



Data Visualization Project Spring 2022

## **Impact of The Pandemic on Petroleum Energy Consumption**

By Ester Gadelha and Carol Rios Rocha  
Technical Coach: Karen Palino

## Introduction

The COVID-19 pandemic impacted people all across the globe. Most developed countries imposed social distancing and quarantines during the peak of the pandemic. This resulted in behavioral changes such as working from home, avoiding traveling, social distancing and closure of businesses related to entertainment. Although the period between the end of 2019 and 2020 was marked by tragedy and a collective sense of hopelessness, there was at least one positive event about the period. For the first time in recent history, global energy consumption declined sharply.

The most recently published edition of the bp Statistical Review of World Energy presents numerical data that shows a 5.3% decline in energy production in the United States. One of the most noticeable declines is related to the production and consumption of oil. Before the pandemic, petroleum and oil gas were the primary sources of energy in the United States. At the beginning of the pandemic the price of the barrels of petroleum and oil decreased significantly as well as their consumption. Concurrently, renewable energy consumption had slightly increased. The statistical data seems to suggest that renewable energy production and consumption are finally becoming more relevant than non-renewable energy in the US. This could mean that environmental awareness is finally having a concrete impact on the production of energy and consumption habits.

However, a more detailed analysis of the data reveals that the decline in non-renewable energy production and the increase in renewable energy production may not be correlated. Instead, the behavioral changes observed during the period of the pandemic were responsible for this shift.

## Hypothesis

The decrease in oil consumption in the United States during the pandemic was not related to greater environmental awareness and a preference for renewable energy. The decrease in energy consumption in the industrial, commercial, transportation, and residential sectors resulted in the historical negative growth rate in oil consumption in the United States.

## Analysis

During the pandemic, some regions in the US declared lockdown measures as an attempt to control the spread of COVID-19. The industry and transportation sectors were directly affected by these measures. For example, the demand for air travel decreased abruptly and airline companies had to cancel flights and reduce their operations. Additionally, social distancing contributed to creating staff shortages. In terms of energy production, the onshore and offshore production of oil was disrupted by the lack of workers. This disruption reduced the total amount of oil produced, which may explain the historical decline documented in the bp Statistical Review of World Energy report.

While the production of non-renewable energy decreased, the production of renewable energy increased. This observation seems like an indication that the U.S is finally ready to change the energy production paradigm to more environmentally friendly alternatives. However, the means of production of non-renewable and renewable energy differ considerably. Generally, the production of solar, wind and hydroelectric energy require fewer workers in the production cycle. The fact that the pandemic did not have a negative impact on the production of these energy types is an obstacle to defining an accurate correlation between the statistics of non-renewable and renewable energy.

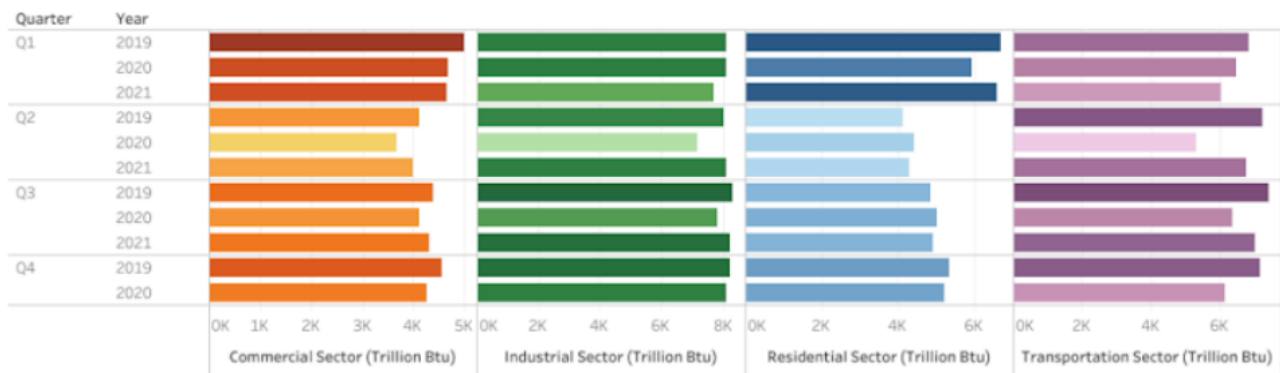
This project investigates the impact on energy consumption caused by changes in societal behaviors during the pandemic. The investigation is based exclusively on statistical data, and socioeconomic and geopolitical considerations were excluded from the analysis. The correlation between the behavioral changes caused by the pandemic and the statistical data is extrapolated from the Statistical Review of World Energy and the social context during the pandemic. The data was obtained from the U.S Energy Information Administration (EIA), processed through Microsoft Excel, and analyzed using Tableau Software.

The analysis process started by comparing the total consumption of petroleum and renewable energy from 2019 to 2021. This comparison provided an overview of the general energy consumption in the U.S. Next, the total oil consumption by sectors (industrial, residential, transportation, and commercial) from 2019 to 2021 was compared. Lastly, the total consumption of renewable energy considering each sector was included in the analysis.

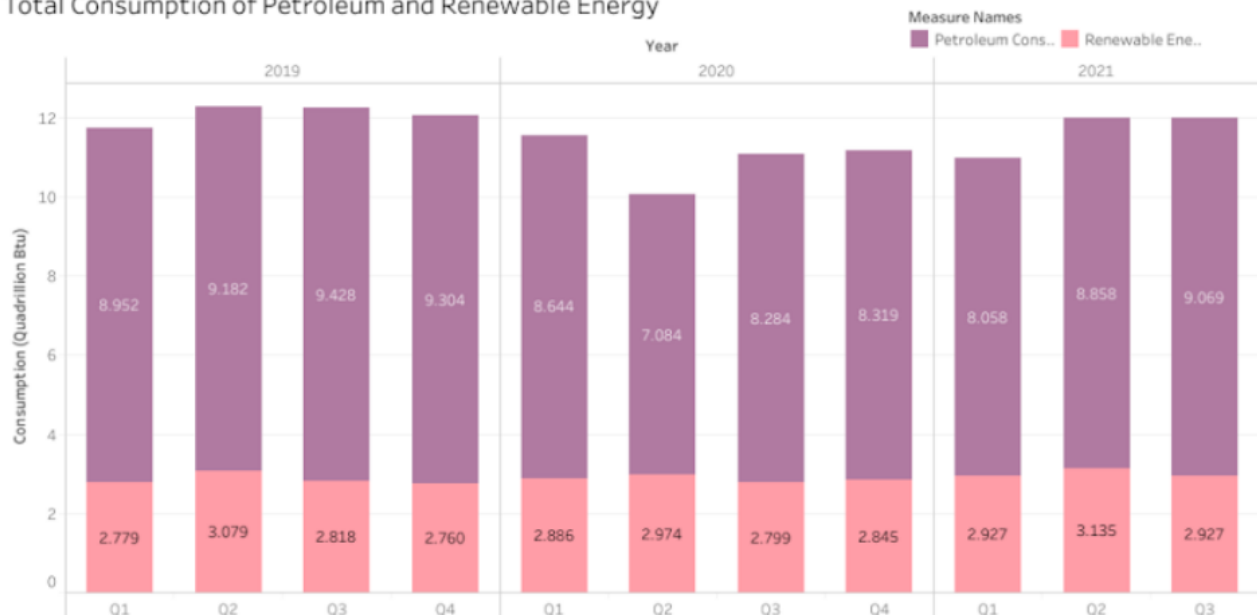
## Results

The analysis of energy consumption by sector in the U.S highlights the variation in the reported numbers in the last quarter of 2019 through 2021. However, the sharpest decline in energy consumption is observed in the second quarter of 2020. Considering the social context of the US, it is essential to recall that lockdown measures started being implemented in the US during March of 2020. Observing the previous statistics of energy consumption by sector and considering the timing of the sharpest decline, it is reasonable to assume a relationship between the negative growth rate of energy consumption and the behavior changes that occurred during the pandemic.

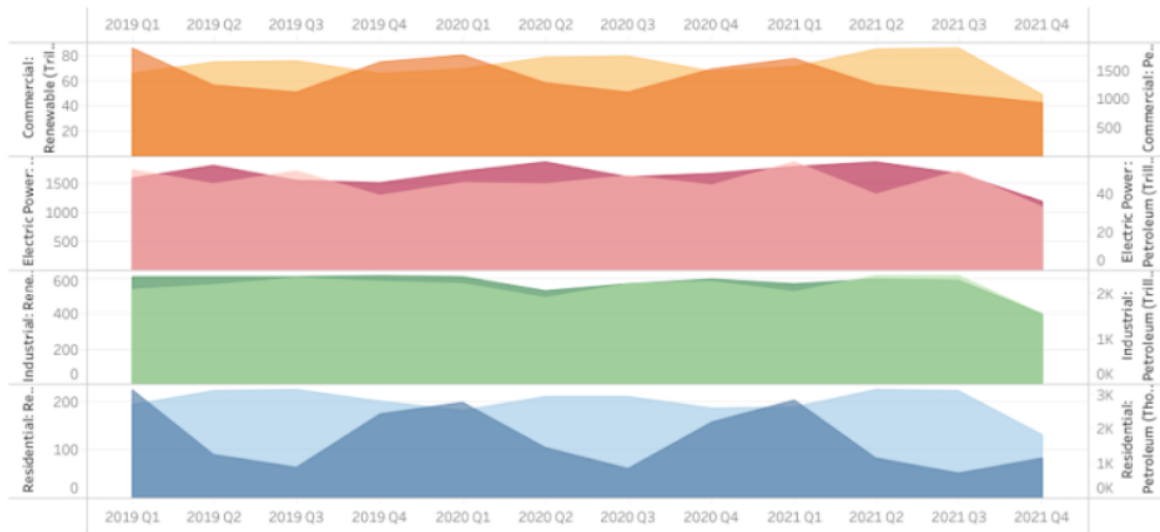
### Total Consumption Per Sector



### Total Consumption of Petroleum and Renewable Energy



### Consumption per Sector in Petroleum and Renewable Energy



### Petroleum Consumption in the Transportation Sector

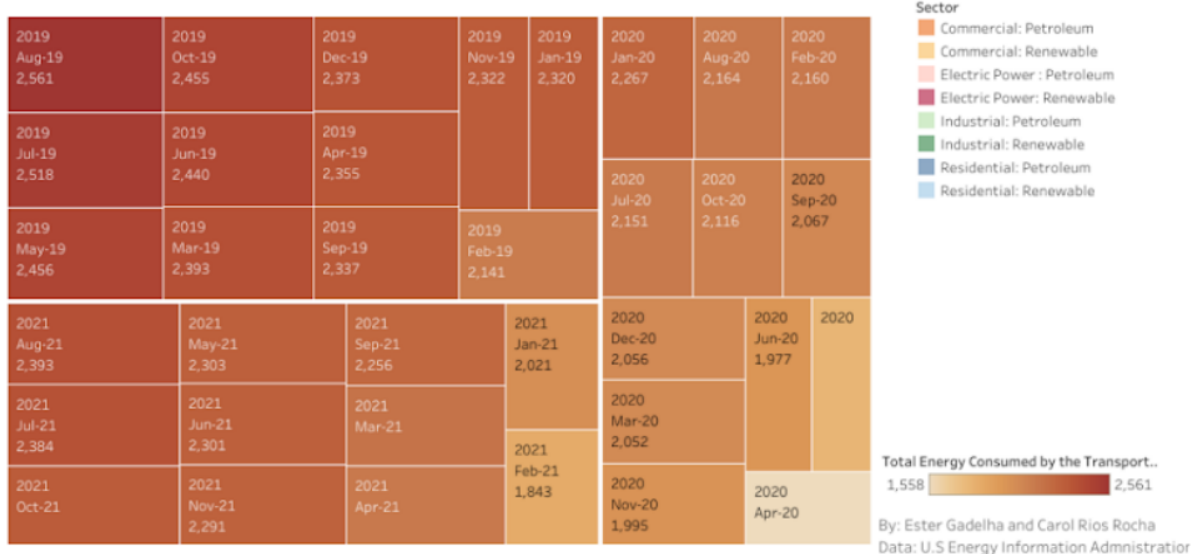


Tableau Dashboard:

[https://public.tableau.com/views/t3\\_16491307275110/Dashboard2?:language=en-US&:display\\_count=n&:origin=viz\\_share\\_link](https://public.tableau.com/views/t3_16491307275110/Dashboard2?:language=en-US&:display_count=n&:origin=viz_share_link)

Observing the visualizations produced, it is possible to conclude that the increase in total consumption of renewable energy is not significant when considering the context that caused oil consumption to decrease. Instead, by noticing the decline in energy consumption in the transportation sector, it is possible to infer that mobility was significantly impacted by the pandemic. Consequently, it is reasonable to extrapolate that the changes in societal behavior caused the decrease in both production and consumption of oil.