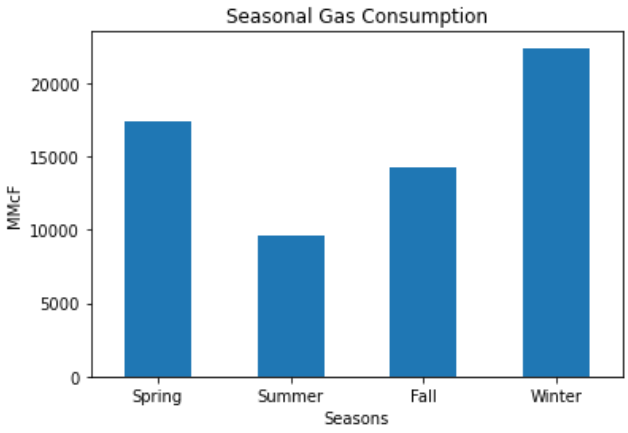
Temperature and Population Effects on Natural Gas Consumption

Background

The United States varies in weather across all 50 states. Some states have similar weather throughout the year and other states have weather that fluctuates with the seasons. The residents within most of the states are receiving natural gas to their homes throughout the year. The gas could be used for cooking with a gas stove, heating water, making a fire with a gas fireplace, drying clothes with a natural gas dryer, and cooling with a natural gas air conditioning. Conceptually, we desire to understand if there is a direct relationship between gas consumption and temperature across the U.S. Additionally, we desire to include population as a relevant factor and determine if there is a relationship with gas consumption and temperature, given the population.

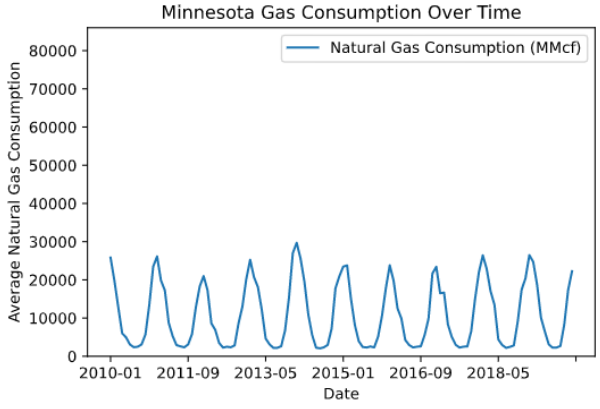
How much does natural gas consumption fluctuate by season?

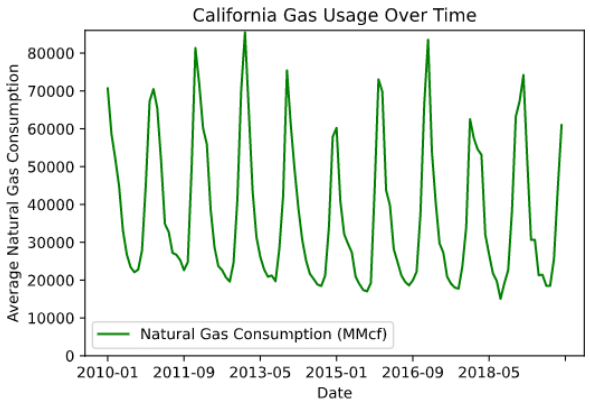
From the years 2000-2019, there are 24 states with average natural gas usage greater than 5000 mmcf. In order to determine the gas consumption for each season, the months of the year were split by season. When analyzing the total gas consumption for each season, it was confirmed that there is a fluctuation in the seasons. There is more natural gas used by residents in the winter than any other season.



Which state has the most and least extreme weather? Is gas affected?

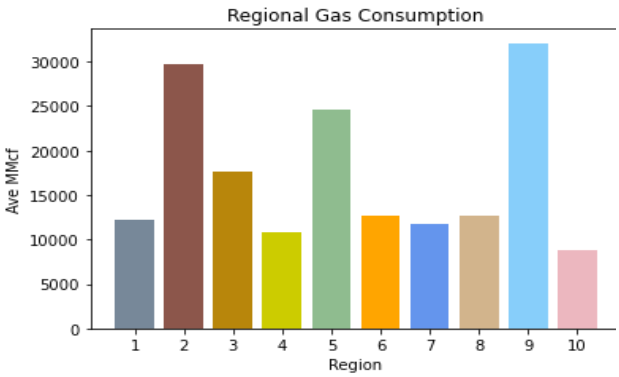
The most extreme weather state with gas consumption greater than 5,000 mmcf is Minnesota, while the least extreme weather state with gas consumption greater than 5,000 mmcf is Caliifornia. Minnesota tends to use less gas and experiences more extreme weather than California.

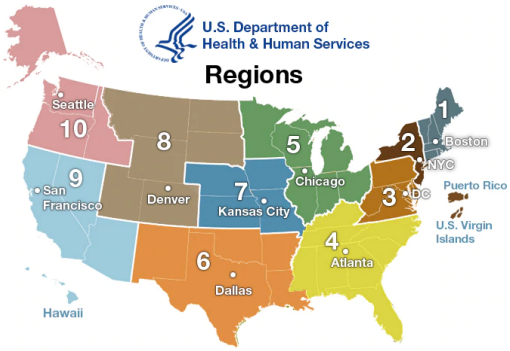




Which region consumes the most natural gas?

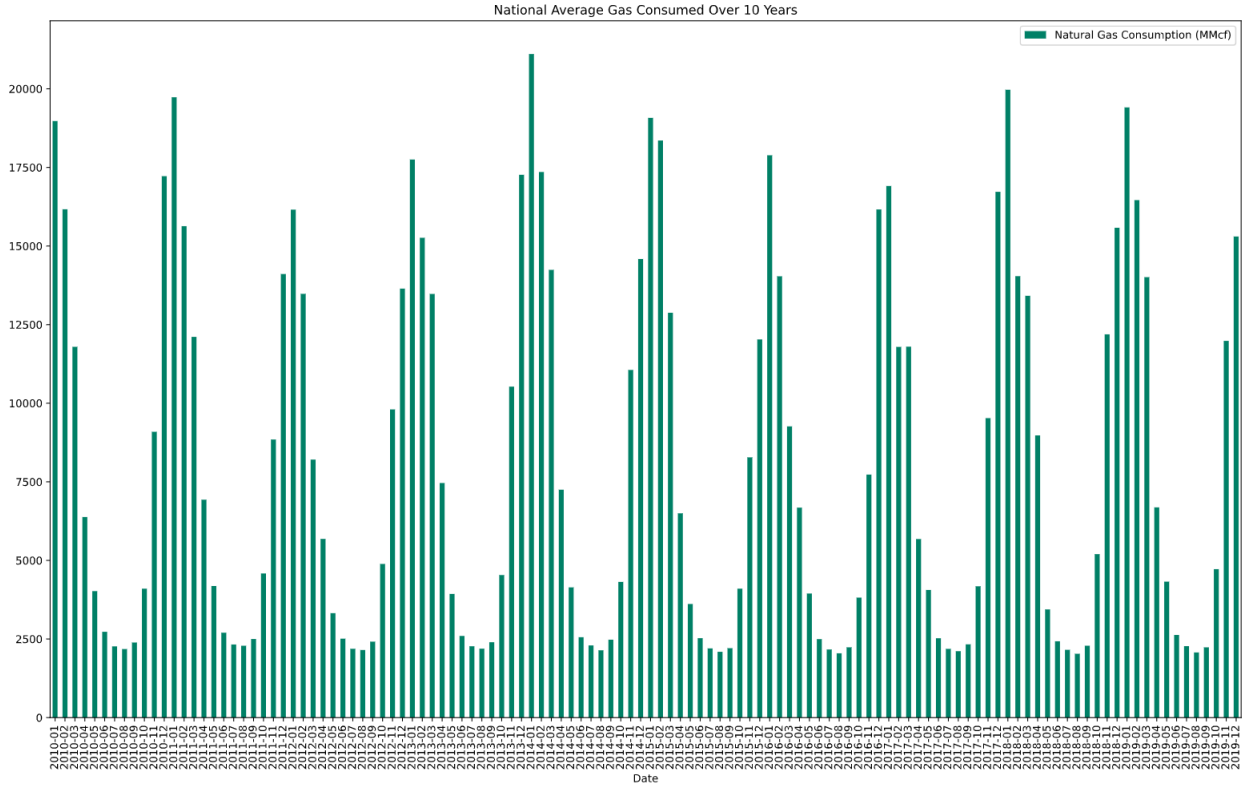
We separated the United States into ten regions. The use of this number of regions allows for a clearer understanding of which states are affecting the regions. The region that consumed the most natural gas contains the following states: California, Nevada, and Arizona.





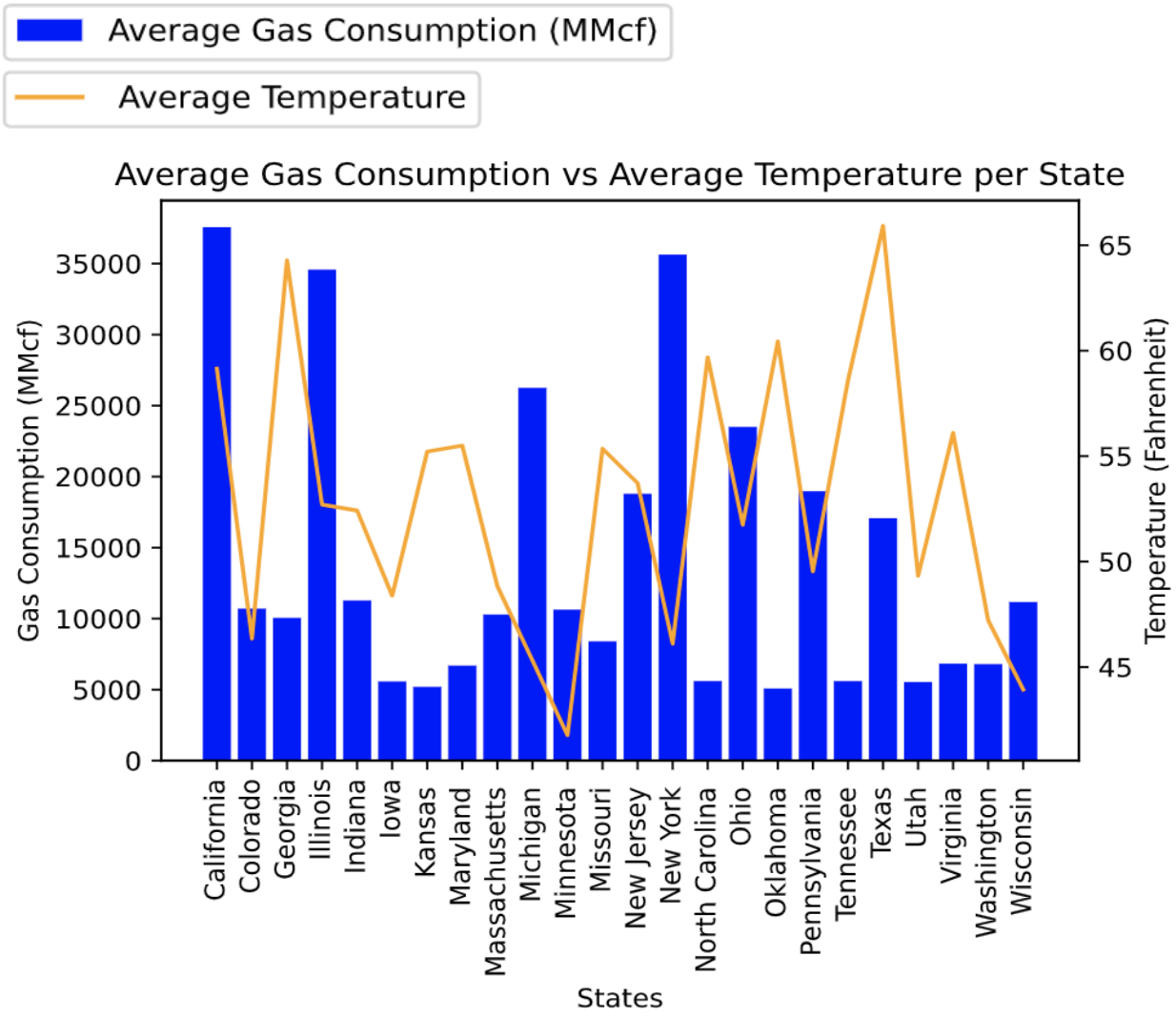
Has the natural gas consumption gone up over time?

The natural gas consumed for all states over the last 10 years has not seen a steady increase or decrease. The natural gas consumed fluctuates in a similar pattern every year.



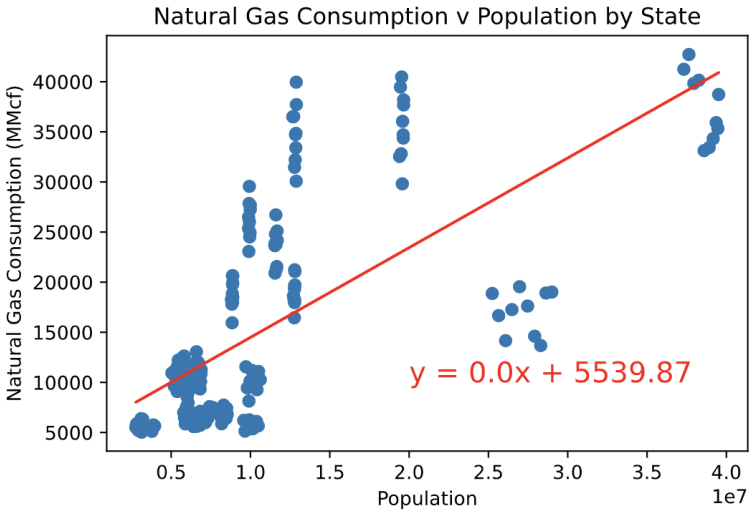
Do certain states average different amounts of gas consumption based on their average temperature?

There is not a consistent pattern of the gas consumption and the temperature for each state. California has the highest gas consumption and a relatively high temperature, while Texas uses less gas and has the highest temperature.



Does population affect the amount of gas used?

The population is clustered in multiple places. The regression line showcases a positive relationship between the population and the natural gas consumption. However the r-squared is 51%, which means the population is more correlated than not, but one variable is not fully explained by the other.



Summary

In conclusion, there is only one instance where there is a direct relationship between the temperature and the natural gas consumption. When winter arises there is more natural gas consumed than in warmer months, which is expected. Moreover, there is a slight correlation with the population and the gas consumed. No other relationships were identified.