Electric Vehicles Market Size Analysis

Analyzing the market size for electric vehicles involves a series of steps that include outlining the market parameters, gathering and organizing data, conducting analytical modeling, and presenting results through visualizations and reports.

Data collection methodology The data set has many data points such as county, city, state, postal code, model year, model, make, electric vehicle type, etc.

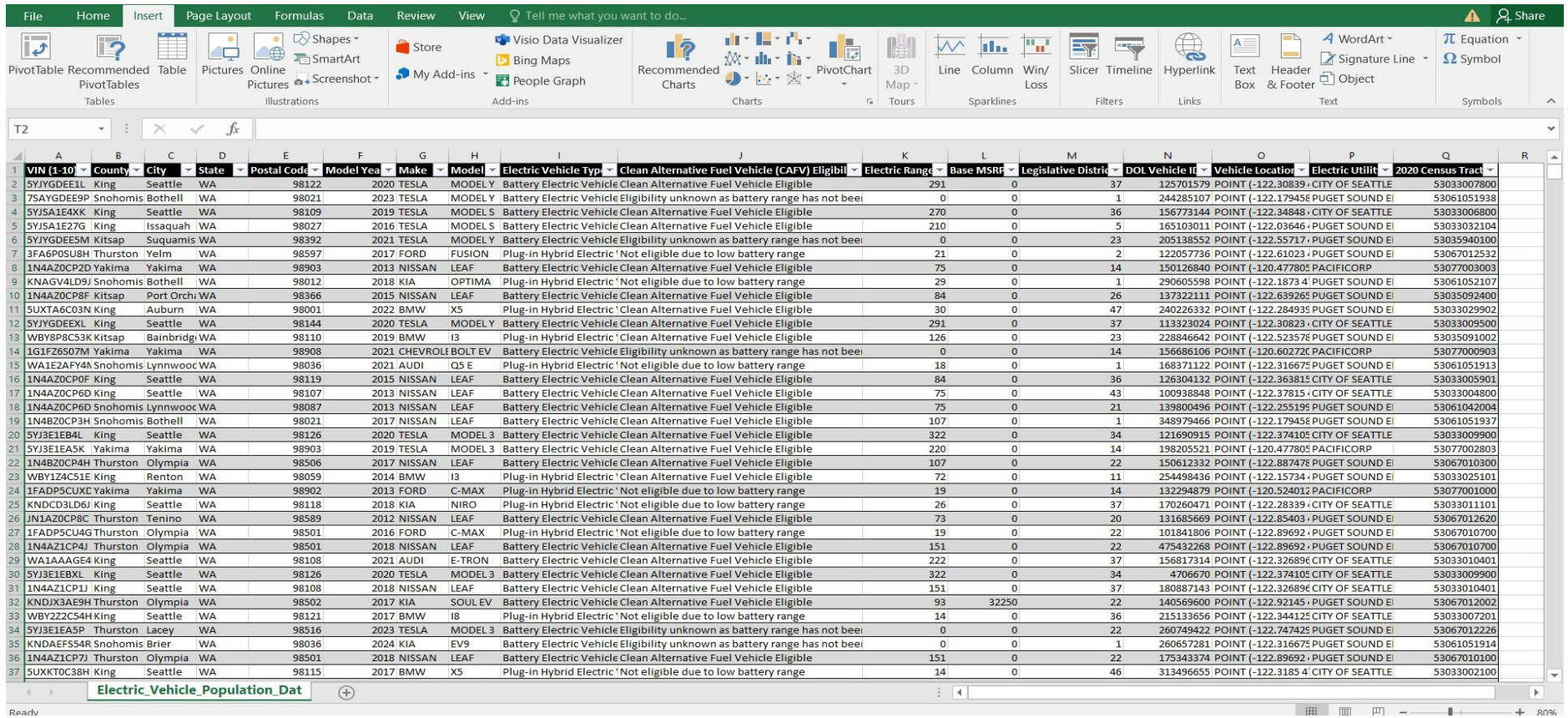
Statistical and Analytic Issues The dataset contains NA values in several columns, including county, city, postal code, legislative district, vehicle location, electric utility, and 2020 census tract, indicating that data for these fields is missing. As a result, we have excluded those rows with blank cells, which represent unavailable data.

Data description of the data set of column

Data	Description
VIN (1-10)	This column consist of most of the countries of the world.
County	The county in which the vehicle is registered.
City	The city in which the vehicle is registered.
State	The state in which the vehicle is registered. It appears that this dataset may be focused on Washington (WA) state.
Postal Code	The postal code where the vehicle is registered.
Model Year	The year of the vehicle model.
Make	The manufacturer of the vehicle.
Model	The model of the vehicle.
Electric Vehicle Type	The type of electric vehicle, e.g., Battery Electric Vehicle (BEV).
CAFV Eligibility	Eligibility status for clean alternative fuel vehicle programs.
Electric Range	The maximum range of the vehicle on a single charge (in miles).
Base MSRP	The Manufacturer’s Suggested Retail Price.
Legislative District	The legislative district where the vehicle is registered.
DOL Vehicle ID	Department of Licensing Vehicle Identification.
Vehicle Location	Geographic coordinates of the vehicle location.
Electric Utility	The electric utility service provider for the vehicle’s location.
2020 Census Tract	The census tract for the vehicle’s location.

DATA VISUALIZATION AND ANALYSIS

We will be analyzing the data with the help of some questions. Below is the figure of the data sheet in excel that will give you the hint that how the data is available to us.



VIN (1-10)	County	City	State	Postal Code	Model Year	Make	Model	Electric Vehicle Type	Clean Alternative Fuel Vehicle (CAFV) Eligibility	Electric Range	Base MSRP	Legislative District	DOL Vehicle ID	Vehicle Location	Electric Utility	2020 Census Tract
5YJYGDEE1L	King	Seattle	WA	98122	2020	TESLA	MODEL Y	Battery Electric Vehicle	Clean Alternative Fuel Vehicle Eligible	291	0	37	125701579	POINT (-122.30839	CITY OF SEATTLE	53033007800
7SAYGDEE9P	Snohomis	Bothell	WA	98021	2023	TESLA	MODEL Y	Battery Electric Vehicle	Eligibility unknown as battery range has not beei	0	0	1	244285107	POINT (-122.179458	PUGET SOUND EI	53061051938
5YJSA1E4XK	King	Seattle	WA	98109	2019	TESLA	MODEL S	Battery Electric Vehicle	Clean Alternative Fuel Vehicle Eligible	270	0	36	156773144	POINT (-122.34848	CITY OF SEATTLE	53033006800
5YJSA1E27G	King	Issaquah	WA	98027	2016	TESLA	MODEL S	Battery Electric Vehicle	Clean Alternative Fuel Vehicle Eligible	210	0	5	165103011	POINT (-122.03646	PUGET SOUND EI	53033032104
5YJYGDEE5M	Kitsap	Suquamis	WA	98392	2021	TESLA	MODEL Y	Battery Electric Vehicle	Eligibility unknown as battery range has not beei	0	0	23	205138552	POINT (-122.55717	PUGET SOUND EI	53035940100
3FA6P0SU8H	Thurston	Yelm	WA	98597	2017	FORD	FUSION	Plug-in Hybrid Electric	Not eligible due to low battery range	21	0	2	122057736	POINT (-122.61023	PUGET SOUND EI	53067012532
1N4AZ0CP2D	Yakima	Yakima	WA	98903	2013	NISSAN	LEAF	Battery Electric Vehicle	Clean Alternative Fuel Vehicle Eligible	75	0	14	150126840	POINT (-120.477805	PACIFICORP	53077003003
KNAGV4LD9J	Snohomis	Bothell	WA	98012	2018	KIA	OPTIMA	Plug-in Hybrid Electric	Not eligible due to low battery range	29	0	1	290605598	POINT (-122.1873 4	PUGET SOUND EI	53061052107
1N4AZ0CP8F	Kitsap	Port Orch	WA	98366	2015	NISSAN	LEAF	Battery Electric Vehicle	Clean Alternative Fuel Vehicle Eligible	84	0	26	137322111	POINT (-122.639265	PUGET SOUND EI	53035092400
5UXTA6C03N	King	Auburn	WA	98001	2022	BMW	X5	Plug-in Hybrid Electric	Clean Alternative Fuel Vehicle Eligible	30	0	47	240226332	POINT (-122.284939	PUGET SOUND EI	53033029902
5YJYGDEEXL	King	Seattle	WA	98144	2020	TESLA	MODEL Y	Battery Electric Vehicle	Clean Alternative Fuel Vehicle Eligible	291	0	37	113323024	POINT (-122.30823	CITY OF SEATTLE	53033009500
WBY8P8C53K	Kitsap	Bainbridg	WA	98110	2019	BMW	I3	Plug-in Hybrid Electric	Clean Alternative Fuel Vehicle Eligible	126	0	23	228846642	POINT (-122.523578	PUGET SOUND EI	53035091002
1G1FZ6S07M	Yakima	Yakima	WA	98908	2021	CHEVROLE	BOLT EV	Battery Electric Vehicle	Eligibility unknown as battery range has not beei	0	0	14	156686106	POINT (-120.60272(	PACIFICORP	53077000903
WA1E2AFY4N	Snohomis	Lynnwooc	WA	98036	2021	AUDI	Q5 E	Plug-in Hybrid Electric	Not eligible due to low battery range	18	0	1	168371122	POINT (-122.316675	PUGET SOUND EI	53061051913
1N4AZ0CP0F	King	Seattle	WA	98119	2015	NISSAN	LEAF	Battery Electric Vehicle	Clean Alternative Fuel Vehicle Eligible	84	0	36	126304132	POINT (-122.363815	CITY OF SEATTLE	53033005901
1N4AZ0CP6D	King	Seattle	WA	98107	2013	NISSAN	LEAF	Battery Electric Vehicle	Clean Alternative Fuel Vehicle Eligible	75	0	43	100938848	POINT (-122.37815	CITY OF SEATTLE	53033004800
1N4AZ0CP6D	Snohomis	Lynnwooc	WA	98087	2013	NISSAN	LEAF	Battery Electric Vehicle	Clean Alternative Fuel Vehicle Eligible	75	0	21	139800496	POINT (-122.255195	PUGET SOUND EI	53061042004
1N4BZ0CP3H	Snohomis	Bothell	WA	98021	2017	NISSAN	LEAF	Battery Electric Vehicle	Clean Alternative Fuel Vehicle Eligible	107	0	1	348979466	POINT (-122.179458	PUGET SOUND EI	53061051937
5YJ3E1EB4L	King	Seattle	WA	98126	2020	TESLA	MODEL 3	Battery Electric Vehicle	Clean Alternative Fuel Vehicle Eligible	322	0	34	121690915	POINT (-122.374105	CITY OF SEATTLE	53033009900
5YJ3E1EA5K	Yakima	Yakima	WA	98903	2019	TESLA	MODEL 3	Battery Electric Vehicle	Clean Alternative Fuel Vehicle Eligible	220	0	14	198205521	POINT (-120.477805	PACIFICORP	53077002803
1N4BZ0CP4H	Thurston	Olympia	WA	98506	2017	NISSAN	LEAF	Battery Electric Vehicle	Clean Alternative Fuel Vehicle Eligible	107	0	22	150612332	POINT (-122.887478	PUGET SOUND EI	53067010300
WBY1Z4C51E	King	Renton	WA	98059	2014	BMW	I3	Plug-in Hybrid Electric	Clean Alternative Fuel Vehicle Eligible	72	0	11	254498436	POINT (-122.15734	PUGET SOUND EI	53033025101
1FADP5CUXD	Yakima	Yakima	WA	98902	2013	FORD	C-MAX	Plug-in Hybrid Electric	Not eligible due to low battery range	19	0	14	132294879	POINT (-120.524012	PACIFICORP	53077001000
KNDCD3LD6J	King	Seattle	WA	98118	2018	KIA	NIRO	Plug-in Hybrid Electric	Not eligible due to low battery range	26	0	37	170260471	POINT (-122.28339	CITY OF SEATTLE	53033011101
JN1AZ0CP8C	Thurston	Tenino	WA	98589	2012	NISSAN	LEAF	Battery Electric Vehicle	Clean Alternative Fuel Vehicle Eligible	73	0	20	131685669	POINT (-122.85403	PUGET SOUND EI	53067012620
1FADP5CU4G	Thurston	Olympia	WA	98501	2016	FORD	C-MAX	Plug-in Hybrid Electric	Not eligible due to low battery range	19	0	22	101841806	POINT (-122.89692	PUGET SOUND EI	53067010700
1N4AZ1CP4J	Thurston	Olympia	WA	98501	2018	NISSAN	LEAF	Battery Electric Vehicle	Clean Alternative Fuel Vehicle Eligible	151	0	22	475432268	POINT (-122.89692	PUGET SOUND EI	53067010700
WA1AAAGE4	King	Seattle	WA	98108	2021	AUDI	E-TRON	Battery Electric Vehicle	Clean Alternative Fuel Vehicle Eligible	222	0	37	156817314	POINT (-122.326896	CITY OF SEATTLE	53033010401
5YJ3E1EBXL	King	Seattle	WA	98126	2020	TESLA	MODEL 3	Battery Electric Vehicle	Clean Alternative Fuel Vehicle Eligible	322	0	34	4706670	POINT (-122.374105	CITY OF SEATTLE	53033009900
1N4AZ1CP1J	King	Seattle	WA	98108	2018	NISSAN	LEAF	Battery Electric Vehicle	Clean Alternative Fuel Vehicle Eligible	151	0	37	180887143	POINT (-122.326896	CITY OF SEATTLE	53033010401
KNDJX3AE9H	Thurston	Olympia	WA	98502	2017	KIA	SOUL EV	Battery Electric Vehicle	Clean Alternative Fuel Vehicle Eligible	93	32250	22	140569600	POINT (-122.92145	PUGET SOUND EI	53067012002
WBY2Z2C54H	King	Seattle	WA	98121	2017	BMW	I8	Plug-in Hybrid Electric	Not eligible due to low battery range	14	0	36	215133656	POINT (-122.344125	CITY OF SEATTLE	53033007201
5YJ3E1EA5P	Thurston	Lacey	WA	98516	2023	TESLA	MODEL 3	Battery Electric Vehicle	Eligibility unknown as battery range has not beei	0	0	22	260749422	POINT (-122.747425	PUGET SOUND EI	53067012226
KNDAEFS54R	Snohomis	Brier	WA	98036	2024	KIA	EV9	Battery Electric Vehicle	Eligibility unknown as battery range has not beei	0	0	1	260657281	POINT (-122.316675	PUGET SOUND EI	53061051914
1N4AZ1CP7J	Thurston	Olympia	WA	98501	2018	NISSAN	LEAF	Battery Electric Vehicle	Clean Alternative Fuel Vehicle Eligible	151	0	22	175343374	POINT (-122.89692	PUGET SOUND EI	53067010100
5UXKT0C38H	King	Seattle	WA	98115	2017	BMW	X5	Plug-in Hybrid Electric	Not eligible due to low battery range	14	0	46	313496655	POINT (-122.3185 4	CITY OF SEATTLE	53033002100

Figure 5.1: Electric Vehicles Population Dataset

```
[1]: # Import Libraries
import pandas as pd
import numpy as np
import matplotlib.pyplot as plt
import seaborn as sns
import warnings as wr
wr.filterwarnings('ignore')
%matplotlib inline
```

Figure 5.2: Importing the required packages

```
[2]: # Load Dataset
ev_data = pd.read_csv('Electric_Vehicle_Population_Data.csv')
ev_data.head()
```

[2]:

	VIN (1-10)	County	City	State	Postal Code	Model Year	Make	Model	Electric Vehicle Type	Clean Alternative Fuel Vehicle (CAFV) Eligibility	Electric Range	Base MSRP	Legislative District	DOL Vehicle ID	Vehicle Location	Electric Utility	2
0	5YJYGDEE1L	King	Seattle	WA	98122.0	2020	TESLA	MODEL Y	Battery Electric Vehicle (BEV)	Clean Alternative Fuel Vehicle Eligible	291	0	37.0	125701579	POINT (-122.30839 47.610365)	CITY OF SEATTLE - (WA)|CITY OF TACOMA - (WA)	5.3
1	7SAYGDEE9P	Snohomish	Bothell	WA	98021.0	2023	TESLA	MODEL Y	Battery Electric Vehicle (BEV)	Eligibility unknown as battery range has not b...	0	0	1.0	244285107	POINT (-122.179458 47.802589)	PUGET SOUND ENERGY INC	5.3
2	5YJSA1E4XK	King	Seattle	WA	98109.0	2019	TESLA	MODEL S	Battery Electric Vehicle (BEV)	Clean Alternative Fuel Vehicle Eligible	270	0	36.0	156773144	POINT (-122.34848 47.632405)	CITY OF SEATTLE - (WA)|CITY OF TACOMA - (WA)	5.3
3	5YJSA1E27G	King	Issaquah	WA	98027.0	2016	TESLA	MODEL S	Battery Electric Vehicle (BEV)	Clean Alternative Fuel Vehicle Eligible	210	0	5.0	165103011	POINT (-122.03646 47.534065)	PUGET SOUND ENERGY INC||CITY OF TACOMA - (WA)	5.3
4	5YJYGDEE5M	Kitsap	Suquamish	WA	98392.0	2021	TESLA	MODEL Y	Battery Electric Vehicle (BEV)	Eligibility unknown as battery range has not b...	0	0	23.0	205138552	POINT (-122.55717 47.733415)	PUGET SOUND ENERGY INC	5.3

Figure 5.3: Reading the csv file

```
[3]: # Dataset Information
ev_data.info()
```

```
<class 'pandas.core.frame.DataFrame'>
RangeIndex: 177866 entries, 0 to 177865
Data columns (total 17 columns):
 #   Column                                             Non-Null Count   Dtype
---  ------                                             --------------   -----
 0   VIN (1-10)                                         177866 non-null  object
 1   County                                             177861 non-null  object
 2   City                                               177861 non-null  object
 3   State                                              177866 non-null  object
 4   Postal Code                                        177861 non-null  float64
 5   Model Year                                         177866 non-null  int64
 6   Make                                               177866 non-null  object
 7   Model                                              177866 non-null  object
 8   Electric Vehicle Type                              177866 non-null  object
 9   Clean Alternative Fuel Vehicle (CAFV) Eligibility  177866 non-null  object
 10  Electric Range                                     177866 non-null  int64
 11  Base MSRP                                          177866 non-null  int64
 12  Legislative District                               177477 non-null  float64
 13  DOL Vehicle ID                                     177866 non-null  int64
 14  Vehicle Location                                   177857 non-null  object
 15  Electric Utility                                   177861 non-null  object
 16  2020 Census Tract                                  177861 non-null  float64
dtypes: float64(3), int64(4), object(10)
memory usage: 23.1+ MB
```

Figure 5.4: Dataset Information

```
[4]: # Missing/Null Values Count
ev_data.isnull().sum()
```

```
[4]: VIN (1-10)                                         0
County                                             5
City                                               5
State                                              0
Postal Code                                        5
Model Year                                         0
Make                                               0
Model                                              0
Electric Vehicle Type                              0
Clean Alternative Fuel Vehicle (CAFV) Eligibility  0
Electric Range                                     0
Base MSRP                                          0
Legislative District                             389
DOL Vehicle ID                                     0
Vehicle Location                                   9
Electric Utility                                   5
2020 Census Tract                                  5
dtype: int64
```

Figure 5.5: Missing/Null Values Count

```
[5]: # Drop Missing/Null Values
     ev_data = ev_data.dropna()
```

Figure 5.6: Drop Null Values

1. Which counties have the highest concentration of vehicles in Washington state, and how does this distribution influence vehicle import trends, market preferences, and the demand for international vehicle brands?

   Solution: Below code and figure will be useful for policy-makers, car manufacturers, and dealerships aiming to better understand the global composition of vehicles on the road in Washington.

Top 10 count of cars per Country

```
[6]: county_counts = pd.DataFrame(ev_data.County.value_counts().reset_index())
[7]: county_counts.columns = ["County", "counts"]
[8]: county_counts.head(10)
```

[8]:

	County	counts
0	King	92740
1	Snohomish	21001
2	Pierce	13782
3	Clark	10409
4	Thurston	6428
5	Kitsap	5840
6	Spokane	4586
7	Whatcom	4253
8	Benton	2147
9	Skagit	1910

Figure 5.7

Figure 5.8

Conclusion - King County has the highest concentration of vehicles in Washington state, with 92,740 registered vehicles, making it the dominant region for vehicle ownership. Snohomish and Pierce counties follow with 21,001 and 13,782 vehicles, respectively, indicating that the Seattle metropolitan area is the primary hub for vehicle registrations. Clark and Thurston counties rank next, though their totals are significantly lower. The overall trend shows that urbanized counties have far higher vehicle concentrations compared to more rural regions like Benton and Skagit, reflecting population density and urban development patterns.

2. Which cities in Washington state have the highest concentration of registered vehicles, and how does this distribution impact local transportation infrastructure, environmental planning, and market potential for vehicle-related services?

Solution: Below code and figure will be useful for analyzing the vehicle registration data to identify the top 10 cities by vehicle count. This will provide key insights into areas with high vehicle concentration, enabling better planning for transportation infrastructure and services.

Figure 5.9

```
[25]: plt.figure(figsize=(16,8))
      plt.title("Number of electric vehicles per city", fontsize= 15)
      sns.barplot(x = city_counts.City[:10], y = city_counts.counts, data = city_counts, palette="cubehelix")

[25]: <Axes: title={'center': 'Number of electric vehicles per city'}, xlabel='City', ylabel='counts'>
```

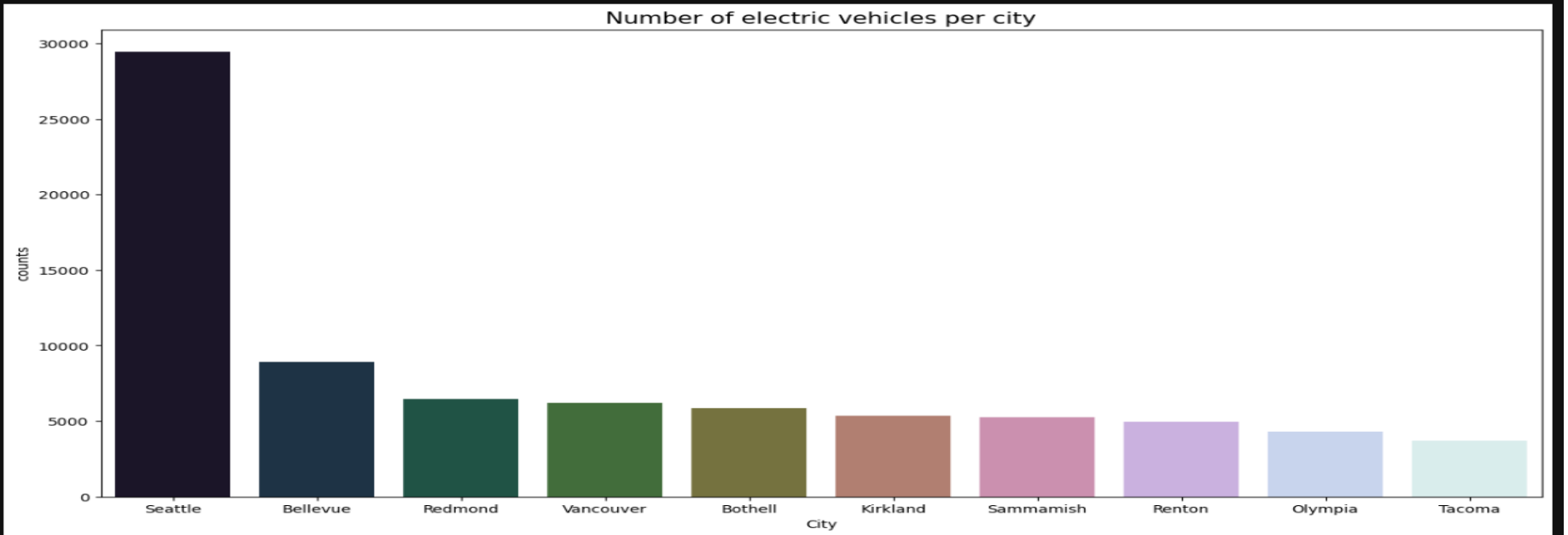


Figure 5.10

Conclusion - Seattle has the highest number of registered vehicles, with 29,447, significantly surpassing the other cities in Washington. Bellevue and Redmond follow, but with much lower counts, highlighting Seattle's dominance in vehicle registrations. The data suggests that urban areas, particularly those near tech hubs like Bellevue and Redmond, have a higher vehicle concentration, while cities like Olympia and Tacoma show a more moderate vehicle count.

3. How does the price of electric vehicles vary across different model years, and what factors contribute to these price fluctuations over time?

Solution: Below code and figure will be useful for analyzing how electric vehicle (EV) prices vary by model year to identify price trends over time. This analysis can help reveal factors like technological advancements, manufacturing costs, and market demand that impact EV pricing. It will assist manufacturers, consumers, and policymakers in understanding pricing patterns and making more informed decisions on EV adoption and incentives.

Electric Vehicle Price by Model Year

```
[27]: avg_price_by_year = ev_data.groupby('Model Year')['Base MSRP'].mean()

plt.plot(avg_price_by_year.index, avg_price_by_year.values, marker='o')
plt.title('Average Electric Vehicle Price by Model Year')
plt.xlabel('Model Year')
plt.ylabel('Average MSRP')
plt.grid()
```

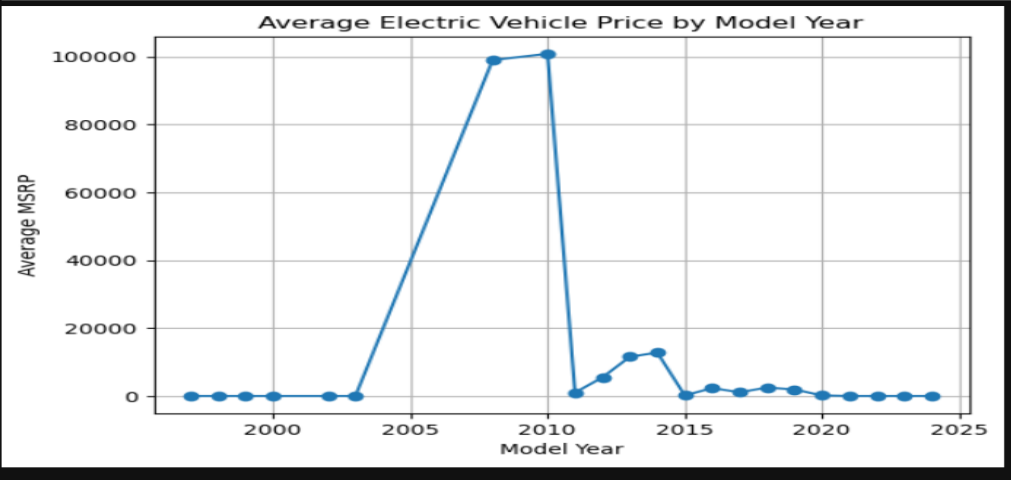


Figure 5.11

Conclusion - Early model years, particularly between 2008 and 2010, had significantly higher prices, with 2008 and 2010 models priced around $98,950 and $100,781, respectively. However, there is a sharp decline in prices for model years after 2011, with many years, including 2021-2024, having zero or minimal prices recorded. This suggests that older EVs were initially more expensive, and either prices have fallen significantly in recent years or the data lacks more recent vehicle prices.

4. Which vehicle types are most eligible for Clean Alternative Fuel Vehicle (CAFV) incentives, and how does this distribution affect the adoption of eco-friendly vehicles in different categories.

Solution: Below code and figure will be useful for analyzing increase the adoption of Clean Alternative Fuel Vehicles (CAFVs) across various vehicle categories, focus should be placed on promoting and incentivizing eligibility for diverse vehicle types, such as electric SUVs, trucks, and sedans. Policymakers and manufacturers can enhance awareness, offer incentives, and expand the range of eligible vehicles to encourage broader adoption and support the transition to cleaner, eco-friendly transportation.

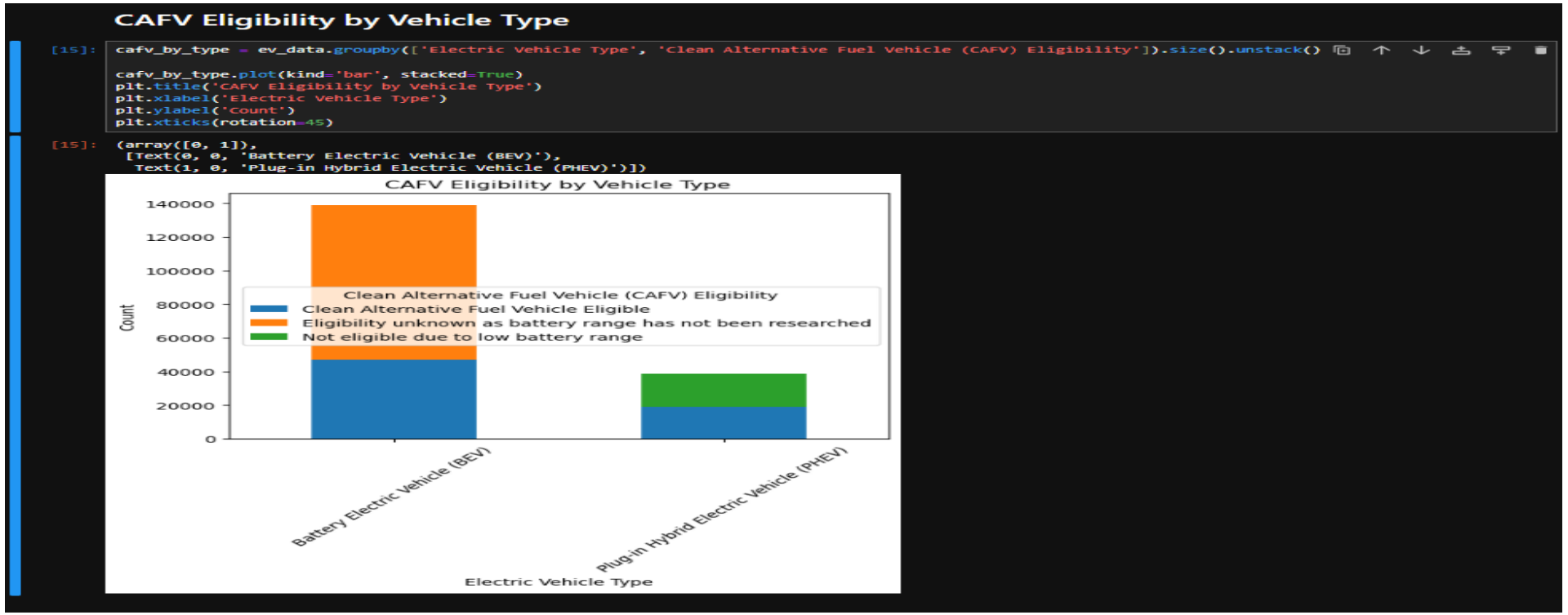


Figure 5.12

Conclusion - Clean Alternative Fuel Vehicle (CAFV) eligibility, we observe that a significant number of Battery Electric Vehicles (BEVs), 47,149, are eligible for CAFV incentives, while 91,790 BEVs have unknown eligibility due to unresearched battery range. Only a small portion (8 vehicles) is ineligible. In contrast, for Plug-in Hybrid Electric Vehicles (PHEVs), 19,017 are CAFV-eligible, but a considerable number, 19,509, are not eligible due to low battery range. This suggests that BEVs generally have better eligibility, though a large number of vehicles need further research on battery performance.

5. What are the differences in average electric range across various car manufacturers, and how do these variations impact consumer preferences for electric vehicles?

Solution: Below code and figure will be useful for analyzing electric range varies significantly across different car manufacturers. Brands with higher average electric ranges may attract more consumers due to the longer driving distance on a single charge, which is a key factor in electric vehicle (EV) adoption. Manufacturers with lower ranges might need to focus on improving battery efficiency or targeting specific markets where range is less of a priority. By analyzing these ranges, manufacturers can optimize their product offerings to align with market demands for longer-range electric vehicles.

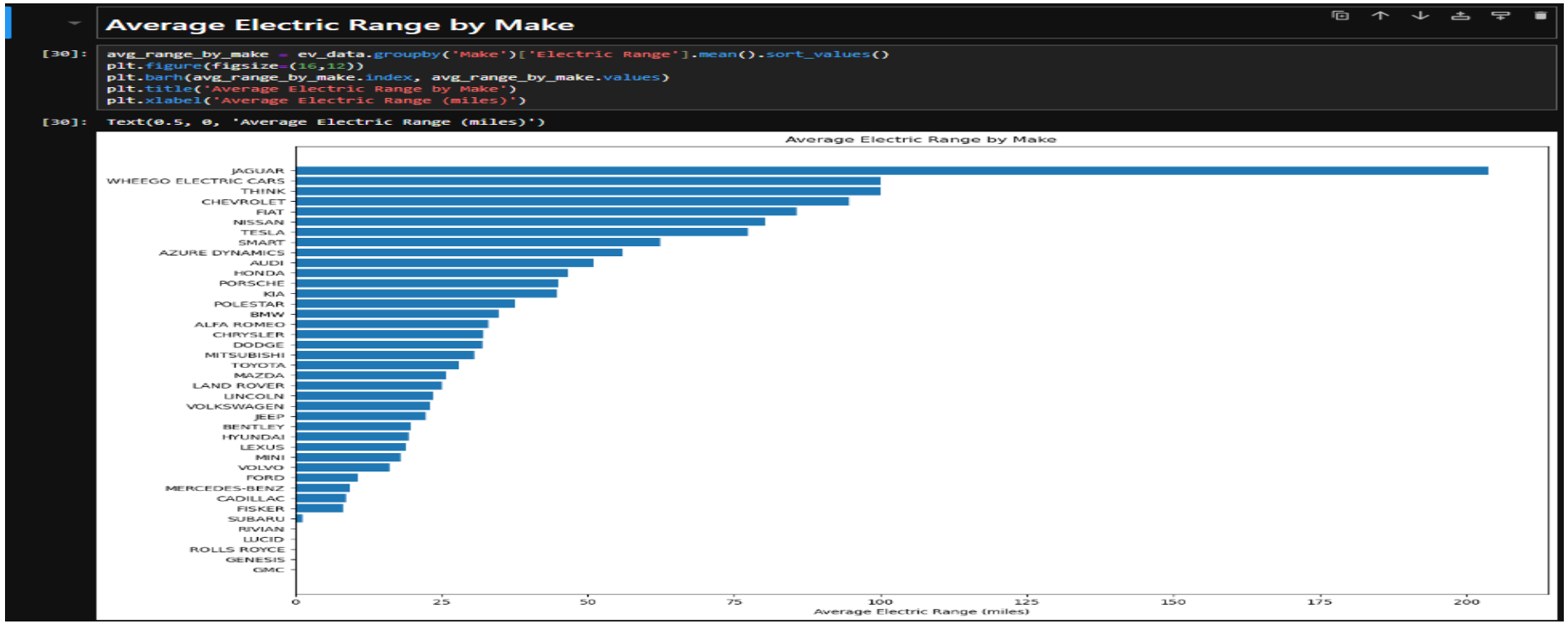


Figure 5.13

Conclusion - average electric range by make reveals significant variation among manufacturers. Brands like Jaguar, with an exceptionally high average range of over 200 miles, and Tesla, with over 77 miles, lead the market in terms of electric vehicle range. Conversely, luxury and high-performance brands like Rolls Royce, Lucid, and GMC show zero or near-zero electric range, indicating their minimal focus on electric vehicles. This insight highlights that certain manufacturers, especially luxury brands, may still have limited offerings in the EV market, while others, particularly Tesla, Nissan, and Chevrolet, are prioritizing long-range electric vehicles.

6. What is the trend in electric vehicle (EV) registration growth over the years, and which years have seen the highest or lowest growth rates?

Solution: Below code and figure will be useful for analyzing the "EV Registration Growth Rate by Year" insight involves calculating the year-over-year percentage growth in EV registrations. This will highlight trends such as periods of rapid growth, steady increases, or stagnation.

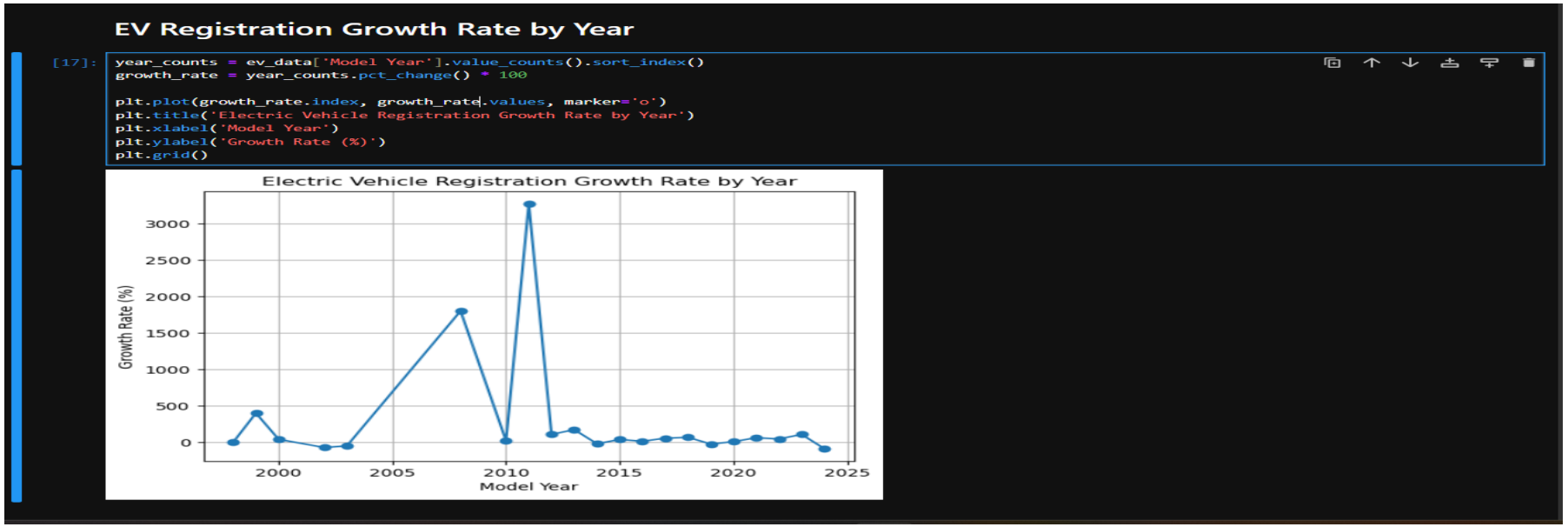


Figure 5.14

Conclusion - Steady increase in electric vehicle (EV) registrations from 1997 to 2023, with significant growth observed after 2010. The most notable surge occurred in 2023, with a 107.6% increase in registrations, indicating a rapid acceleration in EV adoption. However, the registration growth dropped sharply by 87.7% in 2024, suggesting either market saturation, a supply chain issue, or changes in EV policies. Overall, the trend reveals a strong upward trajectory in EV adoption, but with some fluctuations that merit further investigation to understand the causes behind the 2024 decline.

7. How does the average Manufacturer's Suggested Retail Price (MSRP) vary between different types of electric vehicles (e.g., Battery Electric Vehicles vs. Plug-in Hybrid Electric Vehicles)?

Solution: Below code and figure will be useful for analyzing the differences in average MSRP between various electric vehicle types, such as Battery Electric Vehicles (BEVs) and Plug-in Hybrid Electric Vehicles (PHEVs). This comparison provides insights into the pricing trends, helping consumers and manufacturers understand which type of EV offers more value for the price.

Comparison of EV Types by Average MSRP

```
[32]: avg_msrp_by_type = ev_data.groupby('Electric Vehicle Type')['Base MSRP'].mean()

      plt.bar(avg_msrp_by_type.index, avg_msrp_by_type.values)
      plt.title('Average MSRP by Electric Vehicle Type')
      plt.xlabel('Electric Vehicle Type')
      plt.ylabel('Average MSRP')
      plt.xticks(rotation=45)

[32]: ([0, 1],
       [Text(0, 0, 'Battery Electric Vehicle (BEV)'),
        Text(1, 0, 'Plug-in Hybrid Electric Vehicle (PHEV)')])
```

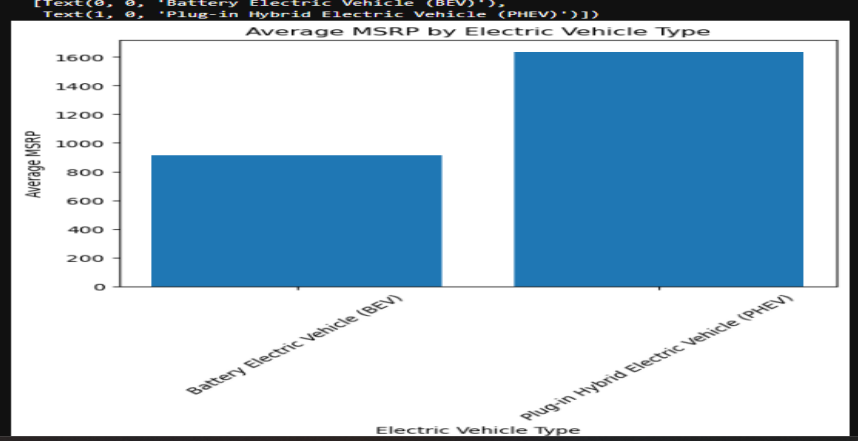


Figure 5.15

Conclusion - comparison of average MSRP by electric vehicle type shows that Plug-in Hybrid Electric Vehicles (PHEVs) have a significantly higher average MSRP (1,632.99 units) compared to Battery Electric Vehicles (BEVs), which have an average MSRP of 914.68 units**.** This suggests that PHEVs are generally more expensive than BEVs, potentially due to the additional hybrid technology they incorporate, offering both electric and fuel options.

8. How has the adoption rate of electric vehicles changed over time, and what factors have influenced significant increases or decreases in specific years?

Solution: Below code and figure will be useful for analyzing the adoption rate of electric vehicles has shown significant growth, particularly in recent years. This upward trend is driven by advancements in EV technology, increasing environmental awareness, and supportive government policies. Addressing infrastructure challenges, such as expanding charging networks, and offering incentives can further accelerate this growth in the coming years.

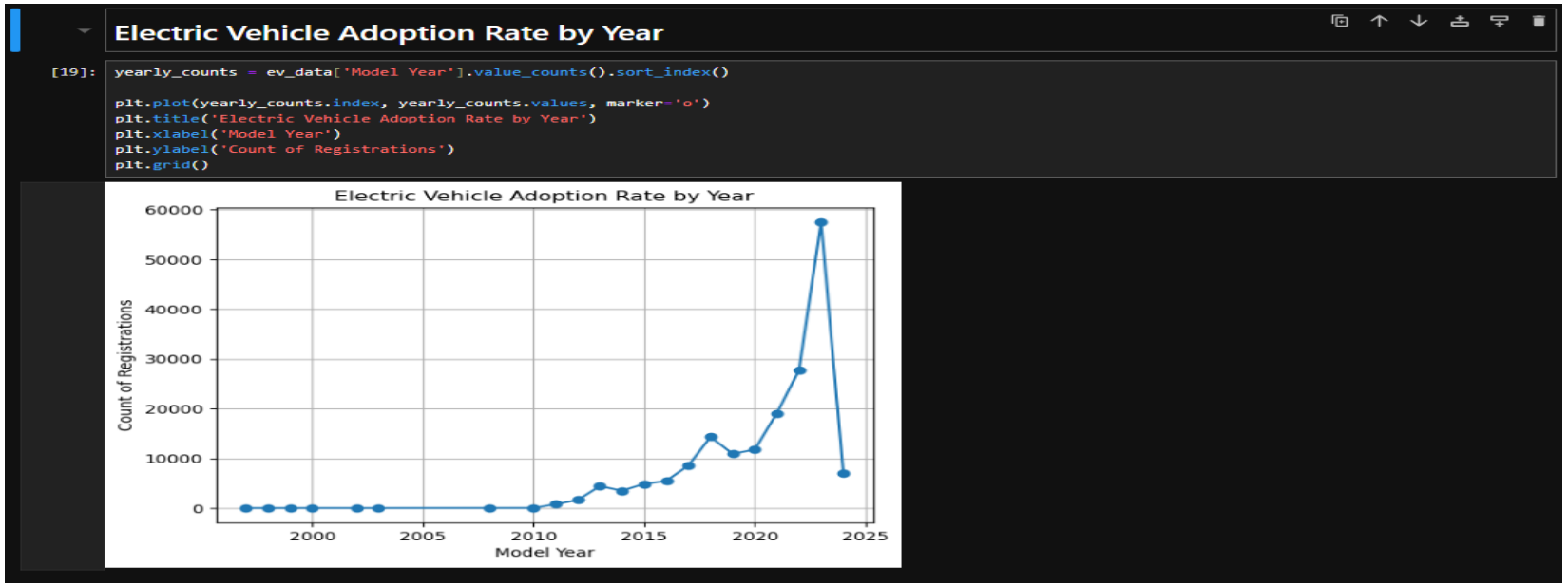


Figure 5.16

Conclusion - Electric vehicle (EV) registrations by model year shows a clear upward trend in EV adoption, with significant growth starting in 2011. This trend accelerates in the 2020s, reaching a peak of 57,519 registrations in 2023. The sharp rise in recent years reflects increasing consumer interest in EVs, likely driven by technological advancements, broader availability, and growing environmental concerns. However, the lower number in 2024 (7,072) may suggest that more data or market factors need to be considered to understand if this drop is temporary or part of a larger trend.

9. How does the electric range of Battery Electric Vehicles (BEVs) compare to that of Plug-in Hybrid Electric Vehicles (PHEVs), and what factors contribute to the differences in range?

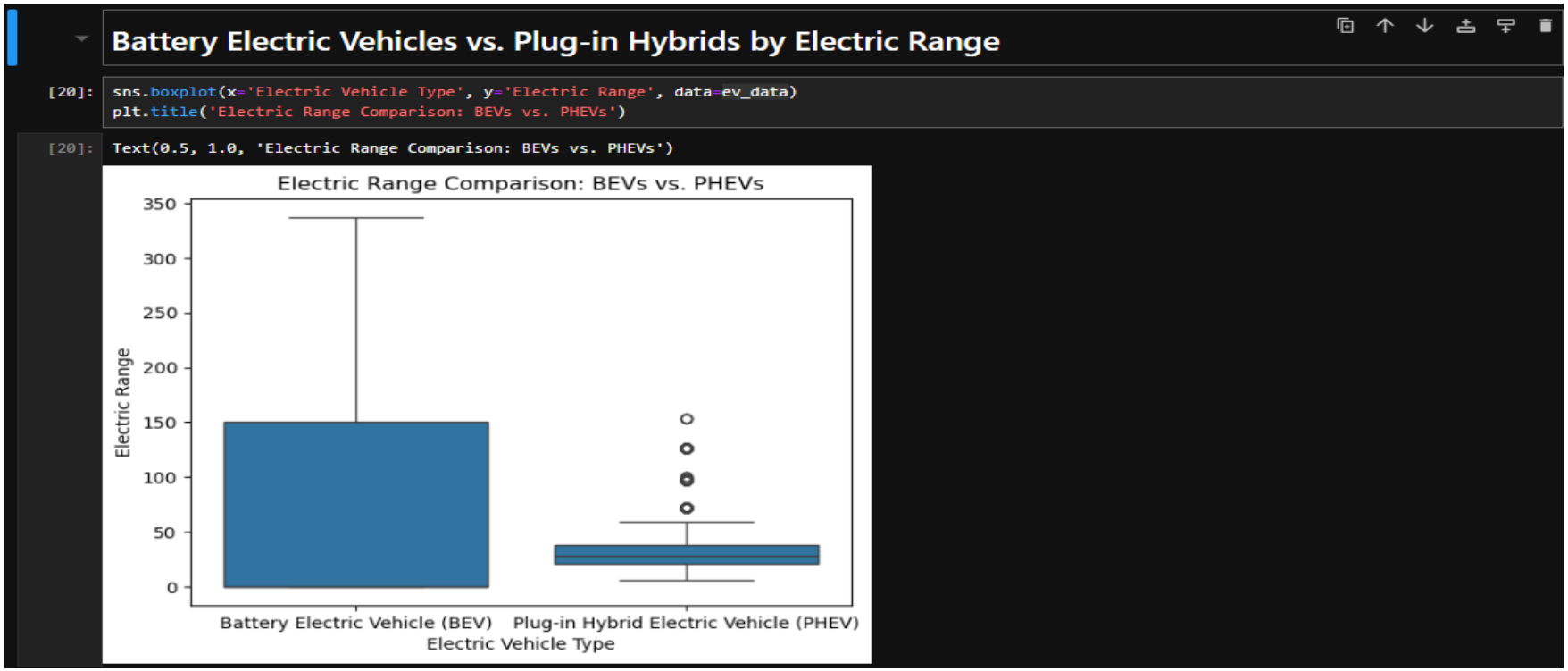


Figure 5.17

10. How does the average electric range across different vehicle type?

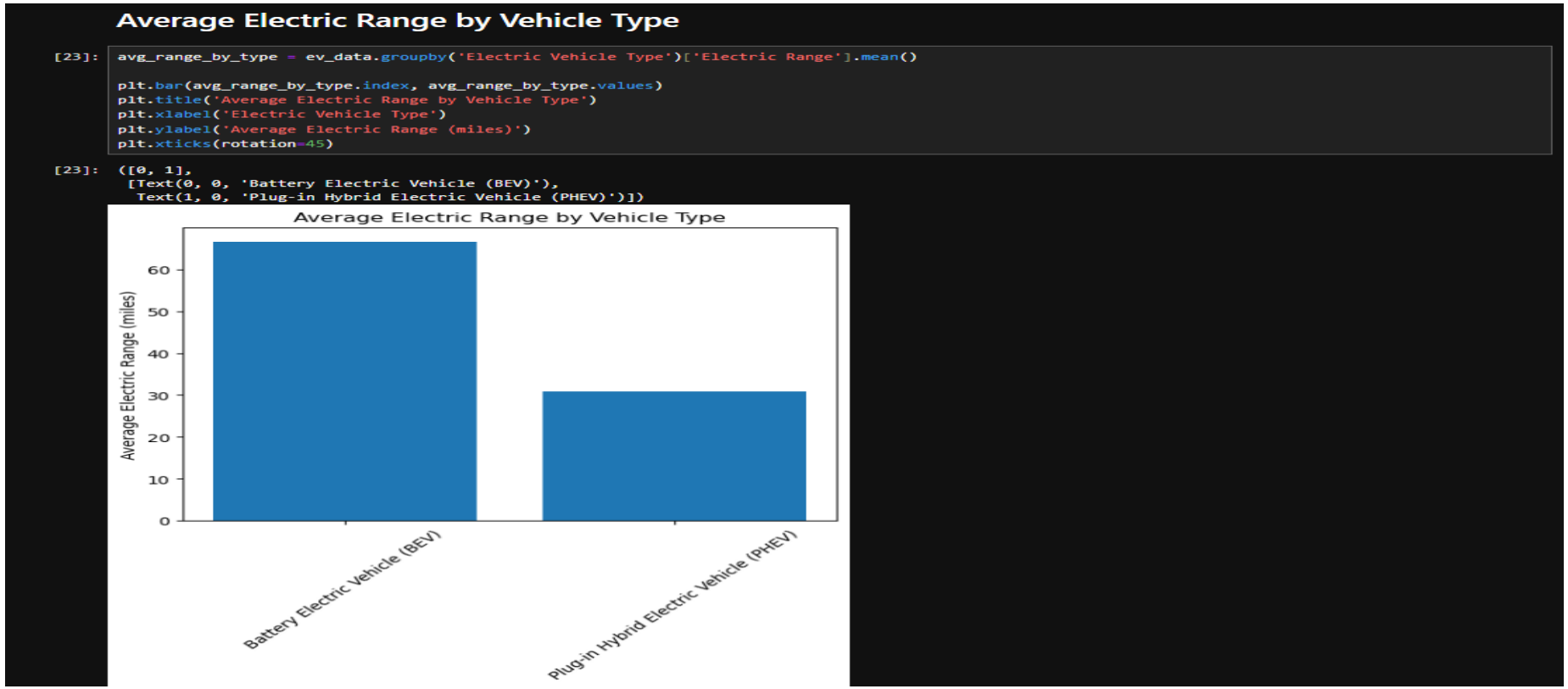


Figure 5.18

Conclusion – Average electric range of Battery Electric Vehicle is higher compare to Plug-in Hybrid Electric Vehicle. Average electric range of BEV is 65 to 67 and PHEV electric range is 30.