In [1]:

```
pip install plotly
```

```
Requirement already satisfied: plotly in c:\users\vivek\anaconda3\lib\site
-packages (5.9.0)
Requirement already satisfied: tenacity>=6.2.0 in c:\users\vivek\anaconda3
\lib\site-packages (from plotly) (8.0.1)
Note: you may need to restart the kernel to use updated packages.
```

In [2]:

```
import pandas as pd
import plotly.express as px
import seaborn as sns
import matplotlib.pyplot as plt
```

In [3]:

```
df=pd.read_csv("dataset.csv")
df.head()
```

Out[3]:

	VIN (1-10)	County	City	State	Postal Code	Model Year	Make	Model	Electric Vehicle Type
0	JTMEB3FV6N	Monroe	Key West	FL	33040	2022	TOYOTA	RAV4 PRIME	Plug-in Hybrid Electric Vehicle (PHEV)
1	1G1RD6E45D	Clark	Laughlin	NV	89029	2013	CHEVROLET	VOLT	Plug-in Hybrid Electric Vehicle (PHEV)
2	JN1AZ0CP8B	Yakima	Yakima	WA	98901	2011	NISSAN	LEAF	Battery Electric Vehicle (BEV)
3	1G1FW6S08H	Skagit	Concrete	WA	98237	2017	CHEVROLET	BOLT EV	Battery Electric Vehicle (BEV)
4	3FA6P0SU1K	Snohomish	Everett	WA	98201	2019	FORD	FUSION	Plug-in Hybrid Electric Vehicle (PHEV)

In [4]:

```
df.isna().sum()
```

Out[4]:

```
VIN (1-10)                                           0
County                                               0
City                                                 0
State                                                0
Postal Code                                          0
Model Year                                           0
Make                                                 0
Model                                               20
Electric Vehicle Type                                0
Clean Alternative Fuel Vehicle (CAFV) Eligibility    0
Electric Range                                       0
Base MSRP                                            0
Legislative District                               286
DOL Vehicle ID                                       0
Vehicle Location                                    24
Electric Utility                                   443
2020 Census Tract                                    0
dtype: int64
```

In [5]:

```
df.dtypes
```

Out[5]:

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

In [6]:

```
df=df.dropna()
df.head()
```

Out[6]:

	VIN (1-10)	County	City	State	Postal Code	Model Year	Make	Model	Electric Vehicle Type
2	JN1AZ0CP8B	Yakima	Yakima	WA	98901	2011	NISSAN	LEAF	Battery Electric Vehicle (BEV)
3	1G1FW6S08H	Skagit	Concrete	WA	98237	2017	CHEVROLET	BOLT EV	Battery Electric Vehicle (BEV)
4	3FA6P0SU1K	Snohomish	Everett	WA	98201	2019	FORD	FUSION	Plug-in Hybrid Electric Vehicle (PHEV)
5	5YJ3E1EB5J	Snohomish	Bothell	WA	98021	2018	TESLA	MODEL 3	Battery Electric Vehicle (BEV)
6	1N4AZ0CP4D	Snohomish	Everett	WA	98203	2013	NISSAN	LEAF	Battery Electric Vehicle (BEV)

In [7]:

```
df[df.duplicated()]
```

Out[7]:

	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

In [8]:

```
df = df.reset_index(drop=True)
df.head()
```

Out[8]:

	VIN (1-10)	County	City	State	Postal Code	Model Year	Make	Model	Electric Vehicle Type
0	JN1AZ0CP8B	Yakima	Yakima	WA	98901	2011	NISSAN	LEAF	Battery Electric Vehicle (BEV)
1	1G1FW6S08H	Skagit	Concrete	WA	98237	2017	CHEVROLET	BOLT EV	Battery Electric Vehicle (BEV)
2	3FA6P0SU1K	Snohomish	Everett	WA	98201	2019	FORD	FUSION	Plug-in Hybrid Electric Vehicle (PHEV)
3	5YJ3E1EB5J	Snohomish	Bothell	WA	98021	2018	TESLA	MODEL 3	Battery Electric Vehicle (BEV)
4	1N4AZ0CP4D	Snohomish	Everett	WA	98203	2013	NISSAN	LEAF	Battery Electric Vehicle (BEV)

In [ ]:

```
```

In [9]:

```
df["County"].unique()
```

Out[9]:

```
array(['Yakima', 'Skagit', 'Snohomish', 'Island', 'Thurston', 'Grant',
       'King', 'Kitsap', 'Whitman', 'Spokane', 'Cowlitz', 'Pierce',
       'Kittitas', 'Grays Harbor', 'Clark', 'Chelan', 'Whatcom', 'Benton',
       'Walla Walla', 'Mason', 'San Juan', 'Lewis', 'Jefferson',
       'Clallam', 'Douglas', 'Klickitat', 'Skamania', 'Adams', 'Franklin',
       'Okanogan', 'Stevens', 'Asotin', 'Ferry', 'Pacific', 'Columbia',
       'Wahkiakum', 'Lincoln', 'Pend Oreille', 'Garfield'], dtype=object)
```

In [10]:

```
df["Electric Vehicle Type"].unique()
```

Out[10]:

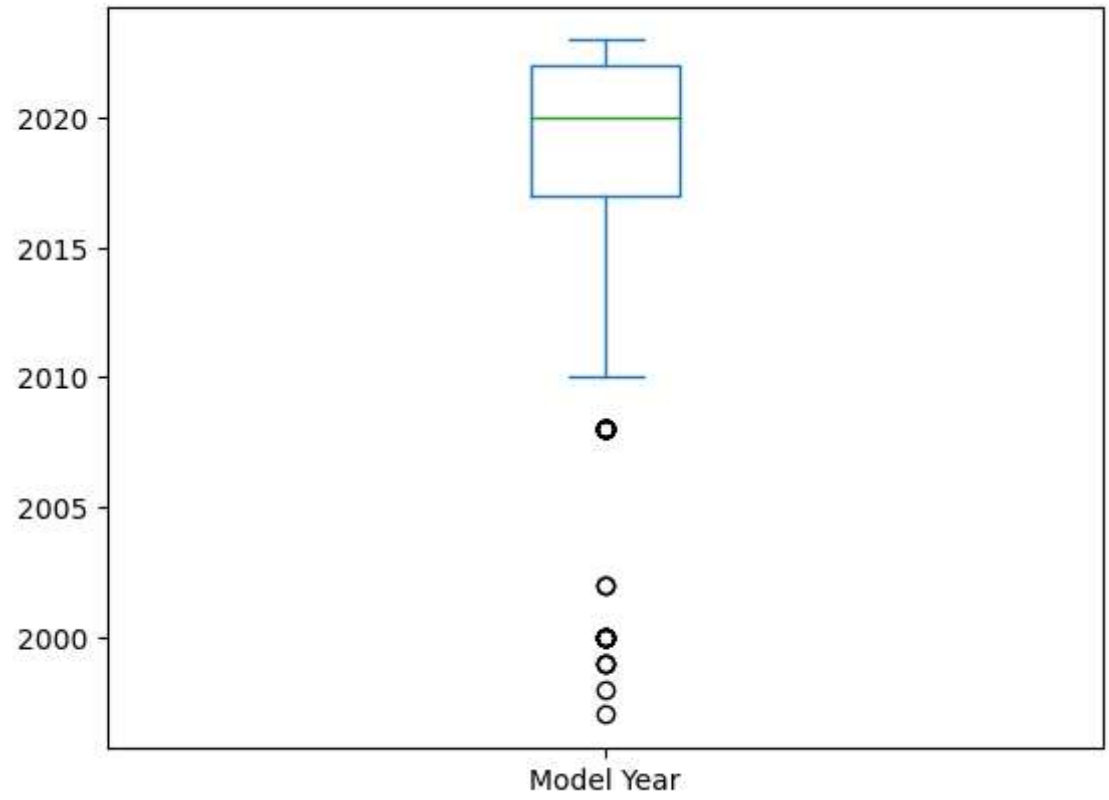
```
array(['Battery Electric Vehicle (BEV)',
       'Plug-in Hybrid Electric Vehicle (PHEV)'], dtype=object)
```

In [11]:

```
df['Model Year'].plot(kind='box')
```

Out[11]:

```
<AxesSubplot:>
```



In [12]:

```
df=df[df['Model Year']>=2010]
```

In [13]:

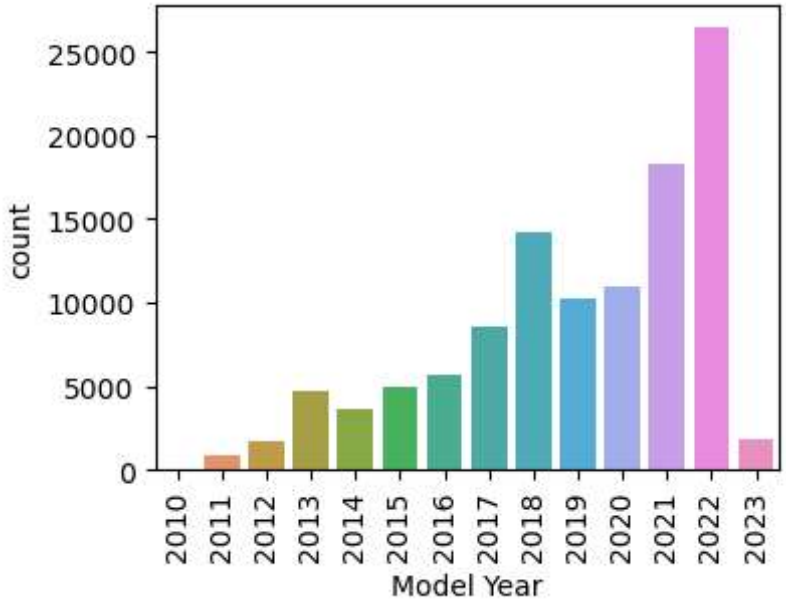
```
df["Model Year"].unique()
```

Out[13]:

```
array([2011, 2017, 2019, 2018, 2013, 2016, 2020, 2021, 2022, 2015, 2014,
       2012, 2023, 2010], dtype=int64)
```

In [14]:

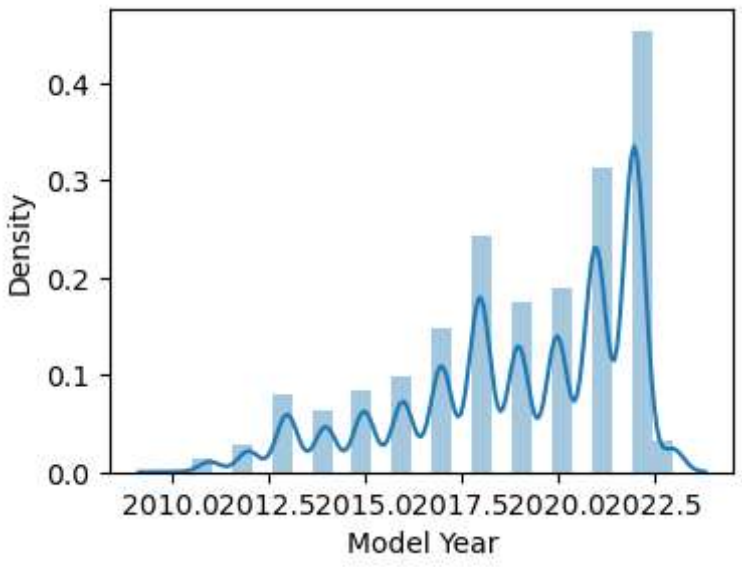
```
plt.figure(figsize=(4,3))
sns.countplot(x = "Model Year", data = df )
plt.xticks(rotation = 90)
plt.show()
```



In [15]:

```
plt.figure(figsize=(4,3))
sns.distplot(df["Model Year"], bins = 25,)
plt.show()
```

```
C:\Users\Vivek\anaconda3\lib\site-packages\seaborn\distributions.py:2619:
FutureWarning: `distplot` is a deprecated function and will be removed in
a future version. Please adapt your code to use either `displot` (a figure
-level function with similar flexibility) or `histplot` (an axes-level fun
ction for histograms).
  warnings.warn(msg, FutureWarning)
```



In [16]:

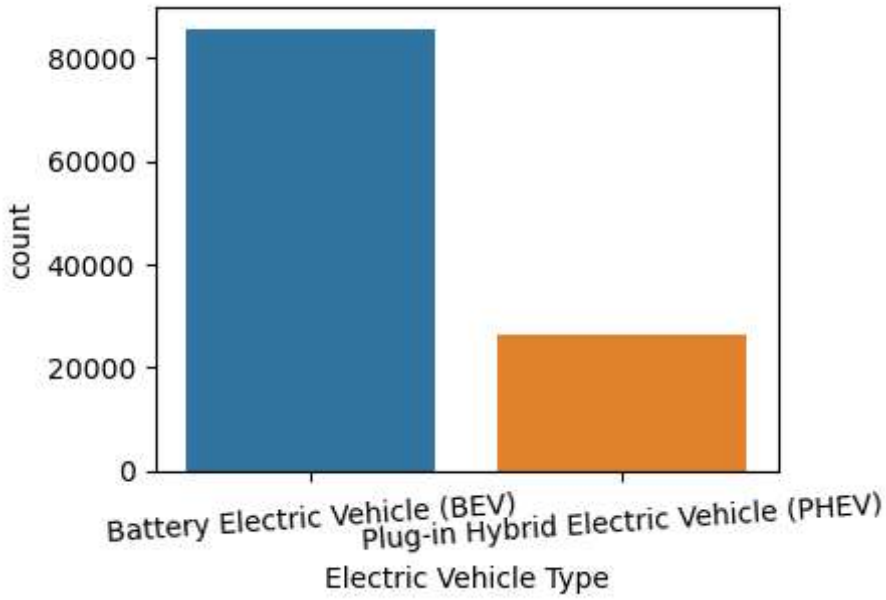
```
df["Model Year"].value_counts()
```

Out[16]:

```
2022    26455
2021    18277
2018    14190
2020    10998
2019    10216
2017     8598
2016     5709
2015     4918
2013     4669
2014     3665
2023     1863
2012     1695
2011      835
2010       24
Name: Model Year, dtype: int64
```

In [17]:

```
plt.figure(figsize=(4,3))
sns.countplot(x = "Electric Vehicle Type", data = df )
plt.xticks(rotation = 4)
plt.show()
```



In [18]:

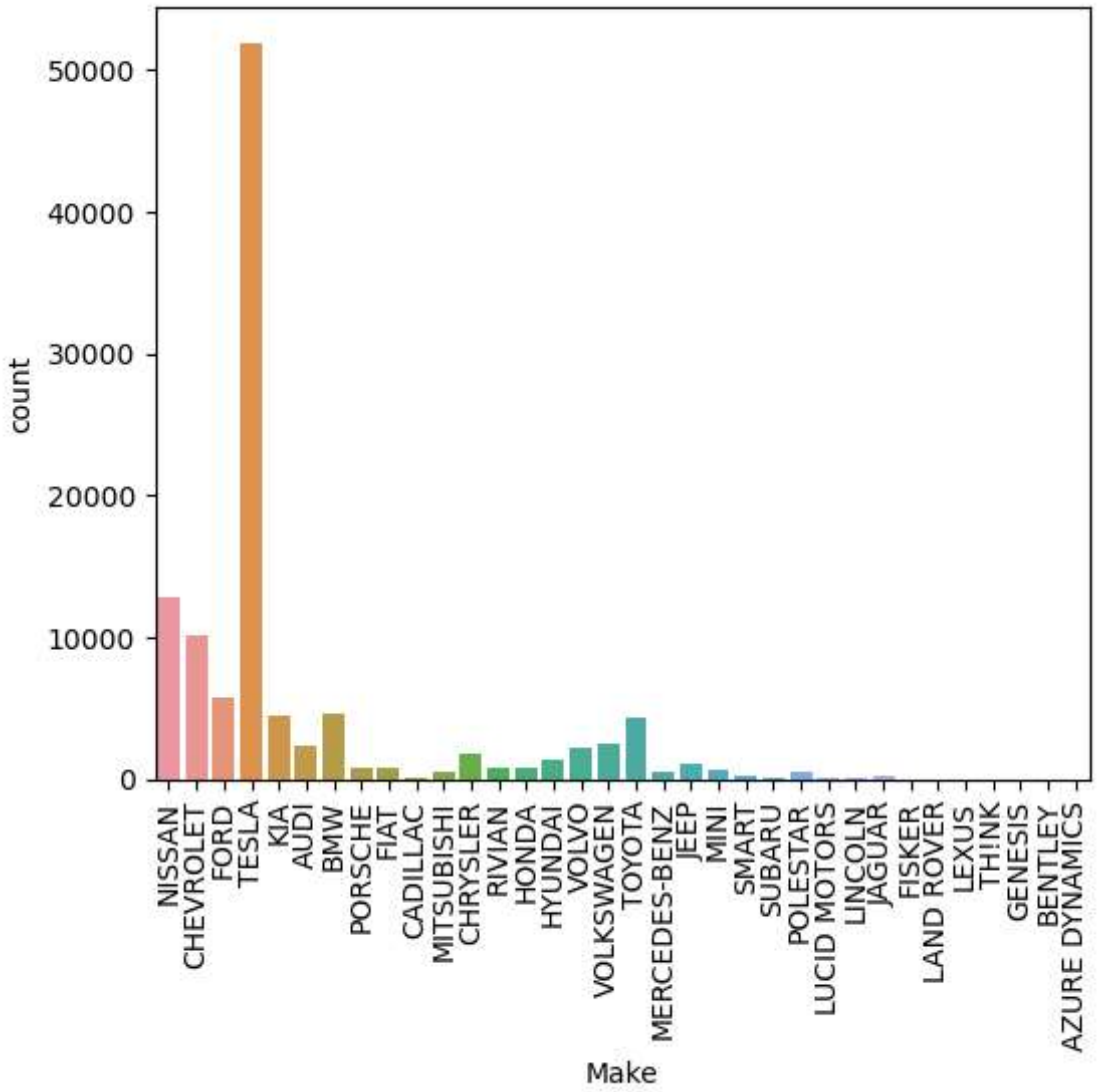
```
df["Electric Vehicle Type"].value_counts()
```

Out[18]:

```
Battery Electric Vehicle (BEV)            85692
Plug-in Hybrid Electric Vehicle (PHEV)    26420
Name: Electric Vehicle Type, dtype: int64
```

In [19]:

```
plt.figure(figsize=(6,5))
sns.countplot(x = "Make", data = df )
plt.xticks(rotation = 90)
plt.show()
```



In [20]:

```
df["Make"].value_counts()
```

Out[20]:

```
TESLA             51860
NISSAN            12846
CHEVROLET         10139
FORD               5766
BMW                4660
KIA                4469
TOYOTA             4366
VOLKSWAGEN         2507
AUDI               2320
VOLVO              2256
CHRYSLER           1780
HYUNDAI            1407
JEEP               1143
RIVIAN              883
FIAT                820
PORSCHE             817
HONDA               788
MINI                631
MITSUBISHI          585
POLESTAR            557
MERCEDES-BENZ       503
SMART               271
JAGUAR              218
LINCOLN             167
CADILLAC            108
LUCID MOTORS         65
SUBARU               59
LAND ROVER           38
LEXUS                33
FISKER               19
GENESIS              18
AZURE DYNAMICS        7
TH!NK                 3
BENTLEY               3
Name: Make, dtype: int64
```

In [21]:

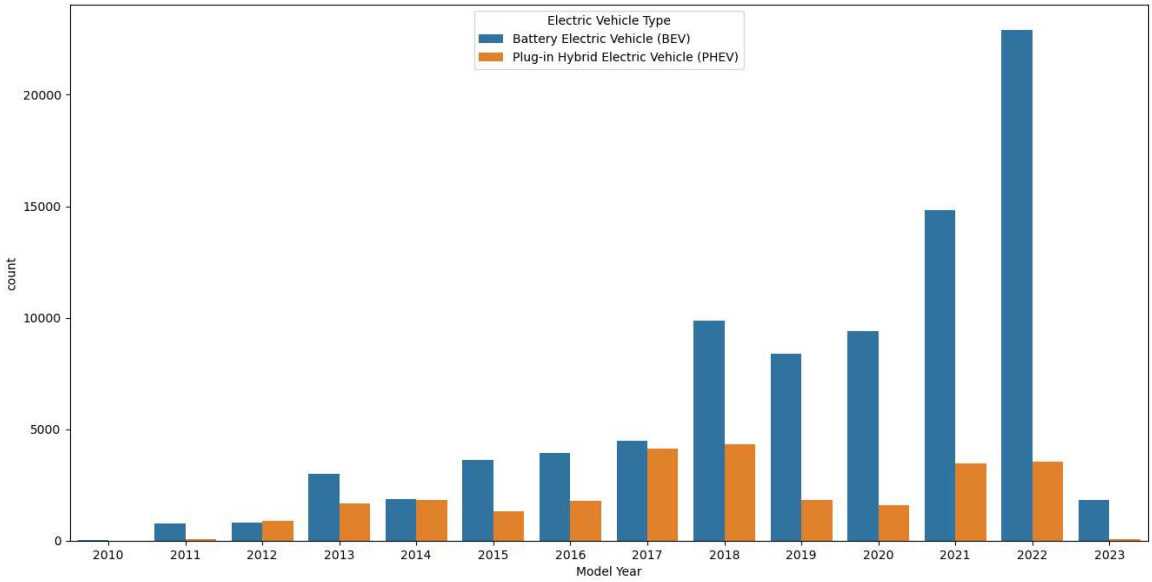
```
df["City"].value_counts()
```

Out[21]:

```
Seattle        20285
Bellevue        5918
Redmond         4197
Vancouver       4012
Kirkland        3597
               ...
Malott             1
Rockport           1
Bucoda             1
Grays River        1
Uniontown          1
Name: City, Length: 435, dtype: int64
```

In [22]:

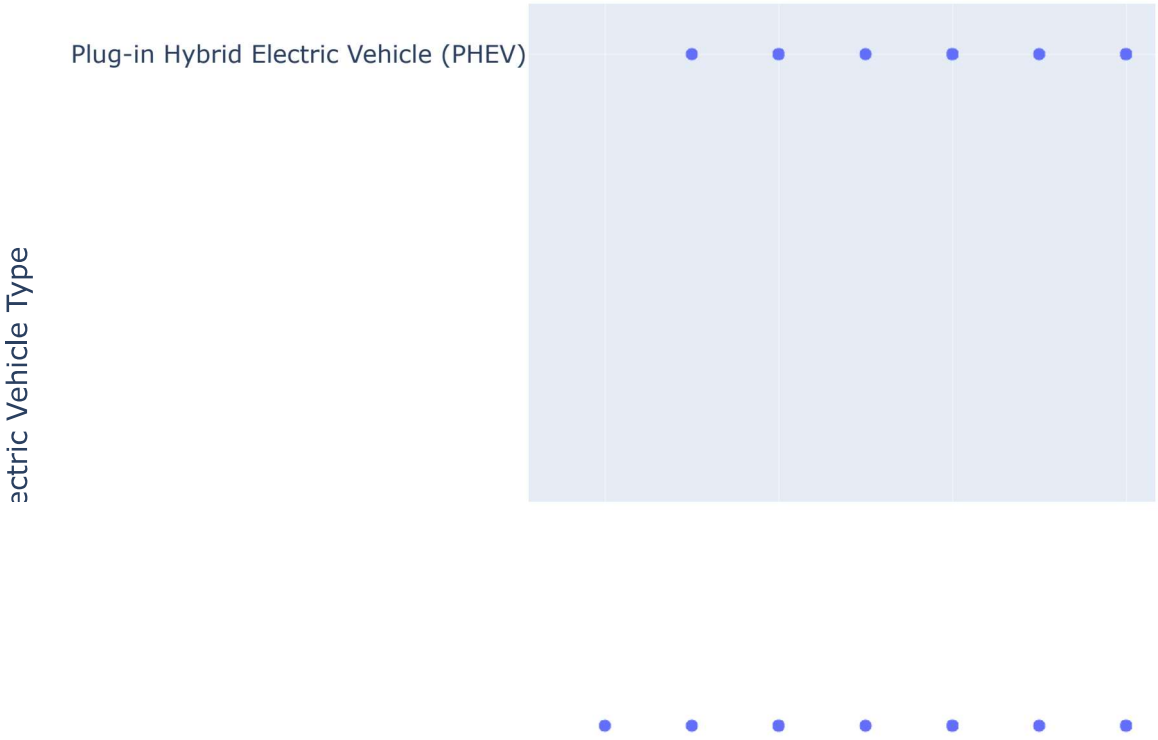
```
plt.figure(figsize=(16,8))
sns.countplot(x = "Model Year", data = df, hue="Electric Vehicle Type")
plt.show()
```



Applying Plotly

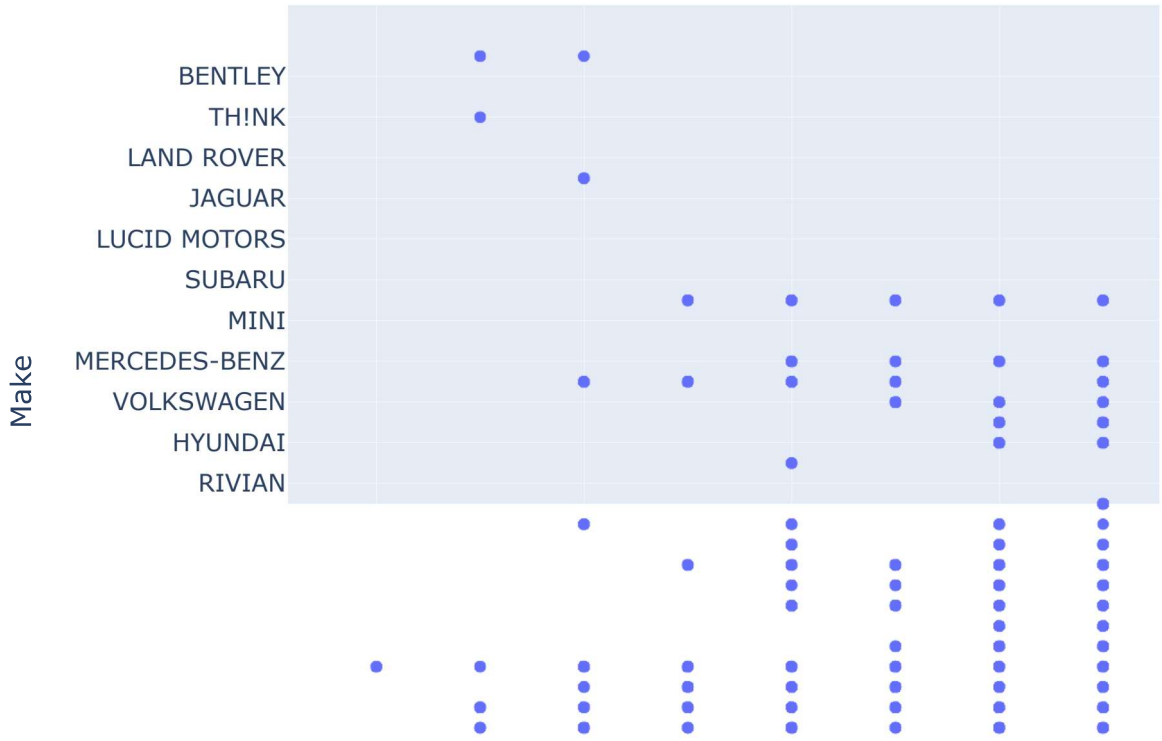
In [23]:

```
px.scatter(df,x="Model Year",y="Electric Vehicle Type")
```



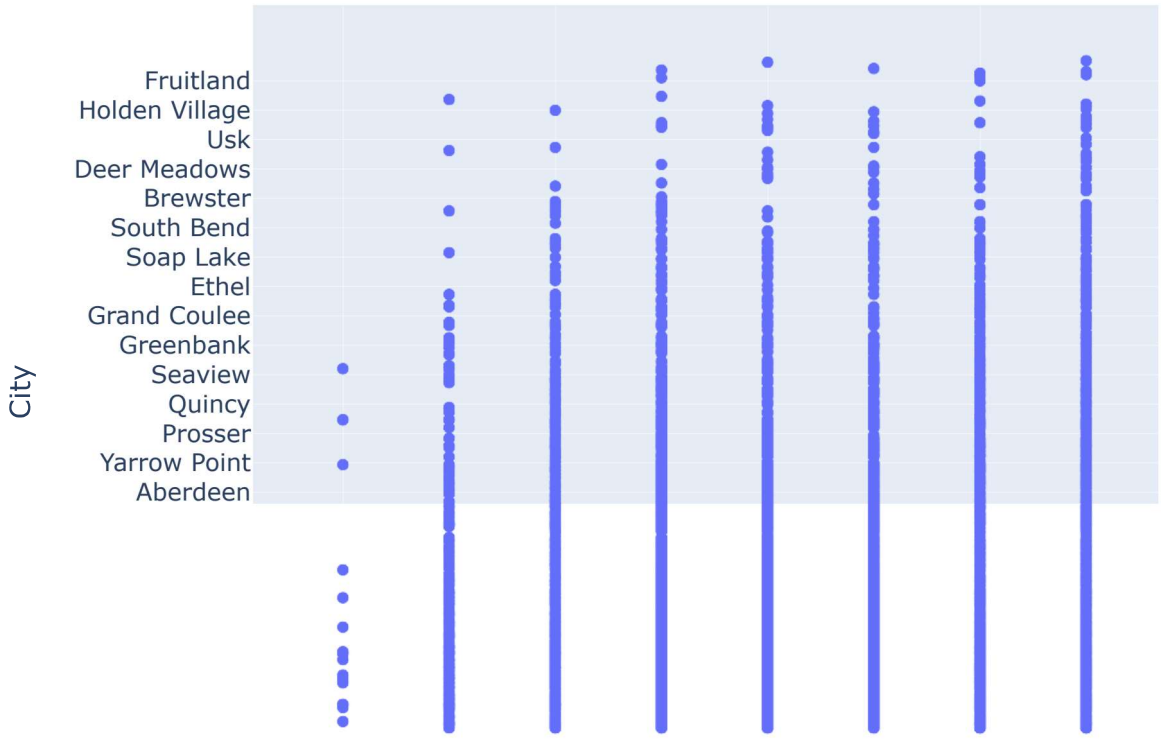
In [24]:

```
px.scatter(df,x="Model Year",y="Make")
```



In [25]:

```
px.scatter(df,x="Model Year",y="City")
```

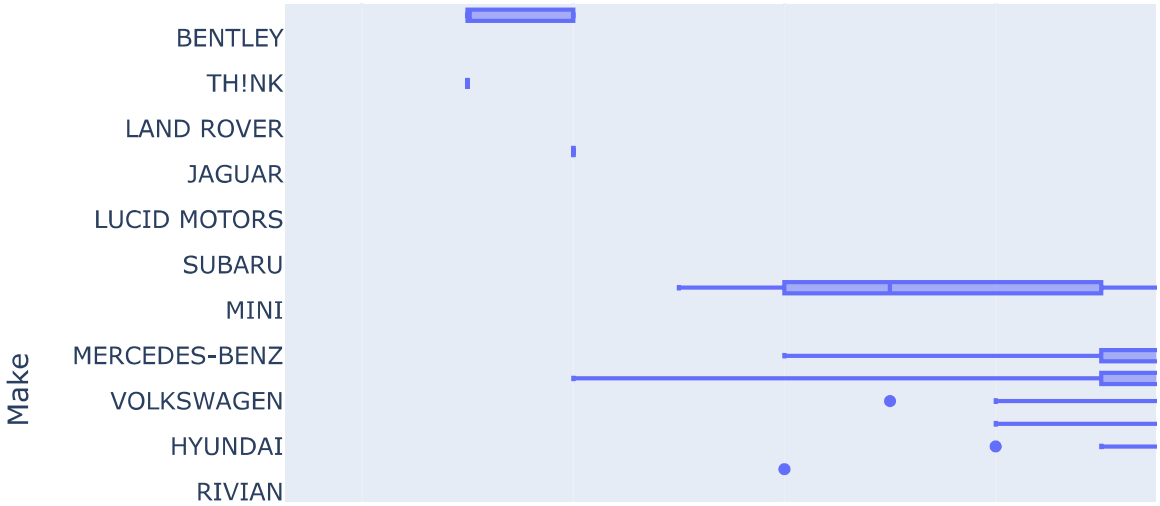


In [26]:

```
px.box(df,x="Model Year")
```

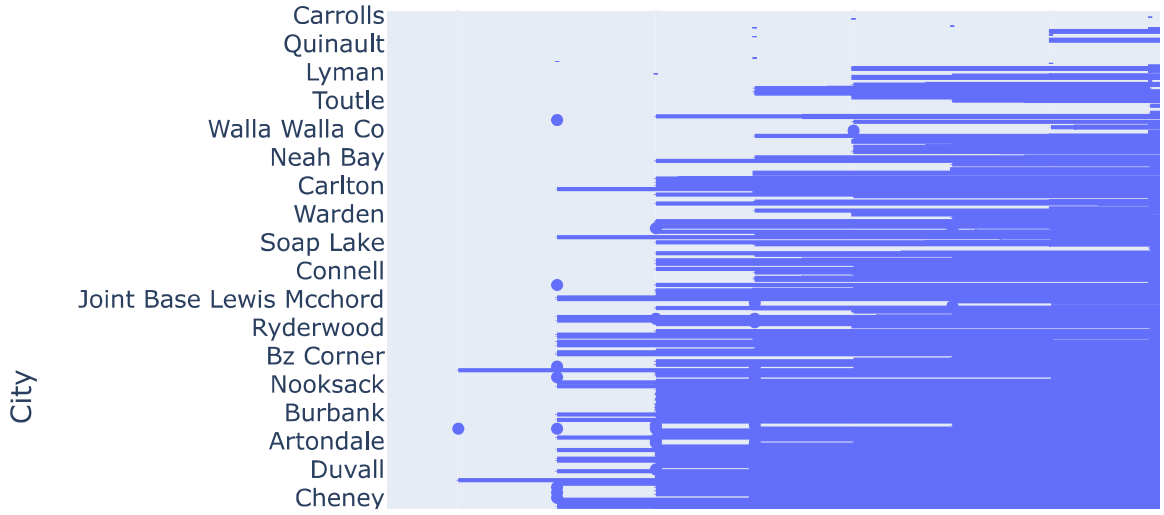
In [27]:

```
px.box(df,x="Model Year",y="Make")
```



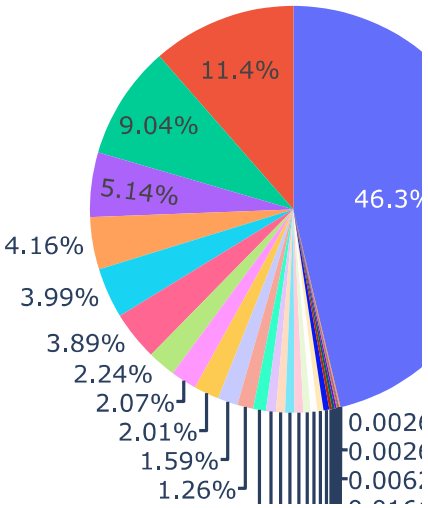
In [28]:

```
px.box(df,x="Model Year",y="City")
```



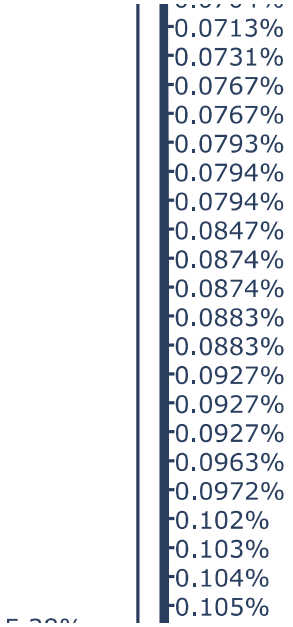
In [29]:

```
px.pie(df,values="Model Year",names="Make")
```



In [30]:

```
px.pie(df,values="Model Year",names="City")
```



Conclusion:- Tesla performs better amng all the other companies with 46.3% of Market Share

Recomendations:- Remaining Companies should focus on Marketing Strategies and Technology Development

In [ ]:

```
```