Megan Vander Wiele
DS 4002 Spring 2025

Exploring the Difference in Natural Gas Price Peaks During Winter and Summer Extreme Weather Events

Context:

Energy, including its reliability and affordability, is a vital building block in our day to day lives. From powering business and hospitals to heating homes, our world would look vastly different if reliable energy was not available. In 2022, the United States ranked the second highest international producer of energy, and contributed to 16% of global consumption. Although the United States energy system is relatively stable and reliable, in the face of extreme weather events, there can be damaging interruption in supply and delivery, causing prices to spike and increasing the potential for threatening energy blackouts. To try and mitigate this risk, local distribution companies, such as Dominion, Washington Gas, and Peoples Gas, try and predict when natural gas prices will spike so they can purchase their supply ahead of time and avoid exuberant costs. Historically, this has only been done in the winter time when natural gas is used to a greater extent to heat homes and businesses, but recently, something interesting has been happening. Every summer for the past few years, natural gas consumption has broken record after record, as it is being used at an increasing rate for electricity production. Given this rise of summer consumption of natural gas, it is your job to determine if the seasonal spikes in price seen in the winter time are being replicated in the summer. This information will be crucial to utility companies so they can know if they should hedge against exuberant prices in the summer, as well as the winter.

Deliverable:

One city at risk of seeing gas prices peak in the summer as well as the winter is Chicago, as they historically have seen extreme summer and winter temperatures and are situated in an urban location with high energy demand. The utility companies of Chicago are looking for a data scientist like you to analyze the relationship between temperature and natural gas prices to determine seasonal variation, and give them a recommendation on price hedging in the summer months. For a complete analysis, significance testing, regression analysis, and in-depth exploratory data analysis should be used. The results you provide should paint a clear picture to utility companies on if the summer natural gas price peaks during extreme weather events are similar or lesser than the natural gas price peaks during winter extreme events.

Link to Github: https://github.com/MeganVW06/CS3-DS4002