BAIT 518 Data Visualization

Project Proposal

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BA1 - Team B

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ChatGPT

Part A: Introduction

We selected vehicle fuel economy for our topic of interest.

1. Context

In today's world, society is seeing the detrimental impact of global warming. Countries have acknowledged the urgent need to take immediate action to reduce the impact of climate change and build a cleaner world. Cars emit a significant amount of greenhouse gasses, such as carbon dioxide, that lead to global warming and climate change. It is important to thoroughly understand how car emissions negatively affect the environment and take corresponding actions to resolve this environmental challenge with more insights.

The US Government is encouraging manufacturers to transition to electric vehicles by 2035. The expectation is that by 2030, 50% of cars sold need to be electric (The White House, 2023), by 2032 67% (Duffy, 2023), and 100% by 2035 (Romaine, 2021).

There is comprehensive data available on the energy consumption of vehicle types, and US policymakers have a vested interest in gathering insights from this data in order to make informed plans.

2. Goal

The goal of this project is to provide insights into the relationships between car characteristics and petroleum consumption. It also aims to provide insight into the trends in electric vehicle innovation over the years.

3. Potential impact

Policymakers can use this information to determine which car characteristics are associated with higher or lower MPG (with higher MPG being favorable for the environment). This will allow them to make decisions regarding which cars will incur taxes or be granted incentives. Furthermore, understanding the trends in electric vehicle innovation can help policymakers see whether the goal to transition to electric vehicles by 2035 will be met.

For consumers, this will also empower them to make informed decisions regarding vehicle choices. They can purchase the appropriate type of vehicle, driven by various considerations, be it cost or environmental concerns.

Part B: Dataset

1. Discussion

We have discussed our shared interests and discovered that all of us are planning to purchase a car in the near future. However, due to the high gasoline prices in Vancouver, the miles per gallon of gasoline (MPG) has become a key consideration for us.

Apart from that, we are all environmentalists, and from a macro point of view, we want to investigate what types of cars can consume less fuel and produce less exhaust.

2. Data Sources

We conducted research on this topic and found a suitable dataset on Kaggle from the US Department of Energy. This dataset includes vehicle fuel economy data in the US, such as MPG, EV range (where applicable), engine statistics, and more. Our data source is linked here: 🚙 Vehicle MPG (1984-2023) (kaggle.com)

Part C: Visualization Ideas

In this section, we will describe each visualization idea and present a rough sketch of the idea.
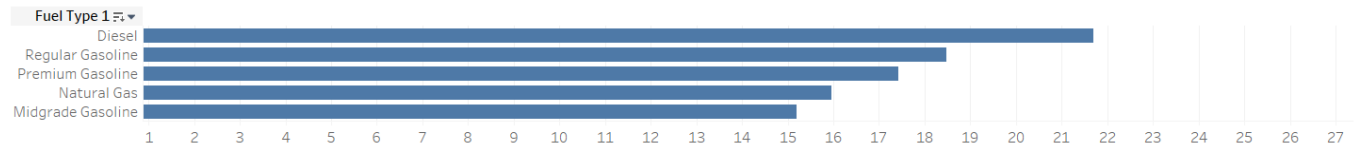
Visualization 1 - Car characteristics and MPG

The relationship between **combined MPG** and vehicle class. This visualization will be presented with a filter for fuel type (i.e., gas, hybrid, or electric).
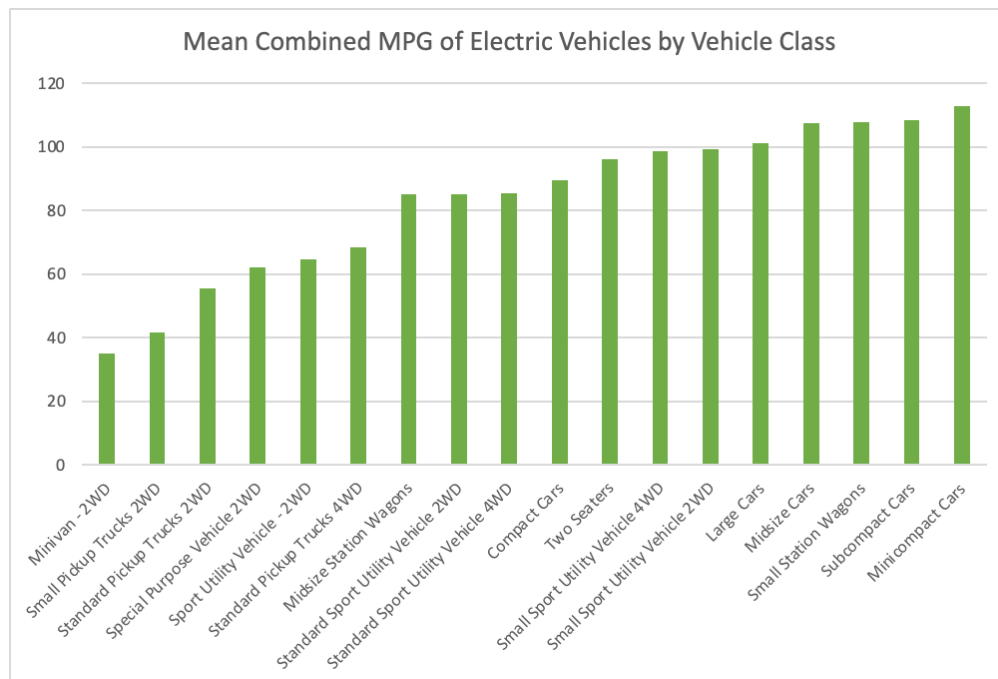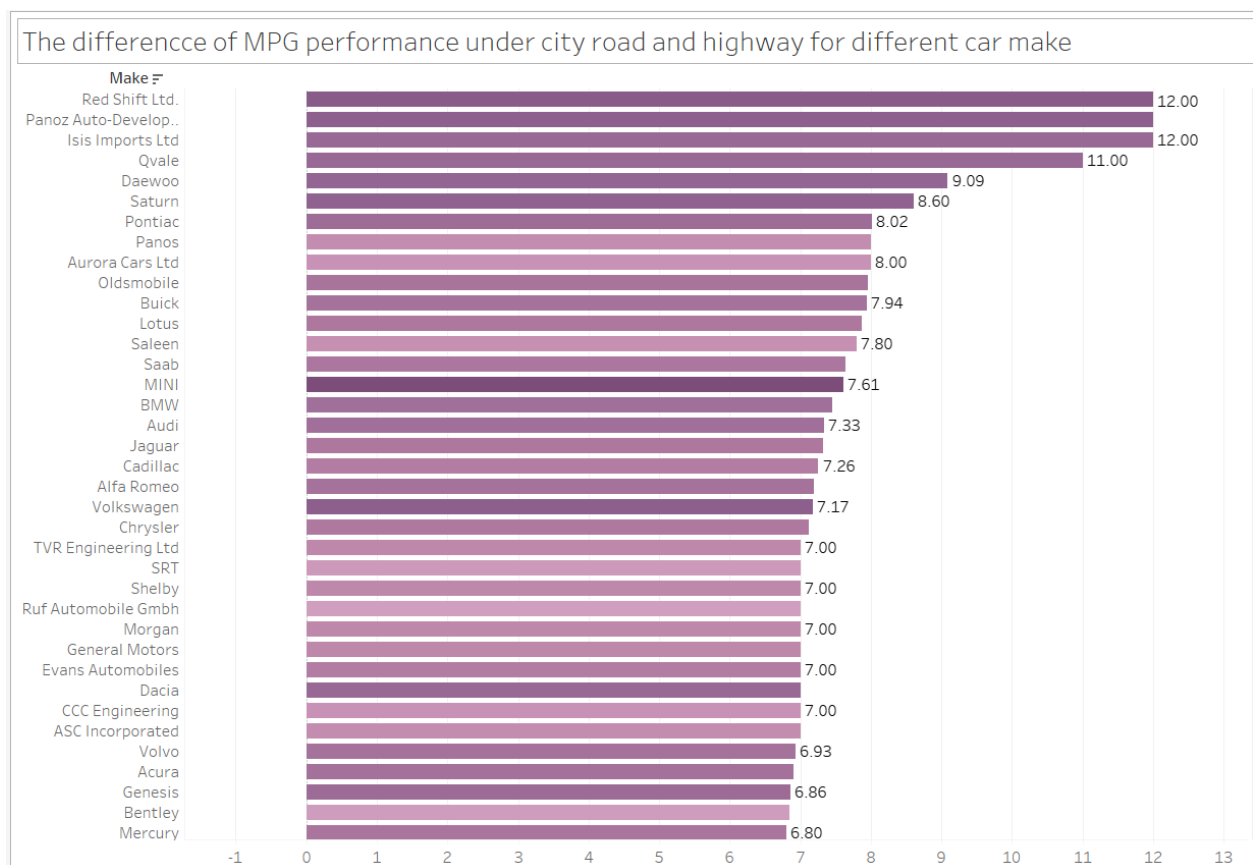
Visualization 2 - Fuel type and MPG

The mean **city MPG**, **highway MPG**, and **combined MPG** by <u>fuel type</u>.

Average City MPG for different fuel types

| Fuel Type 1	
Diesel	
Regular Gasoline	
Premium Gasoline	
Natural Gas	
Midgrade Gasoline	

1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27

Visualization 3 - Cars with the best MPG

The <u>car makes</u> with the highest mean **city MPG**, **highway MPG**, and **combined MPG**.

The differencce of MPG performance under city road and highway for different car make

Make	
Red Shift Ltd.	12.00
Panoz Auto-Develop..	12.00
Isis Imports Ltd	12.00
Qvale	11.00
Daewoo	9.09
Saturn	8.60
Pontiac	8.02
Panos	
Aurora Cars Ltd	8.00
Oldsmobile	
Buick	7.94
Lotus	
Saleen	7.80
Saab	
MINI	7.61
BMW	
Audi	7.33
Jaguar	
Cadillac	7.26
Alfa Romeo	
Volkswagen	7.17
Chrysler	
TVR Engineering Ltd	7.00
SRT	
Shelby	7.00
Ruf Automobile Gmbh	
Morgan	7.00
General Motors	
Evans Automobiles	7.00
Dacia	
CCC Engineering	7.00
ASC Incorporated	
Volvo	6.93
Acura	
Genesis	6.86
Bentley	
Mercury	6.80

-1 0 1 2 3 4 5 6 7 8 9 10 11 12 13

## Visualization 4 - Time trends of EVs

Trend between year and the percentage of electric vehicles, as well as the range of EVs.

Range for EVs over Years
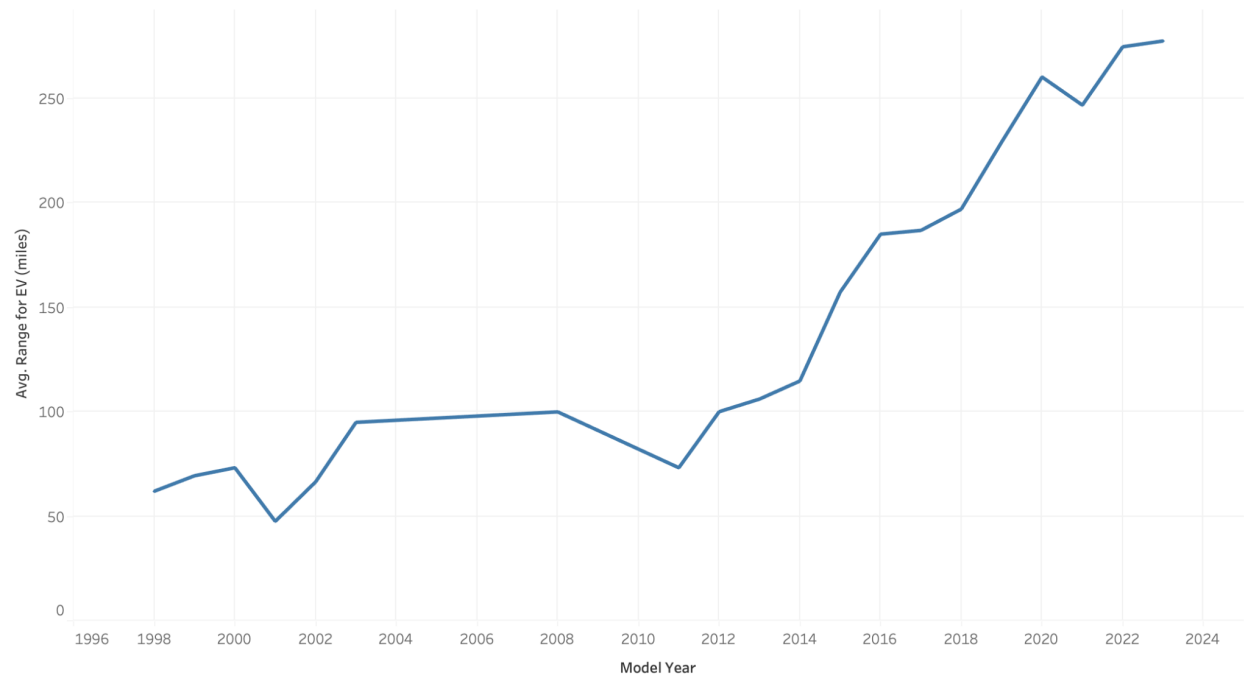
Visualization 5: Improvement in petroleum consumption

The **improvement factor of petroleum consumption** (or petroleum equivalent for the case of EV) for each <u>vehicle class</u>. This improvement factor is calculated by dividing the average non-electric petroleum consumption for a specific class type by the electric petroleum consumption of the same class type.
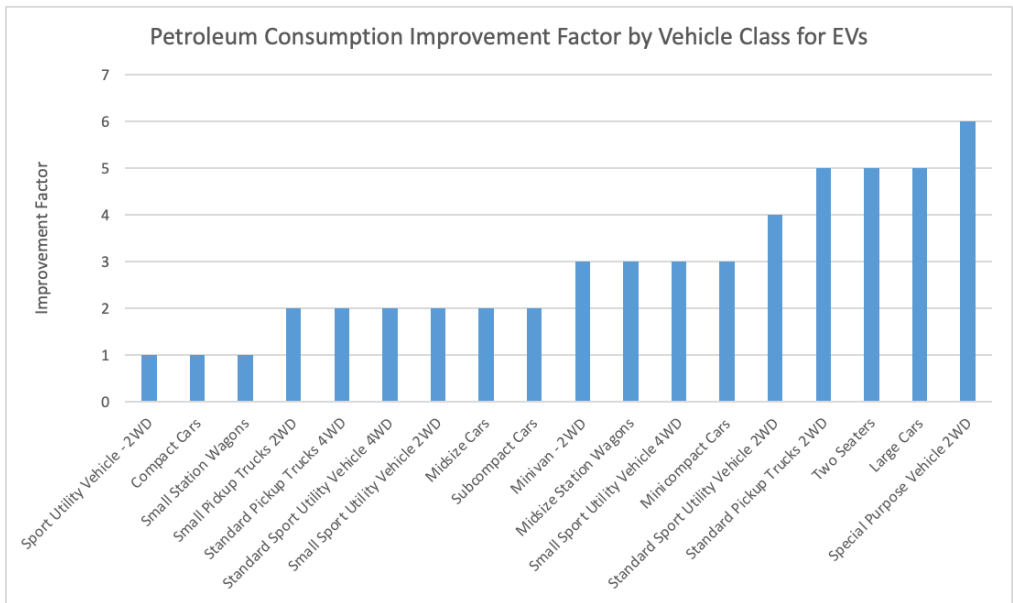
References

ChatGPT. (2023, October 23). Help me create a logo of vehicle fuel. [Response to user question]. Retrieved from https://chat.openai.com/

The White House. (2023, April 17). *Fact sheet: Biden-Harris administration announces new private and public sector investments for affordable electric vehicles.* The White House. https://www.whitehouse.gov/briefing-room/statements-releases/2023/04/17/fact-sheet-biden-harris-administration-announces-new-private-and-public-sector-investments-for-affordable-electric-vehicles/

Duffy, Claire. (2023, August 31). *Auto industry's switch to EVs gets $12 billion in loans and grants from the US energy department.* CNN Business. https://www.cnn.com/2023/08/31/cars/biden-evs-usde-billion-manufacturing/index.html#:~:text=The%20funding%20pledge%20comes%20after%20the%20Biden%20administration,cars%20sold%20in%20the%20United%20States%20by%202032.

Romain, Jenna. (2021, April 15). All new US vehicles could be required to be electric by 2035, new study says. https://thehill.com/changing-america/sustainability/energy/548394-all-new-us-vehicles-could-be-required-to-be-electric/#:~:text=1%20A%20new%20study%20by%20University%20of%20California%2C,to%20it%20as%20the%20primary%20use%20of%20transportation.