

OFFICE OF THE
CITY ADMINISTRATOR

MEMORANDUM

Date: May 6, 2021
To: Board of Supervisors; Angela Calvillo, Clerk of the Board
From: Don Jones, Acting Director of Fleet Management Division (FMD)
RE: Annual Telematics Report for Calendar Year 2020

This memo reports on key metrics of the City's telematics program to satisfy the reporting requirements under Administrative Code Section 4.10-2(c).

Program Status

Ordinance 119-19 was approved in June 2019 amending Administrative Code Section 4.10-2 to remove the exemption of vehicles used for public safety and investigative purposes. The Code therefore now requires all city vehicles be equipped with telematics by June 30, 2020, while allowing for a waiver process for vehicles with certain use profiles that require locational anonymity. That group of departments was not able to install telematics devices into their vehicles in FY20 or FY21 because of the lack of allocated budget to support the installation and on-going subscription costs.

Below is an overview of the count of vehicles that are already part of the telematics program as of end of April 2021, and the rough count of vehicles that will be onboarded next fiscal year.

| Vehicle Group | Count of Mandated Vehicles | Count of Non-Mandated Assets ¹ | TOTAL |
|--|----------------------------|---|------------------------|
| General government vehicles | 3,797 | 540 (out of 2,245) | 4,337 |
| Public safety & investigative services vehicles ² | 1,880 | TBD (out of 131) | 1,880 |
| TOTAL | 5,677 | 540 (out of 2,376) | At least ≈6,200 |

The City's contract with the legacy system provider is set to expire at the end of May 2021, and FMD has been working with the new provider (Geotab) and the departments since January 2021 to transition the mandated group of roughly 3,800 vehicles to the new system by the end of FY21.

The second group of 1,880 public safety vehicles will be outfitted in phases as budget is available. Public safety departments will hold their own accounts with the provider, and FMD will not have direct access to their data unlike with other City departments.

¹ Non-motorized or non-street-legal assets, such as trailers and off-road vehicles, are not mandated to be part of the telematics program. Departments can decide to opt those assets in or out of the program at their discretion.

² Includes vehicles used for public safety and investigative services by the following departments: Police, Fire, Sheriff, Juvenile Probation, Adult Probation, City Attorney and District Attorney. A small group of vehicles owned by MTA, PUC and SFO but used for public safety purposes by public safety personnel are also included in this group.

Telematics Related Metrics

Below are the key metrics for safety and usage that are covered by this report:

- **Speeding**
- **Idling**
- **Utilization**
- **Emissions**

A few other metrics called out by the reporting requirements in Ordinance 225-20 in November 2020 will not be covered by this report for calendar year 2020 for various reasons explained below, but will be included in the calendar year 2021 report.

Maintenance work needed for City vehicles is not something that is tracked by telematics systems. Telematics systems, however, have the ability to read and relay to the system user hundreds of diagnostic trouble codes that will serve as indicators of a mechanical or electrical fault that has taken place or may take place some time in the future. As this metric was not fully evaluated and used from the legacy system, it will be part of the report for calendar year 2021 with data available from the new telematics system.

Collisions is not a metric that comes in readily available data format via the legacy system, and cannot be entirely captured by telematics alone. It requires input from the driver on the details of the incident that took place. In January 2021, FMD developed and distributed a one-page form for fleet managers to fill out and submit to FMD whenever a collision took place involving one of their vehicles.

Take-Home Vehicle Assignments similarly is not a metric that telematics can capture and report on. This requires input from the fleet managers of each department. Section 4.11 of the Administrative Code enumerates several admissible reasons for a department to assign a take-home vehicle to an employee. In January 2021, FMD developed and distributed a form for fleet managers to fill out and submit to FMD on a monthly basis. Data from the telematics system could potentially be used to check for incidents of non-compliance in the future.

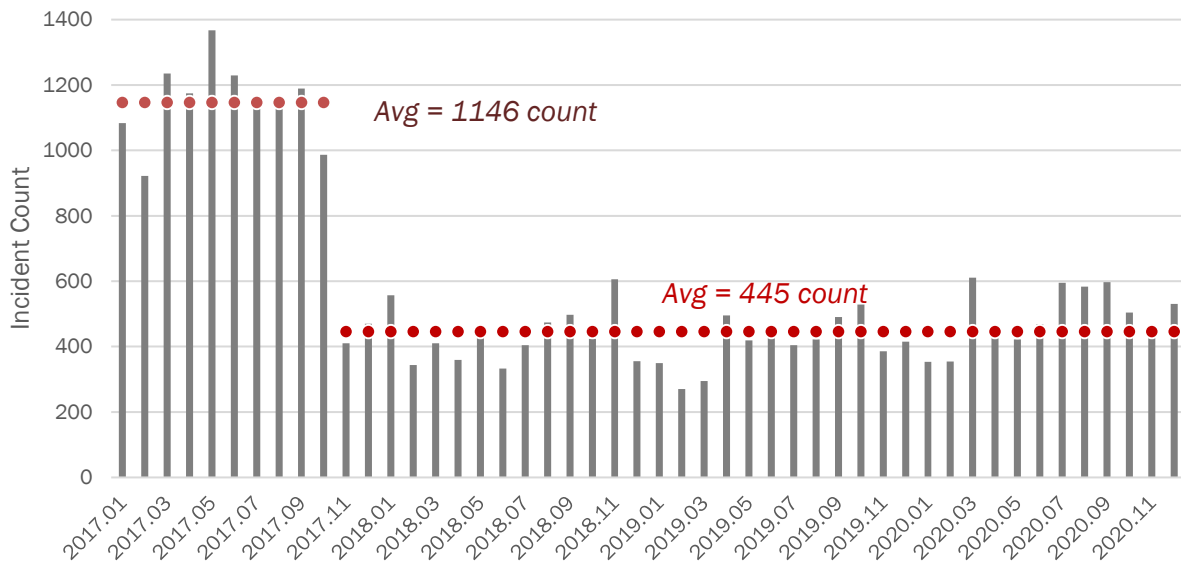
Correction Plans for unsafe driving and idling were required of departments starting in calendar year 2020. As departments have yet to fully develop their plans, implement them, and report on their impacts, this will also be an item to be included in the report for calendar year 2021.

Speeding

Speeding is a major cause of accidents, and significantly increases the odds of injuries or fatalities. All department fleet managers and coordinators have access to this data in the telematics system and its reports, and they are able to set automated alerts based on user-defined thresholds on the vehicle's speed.

Historically FMD has reported on any speeding incidents where the vehicle speed was over 80mph. This allows the departments to focus on one metric that addressed the dangerous behavior of speeding on highways, as well as on a relatively reliable metric that didn't rely on the system referencing accurate posted speed limits. The chart below shows the monthly count of 80+ mph incidents observed for all City vehicles with telematics, reaching back to 2017 when speeding was reduced by more than 60% by departments after the initial numbers and the trends were brought to their attention.

Monthly Count of Speeding Incidents (80+ mph)

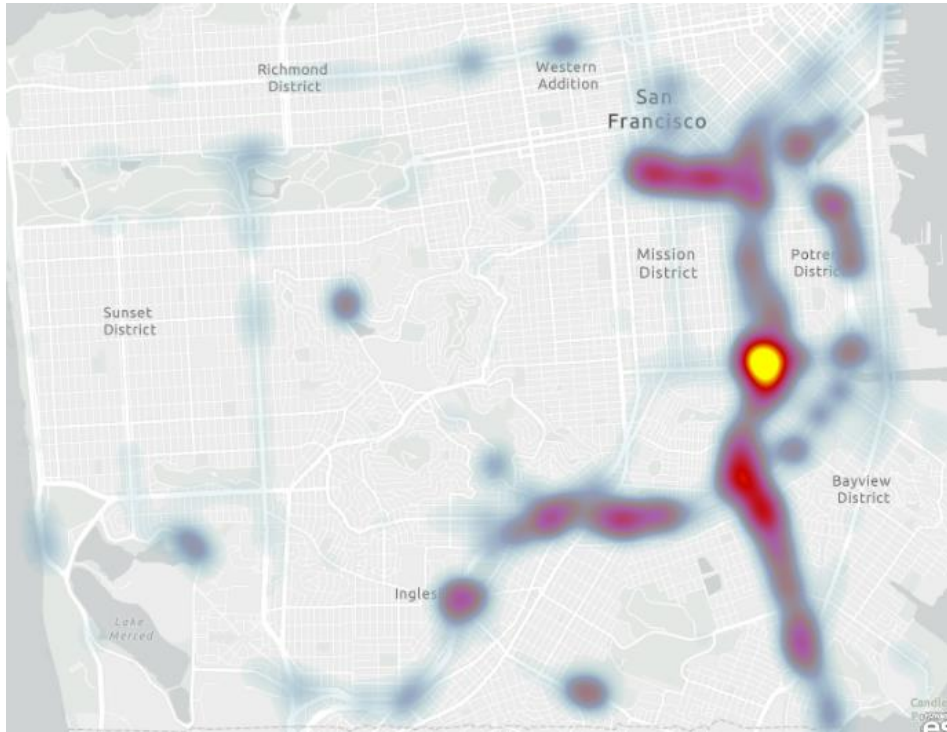


The telematics systems are also able to track events where a vehicle is speeding relative to the posted legal speed limit. This metric introduces two new factors that determine the accuracy of the reported event – the exact GPS location of the vehicle when it was speeding, and the way the system pulls the posted speed limit of nearby streets. As a result the margin of error in the reported data increases, necessitating fleet managers and HR personnel to perform the due diligence to verify the data reported by the telematics system are not false positives.

Below is a matrix mapping the events where the vehicle was speeding 10mph or more over the posted speed limit, covering the month of January 2020. For example, it is possible that the 1,000+ incidents where the vehicle was travelling at 60+ mph on surface streets with 25mph speed limits are false positive events. The vehicles were possibly driving on the highway, but the system erroneously captured a nearby surface street’s posted speed limit.

| Vehicle Speed (mph) | Posted Speed Limit (mph) | | | | | | | | | | | | TOTAL | |
|---------------------|--------------------------|-----|-----|--------|-------|-------|-----|-------|-------|-------|-------|----|-------|--------|
| | 10 | 15 | 20 | 25 | 30 | 35 | 40 | 45 | 50 | 55 | 65 | 70 | | |
| 20 - 29 | 22 | 186 | | | | | | | | | | | | 208 |
| 30 - 39 | 1 | 121 | 639 | 5,780 | | | | | | | | | | 6,541 |
| 40 - 49 | | 35 | 238 | 3,666 | 1,358 | 1,430 | | | | | | | | 6,727 |
| 50 - 59 | | 4 | 20 | 1,485 | 399 | 1,647 | 611 | 676 | | | | | | 4,842 |
| 60 - 69 | | 10 | 1 | 948 | 201 | 746 | 305 | 573 | 2,296 | 1,559 | | | | 6,639 |
| 70 - 79 | | 3 | 1 | 139 | 23 | 76 | 61 | 71 | 241 | 814 | 959 | | | 2,388 |
| 80 - 89 | | | | 5 | 1 | 1 | | | 5 | 2 | 91 | 1 | | 106 |
| 90 - 99 | | | | 1 | | | | | | | 1 | | | 2 |
| Grand Total | 23 | 359 | 899 | 12,024 | 1,982 | 3,900 | 977 | 1,320 | 2,542 | 2,375 | 1,051 | 1 | | 27,453 |

The matrix shows that the majority of the incidents take place when the vehicle is driving between 35-50 mph on 25mph posted speed limit streets. The heatmap below, which uses the same dataset, would indicate that the vehicles are actually driving over highways in most occasions but the system is picking up the posted speed limits of nearby surface streets.



When the fleet is transitioned over to the newer system, FMD will conduct an analysis into the usability of the new dataset reporting on relative speeding.

Idling

The mitigation of idling is an opportunity to reduce the City's fuel use and carbon footprint. Idling is calculated by the legacy system as the time a vehicle's ignition is turned on and the vehicle's speed is at zero, albeit there are differences and exceptions to that generalization with different powertrains and vehicle classes. The system therefore calculates a value for all vehicles, but this analysis excludes idling events for electric vehicles because of the lack of emissions and environmental impact. Furthermore, as heavier duty vehicles sometimes have specialized operational needs for the vehicle's engine to be kept running while parked, the scope of this report will also only focus on light-duty vehicles³.

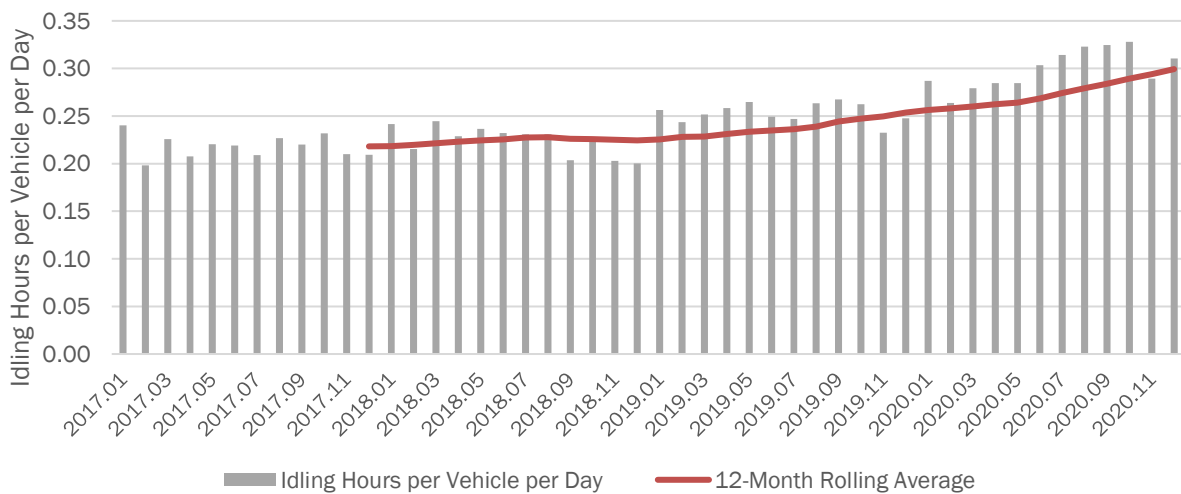
While speeding has garnered scrutiny across many departments over the past few years, idling has not. In fact, the data shows that both the count of idling incidents over 5 minutes and the total idling time for light-duty City vehicles has been on an upward trend over the past four years.

³ Vehicles under GVWR 8,500 lbs., including sedans, SUVs, light duty pickups and vans.

Idling Incident (>5 minutes) Count in Light-Duty City Vehicles



Average Idling Hours per Day for Light Duty City Vehicles



Utilization

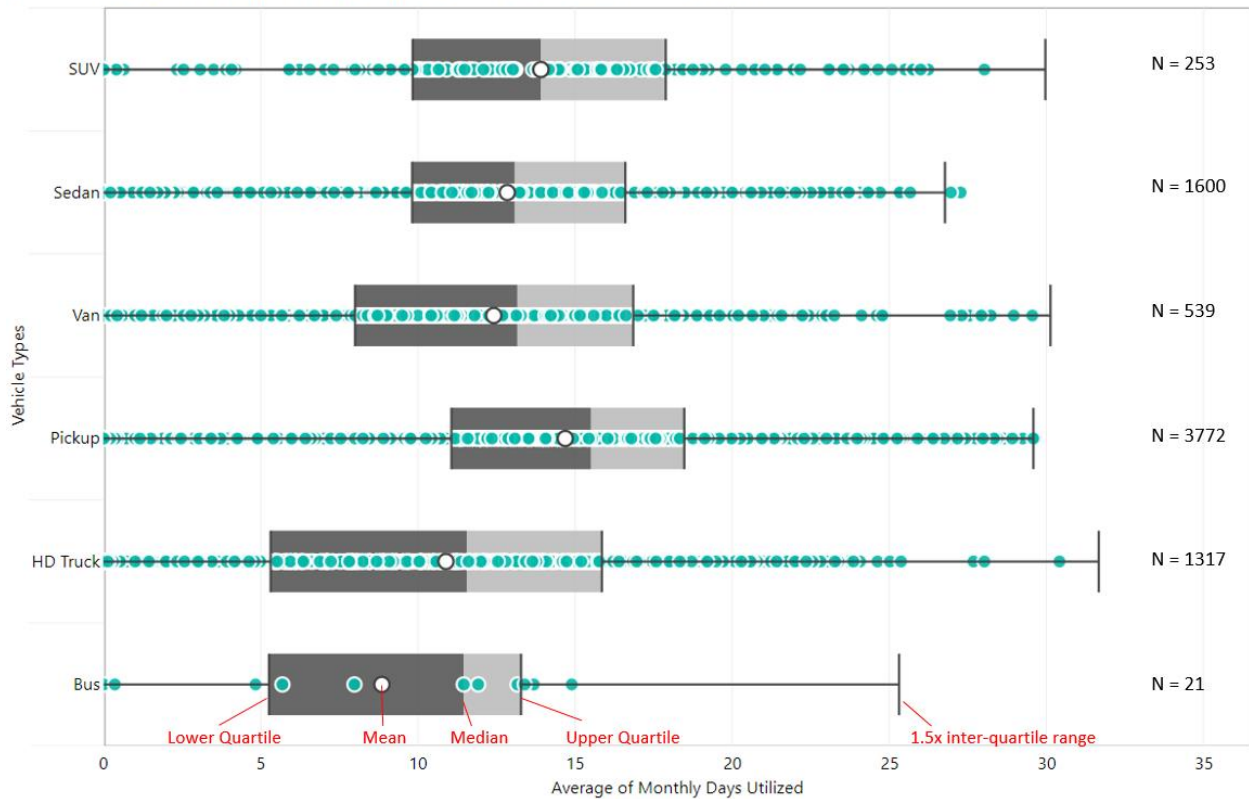
Vehicle utilization rates are important to monitor for a fleet manager to optimize the makeup and management of his/her fleet. Utilization informs many decisions including vehicle assignments, vehicle sharing, maintenance scheduling, vehicle demand management, purchasing or renting of new vehicles, etc.

There are different ways that vehicle utilization can be measured or calculated. With the legacy system, FMD monitors utilization with three metrics: Days Used, Miles Driven, and Trips Taken⁴. In the past, FMD has defined a vehicle to be underutilized if a vehicle is either used fewer than 5 days, driven fewer than 100 miles, or taken fewer than 40 trips for three consecutive months.

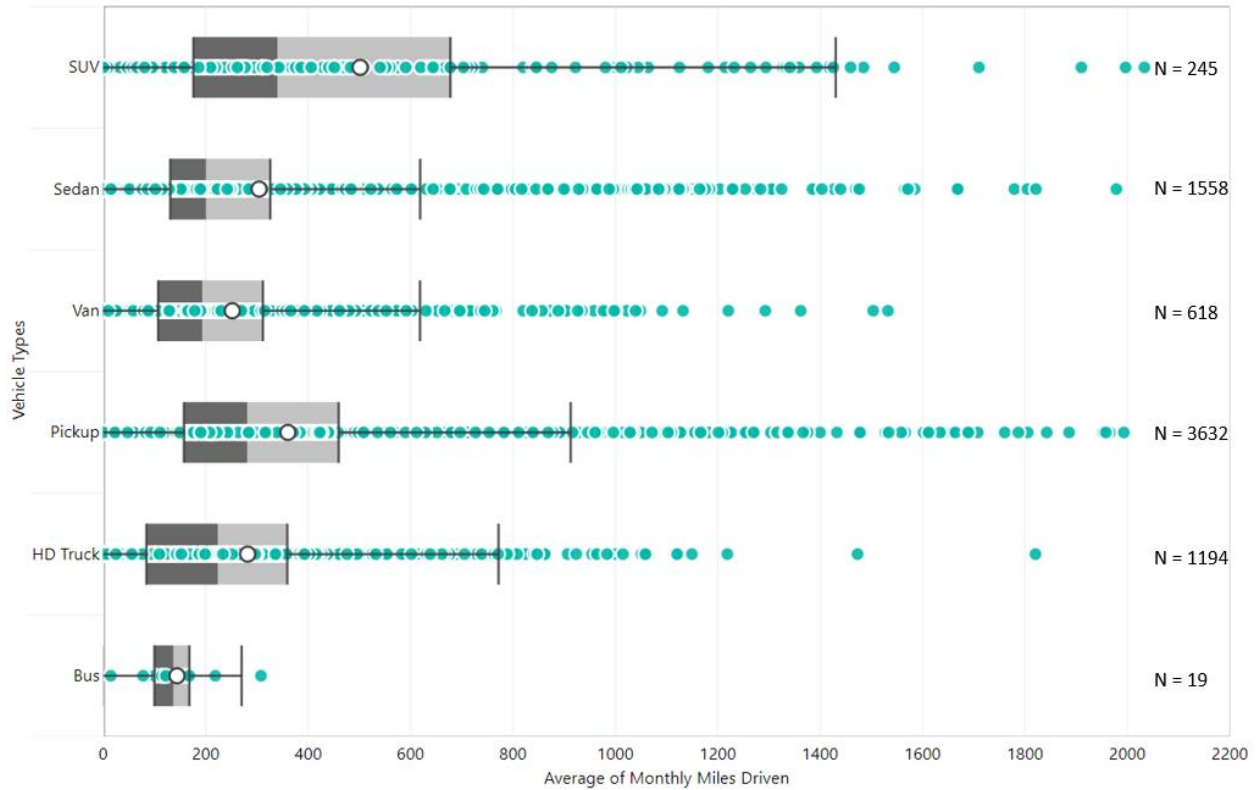
⁴ Defined as an ignition key “on then off” event, regardless of whether the vehicle actually moved.

The below charts indicate the average use profile of each vehicle type in the City. Sedans, for example, have on average been used for fewer than 13 days in a given month, which is slightly more than half of business days in a month. Buses, on the other hand, are more unique assets and typically see fewer days of use due to the nature of their specialized use cases. The use profile in terms of miles driven also shows contrasts between different vehicle types. For example, while the median miles travelled for a sedan in a month is 200 miles, SUVs and pickup trucks tend to travel longer distances on average.

Box Plot of Average Monthly Days Utilized (Data from Jan 2017 - Dec 2020)

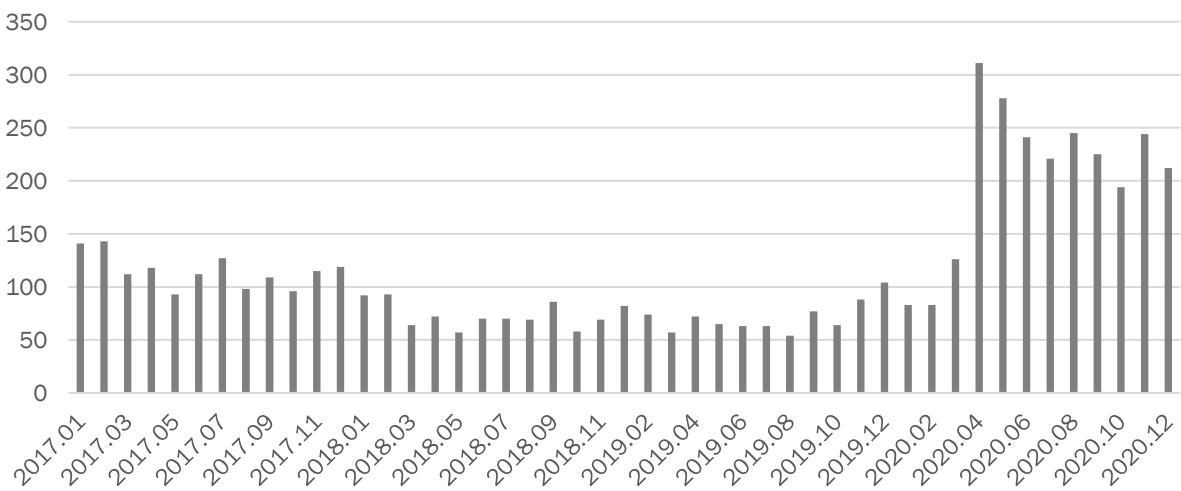


Box Plot of Average Monthly Miles Driven (data from Jan 2017 - Dec 2020)



Under the directive of the City Administrator, FMD requested departments to turn in underutilized sedans in 2017 and again in 2018. As a result, the City's sedan fleet was reduced by 35 sedans. A slight dip in the count of underutilized sedans is observable during calendar years 2018 and 2019 in the chart below. The uptick during 2020 is due to impacts of the pandemic.

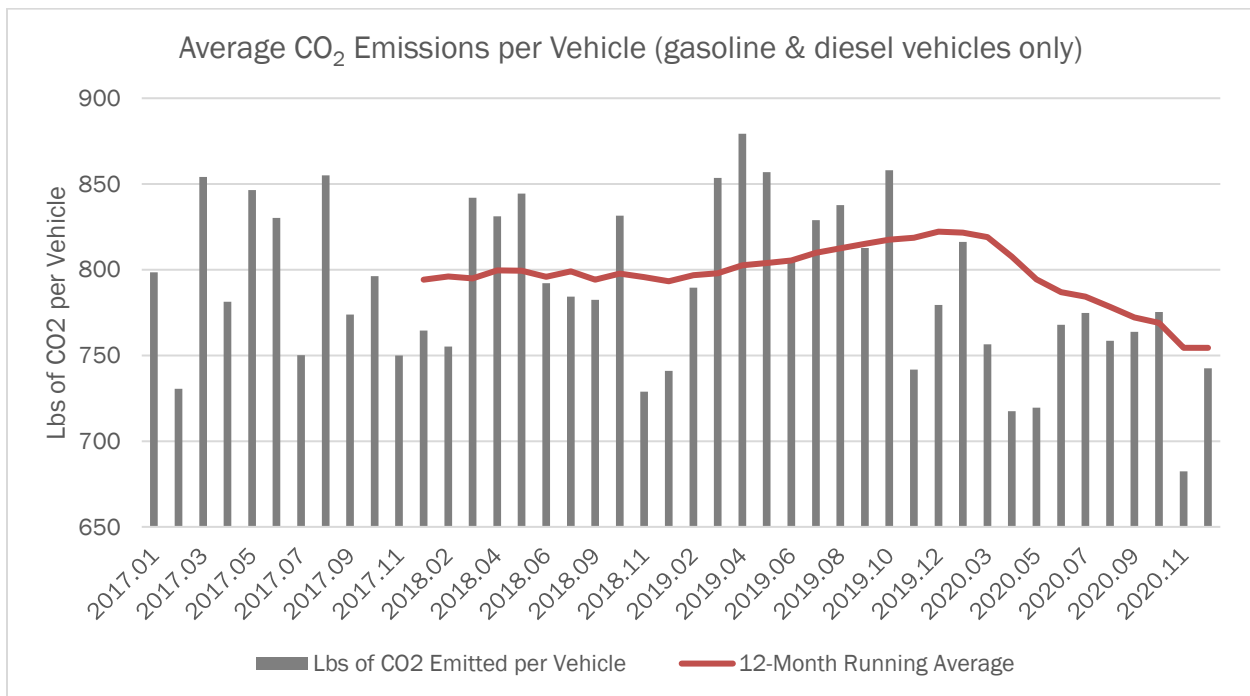
Count of Sedans used Fewer than 5 Days in a Month



Emissions

The legacy telematics system offers a Green House Gas Emissions report that provides rough estimations on fuel usage, and resulting emissions such as carbon dioxide (CO₂), carbon monoxide (CO), hydrocarbons, and nitrogen oxides (NO_x). They are rough calculations based on assumptions about the vehicle and emissions reference points published by the EPA. The calculation is only reasonably accurate for gasoline and diesel vehicles, so any electric, CNG, or hybrid vehicles are excluded from the scope of this report.

The chart below shows the trend of CO₂ emissions from the City's gasoline and diesel vehicles with telematics devices installed⁵. The majority of the emissions is caused by large pickups and other trucks that consume diesel fuel, which has the highest carbon intensity of all fuel types. It is interesting to note that the average CO₂ emissions per vehicle went down in 2020, most likely due to overall reduced utilization of the fleet during the pandemic.



⁵ Fuel designations in the telematics system are not 100% accurate. Also, four months with anomalous data were excluded from the chart. (2018.01, 2018.08, 2019.01, 2020.02)