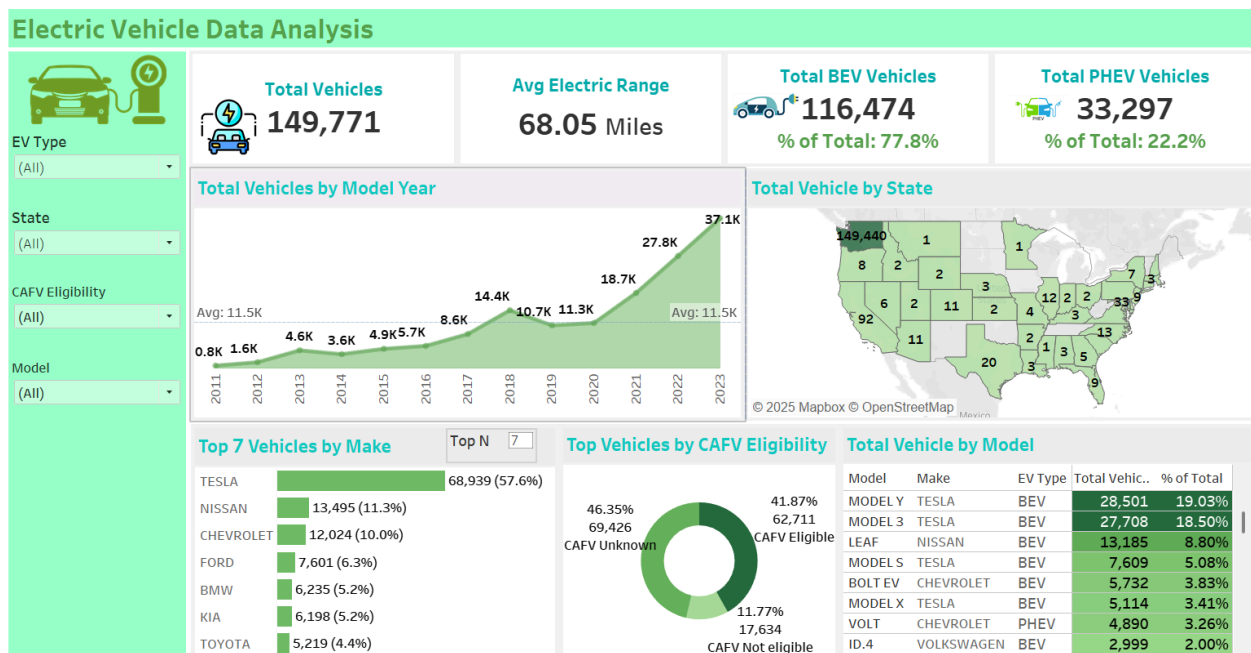


Executive Summary: Electric Vehicle Data Analysis



Problem Statement

KPI's Requirement

1. Total Vehicles:
 - Understand the overall landscape of electric vehicles, encompassing both BEVs and PHEVs, to assess the market's size and growth.
2. Average Electric Range:
 - Determine the average electric range of the electric vehicles in the dataset to gauge the technological advancements and efficiency of the EVs.
3. Total BEV Vehicles and % of Total BEV Vehicles.
 - Identify and analyze the total number of Battery Electric Vehicles (BEVs) in the dataset.
 - Calculate the percentage of BEVs relative to the total number of electric vehicles, providing insights into the dominance of fully electric models.
4. Total PHEV Vehicles and % of Total PHEV Vehicles
 - Identify and analyze the total number of Plug-in Hybrid Electric Vehicles (PHEVs) in the dataset.
 - Calculate the percentage of PHEVs relative to the total number of electric vehicles, offering insights into the market share of plug-in hybrid models.

Charts Requirements


1. Total Vehicles by Model Year (from 2010 Onwards):
 - Visualization: Line/Area Chart
 - Description: This chart will illustrate the distribution of electric vehicles over the years, starting from 2010, providing insights into the growth and pattern and adoption trends.
2. Total Vehicles by State:
 - Visualization: Map Chart
 - Description: This chart will showcase the geographical distribution of electric vehicles across different states, allowing for the identification of regions with higher adoption rates.
3. Top 10 Vehicles by Make:
 - Visualization: Bar Chart
 - Description: Highlights top 10 electric vehicles manufactured based on the number of vehicles, providing insights into the market dominance of specific brands.
4. Total Vehicles by CAFV Eligibility:
 - Visualization: Pie/Donut Chart
 - Description: Illustrate the proportion of electric vehicles that are eligible for Clean Alternative Fuel Vehicle (CAFV) incentives, aiding in understanding the impact of incentives on vehicle adoption.
5. Top 10 Total Vehicle by Model:
 - Visualization: Tree Map

- Description: Highlight top 10 electric vehicle models based on the total number of vehicles, offering insights into consumer preference and popular models in the market..

Key Highlights

1. Total Electric Vehicles (EVs)

- **Battery Electric Vehicles (BEVs)** account for **116,474 units**, making up **77.8%** of the total EVs.
- **Plug-in Hybrid Electric Vehicles (PHEVs)** contribute **33,297 units** or **22.2%** of the total EVs.

Total BEV Vehicles
 **116,474**
% of Total: 77.8%

Total PHEV Vehicles
 **33,297**
% of Total: 22.2%

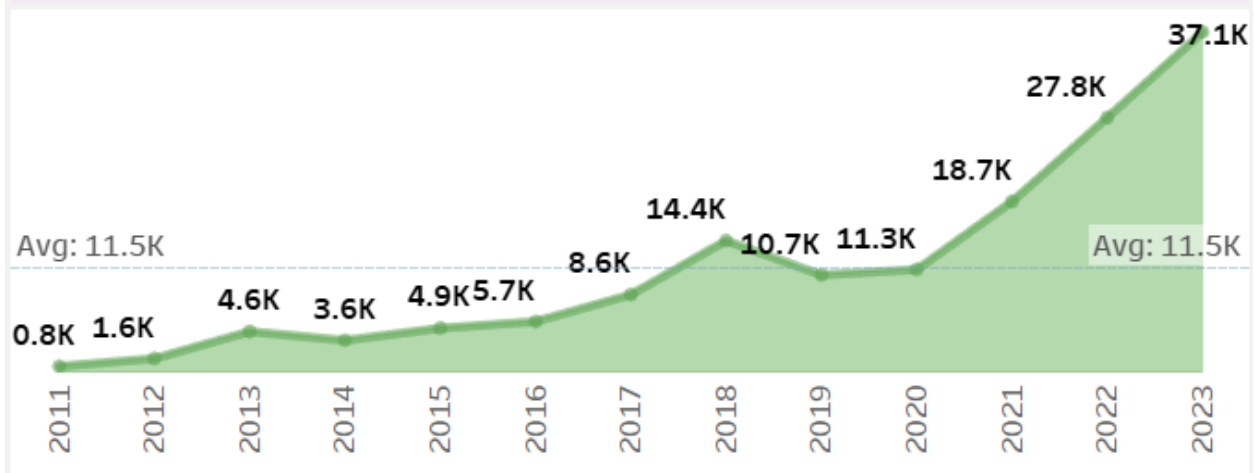
2. Average Electric Range

- The average range of EVs is **68.05 miles**, reflecting advancements in battery technology and efficiency.

3. Growth in EV Adoption

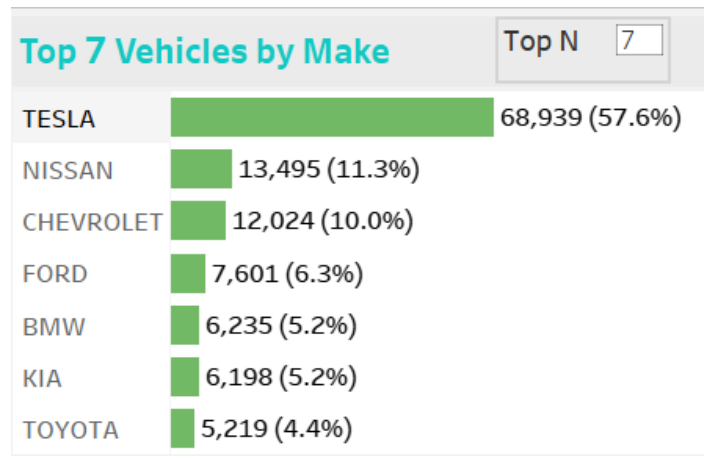
- EV adoption has grown significantly since 2011. Total vehicle registrations rose from **0.8K** in 2011 to **37.1K** in 2023, representing a **4,538% increase**.
- Key milestones:
 - A sharp increase observed in **2020-2023**, with annual registrations surpassing **18.7K** in 2022 and **37.1K** in 2023.

Total Vehicles by Model Year



4. Top EV Makes

- **Tesla** dominates the market with **68,939 vehicles (57.6%)** of the total EVs.
- Other major contributors:
 - **Nissan:** 13,495 units (11.3%).
 - **Chevrolet:** 12,024 units (10.0%).
 - **Ford, BMW, KIA, and Toyota** collectively account for **19.3%** of EVs.



5. Top EV Models

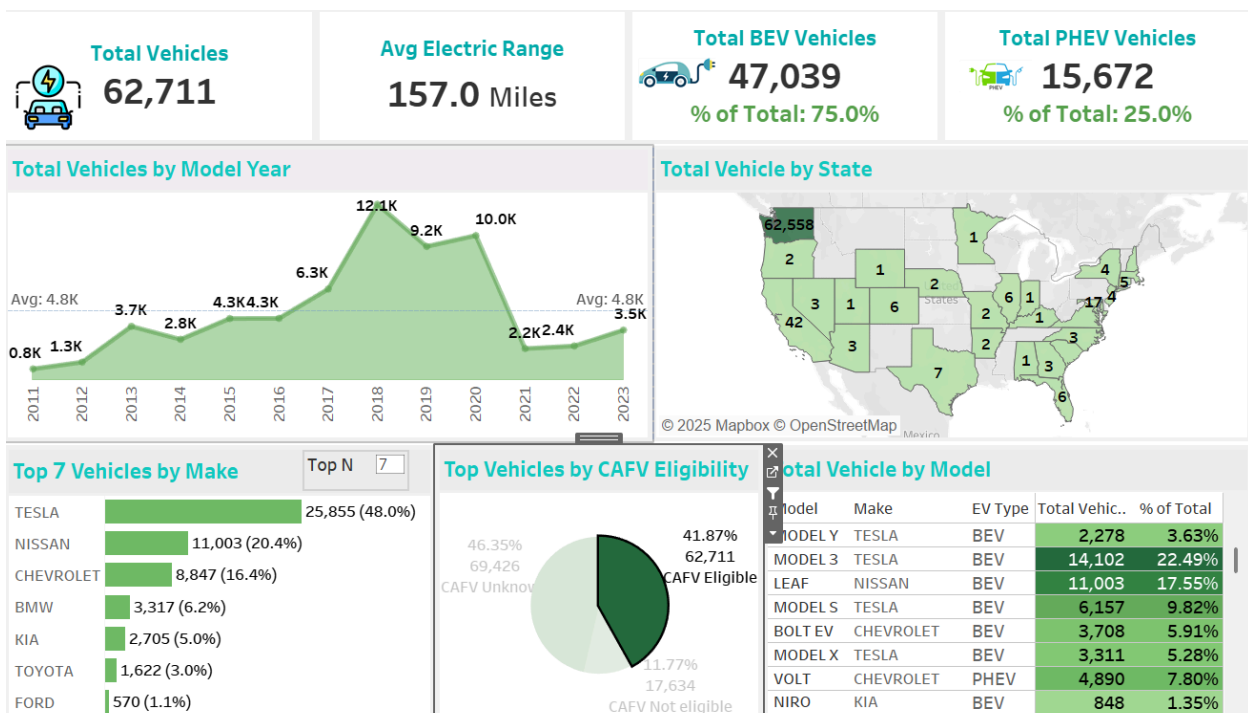
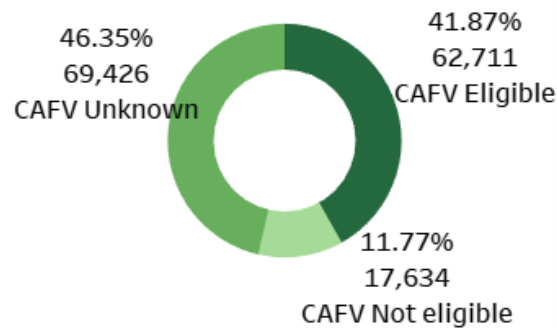
- **Tesla Model Y** and **Model 3** lead the market, with:
 - **Model Y:** **28,501 units (19.03%)**.
 - **Model 3:** **27,708 units (18.5%)**.
- Other significant models include:
 - **Nissan Leaf** (**13,185 units**, 8.8%).
 - **Tesla Model S** (**7,609 units**, 5.0%).
 - **Chevrolet Bolt EV** (**5,732 units**, 3.83%).

Total Vehicle by Model					
Model	Make	EV Type	Total Vehic..	% of Total	
MODEL Y	TESLA	BEV	28,501	19.03%	
MODEL 3	TESLA	BEV	27,708	18.50%	
LEAF	NISSAN	BEV	13,185	8.80%	
MODEL S	TESLA	BEV	7,609	5.08%	
BOLT EV	CHEVROLET	BEV	5,732	3.83%	
MODEL X	TESLA	BEV	5,114	3.41%	
VOLT	CHEVROLET	PHEV	4,890	3.26%	
ID.4	VOLKSWAGEN	BEV	2,999	2.00%	

6. CAFV (Clean Alternative Fuel Vehicle) Eligibility

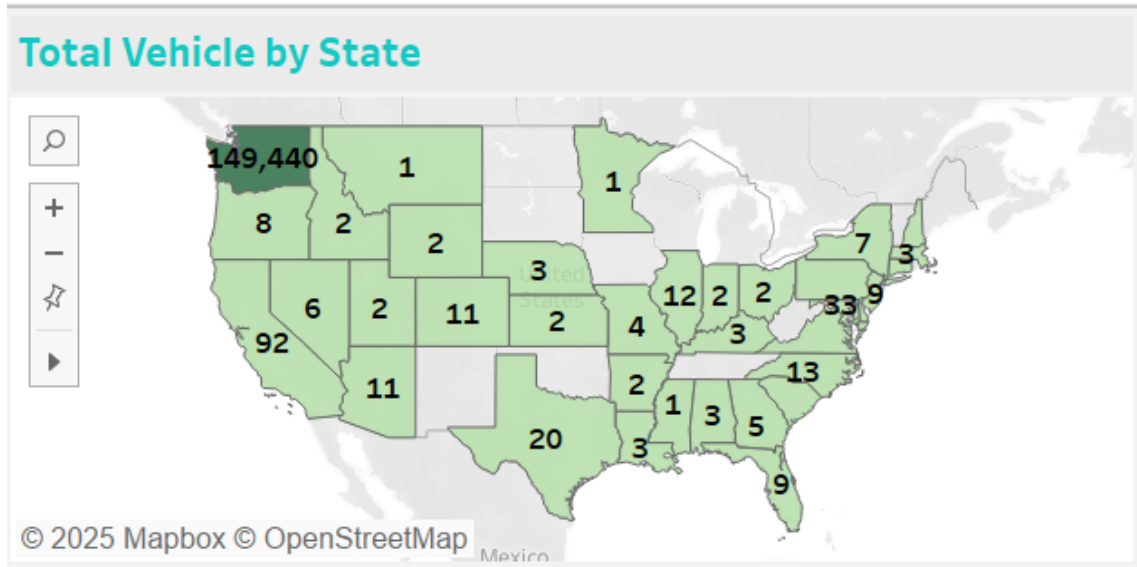
- **46.35%** (69,426) are marked as "Unknown"(Research Phase) for CAFV eligibility.
- **41.87%** (62,711 vehicles) are CAFV eligible.
- **11.77%** (17,634 vehicles) are not CAFV eligible, indicating room for improvement in meeting CAFV standards.

Top Vehicles by CAFV Eligibility



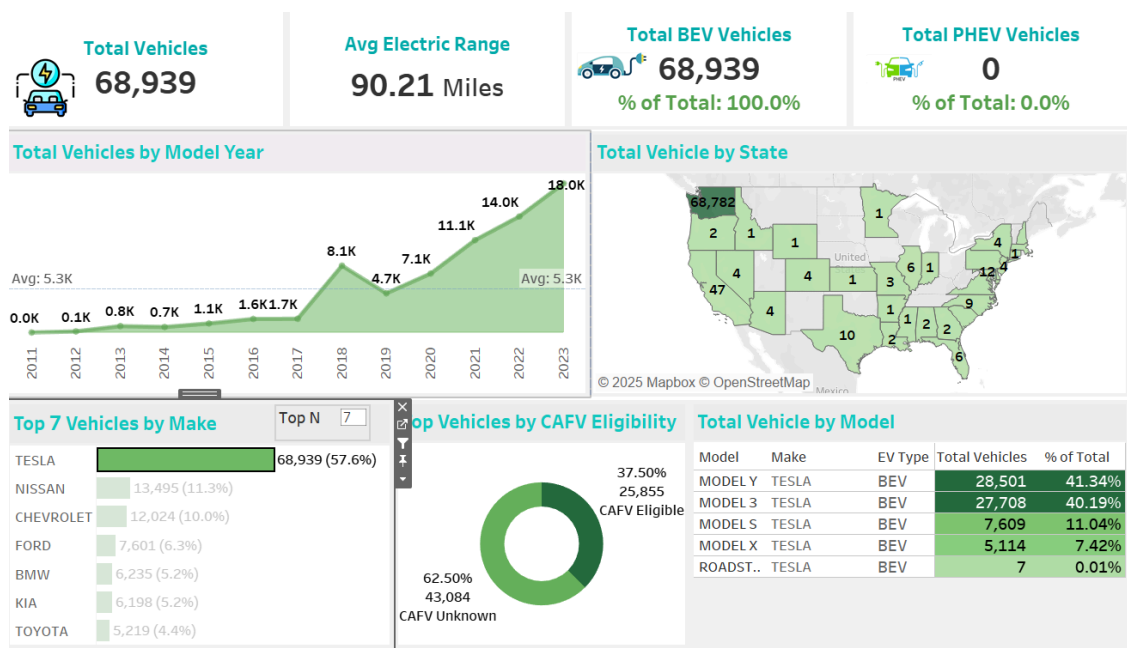
7. State-Wise Distribution

- The majority of vehicles are concentrated in California, with **149,440 units**. Other states show minimal adoption, highlighting potential market opportunities in underserved regions.



Detailed Observations

- Tesla's Dominance:** Tesla's stronghold in both the make and model categories underscores its market leadership and brand loyalty.



- **Emerging Trends:**

- Increased adoption of BEVs highlights a shift towards fully electric solutions rather than hybrids.
- The growth trajectory from 2011 to 2023 indicates exponential adoption as technology matures and incentives improve.

Recommendations

1. **Diversify Model Offerings:**

- Encourage other manufacturers to innovate and compete with Tesla to diversify market options.
- Promote more affordable models for increased accessibility.

2. **Range Optimization:**

- Invest in R&D to improve EV range and address consumer concerns about distance limitations.
- Highlight vehicles with exceptional range to attract new customers.

