**Topic :** Comparison of Fuel prices in Sudbury and North Bay

**Group :** Group E

**Subject :** Dashboard and Data Analysis (EXL1002 – 93951)

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**Executive Summary**

This report analyzes Sudbury and North Bay fuel prices from 2019 to 2023, concentrating on Diesel, mid-grade gasoline, premium gasoline, and regular unleaded gasoline. All fuel types consistently increased annually, surpassing general inflation rates (Bank of Canada, 2023). Examination of the pricing data reveals that premium gasoline emerged as the most consumed fuel in both regions.

**Data Decisions**

After delving into the historical data of retail fuel prices across seventeen Ontario markets, a critical decision emerges: to pinpoint the most preferred fuel type among Diesel, midgrade gasoline, premium gasoline, and regular unleaded gasoline, specifically in the cities of Sudbury and North Bay. This report shows how much Sudbury and North Bay people consume these different fuel types. This report aims to determine which fuel is most consumed by checking what people buy more often. This deeper understanding will guide business strategies and foster a more robust customer connection, ensuring that offerings align seamlessly with their preferences and needs.

**Data Acquisition**

We utilized a comprehensive approach to obtain the necessary data to analyze Sudbury and North Bay fuel prices. The primary source was the Ontario fuel price survey encompassing seventeen Ontario markets, covering Diesel, mid-grade gasoline, premium gasoline, and regular unleaded gasoline. This survey, extending from January 3, 1990, onwards, presented the prices in Canadian dollars per liter. The information was meticulously organized in a tabular format. To ensure the credibility of our findings, we carefully double-checked the data by comparing it with trustworthy sources (Ontario Data Catalogue). This diligent data verification process was essential in building a solid foundation for our analysis, helping us uncover valuable insights into fuel price trends in the designated regions.

**Data Timing**

This research examines the temporal dynamics of fuel costs in Sudbury and North Bay, Ontario, from 2019 to 2023. The research focuses on quarterly variations in Diesel, mid-grade gasoline, premium gasoline, and regular unleaded gasoline. The dataset ranged from 1990 to 2023 and was thoroughly cleaned and filtered. The study visually displays the timing of fuel price increases using a time series analysis focusing on quarterly intervals. Visualizations concisely depict temporal trends, providing a complete understanding of the temporal features of gasoline price dynamics. The research continues by underlining the importance of understanding the timing of fuel price swings in Sudbury and North Bay throughout the chosen timeframe.

**Data Analysis**

A comprehensive data collection method was used to research Sudbury and North Bay fuel price patterns from 2019 to 2023. The research used pivot tables to reveal significant insights into quarterly average, minimum, and maximum values for Diesel, midgrade gasoline, premium gasoline, and ordinary unleaded gasoline. The study thoroughly evaluates quarterly averages, offering a comprehensive view of fuel cost patterns during the selected time. The analysis sheds light on the overall trajectory of fuel costs by computing these averages for each fuel type in both Sudbury and North Bay, allowing for a more nuanced view of market dynamics.

Furthermore, the study dives into establishing minimum Diesel and mid-grade gasoline costs across numerous fuel kinds in Sudbury and North Bay. This research element highlights the lowest price points and provides insights into anticipated swings, contributing to a more comprehensive understanding of fuel cost variability. The data was carefully filtered by years and quarters to increase the temporal granularity of the investigation. This systematic methodology allowed for a thorough assessment of fuel price patterns on an annual and quarterly basis. The data for each fuel type was added to the analysis, allowing a more sophisticated exploration of temporal patterns.

In addition to simple data retrieval, the use of pivot tables serves as a valuable analytical tool. This allows the determination of gasoline price patterns, with quarterly averages, minimum values, and maximum values serving as critical indications. This gives a snapshot of fuel prices and allows for a more in-depth understanding of the swings in ordinary unleaded gasoline, premium gasoline, mid-grade gasoline, and Diesel from 2019 to 2023. This analysis thoroughly examines the dynamics of fuel costs in Sudbury and North Bay, showing average prices, minimum values, and yearly trends. The strategic use of pivot tables expands the scope of research, providing a more nuanced view of the temporal changes in fuel costs during the selected period.

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| --- | --- | --- |
| **Row Labels** | **Sum of Sudbury** | **Sum of North Bay** |
| Diesel | 11469.1 | 11599.1 |
| Mid-Grade Gasoline | 12474.3 | 12358.6 |
| Premium Gasoline | 13062.9 | 12959 |
| Regular Unleaded Gasoline | 11159.3 | 11098.2 |
| **Grand Total** | **48165.6** | **48014.9** |

Table 1: This Table visually represents the total fuel prices between Diesel, midgrade gasoline, premium gasoline, and regular unleaded gasoline in Sudbury and North Bay from 2019 to 2023

Chart 1: This Bar chart visually represents the fuel consumption, including Diesel, mid**-**grade gasoline, premium gasoline, and regular unleaded gasoline in Sudbury and North Bay from 2019 to 2023.

**Data Transformation**

From 1990 until 2023, a comprehensive cleaning process ensures data accuracy, starting with raw fuel pricing data for all Ontario cities. The updated dataset focuses on Sudbury and North Bay from 2019 to 2023. A time series analysis, establishing quarterly intervals from 2019 to 2023, is a significant point. Statistical analysis calculates quarterly averages, minimum and maximum values, trends, and extremes. For example, line graphs, Bar charts, and time series graphs clearly grasp gasoline price changes. Pivot tables provide strategic insights that go beyond data retrieval to provide nuanced perspectives on quarterly averages, minimum values, and maximum values. This data-driven journey gives subtle insights into fuel price dynamics, stressing the significance of data transformation in identifying significant patterns. The improved dataset demonstrates the effectiveness of meticulous data analysis in exposing hidden complexities.

Chart 2: This line chart visually represents the Average quarterly fuel expenditures for Diesel, midgrade gasoline, premium gasoline, and regular unleaded gasoline in Sudbury and North Bay from 2019 to 2023.

Chart 3: This Bar chart visually represents the minimum yearly fuel expenditures for Diesel, midgrade gasoline, premium gasoline, and regular unleaded gasoline in Sudbury and North Bay from 2019 to 2023

Chart 4: This Bar chart visually represents the Maximum quarterly fuel expenditures for Diesel, midgrade gasoline, premium gasoline, and regular unleaded gasoline in Sudbury and North Bay from 2019 to 2023

**Data Audit**

Based on historical data on weekly retail fuel prices from seventeen Ontario markets, four different fuel types, Diesel, mid-grade Gasoline, Premium gasoline, and regular unleaded gasoline, were selected. This research used pivot tables to reveal significant insights into quarterly averages minimum and maximum values for Diesel, midgrade gasoline, premium gasoline, and ordinary unleaded gasoline. The average of Diesel from 2019 to 2023 was 138.18 in Sudbury and 139.74 in North Bay. The average of midgrade gasoline from 2019 to 2023 was 150.29 in Sudbury and 148.89 in North Bay. The average premium gasoline from 2019 to 2023 was 157.38 in Sudbury and 156.13 in North Bay. The average of regular unleaded gasoline from 2019 to 2023 was 134.44 in Sudbury and 133.71 in North Bay. Diesel's maximum and minimum prices were 243.3 and 79 in Sudbury and North Bay, 240.5 and 92.4. The maximum price and minimum price of midgrade gasoline were 228.9 and 98.2 in Sudbury and North Bay, and 229.5 and 93.3 maximum and minimum. The maximum price and minimum price of Premium gasoline were 236.4 and 104.8 in Sudbury and North Bay, and 236.7 and 100.4 maximum and minimum. The maximum and minimum prices of regular unleaded gasoline were 211.6 and 83.2 in Sudbury and North Bay, and 213.4 and 78.3 maximum and minimum. Total consumption: $ 48165.60 (Canadian dollars) was consumed in Sudbury and $ 48014.90 (Canadian dollars) in North Bay, including all four fuel types. The data was carefully audited, and we ensured that the data used for this analysis were that of the two cities being compared and the prices analyzed were confirmed to be of the chosen fuel types.

**Data Design**

Relational data design is used for our study. Since the data was collected for seventeen cities in Ontario, we omitted other cities as we needed only two cities for our analysis. A comprehensive data collection method was used to research Sudbury and North Bay fuel price patterns from 2019 to 2023. The average fuel Price was calculated for both cities. Sudbury and North Bay data were selected for the price comparison and fuel consumption.

**Assumption**

Based on the findings, In the past five years, from 2019 to 2023, fuel consumption was similar in both cities, Sudbury and North Bay. Among all four fuel types, we discovered that the maximum fuel price recorded was Diesel (243.3), and the minimum was Diesel (79) in Sudbury. Similarly, the Maximum recorded fuel price was Diesel (240.5), and the minimum fuel price recorded was regular unleaded gasoline (78.3) in North Bay. From this result, we can assume fuel consumption in both cities is similar. Average fuel price, minimum and maximum recorded fuel price show both the cities have similar fuel rates, but rates are a bit cheaper in North Bay. Fuel prices for the past five years have seen an annual increase in fuel prices. This increment in fuel prices suggests that fuel prices will likely increase in the coming years.

**References:**

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