DATA/IO
Project

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Problem

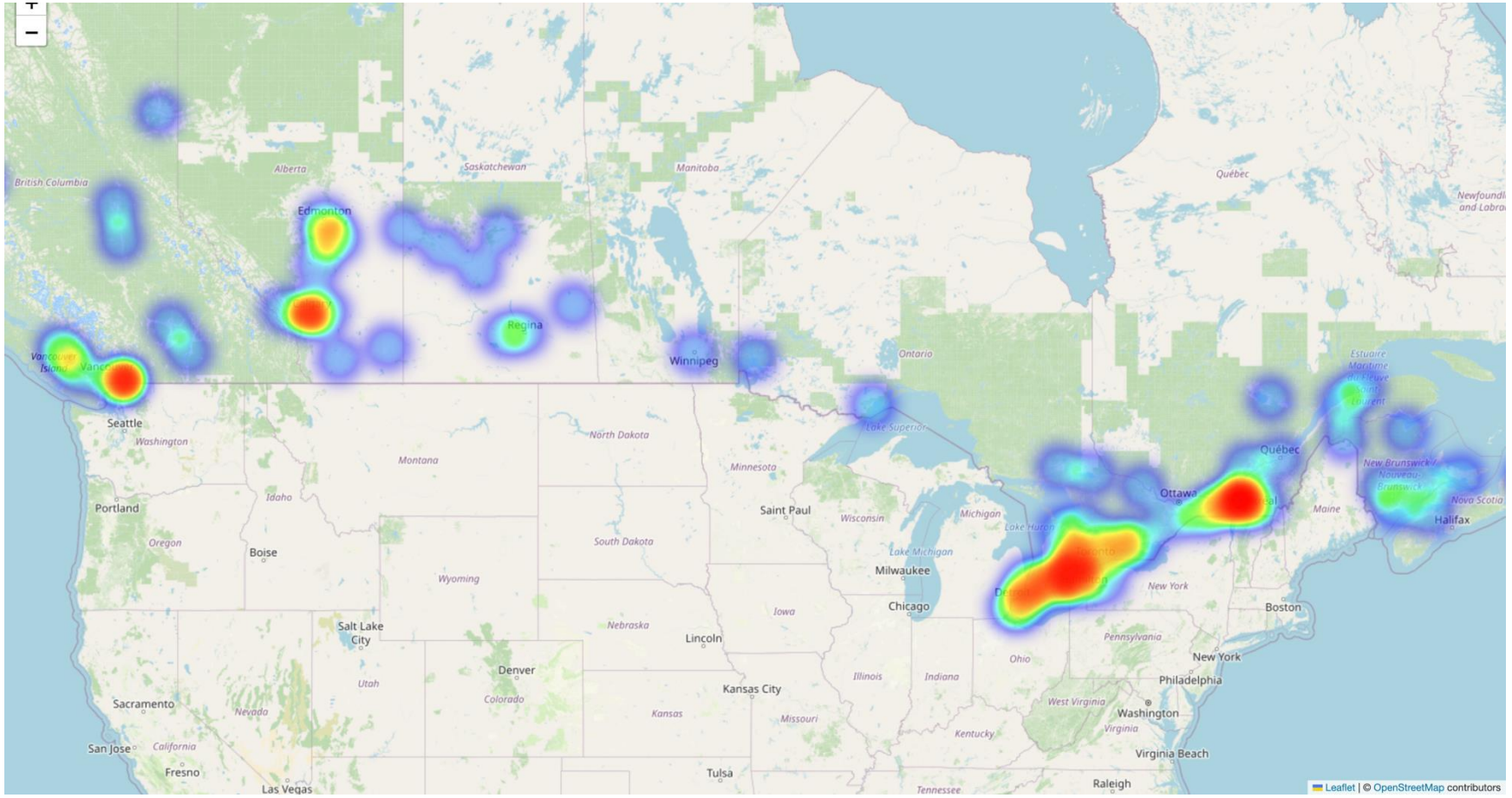
- Reducing CO_2 emissions from vehicles is a critical step in mitigating climate change and improving air quality. Vehicle emissions contribute significantly to global greenhouse gas levels, with factors such as engine size, fuel consumption, and vehicle type playing a major role in determining emission levels.

- The challenge is to analyze vehicle emissions data, uncover trends, and identify actionable strategies to reduce CO_2 emissions. By understanding the relationships between vehicle characteristics and emissions, we can develop data-driven solutions to promote cleaner and more efficient transportation options.

83% of emissions in the U.S. transportation sector.

From CBO.GOV

Insight 1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Ottawa
Portland
Idaho
Saint Paul
Wisconsin
Michigan
Maine
Halifax
Oregon
Boise
South Dakota
Milwaukee
Wyoming
New York
Chicago
Boston
Iowa
Salt Lake City
Nebraska
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Pennsylvania
Ohio
New York
Denver
Philadelphia
Utah
Illinois
Indiana
Kansas City
Sacramento
Colorado
West Virginia
Washington
Nevada
Kansas
Missouri
Virginia
San Jose
California
Kentucky
Virginia Beach
Fresno
Tulsa
Raleigh
Las Vegas
Tennessee
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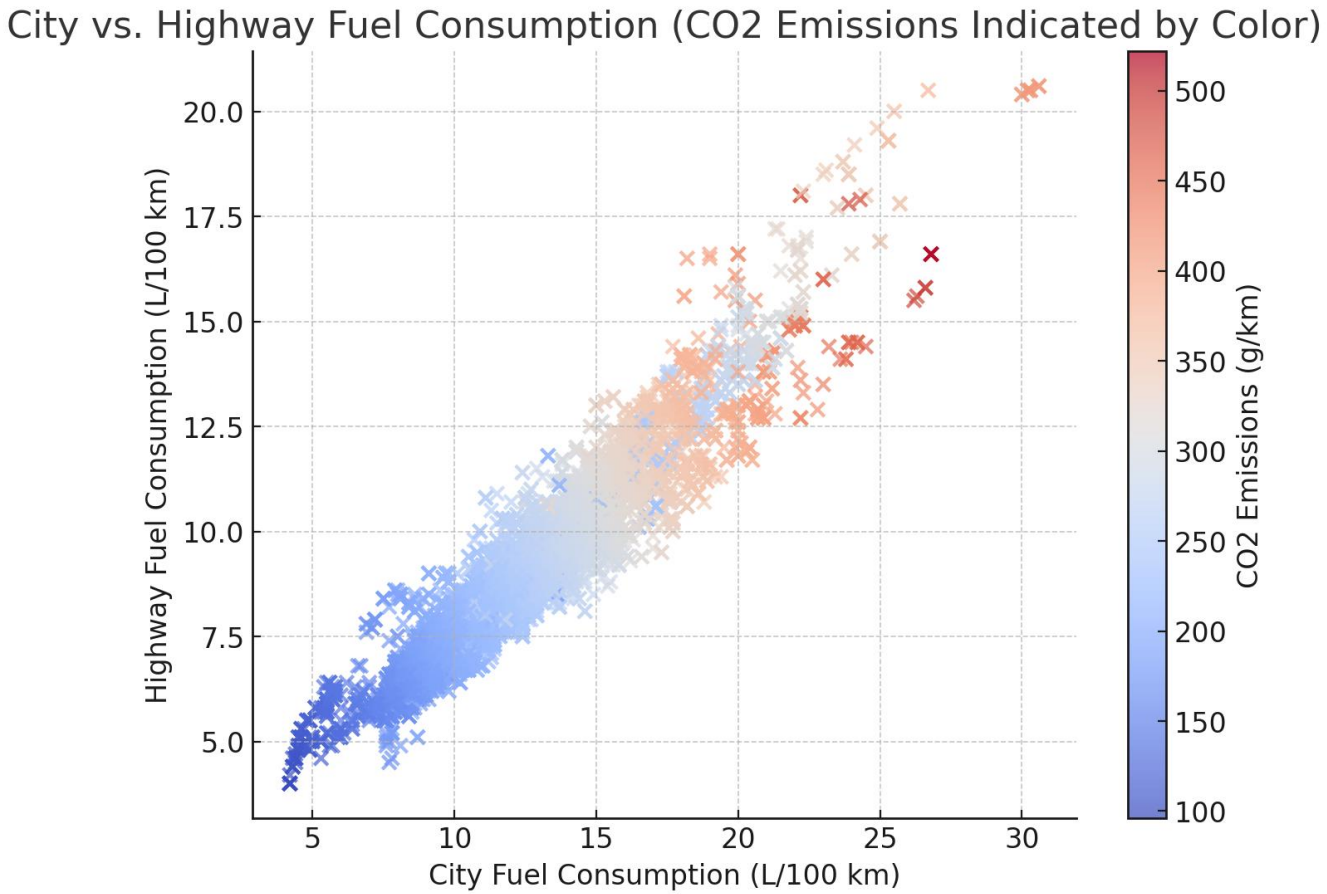
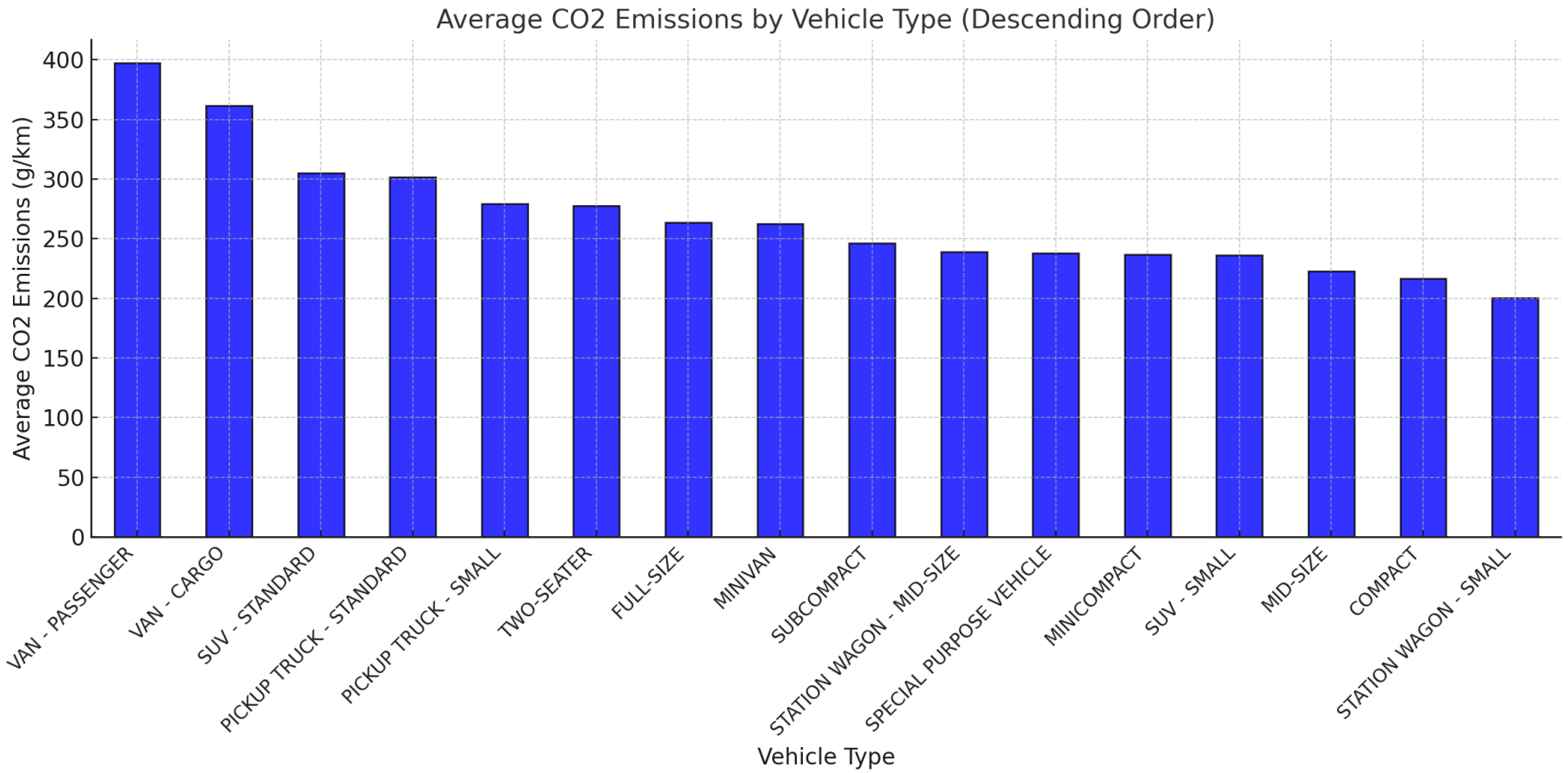
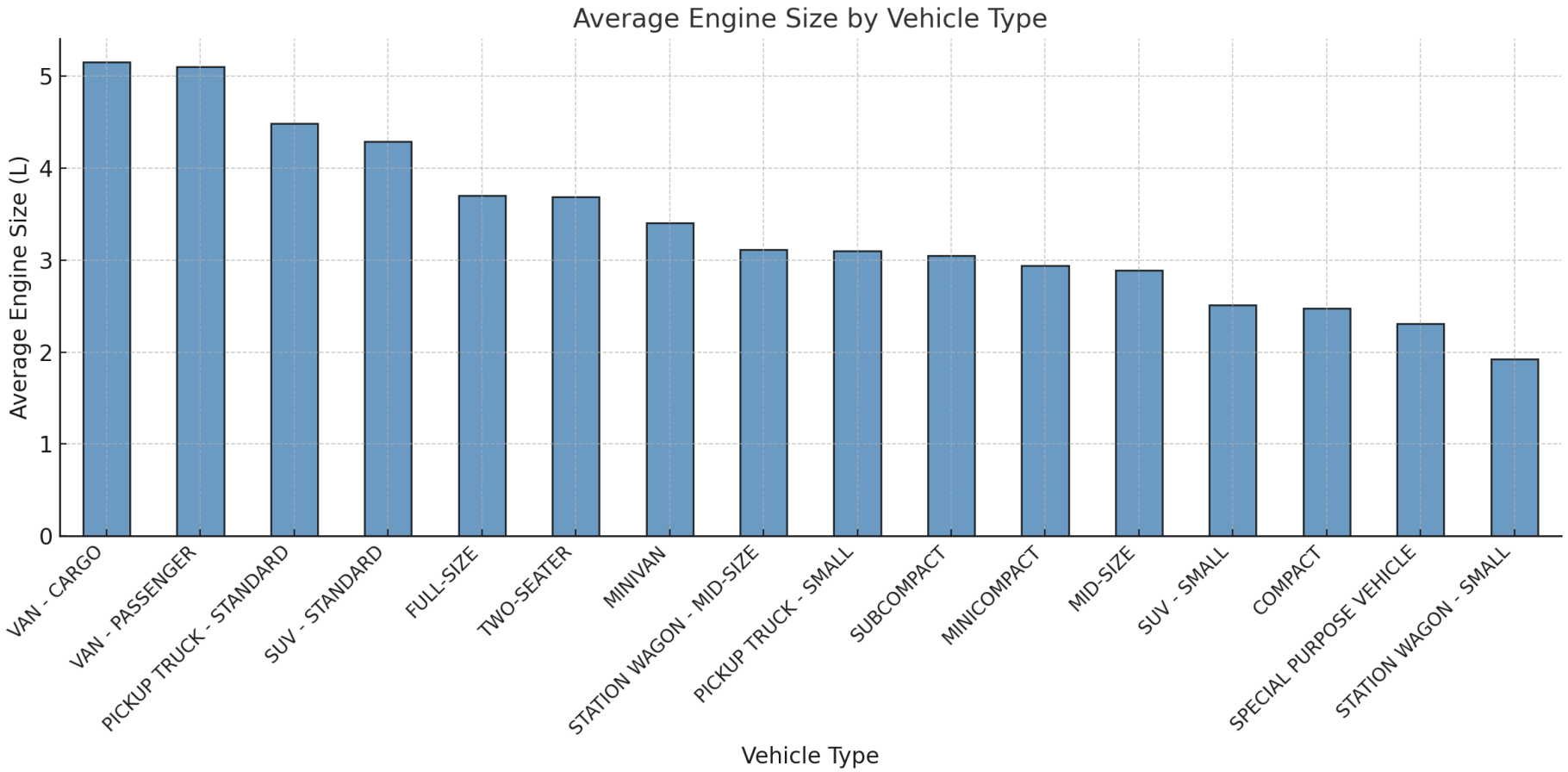
Insight 2


City vs. Highway Fuel Consumption (CO2 Emissions Indicated by Color)
Highway Fuel Consumption (L/100 km)
City Fuel Consumption (L/100 km)
CO2 Emissions (g/km)
20.0
17.5
15.0
12.5
10.0
7.5
5.0
5
10
15
20
25
30
500
450
400
350
300
250
200
150
100

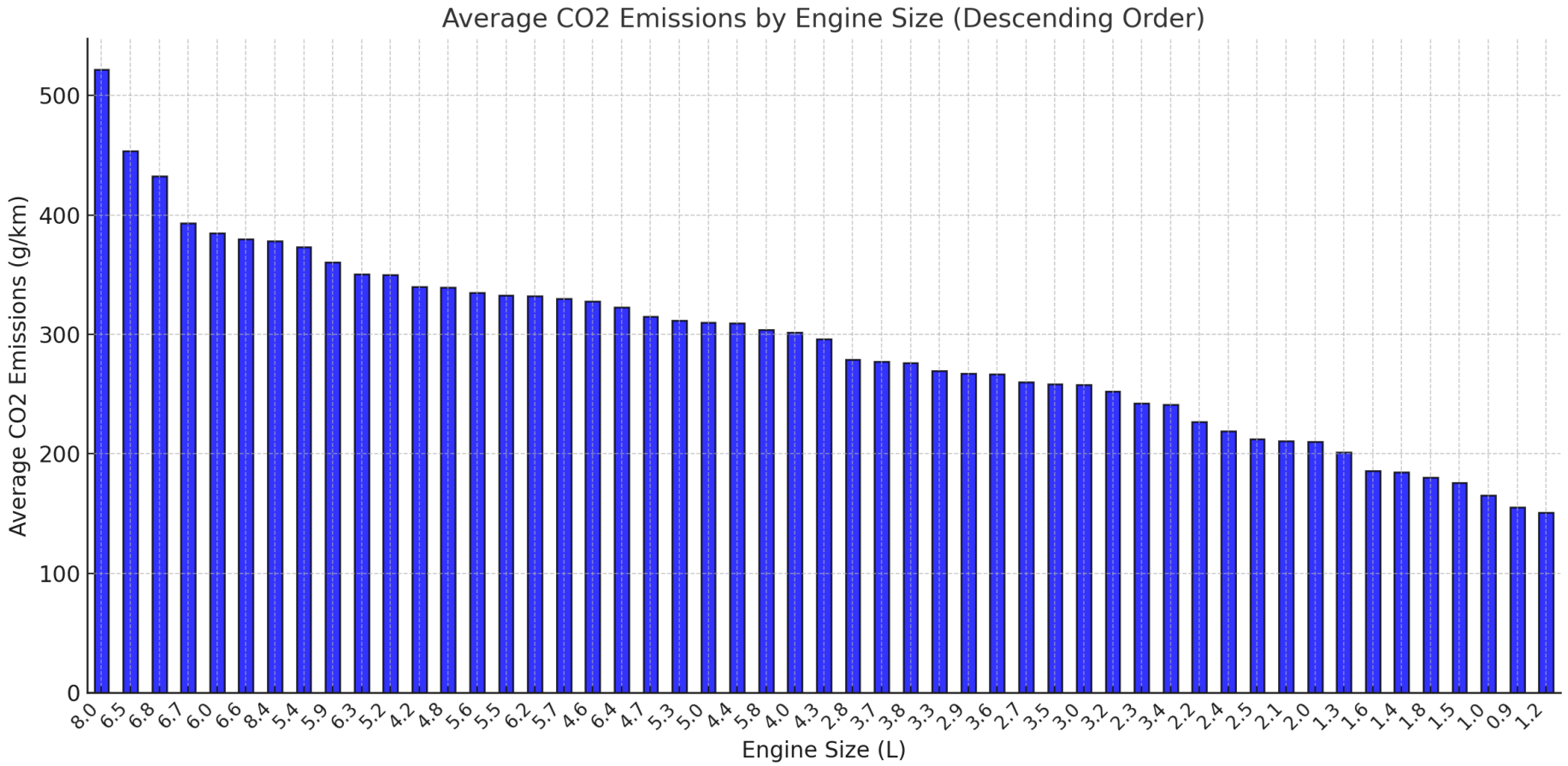
Insight 2


Average CO2 Emissions by Vehicle Type (Descending Order)
Average CO2 Emissions (g/km)
0
50
100
150
200
250
300
350
400
VAN - PASSENGER
VAN - CARGO
SUV - STANDARD
PICKUP TRUCK - STANDARD
PICKUP TRUCK - SMALL
TWO-SEATER
FULL-SIZE
MINIVAN
SUBCOMPACT
STATION WAGON - MID-SIZE
SPECIAL PURPOSE VEHICLE
MINICOMPACT
SUV - SMALL
MID-SIZE
COMPACT
STATION WAGON - SMALL
Vehicle Type

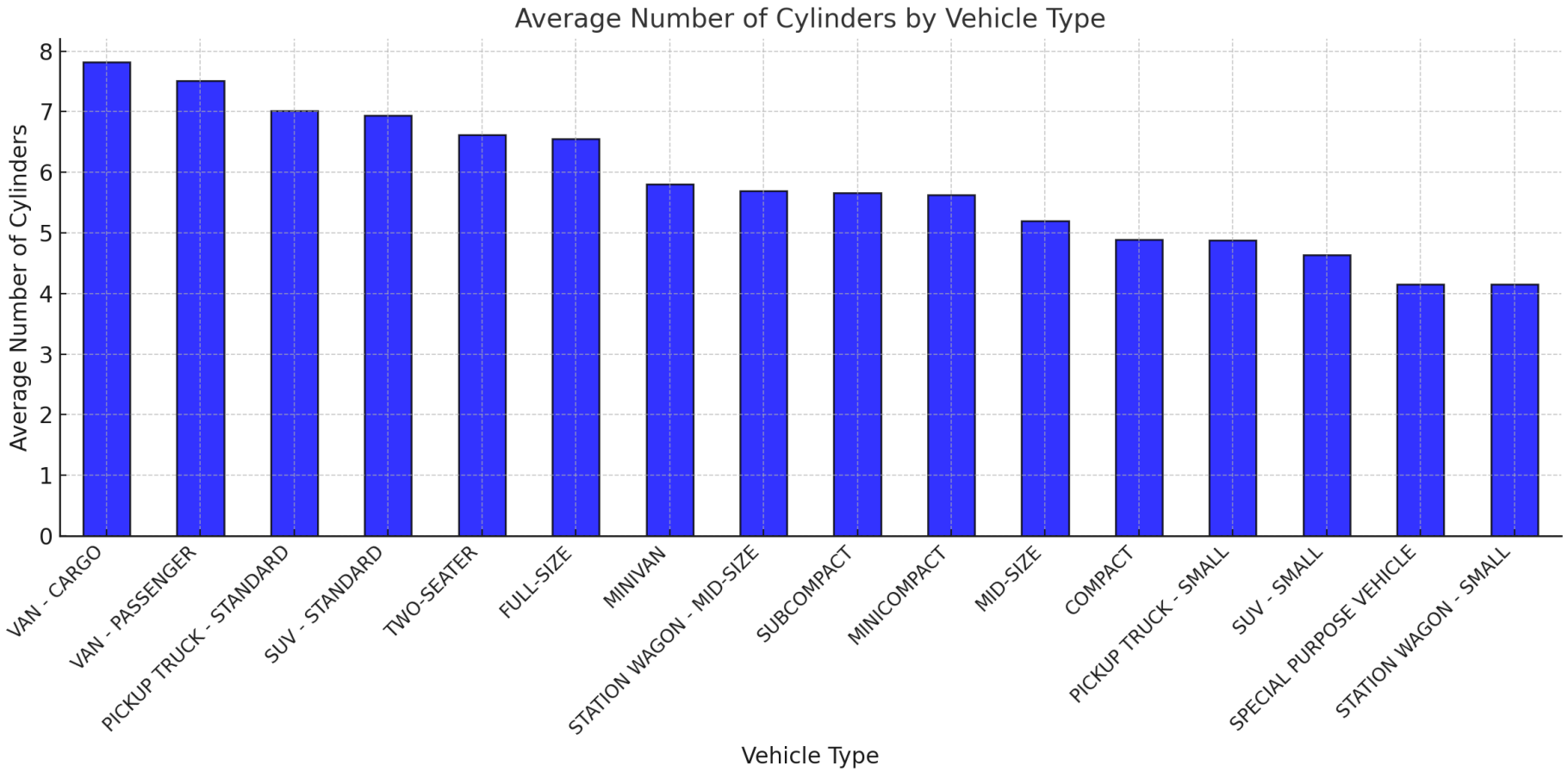
Insight 3


Average Engine Size by Vehicle Type
Average Engine Size (L)
0
1
2
3
4
5
VAN - CARGO
VAN - PASSENGER
PICKUP TRUCK - STANDARD
SUV - STANDARD
FULL-SIZE
TWO-SEATER
MINIVAN
STATION WAGON - MID-SIZE
PICKUP TRUCK - SMALL
SUBCOMPACT
MINICOMPACT
MID-SIZE
SUV - SMALL
COMPACT
SPECIAL PURPOSE VEHICLE
STATION WAGON - SMALL
Vehicle Type

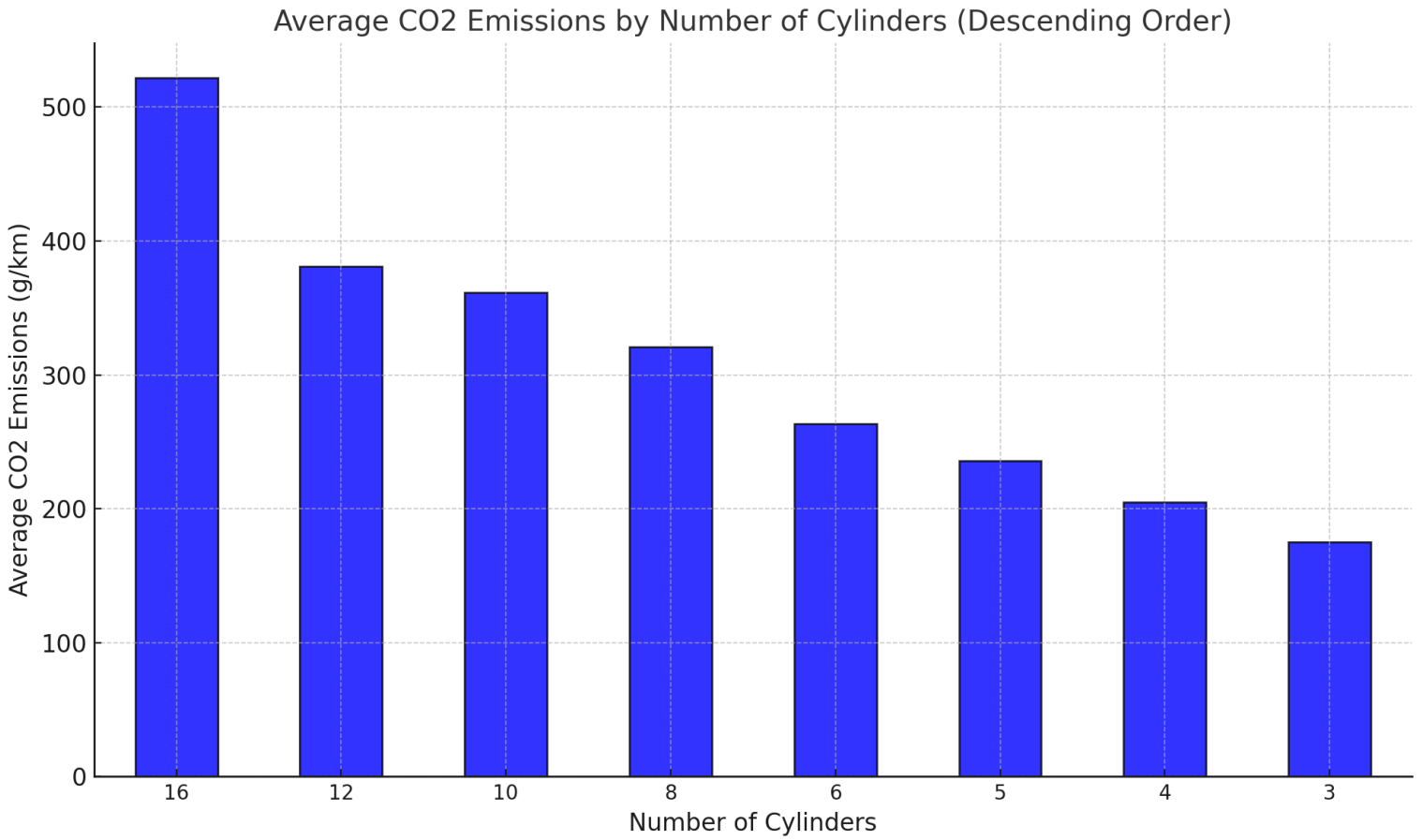
Insight 4


Average CO2 Emissions by Engine Size (Descending Order)
Average CO2 Emissions (g/km)
0
100
200
300
400
500
8.0 6.5 6.8 6.7 6.0 6.6 8.4 5.4 5.9 6.3 5.2 4.2 4.8 5.6 5.5 6.2 5.7 4.6 6.4 4.7 5.3 5.0 4.4 5.8 4.0 4.3 2.8 3.7 3.8 3.3 2.9 3.6 2.7 3.5 3.0 3.2 2.3 3.4 2.2 2.4 2.5 2.1 2.0 1.3 1.6 1.4 1.8 1.5 1.0 0.9 1.2
Engine Size (L)

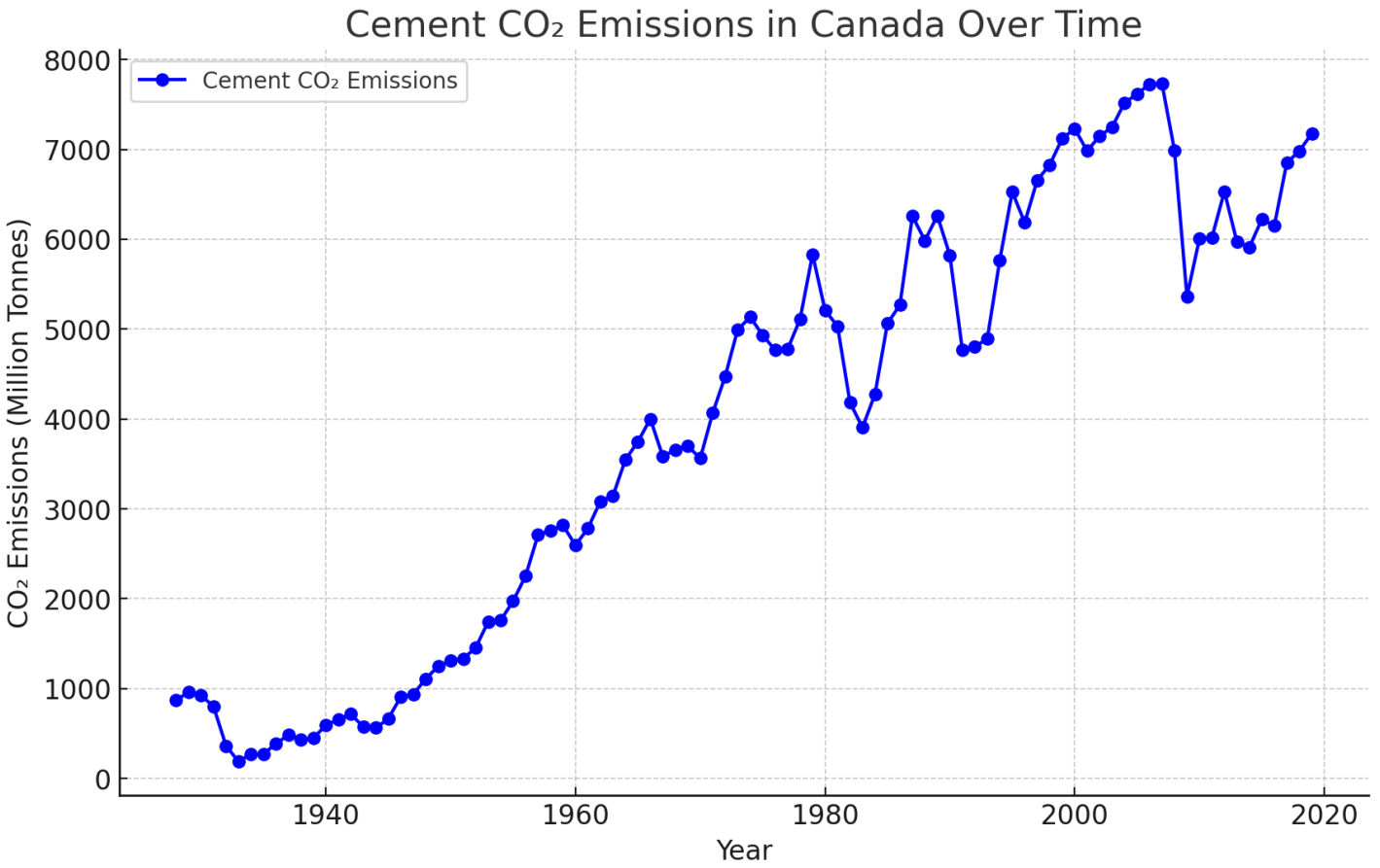
Insight 5


Average Number of Cylinders by Vehicle Type
Average Number of Cylinders
0
1
2
3
4
5
6
7
8
VAN - CARGO
VAN - PASSENGER
PICKUP TRUCK - STANDARD
SUV - STANDARD
TWO-SEATER
FULL-SIZE
MINIVAN
STATION WAGON - MID-SIZE
SUBCOMPACT
MINICOMPACT
MID-SIZE
COMPACT
PICKUP TRUCK - SMALL
SUV - SMALL
SPECIAL PURPOSE VEHICLE
STATION WAGON - SMALL
Vehicle Type

Insight 6


Average CO2 Emissions by Number of Cylinders (Descending Order)
Average CO2 Emissions (g/km)
0
100
200
300
400
500
16
12
10
8
6
5
4
3
Number of Cylinders

Insight 7


Cement CO₂ Emissions in Canada Over Time
Cement CO₂ Emissions
CO₂ Emissions (Million Tonnes)
0
1000
2000
3000
4000
5000
6000
7000
8000
1940
1960
1980
2000
2020
Year

Thought Process

Lower CO_2 Emissions from Transportation

• As shown in our analysis, smaller vehicles consume less fuel, have fewer cylinders, smaller engines, and lower CO_2 emissions—reducing the overall environmental impact in urban areas.

Reduced Need for Cement Production, Cutting Industrial Emissions

• Since cement manufacturing is a high-emission industry, lowering its demand for roads, garages, and city infrastructure directly leads to less CO_2 output from cement plants.

Lower Road Maintenance Due to Lighter Vehicles

• Lighter vehicles cause less wear and tear on roads, leading to fewer repairs and reconstructions, which significantly cuts concrete and cement usage for road maintenance

Less Demand for Parking & Infrastructure

• Smaller vehicles require less parking space, reducing the need for large parking lots, garages, and high-rise parking structures, all of which rely heavily on cement

Solution

Weight – Based Emission Taxes

Small Vehicle Priority Lanes

sources

- https://www.brusselstimes.com/61738/heavier-electric-cars-wear-out-roads-faster
- https://www.iea.org/commentaries/as-their-sales-continue-to-rise-suvs-global-co2-emissions-are-nearing-1-billion-tonnes