Problem Statement/object

Market Size Analysis is the process of estimating the potential sales for a product or service within a particular market segment. In the context of electric vehicles (EVs), it involves assessing the total volume of EV registrations to understand the growth of the market, forecast future trends, and help stakeholders make informed decisions regarding production,infrastructure development, and policy-making.The provided dataset contains the following columns, each representing different aspects of the electric vehicle (EV) population in the United States:

- VIN (1-10): Partial Vehicle Identification Number.
- 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).
- Clean Alternative Fuel Vehicle (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.

In [3]:
```
1
```

```
C:\Program Files (x86)\Microsoft Visual Studio\Shared\Anaconda3_64\lib\site-packages\IPython\core\interactiveshell.py:2785: DtypeWarning: Columns (10,12) have mixed types. S
pecify dtype option on import or set low_memory=False.
  interactivity=interactivity, compiler=compiler, result=result)
```

In [4]:
```
1 df
```

										(PHEV)	range						
24	JN1AZ0CP8C	Thurston	Tenino	WA	98589.0	2012	NISSAN	LEAF	Battery Electric Vehicle (BEV)	Clean Alternative Fuel Vehicle Eligible	73	0	20	131685669	POINT (-122.85403 46.856085)	PUGET SOUND ENERGY INC	5.306701e-
25	1FADP5CU4G	Thurston	Olympia	WA	98501.0	2016	FORD	C-MAX	Plug-in Hybrid Electric Vehicle (PHEV)	Not eligible due to low battery range	19	0	22	101841806	POINT (-122.89692 47.043535)	PUGET SOUND ENERGY INC	5.306701e-
26	1N4AZ1CP4J	Thurston	Olympia	WA	98501.0	2018	NISSAN	LEAF	Battery Electric Vehicle (BEV)	Clean Alternative Fuel Vehicle Eligible	151	0	22	475432268	POINT (-122.89692 47.043535)	PUGET SOUND ENERGY INC	5.306701e-
27	WA1AAAGE4M	King	Seattle	WA	98108.0	2021	AUDI	E-TRON	Battery Electric	Clean Alternative Fuel	222	0	37	156817314	POINT (-122.3268963	CITY OF SEATTLE - (WA)|CITY OF TACOMA -	5.303301e-

1. Display the top 5 rows

In [5]:
```
1
```

Top 5 rows of the dataset:

	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
0	5YJYGDEE1L	King	Seattle	WA	98122.0	2020	TESLA	MODEL Y	Battery Electric Vehicle (BEV)	Clean Alternative Fuel Vehicle Eligible	291	0	37	125701579	POINT (-122.30839 47.610365)	CITY OF SEATTLE - (WA)|CITY OF TACOMA - (WA)	5.303301e+10
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	244285107	POINT (-122.179458 47.802589)	PUGET SOUND ENERGY INC	5.306105e+10
2	5YJSA1E4XK	King	Seattle	WA	98109.0	2019	TESLA	MODEL S	Battery Electric Vehicle (BEV)	NaN	270	0	36	156773144	POINT (-122.34848 47.632405)	CITY OF SEATTLE - (WA)|CITY OF TACOMA - (WA)	5.303301e+10
3	5YJSA1E27G	King	Issaquah	WA	98027.0	2016	TESLA	MODEL S	Battery Electric Vehicle (BEV)	Clean Alternative Fuel Vehicle Eligible	210	0	5	165103011	POINT (-122.03646 47.534065)	PUGET SOUND ENERGY INC||CITY OF TACOMA - (WA)	5.303303e+10
4	5YJYGDEE5M	Kitsap	Suquamish	WA	98392.0	2021	NaN	MODEL Y	Battery Electric Vehicle (BEV)	Eligibility unknown as battery range has not b...	0	0	23	205138552	POINT (-122.55717 47.733415)	PUGET SOUND ENERGY INC	5.303594e+10

2. Display the last 5 rows

In [6]:
```
1
```

Last 5 rows of the dataset:

	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
177861	7SAYGDEE3N	Pierce	Bonney Lake	WA	98391.0	2022	TESLA	MODEL Y	Battery Electric Vehicle (BEV)	Eligibility unknown as battery range has not b...	0	0	31	195224452	POINT (-122.183805 47.18062)	PUGET SOUND ENERGY INC||CITY OF TACOMA - (WA)	5.305307e+10
177862	KM8K23AG1P	Mason	Shelton	WA	98584.0	2023	HYUNDAI	KONA ELECTRIC	Battery Electric Vehicle (BEV)	Eligibility unknown as battery range has not b...	0	0	35	228454180	POINT (-123.105305 47.211085)	BONNEVILLE POWER ADMINISTRATION||CITY OF TACOM...	5.304596e+10
177863	5YJYGDEE6M	Grant	Quincy	WA	98848.0	2021	TESLA	MODEL Y	Battery Electric Vehicle (BEV)	Eligibility unknown as battery range has not b...	0	0	13	168797219	POINT (-119.8493873 47.2339933)	PUD NO 2 OF GRANT COUNTY	5.302501e+10
177864	WVGKMPE27M	King	Black Diamond	WA	98010.0	2021	VOLKSWAGEN	ID.4	Battery Electric Vehicle (BEV)	Eligibility unknown as battery range has not b...	0	0	5	182448801	POINT (-122.00451 47.312185)	PUGET SOUND ENERGY INC||CITY OF TACOMA - (WA)	5.303303e+10
177865	5YJ3E1EA8M	Pierce	Tacoma	WA	98422.0	2021	TESLA	MODEL 3	Battery Electric Vehicle (BEV)	Eligibility unknown as battery range has not b...	0	0	27	211464683	POINT (-122.38578 47.28971)	BONNEVILLE POWER ADMINISTRATION||CITY OF TACOM...	5.305394e+10

3. Check the shape of the dataset

In [7]:
```
1
```

Shape of the dataset:

(177866, 17)

4. Check the data types of each feature

In [8]:
```
1
```

Data types of each feature:

```
VIN (1-10)                                          object
County                                              object
City                                                object
State                                               object
Postal Code                                        float64
Model Year                                           int64
Make                                                object
Model                                               object
Electric Vehicle Type                               object
Clean Alternative Fuel Vehicle (CAFV) Eligibility   object
Electric Range                                      object
Base MSRP                                            int64
Legislative District                                object
DOL Vehicle ID                                       int64
Vehicle Location                                    object
Electric Utility                                    object
2020 Census Tract                                  float64
dtype: object
```

5. Check the statistical summary

In [9]:
```
1
```

Statistical summary of the dataset:

	Postal Code	Model Year	Base MSRP	DOL Vehicle ID	2020 Census Tract
count	177861.000000	177866.000000	177866.000000	1.778660e+05	1.778610e+05
mean	98172.453506	2020.515512	1073.109363	2.202313e+08	5.297672e+10
std	2442.450668	2.989384	8358.624956	7.584987e+07	1.578047e+09
min	1545.000000	1997.000000	0.000000	4.385000e+03	1.001020e+09
25%	98052.000000	2019.000000	0.000000	1.814743e+08	5.303301e+10
50%	98122.000000	2022.000000	0.000000	2.282522e+08	5.303303e+10
75%	98370.000000	2023.000000	0.000000	2.548445e+08	5.305307e+10
max	99577.000000	2024.000000	845000.000000	4.792548e+08	5.603300e+10

6. Check the null values

In [10]:
```
1
```

```
Null values in the dataset:

VIN (1-10)                                           0
County                                               5
City                                                 5
State                                                0
Postal Code                                          5
Model Year                                           0
Make                                                 7
Model                                                4
Electric Vehicle Type                                6
Clean Alternative Fuel Vehicle (CAFV) Eligibility    2
Electric Range                                       3
Base MSRP                                            0
Legislative District                               389
DOL Vehicle ID                                       0
Vehicle Location                                     9
Electric Utility                                     5
2020 Census Tract                                    5
dtype: int64
```

7. Check the duplicate values

In [11]:
```
1
```

```
Duplicate values in the dataset:

0
```

8. Check the anomalies or wrong entries

In [12]:
```
1
```

Anomalies or wrong entries (Example: Checking Model Year for future years):

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

1. Descriptive Statistics:

- What are the mean, median, and standard deviation of the base

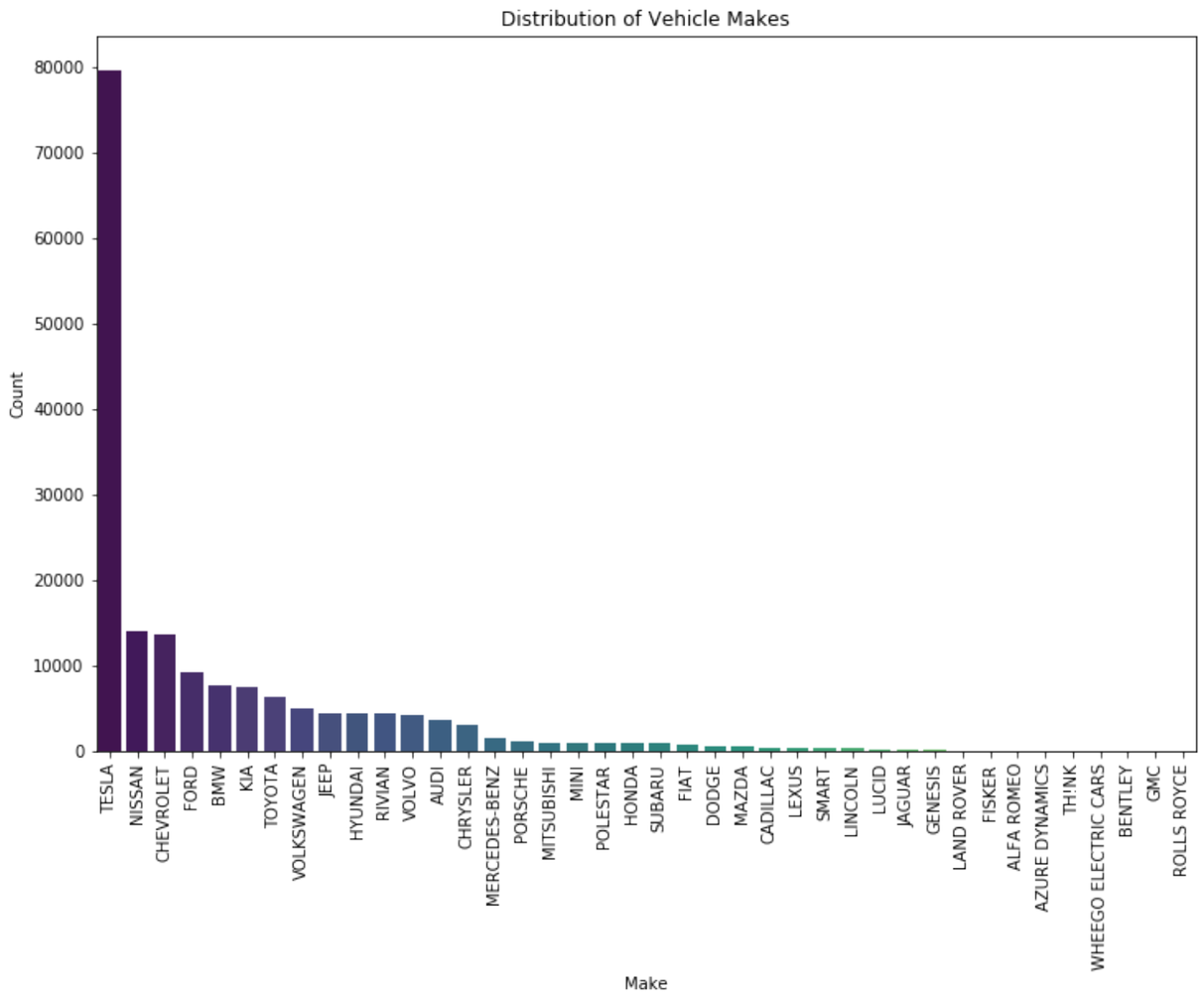
In [13]:
```
1
```

```
Mean MSRP: 1073.1093632284978
Median MSRP: 0.0
Standard Deviation MSRP: 8358.624956079144
```

2. Data Distribution:

- What is the distribution of vehicle makes in the dataset? Represent it using a bar chart.

In [14]:
```
1
```



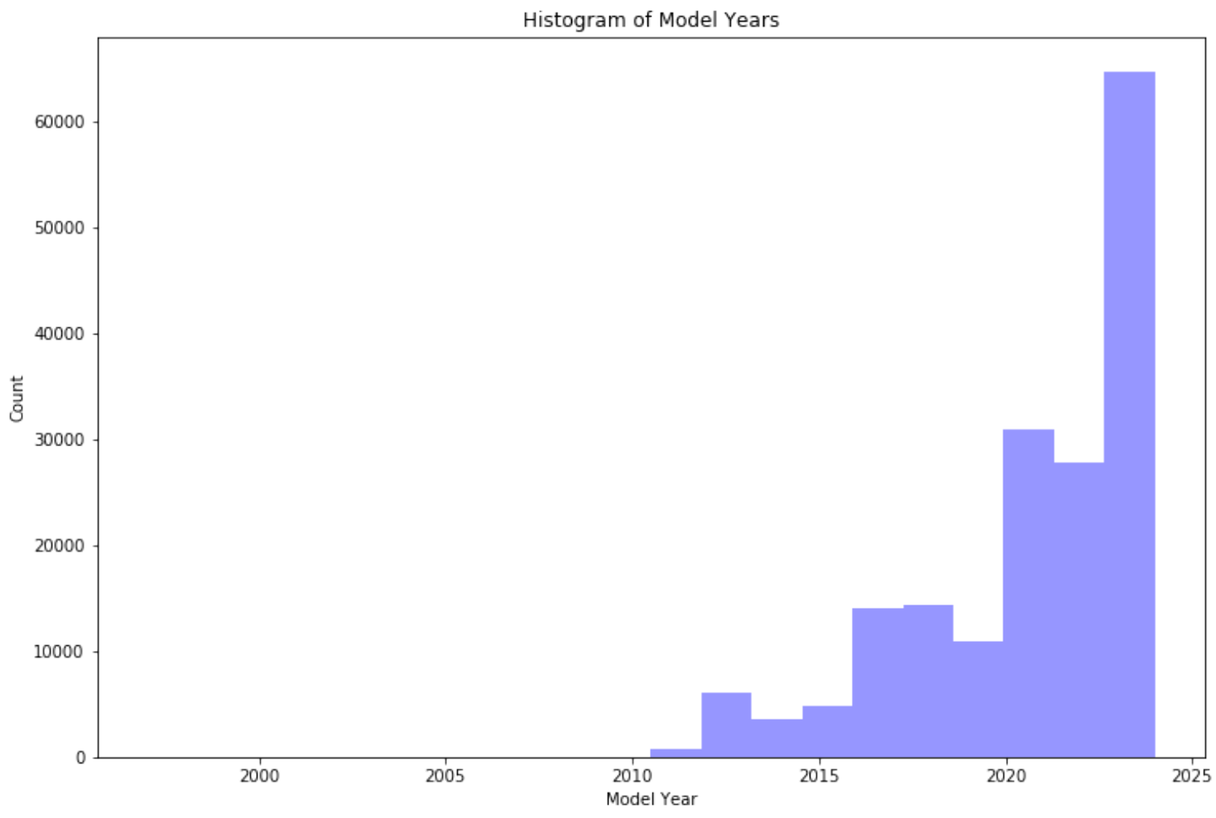
3. Model Year Analysis:

- What are the most common model years in the dataset? Provide a frequency table and histogram.

In [15]:
```
1
```

```
Frequency Table of Model Years:
1997        1
1998        1
1999        5
2000        7
2002        2
2003        1
2008       20
2010       23
2011      775
2012     1618
2013     4409
2014     3509
2015     4844
2016     5483
2017     8562
2018    14323
2019    10940
2020    11768
2021    19132
2022    27776
2023    57587
2024     7080
Name: Model Year, dtype: int64

C:\Program Files (x86)\Microsoft Visual Studio\Shared\Anaconda3_64\lib\site-packages\matplotlib\axes\_axes.py:6462: UserWarning: The 'normed' kwarg is deprecated, and has be
en replaced by the 'density' kwarg.
  warnings.warn("The 'normed' kwarg is deprecated, and has been "
```

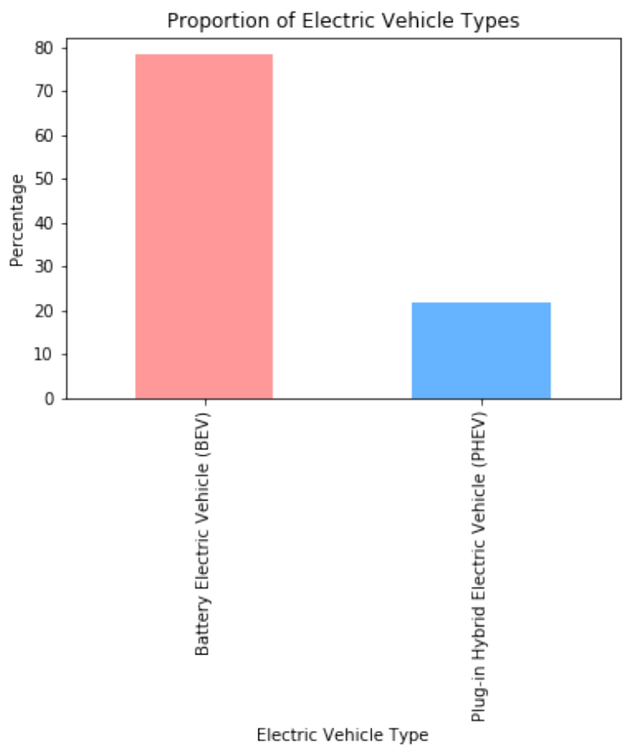


4. Electric Vehicle Type:

- What is the proportion of Battery Electric Vehicles (BEV) versus other types of electric vehicles?

In [16]:
```
1
```

```
Proportion of Electric Vehicle Types:
Battery Electric Vehicle (BEV)            78.266052
Plug-in Hybrid Electric Vehicle (PHEV)    21.733948
Name: Electric Vehicle Type, dtype: float64
```



5. Electric Range Analysis:

- What is the average electric range for vehicles of different makes? Provide a summary table.

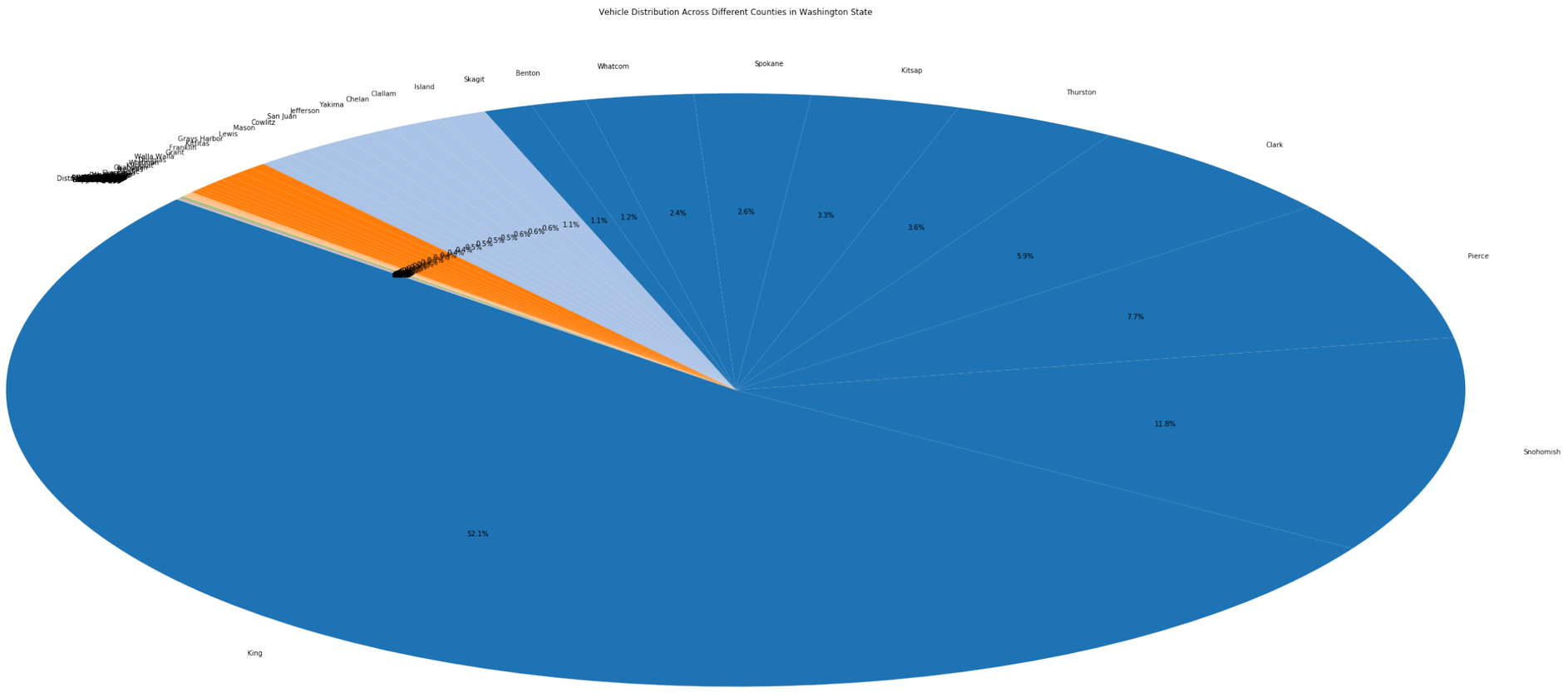
In [17]:
```
1
```

```
Average Electric Range for Vehicles of Different Makes:
Make
JAGUAR                  203.741379
BMW                     201.159730
WHEEGO ELECTRIC CARS    100.000000
TH!NK                   100.000000
CHEVROLET                94.552785
FIAT                     85.645408
NISSAN                   80.348053
TESLA                    77.341268
SMART                    62.325926
AZURE DYNAMICS           56.000000
AUDI                     50.984641
HONDA                    46.600240
PORSCHE                  44.812116
KIA                      44.650161
POLESTAR                 37.776644
ALFA ROMEO               33.000000
CHRYSLER                 32.212162
DODGE                    32.000000
MITSUBISHI               30.646138
TOYOTA                   28.095102
MAZDA                    25.781513
LAND ROVER               25.000000
LINCOLN                  23.543071
VOLKSWAGEN               22.927058
JEEP                     22.365402
BENTLEY                  19.666667
HYUNDAI                  19.362914
LEXUS                    18.800000
MINI                     18.036789
VOLVO                    16.135737
FORD                     10.812914
MERCEDES-BENZ             9.346130
CADILLAC                  8.798429
FISKER                    8.755102
SUBARU                    1.350181
RIVIAN                    0.000000
LUCID                     0.000000
ROLLS ROYCE               0.000000
GENESIS                   0.000000
GMC                       0.000000
Name: Electric Range, dtype: float64
```

6. County Distribution:

- How are vehicles distributed across different counties in Washington state? Represent the distribution using a pie chart.

In [18]:
```
1
```



7. Price Analysis:

- Compare the average base MSRP of vehicles eligible for the Clean Alternative Fuel Vehicle (CAFV) program versus those that are not.

In [19]:
```
1
```

```
C:\Program Files (x86)\Microsoft Visual Studio\Shared\Anaconda3_64\lib\site-packages\IPython\core\interactiveshell.py:2785: DtypeWarning: Columns (10,12) have mixed types. S
pecify dtype option on import or set low_memory=False.
  interactivity=interactivity, compiler=compiler, result=result)

Average Base MSRP for CAFV Eligible Vehicles: $2028.13
Average Base MSRP for Non-Eligible CAFV Vehicles: $505.16
```

8. Geographical Analysis:

- How does the base MSRP vary across different cities in Washington state?

In [20]:
```
1
```

```
                    City   4368.750000
102                 Dayton  4248.437500
333                Raymond  4205.813953
268            Newman Lake  4192.307692
221                   Lyle  4126.315789
13          Anderson Island  3993.750000
417                Touchet  3883.333333
433             Valleyford  3744.642857
292                 Orondo  3698.636364
241                 Medina  3678.947368
293               Oroville  3678.947368
14                   Ariel  3595.900000
59                Cathlamet     0.000000
..                      ...          ...
193               Kittitas     0.000000
190                Keyport     0.000000
189           Kettle Falls     0.000000
184                 Keller     0.000000
183                Kapowsin     0.000000
182                 Kalama     0.000000
181  Joint Base Lewis Mcchord     0.000000
```

9. Legislative Districts:

- Which legislative districts have the highest number of registered electric vehicles? Provide a ranked list.

In [21]:
```
1
```

	Legislative District	Number of Registered EVs
0	41	8441
1	45	7425
2	5	6810
3	48	6631
4	1	6265
5	36	5922
6	43	5049
7	46	5033
8	11	4871
9	34	4449
10	37	4326
11	44	4263
12	21	4037
13	22	3857
14	40	3796
15	45	3312
16	18	3302
17	26	3253
18	48	3186
19	41	3112
20	31	3002
21	32	2957
22	10	2892
23	23	2804
24	11	2636
25	27	2522
26	42	2444
27	39	2396
28	28	2277
29	33	2248
..	...	...
62	7	810
63	5	804
64	34	706
65	22	542
66	49	510
67	44	414
68	21	373
69	15	352
70	30	306
71	24	291
72	26	285
73	20	266
74	35	264
75	39	197
76	2	175
77	19	152
78	14	141
79	10	126
80	31	98
81	15	91
82	38	34
83	7	29
84	13	9
85	12	5
86	9	5
87	16	4
88	40	2
89	3	2
90	6	1
91	?	1

[92 rows x 2 columns]

```
C:\Program Files (x86)\Microsoft Visual Studio\Shared\Anaconda3_64\lib\site-packages\IPython\core\interactiveshell.py:2785: DtypeWarning: Columns (10,12) have mixed types. S
pecify dtype option on import or set low_memory=False.
  interactivity=interactivity, compiler=compiler, result=result)
```

10. Electric Utility Providers:

- What is the distribution of electric utility service providers for the vehicles in the dataset?

In [22]:
```
1
```

```
                                    Electric Utility  Number of Vehicles
0       PUGET SOUND ENERGY INC||CITY OF TACOMA - (WA)              65990
1                             PUGET SOUND ENERGY INC              35882
2        CITY OF SEATTLE - (WA)||CITY OF TACOMA - (WA)              31381
3   BONNEVILLE POWER ADMINISTRATION||PUD NO 1 OF C...              10173
4   BONNEVILLE POWER ADMINISTRATION||CITY OF TACOM...               7828
5   PUGET SOUND ENERGY INC||PUD NO 1 OF WHATCOM CO...               4008
6   BONNEVILLE POWER ADMINISTRATION||AVISTA CORP||...               2797
7   BONNEVILLE POWER ADMINISTRATION||PUD 1 OF SNOH...               1537
8                                          PACIFICORP               1306
9   BONNEVILLE POWER ADMINISTRATION||PUD NO 1 OF B...               1244
10                    MODERN ELECTRIC WATER COMPANY                1127
11                        PUD NO 1 OF CHELAN COUNTY                1047
12  BONNEVILLE POWER ADMINISTRATION||PUGET SOUND E...                951
13  BONNEVILLE POWER ADMINISTRATION||ORCAS POWER &...                938
14  BONNEVILLE POWER ADMINISTRATION||CITY OF RICHL...                903
15  BONNEVILLE POWER ADMINISTRATION||PUD NO 1 OF C...                897
16  BONNEVILLE POWER ADMINISTRATION||PUD NO 1 OF C...                838
17  BONNEVILLE POWER ADMINISTRATION||CITY OF TACOM...                708
18  BONNEVILLE POWER ADMINISTRATION||PUD NO 1 OF G...                609
19                          PUD NO 2 OF GRANT COUNTY                 561
20  BONNEVILLE POWER ADMINISTRATION||PUD NO 1 OF F...                549
21  BONNEVILLE POWER ADMINISTRATION||CITY OF TACOM...                471
22                                        AVISTA CORP                400
23  BONNEVILLE POWER ADMINISTRATION||VERA IRRIGATI...                399
24             NON WASHINGTON STATE ELECTRIC UTILITY                 384
25                      PUD NO 1 OF DOUGLAS COUNTY                   362
26  BONNEVILLE POWER ADMINISTRATION||CITY OF TACOM...                335
27  BONNEVILLE POWER ADMINISTRATION||INLAND POWER ...                335
28  BONNEVILLE POWER ADMINISTRATION||PUD NO 1 OF K...                284
29       CITY OF TACOMA - (WA)||TANNER ELECTRIC COOP                 251
..                                                ...                ...
46  BONNEVILLE POWER ADMINISTRATION||CITY OF MILTO...                 93
47  BONNEVILLE POWER ADMINISTRATION||AVISTA CORP||...                 71
48  BONNEVILLE POWER ADMINISTRATION||PUD NO 1 OF W...                 60
49                   PUD NO 1 OF PEND OREILLE COUNTY                  55
50  BONNEVILLE POWER ADMINISTRATION||AVISTA CORP||...                 44
51                            CITY OF CHENEY - (WA)                   43
52                       PUD NO 1 OF WHATCOM COUNTY                   42
53  BONNEVILLE POWER ADMINISTRATION||TOWN OF RUSTO...                 40
54  BONNEVILLE POWER ADMINISTRATION||CITY OF TACOM...                 39
55  BONNEVILLE POWER ADMINISTRATION||BIG BEND ELEC...                 34
56  BONNEVILLE POWER ADMINISTRATION||TOWN OF EATON...                 29
57                            CITY OF TACOMA - (WA)                   24
58  BONNEVILLE POWER ADMINISTRATION||PUD NO 1 OF M...                 21
59  BONNEVILLE POWER ADMINISTRATION||COLUMBIA RURA...                 20
60  BONNEVILLE POWER ADMINISTRATION||PUD NO 1 OF F...                 18
61  BONNEVILLE POWER ADMINISTRATION||PUD NO 1 OF K...                 16
62  BONNEVILLE POWER ADMINISTRATION||CITY OF MCCLE...                 15
63  BONNEVILLE POWER ADMINISTRATION||PACIFICORP||C...                 14
64   CITY OF SUMAS - (WA)||PUD NO 1 OF WHATCOM COUNTY                  8
65                                    CITY OF CHEWELAH                5
66                       PORTLAND GENERAL ELECTRIC CO                 4
67  BONNEVILLE POWER ADMINISTRATION||CITY OF COULE...                 4
68  BONNEVILLE POWER ADMINISTRATION||BENTON RURAL ...                 4
69  BONNEVILLE POWER ADMINISTRATION||NESPELEM VALL...                 3
70  BONNEVILLE POWER ADMINISTRATION||CITY OF TACOM...                 2
71  BONNEVILLE POWER ADMINISTRATION||PUD NO 1 OF A...                 2
72                            CITY OF SEATTLE - (WA)                  1
73  BONNEVILLE POWER ADMINISTRATION||PENINSULA LIG...                 1
74  BONNEVILLE POWER ADMINISTRATION||PUD NO 1 OF C...                 1
75  BONNEVILLE POWER ADMINISTRATION||PUD NO 1 OF J...                 1

[76 rows x 2 columns]

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pecify dtype option on import or set low_memory=False.
  interactivity=interactivity, compiler=compiler, result=result)
```

11. Census Tract Analysis:

- How are vehicles distributed across different 2020 Census Tracts? Provide insights based on vehicle counts per tract.

In [23]:
```
1
```

```
   2020 Census Tract  Number of Vehicles
0       5.303303e+10                2479
1       5.303303e+10                 983
2       5.303303e+10                 820
3       5.303303e+10                 801
4       5.306701e+10                 672
5       5.303301e+10                 651
6       5.303303e+10                 601
7       5.306105e+10                 581
8       5.303303e+10                 577
9       5.303302e+10                 558

C:\Program Files (x86)\Microsoft Visual Studio\Shared\Anaconda3_64\lib\site-packages\IPython\core\interactiveshell.py:2785: DtypeWarning: Columns (10,12) have mixed types. S
pecify dtype option on import or set low_memory=False.
  interactivity=interactivity, compiler=compiler, result=result)
```

12. Electric Range Correlation:

- Is there a correlation between the electric range and the base MSRP of the vehicles? Provide the correlation coefficient and interpret the result.

In [24]:
```
1
```

```
Correlation coefficient between Electric Range and Base MSRP: 0.00
There is little to no correlation between electric range and base MSRP.

C:\Program Files (x86)\Microsoft Visual Studio\Shared\Anaconda3_64\lib\site-packages\IPython\core\interactiveshell.py:2785: DtypeWarning: Columns (10,12) have mixed types. S
pecify dtype option on import or set low_memory=False.
  interactivity=interactivity, compiler=compiler, result=result)
```

13. VIN Analysis:

- Identify any patterns or commonalities in the VIN (1-10) for the vehicles. Are there any frequent prefixes or suffixes?

In [25]:
```
1
```

```
Most Common VIN Prefixes:
5YJ    50385
7SA    29274
1G1    13389
1N4    12120
KND     7325
1C4     4480
KM8     3781
YV4     3763
JTD     3761
3FM     3322
Name: VIN (1-10), dtype: int64

Most Common VIN Suffixes:
E6P    1606
E7P    1573
E2P    1545
E5P    1525
E8P    1515
EXP    1503
E9P    1497
E3P    1486
E0P    1467
E4P    1455
Name: VIN (1-10), dtype: int64
```

14. Eligibility Status:

- What percentage of vehicles are eligible for the Clean Alternative Fuel Vehicle (CAFV) program?

In [26]:
```
1
```

```
Percentage of vehicles eligible for the CAFV program: 0.00%
```

15. Model Popularity:

- Which vehicle models are the most popular in the dataset? Provide a frequency table of the top 10 models.

In [27]:
```
1
```

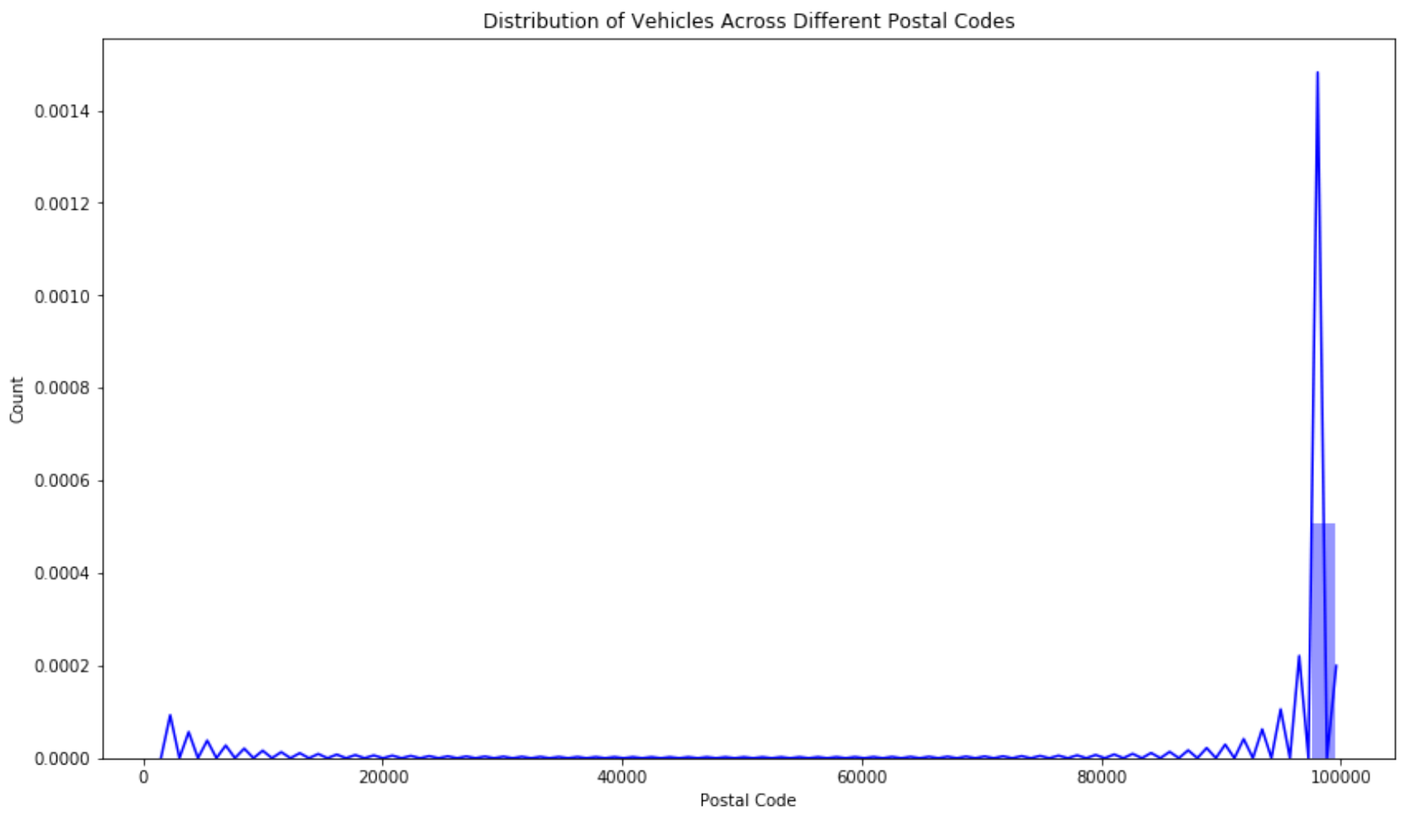
```
Top 10 Most Popular Vehicle Models:
MODEL Y           35989
MODEL 3           30091
LEAF              13365
MODEL S            7734
BOLT EV            6821
MODEL X            5796
VOLT               4796
ID.4               3937
WRANGLER           3392
MUSTANG MACH-E     3322
Name: Model, dtype: int64
```

16. Postal Code Distribution:

- How are vehicles distributed across different postal codes? Provide a heatmap or density plot.

In [28]:
```
1
```

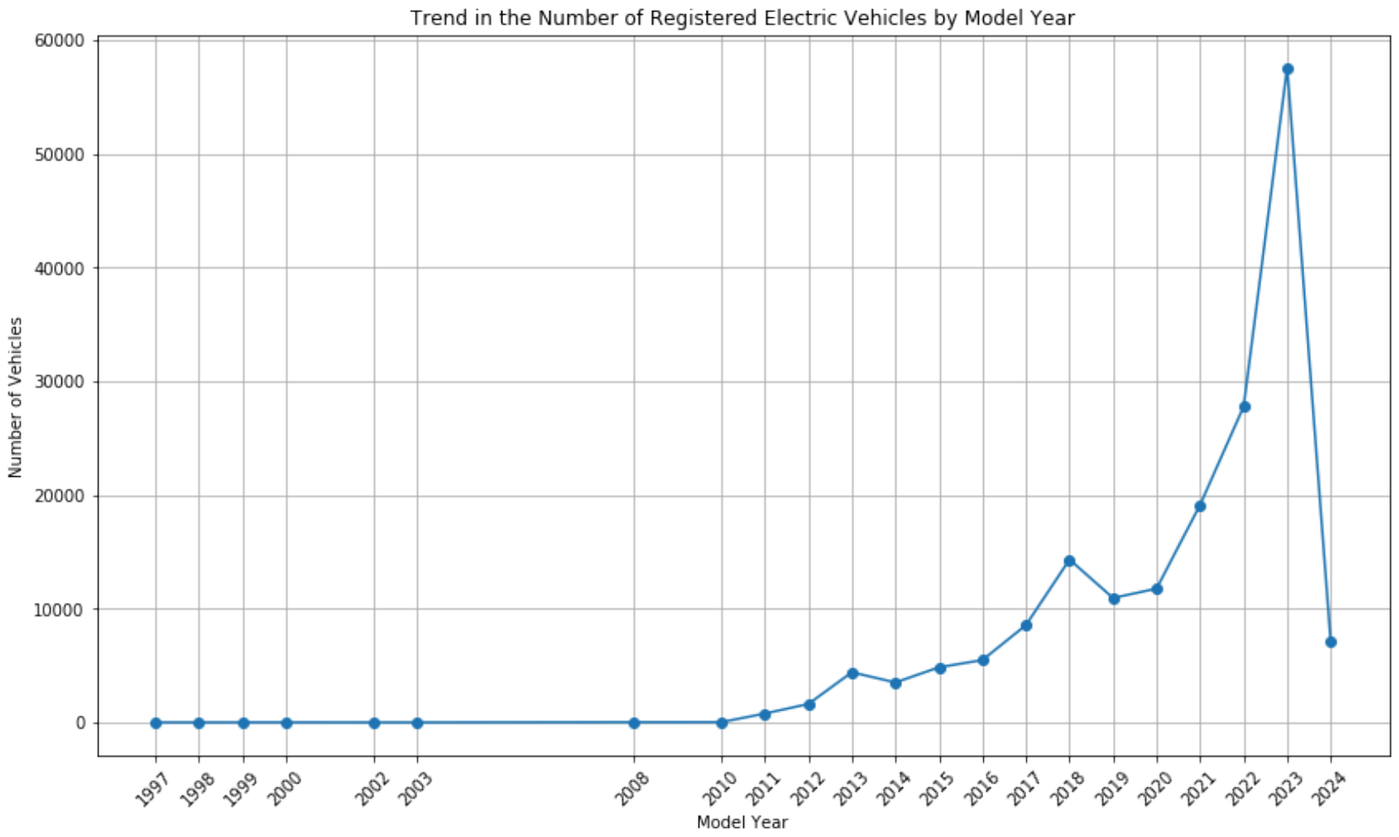
```
C:\Program Files (x86)\Microsoft Visual Studio\Shared\Anaconda3_64\lib\site-packages\matplotlib\axes\_axes.py:6462: UserWarning: The 'normed' kwarg is deprecated, and has be
en replaced by the 'density' kwarg.
  warnings.warn("The 'normed' kwarg is deprecated, and has been "
```



18. Model Year Trend:

- Analyze the trend in the number of registered electric vehicles by model year. Provide a line chart to show any increase or decrease over the years.

In [29]:
```
1
```



19. Range vs. Year:

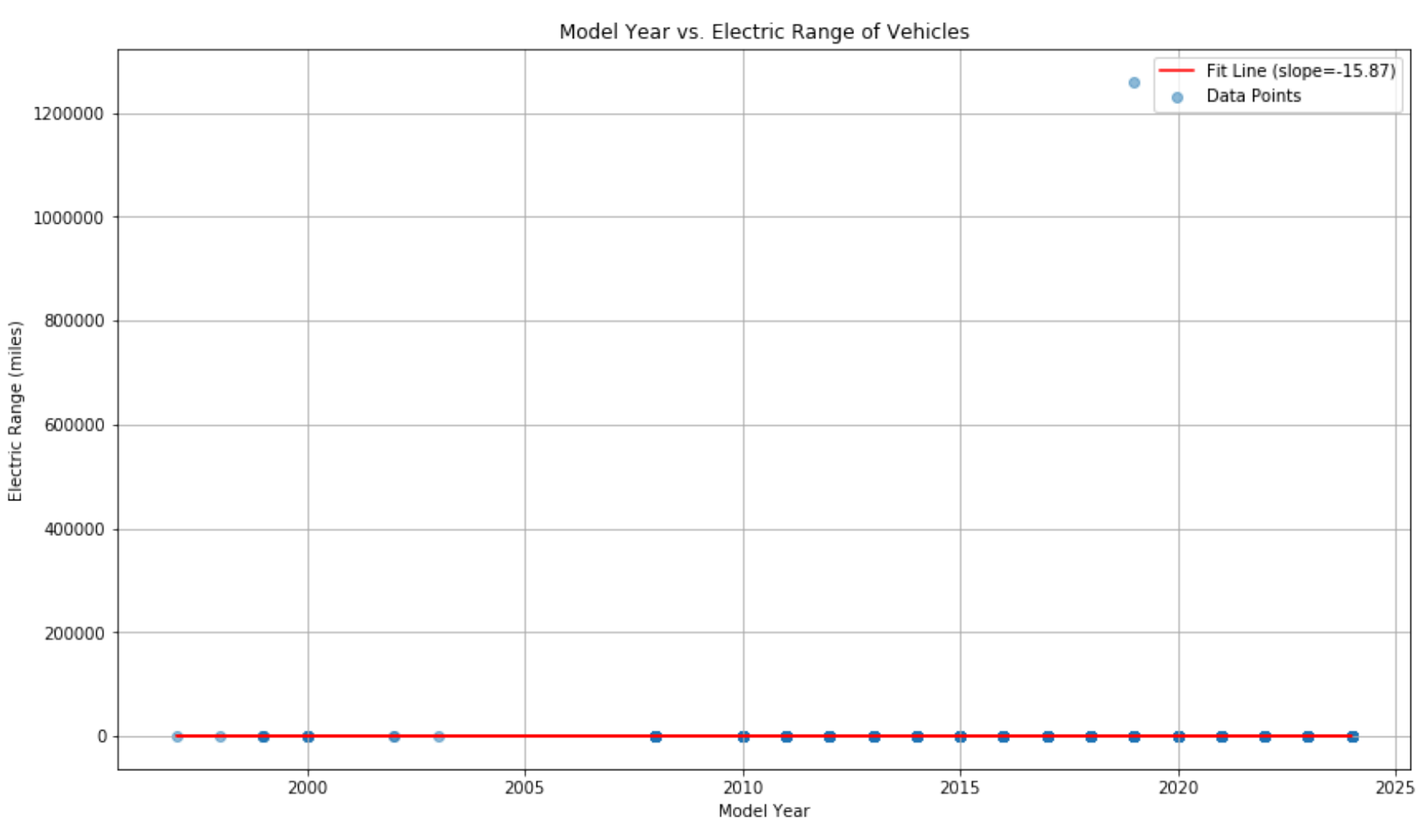
- Is there a trend between the model year and the electric range of the vehicles? Provide a scatter plot and analyze the trend.

In [32]:
```
1
```

```
C:\Program Files (x86)\Microsoft Visual Studio\Shared\Anaconda3_64\lib\site-packages\ipykernel_launcher.py:9: SettingWithCopyWarning:
A value is trying to be set on a copy of a slice from a DataFrame.
Try using .loc[row_indexer,col_indexer] = value instead

See the caveats in the documentation: http://pandas.pydata.org/pandas-docs/stable/indexing.html#indexing-view-versus-copy (http://pandas.pydata.org/pandas-docs/stable/indexing.html#indexing-view-versus-copy)
  if __name__ == '__main__':
C:\Program Files (x86)\Microsoft Visual Studio\Shared\Anaconda3_64\lib\site-packages\ipykernel_launcher.py:10: SettingWithCopyWarning:
A value is trying to be set on a copy of a slice from a DataFrame.
Try using .loc[row_indexer,col_indexer] = value instead

See the caveats in the documentation: http://pandas.pydata.org/pandas-docs/stable/indexing.html#indexing-view-versus-copy (http://pandas.pydata.org/pandas-docs/stable/indexing.html#indexing-view-versus-copy)
  # Remove the CWD from sys.path while we load stuff.
```




```
Slope: -15.874249257702395
Intercept: 32140.093746317798
R-squared: 0.000252064540932783
```

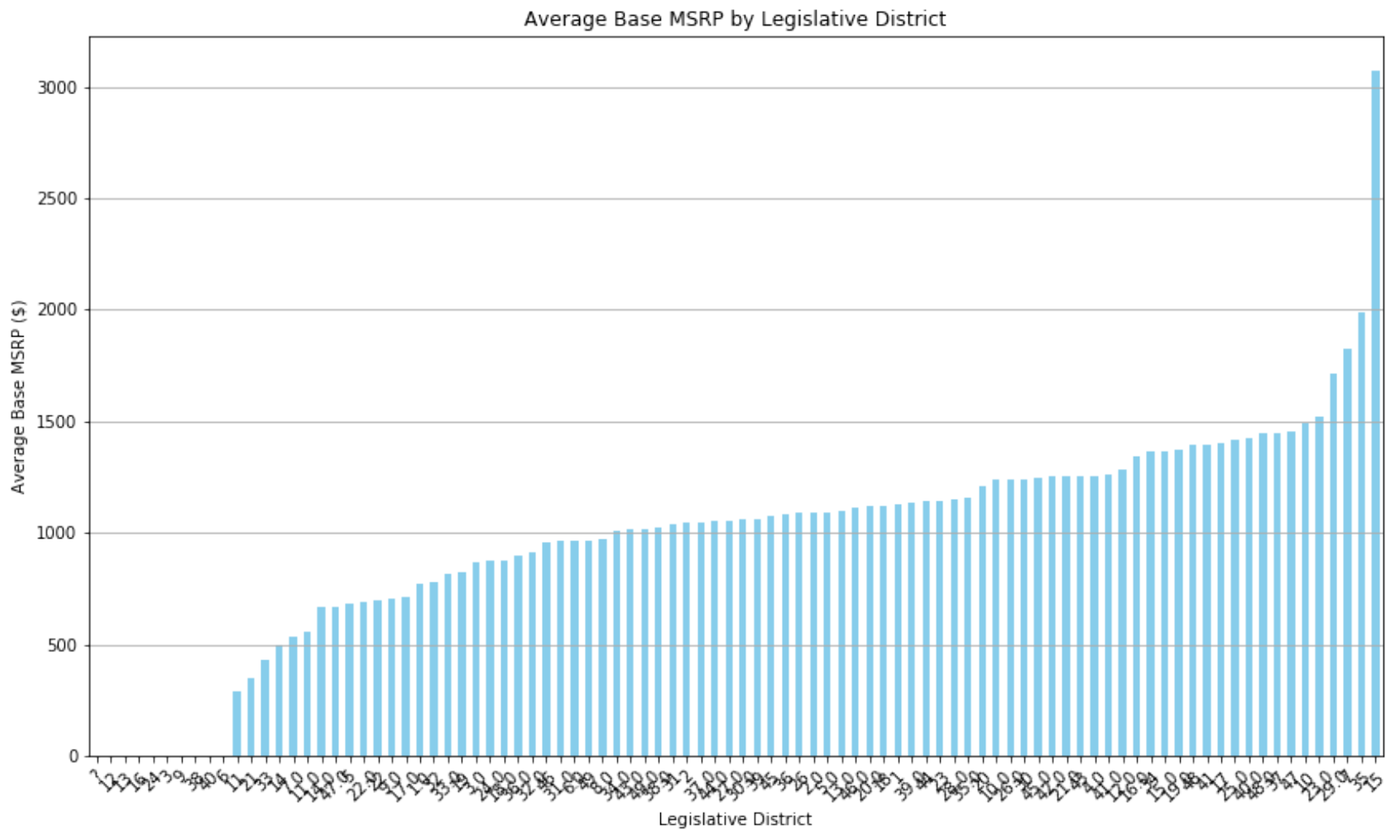
20. Legislative District and MSRP:

- How does the average base MSRP vary across different legislative districts?

In [33]:
```
1
```

```
C:\Program Files (x86)\Microsoft Visual Studio\Shared\Anaconda3_64\lib\site-packages\ipykernel_launcher.py:8: SettingWithCopyWarning:
A value is trying to be set on a copy of a slice from a DataFrame.
Try using .loc[row_indexer,col_indexer] = value instead

See the caveats in the documentation: http://pandas.pydata.org/pandas-docs/stable/indexing.html#indexing-view-versus-copy (http://pandas.pydata.org/pandas-docs/stable/indexing.html#indexing-view-versus-copy)
```



In [ ]:
```
1
```