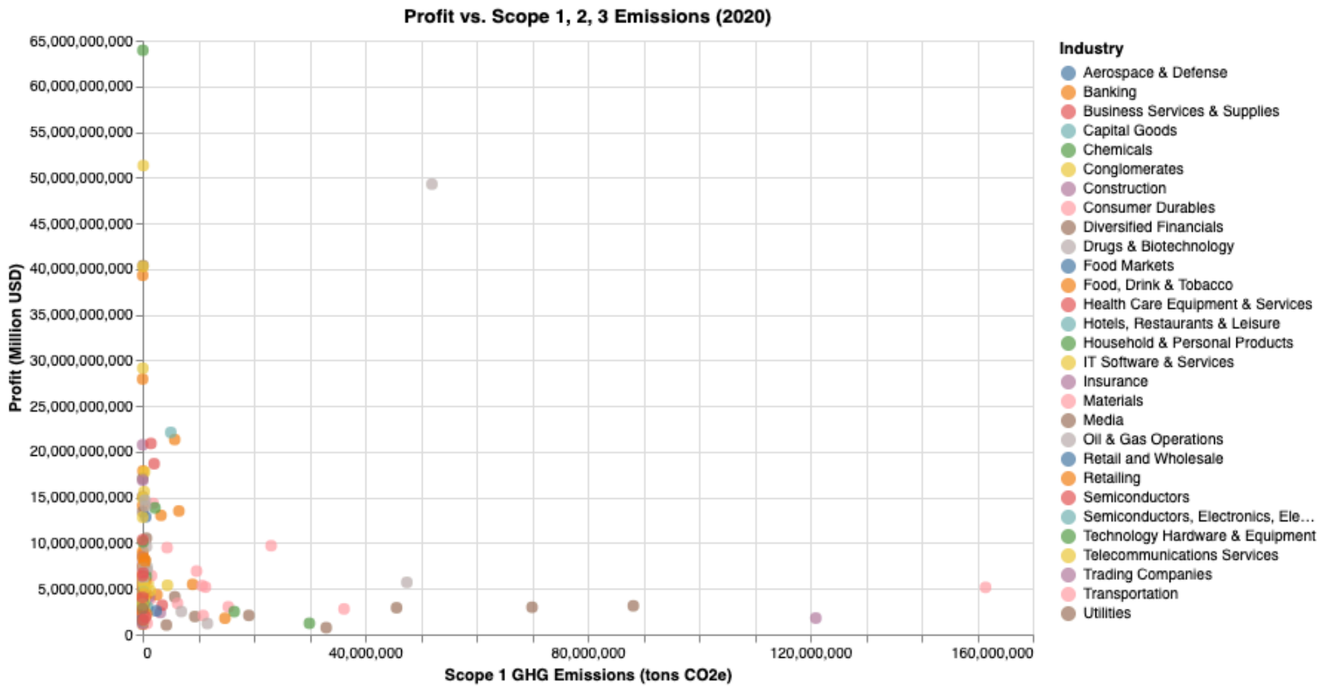
## Data Cleaning

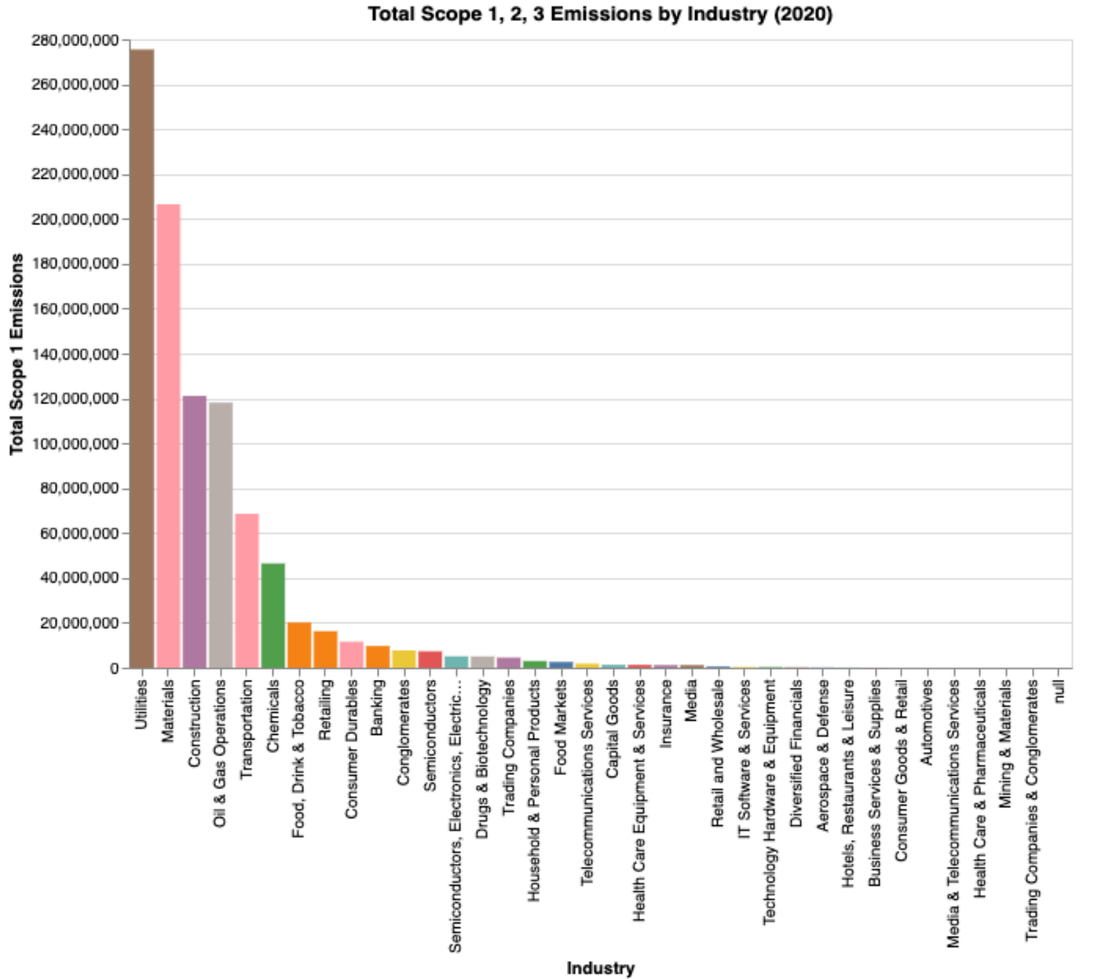
- Log-transformation for visual clarity
- Used three raw data for each plot by year
- Gathered the data and make into one merged data file to do shiny-app

# 2020 The Baseline Year

- Highest Emission and Profit
  - Industry: **Oil & Gas Operations**
  - Emission: Over **160 million tons $CO_2e$**
  - Profit: Up to **$65 billion USD**
- Lowest Emission and Profit
  - Industry: Various (e.g., Telecommunications Services, IT Software & Services)
  - Emission: Less than **1 million tons $CO_2e$**
  - Profit: Around **$1 billion USD**

- Highest Emission Industry
  - Industry **Utilities**
  - Total Scope Emissions: **280 million tons $CO_2e$**
- Lowest Emission Industry
  - Industry: Various (e.g., Construction, Diversified Financials)
  - Total Scope Emissions: Less than **1 million tons $CO_2$**

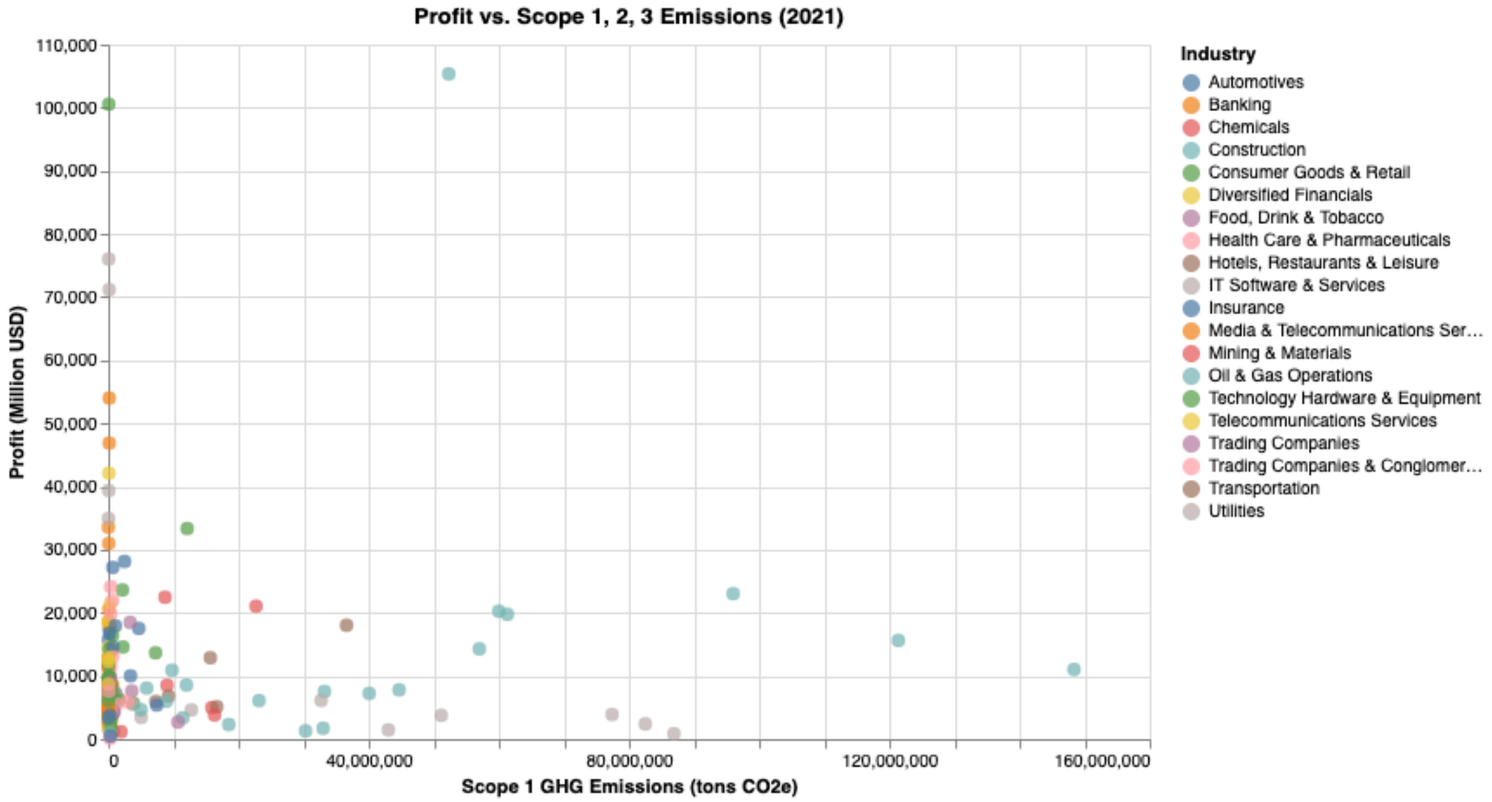


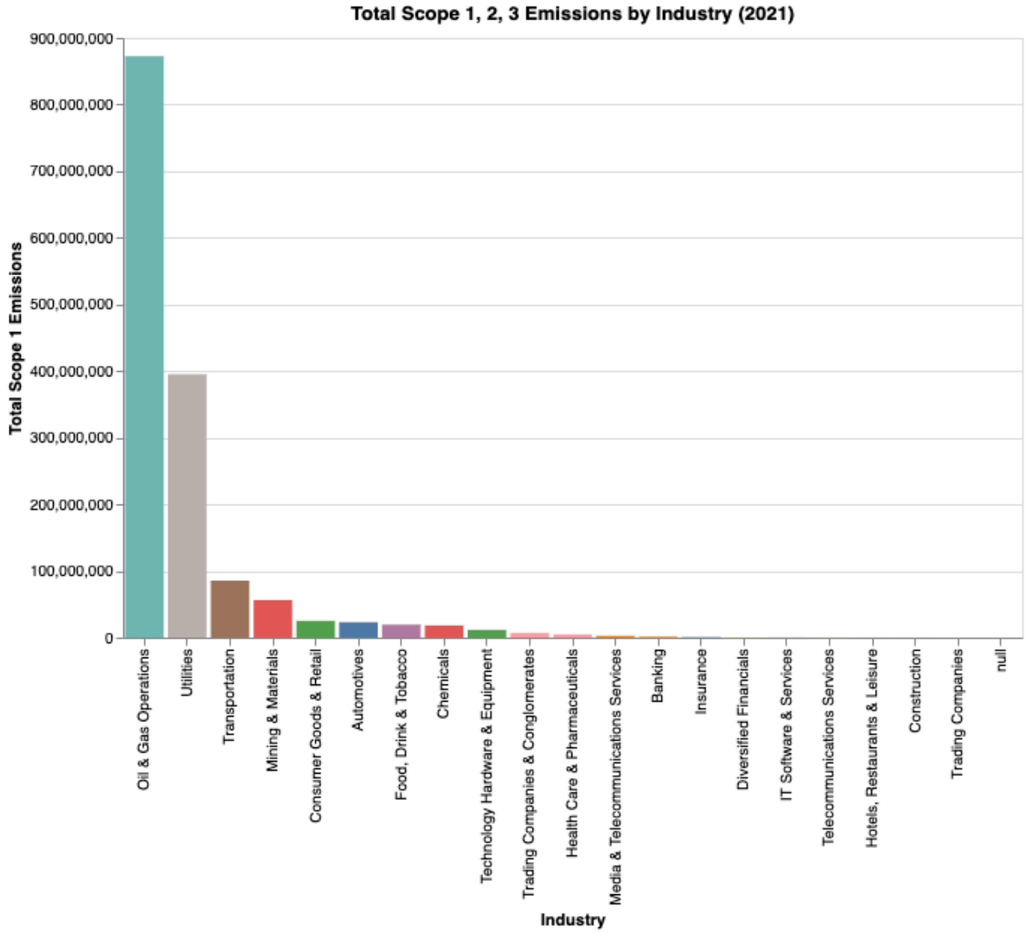



# 2021 The Post-Pandemic Recovery

- Highest Emission and Profit
  - Industry: **Oil & Gas Operations**
  - Emission: Over **160 million tons $CO_2e$**
  - Profit: Up to **$100 billion USD**
- Lowest Emission and Profit
  - IT Software & Services maintained emissions below **1 million tons $CO_2e$** with profits under **$5 billion USD**

- Highest Emission Industry
  - Industry **Oil & Gas Operations**
  - Total Scope Emissions: **850 million tons $CO_2e$**
- Lowest Emission Industry
  - Industry: **Hotels, Restaurants & Leisure**
  - Total Scope Emissions: Less than **1 million tons $CO_2$**

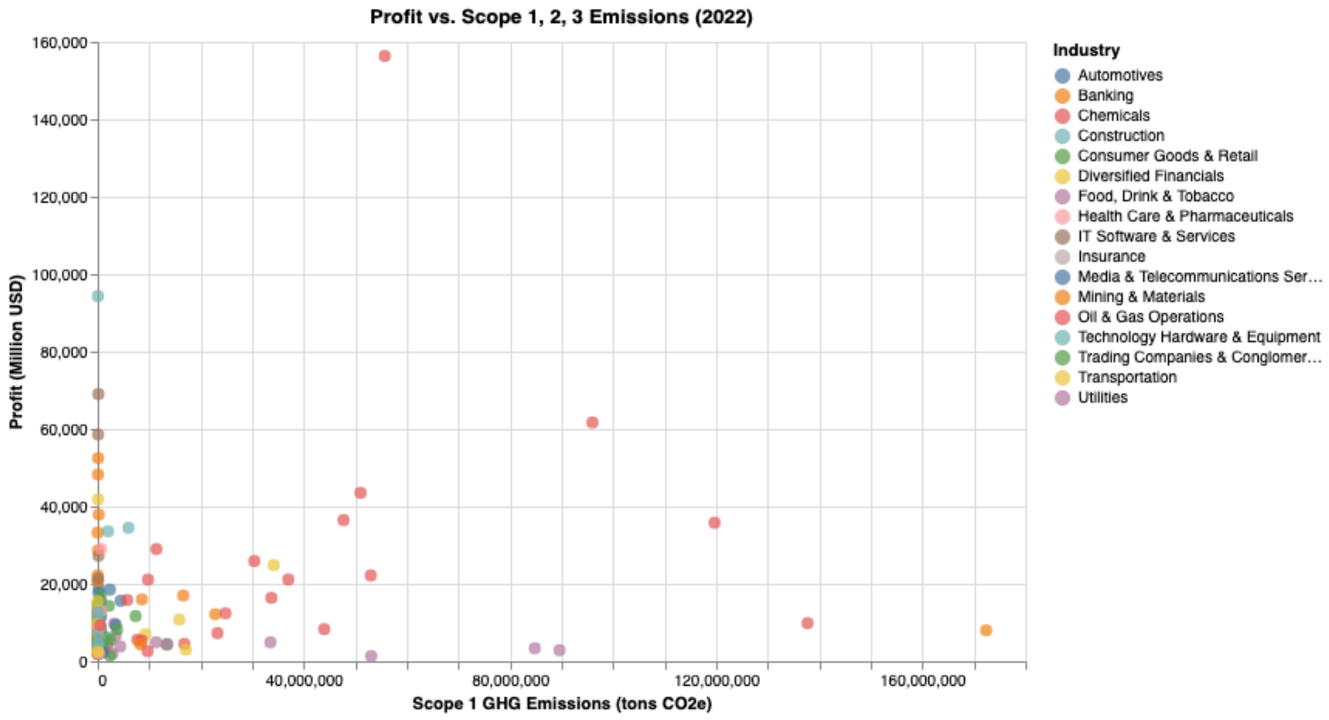


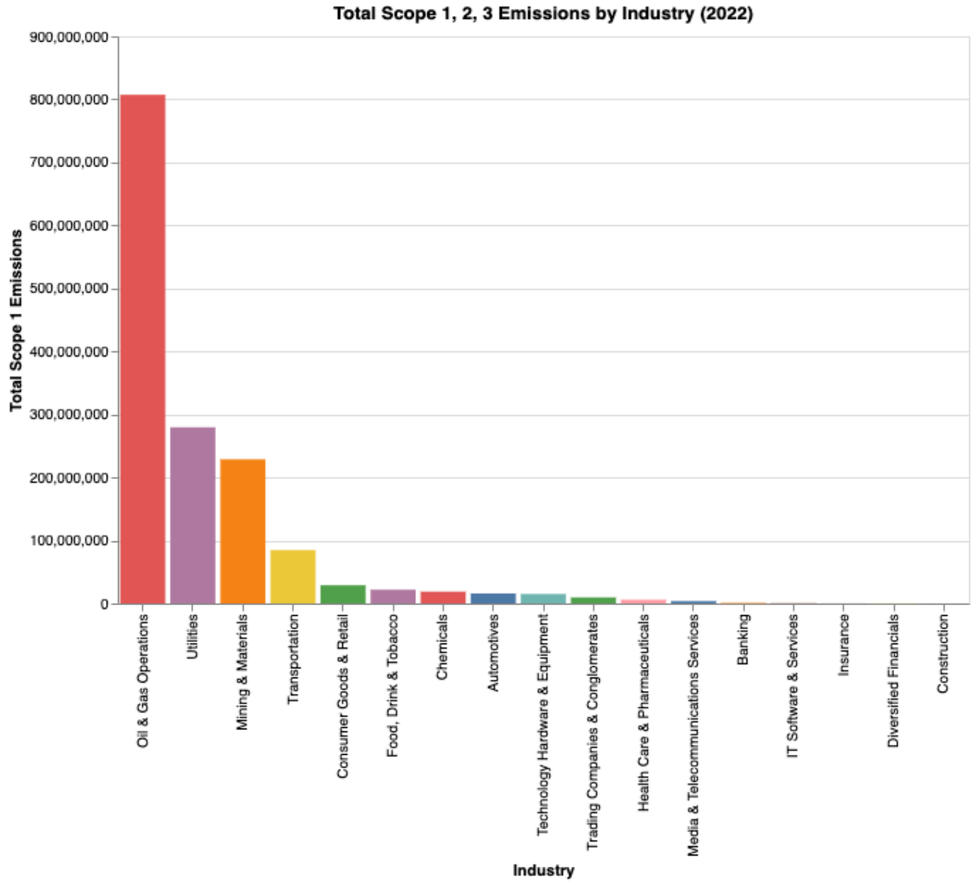



# 2022 A Shift Toward Sustainability

- Highest Emission and Profit
  - Industry: **Oil & Gas Operations**
  - Emission: Over **160 million tons $CO_2e$**
  - Profit: Up to **$150 billion USD**
- Lowest Emission and Profit
  - IT Software & Services maintained emissions below **1 million tons $CO_2e$** with profits under **$2 billion USD**

- Highest Emission Industry
  - Industry **Oil & Gas Operations**
  - Total Scope Emissions: **800 million tons $CO_2e$**
- Lowest Emission Industry
  - Industry: **Construction**
  - Total Scope Emissions: Less than **1 million tons $CO_2$**



# Major Changes

## 2020

- Heavily reliant on fossil fuels, highlight the significant challenge of decarbonization
- But some industry shows the economic potential of environmental efficiency.

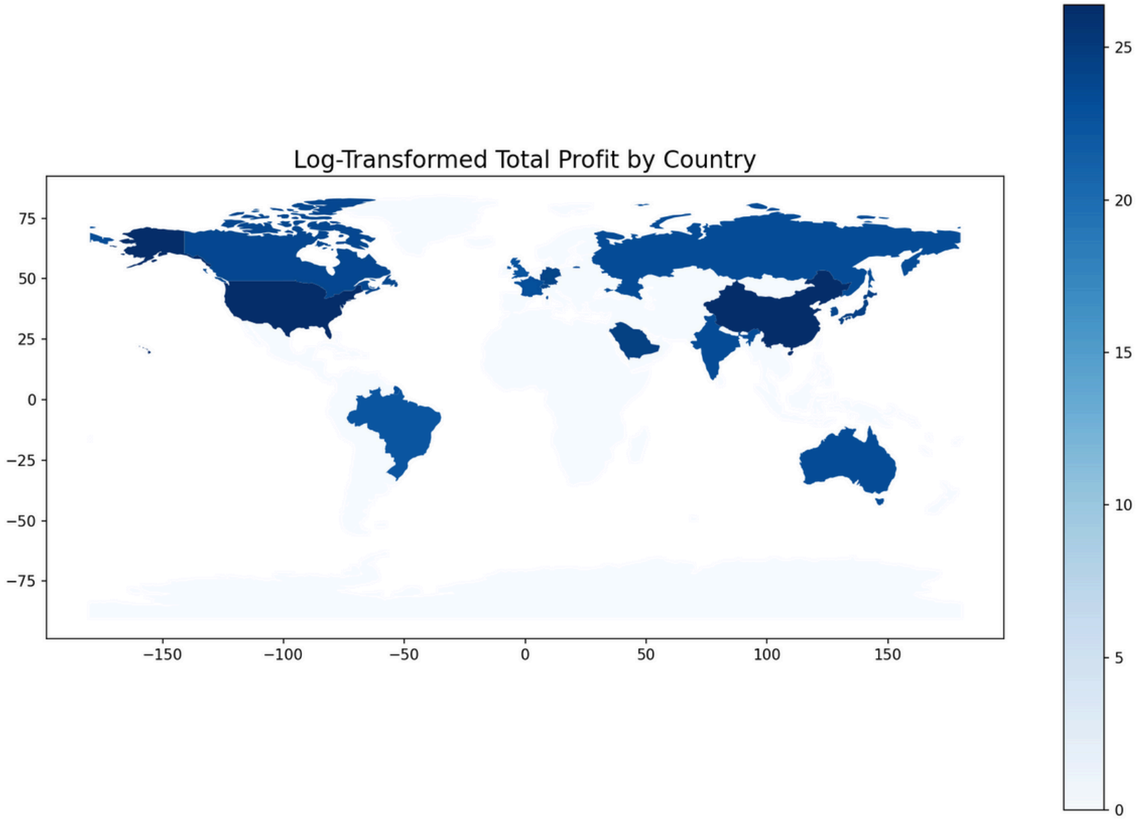
## 2021

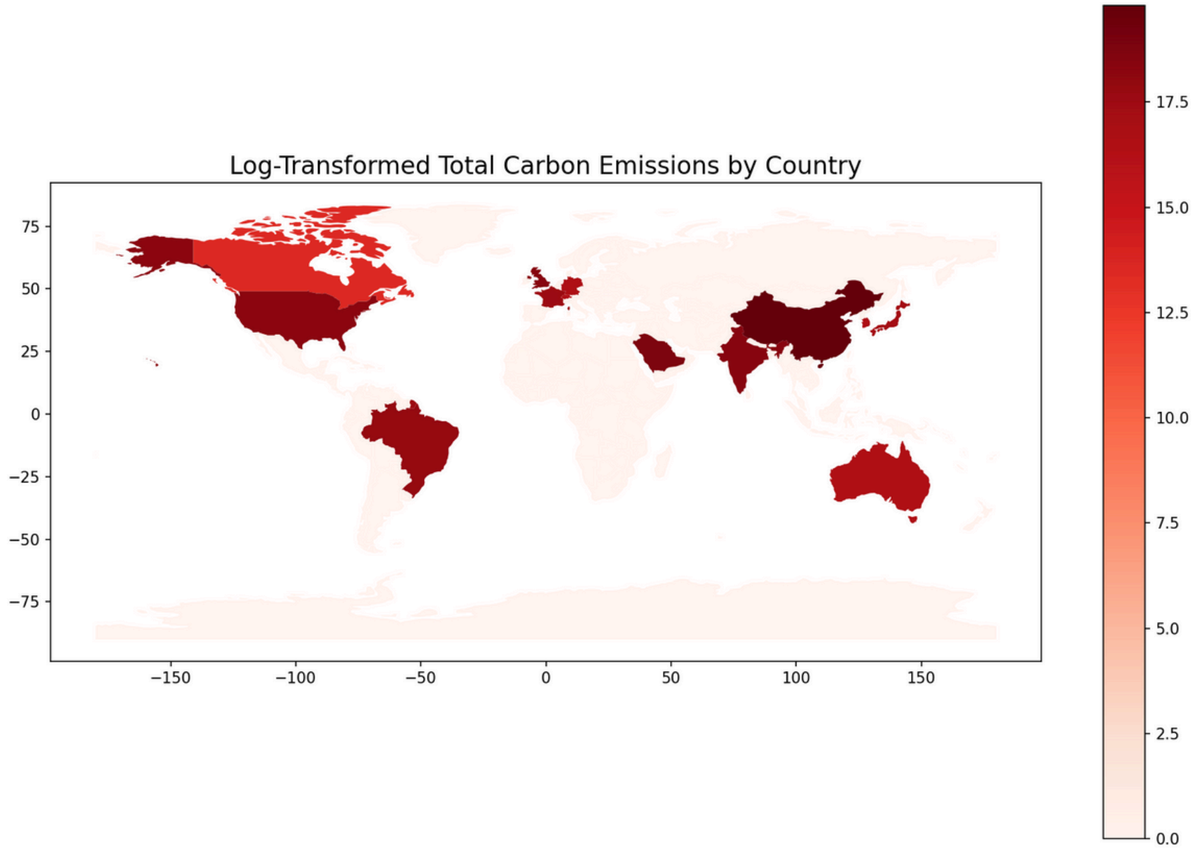
- Shows a significant increase in profits, while maintaining similar emission levels.

## 2022

- Similar result with 2021, but some rising industry maintained low emissions and steady growth.

# Shiny




- Profitability Data: Highlights countries with highly profitable companies for strategic investments.

- Emission Insights: Identifies regions with high carbon footprints to target for global emission reduction policies.

## Conclusion:

Our analysis reveals a positive correlation between profit and emissions across industries, though the relationship varies by sector.

## Suggestion:

Policy Makers: Industry-specific regulations and incentives are essential.

Energy Sector: Companies should focus on reducing their environmental impact.

Technology sector: There may be opportunities for profit growth without increasing emissions. Sector: There may be opportunities for profit growth without increasing emissions.