Explore the Electric Vehicles Sales Data

In [1]:

```
# Import Functions
import numpy as np
import pandas as pd
import matplotlib.pyplot as plt
import seaborn as sns
import plotly.figure_factory as ff
import plotly.express as px

import warnings
warnings.filterwarnings('ignore')
```

In [2]:

```
# Set your custom color palette

colors = ["#FF0B04", "#4374B3"]
cust_colors = sns.set_palette(sns.color_palette(colors))
#sns.set_palette(sns.color_palette(colors))
red = "#FF0B04"
blue = "#4374B3"
combined = "#782F98"
```

Load and Review the Electric Vehicles Data

In [3]:

```
# Create data frames for all records
ev_df = pd.read_csv('Electric_Vehicle_Sales_Data.csv')

print('1st 10 Rows of EV Sales Data')
ev_df.head(10)
```

```
1st 10 Rows of EV Sales Data
```

Out[3]:

	vin	county	city	state	zipcode	year	make	model	ev_type	cafv_eligibility	electric_range	base_msrp	legis
0	WBY8P6C58K	King	Seattle	WA	98115	2019	BMW	I3	BEV	CAFV Elegible	153	0	
1	5YJSA1E26J	King	Kent	WA	98042	2018	TESLA	MODEL S	BEV	CAFV Elegible	249	0	
2	5YJXCDE23J	King	Bellevue	WA	98004	2018	TESLA	MODEL X	BEV	CAFV Elegible	238	0	
3	WBY33AW0XP	King	Seattle	WA	98109	2023	BMW	I4	BEV	Unknown/Not Researched	0	0	
4	5YJ3E1EB5L	King	Bothell	WA	98011	2020	TESLA	MODEL 3	BEV	CAFV Elegible	322	0	
5	1V2GNPE86P	King	Sammamish	WA	98075	2023	VOLKSWAGEN	ID.4	BEV	Unknown/Not Researched	0	0	
6	5YJ3E1EB0M	Yakima	Yakima	WA	98908	2021	TESLA	MODEL 3	BEV	Unknown/Not Researched	0	0	
7	1N4BZ1CP3K	Kitsap	Bainbridge Island	WA	98110	2019	NISSAN	LEAF	BEV	CAFV Elegible	150	0	
8	5YJSA1E29J	Kitsap	Poulsbo	WA	98370	2018	TESLA	MODEL S	BEV	CAFV Elegible	249	0	
9	KNDCC3LGXK	King	Kirkland	WA	98033	2019	KIA	NIRO	BEV	CAFV Elegible	239	0	

In [4]:

```
# Datatypes
print('Checking Datatypes')

ev_df.info()
```

```
Checking Datatypes
<class 'pandas.core.frame.DataFrame'>
RangeIndex: 157240 entries, 0 to 157239
Data columns (total 13 columns):
 #   Column               Non-Null Count   Dtype 
---  ------               --------------   ----- 
 0   vin                  157240 non-null  object
 1   county               157240 non-null  object
 2   city                 157240 non-null  object
 3   state                157240 non-null  object
 4   zipcode              157240 non-null  int64 
 5   year                 157240 non-null  int64 
 6   make                 157240 non-null  object
 7   model                157240 non-null  object
 8   ev_type              157240 non-null  object
 9   cafv_eligibility     157240 non-null  object
 10  electric_range       157240 non-null  int64 
 11  base_msrp            157240 non-null  int64 
 12  legislative_district  157240 non-null  int64 
dtypes: int64(5), object(8)
memory usage: 15.6+ MB
```

In [5]:

```
# Number Rows and Columns

ev_df.shape
```

Out[5]:

```
(157240, 13)
```

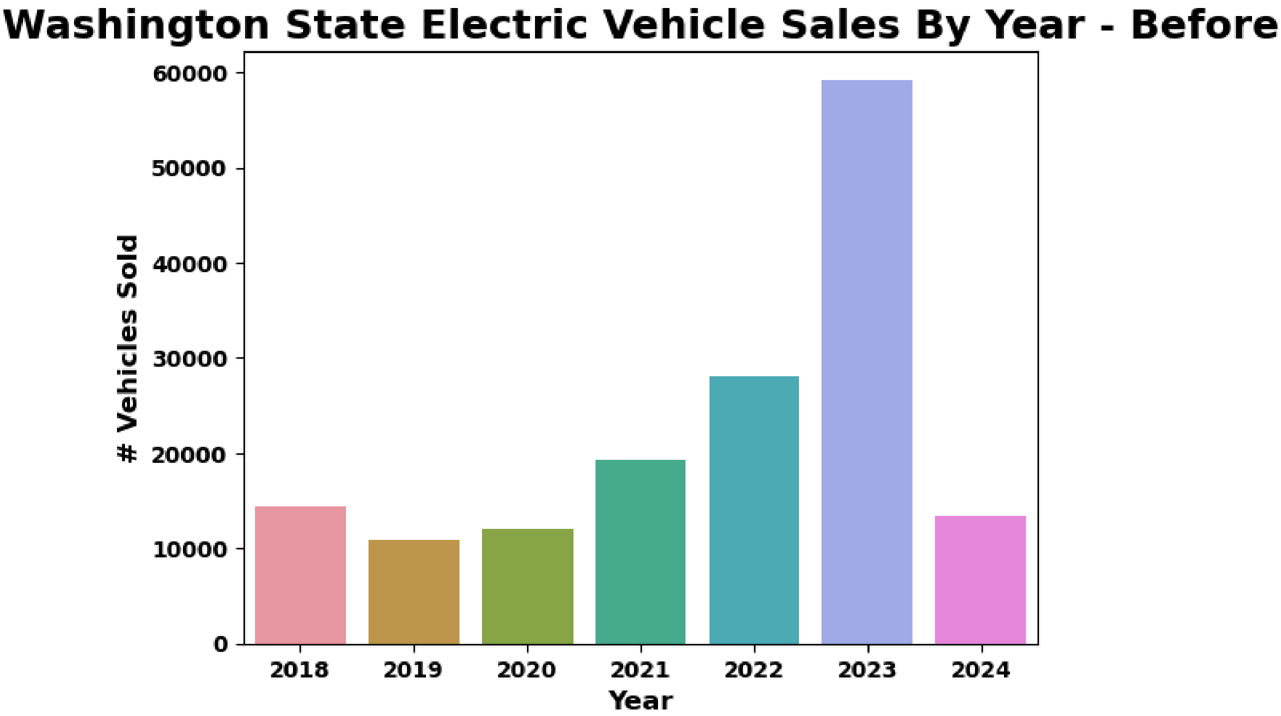
In [6]:

```
# Looking for Nulls
print('Looking for Columns with NULLS')

print(ev_df.isnull().sum())
```

```
Looking for Columns with NULLS
vin                     0
county                  0
city                    0
state                   0
zipcode                 0
year                    0
make                    0
model                   0
ev_type                 0
cafv_eligibility        0
electric_range          0
base_msrp               0
legislative_district    0
dtype: int64
```

Sales Counts

In [7]:
```
# Counts by year

ev_cp = sns.countplot(data = ev_df, x = 'year')

ev_cp.set_title('Washington State Electric Vehicle Sales By Year - Before',
                      fontdict={'size': 18, 'weight': 'bold', 'color': 'black'})
ev_cp.set_xlabel('Year', fontdict={'size': 12, 'weight': 'bold'})
ev_cp.set_ylabel('# Vehicles Sold', fontdict={'size': 12, 'weight': 'bold'})

#Set x-axis labels bold
plt.xticks(weight = 'bold')

#Set y-axis labels and set to bold
plt.yticks(weight = 'bold')

# Show the plot
plt.show()
```



In [8]:
```
# Counts by city and zipcode
print('\nTop 5 Cities by Zipcode Count')

city_cnts = ev_df.groupby('city')['zipcode'].nunique()
city_cnts_df = city_cnts.to_frame()
city_cnts_df = city_cnts_df.sort_values('zipcode',ascending = False)

city_cnts_df.head(5)
```

```
Top 5 Cities by Zipcode Count
```

Out[8]:

	zipcode
city	
Seattle	35
Tacoma	23
Spokane	20
Vancouver	11
Renton	9

In [9]:

```
# Counts by make
print('\nTop 5 Sales by Brand Count')

ev_df[['make']].groupby(['make'])['make'] \
                             .count() \
                             .reset_index(name='count') \
                             .sort_values(['count'], ascending=False) \
                             .head(5)
```

```
Top 5 Sales by Brand Count
```

Out[9]:

	make	count
33	TESLA	77307
5	CHEVROLET	8404
17	KIA	7282
10	FORD	6670
26	NISSAN	6627

In [10]:

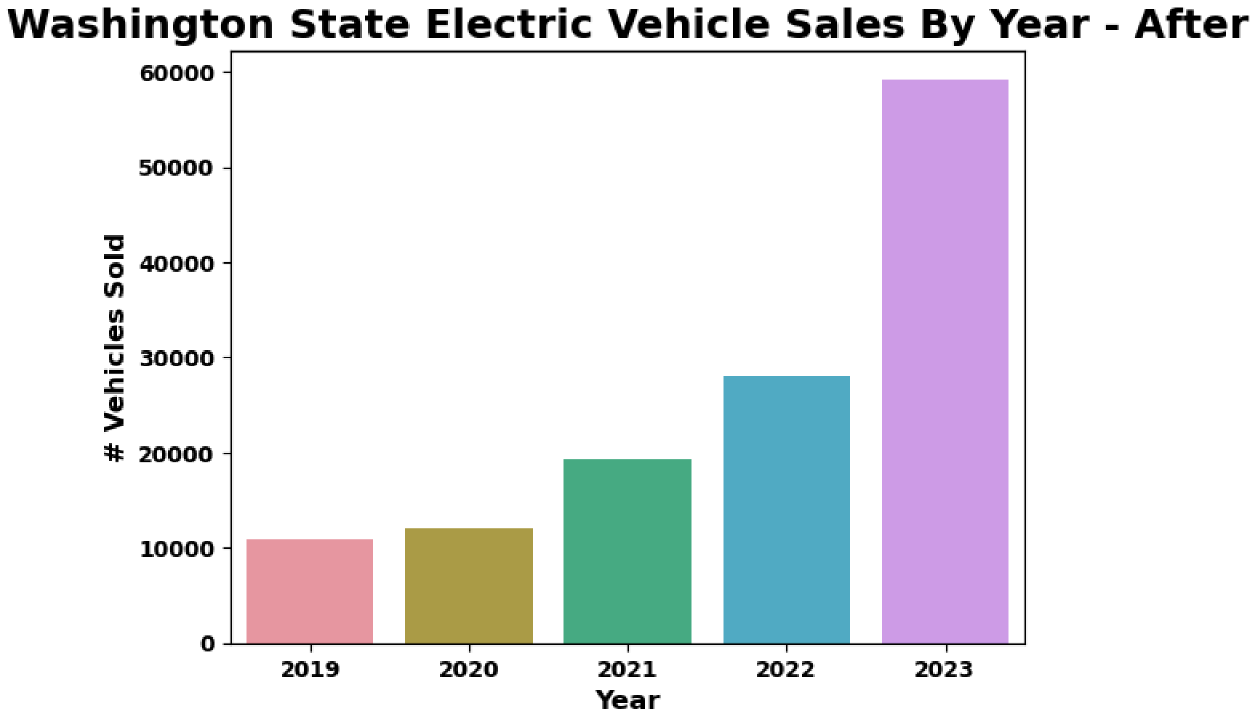
```
# Discard years 2018 and2024
ev_df1 = ev_df[(ev_df['year']>2018)&(ev_df['year']<2024)]

ev_df1.shape
```

Out[10]:

```
(129445, 13)
```

In [11]:

```
# Counts by year after year removal

ev_cp1 = sns.countplot(data = ev_df1, x = 'year')

ev_cp1.set_title('Washington State Electric Vehicle Sales By Year - After',
                      fontdict={'size': 18, 'weight': 'bold', 'color': 'black'})
ev_cp1.set_xlabel('Year', fontdict={'size': 12, 'weight': 'bold'})
ev_cp1.set_ylabel('# Vehicles Sold', fontdict={'size': 12, 'weight': 'bold'})

#Set x-axis labels bold
plt.xticks(weight = 'bold')

#Set y-axis labels and set to bold
plt.yticks(weight = 'bold')

# Show the plot
plt.show()
```



In [12]:

```
print('The End')
```

```
The End
```