## **Industry-Level Report: Electric Vehicle (EV) Analysis Using Tableau**

### **1. Introduction**

The electric vehicle (EV) market has seen significant growth over the past decade, driven by advancements in technology, environmental concerns, and government incentives. This report provides an in-depth analysis of the EV landscape, focusing on key performance indicators (KPIs) such as the total number of EVs, average electric range, and the market distribution between Battery Electric Vehicles (BEVs) and Plug-in Hybrid Electric Vehicles (PHEVs). The analysis leverages Tableau to visualize the data and draw insights about market trends, technological advancements, and regional adoption rates.

### **2. Methodology**

The data for this analysis was sourced from a comprehensive EV dataset that includes various attributes such as vehicle identification numbers (VINs), location data, vehicle specifications, and eligibility for clean alternative fuel vehicle (CAFV) incentives. The following steps were undertaken:

1. Data Cleaning and Preprocessing: Removing duplicates, handling missing values, and standardizing data formats.
2. Data Integration: Combining data from multiple sources to ensure a holistic view of the EV landscape.
3. Visualization: Using Tableau to create interactive dashboards that illustrate key metrics and trends.
4. Analysis: Interpreting the visualizations to extract actionable insights.

### **3. Requirement Analysis**

The analysis focuses on the following KPIs:

1. **Total Vehicles**: Assessing the market size and growth of both BEVs and PHEVs.
2. **Average Electric Range**: Evaluating the technological advancements and efficiency of EVs.
3. **Total BEV Vehicles and % of Total BEV Vehicles**: Analyzing the dominance of fully electric models.
4. **Total PHEV Vehicles and % of Total PHEV Vehicles**: Examining the market share of plug-in hybrid models.
5. **Total Vehicles by Model Year**: Understanding the growth pattern and adoption trends over the years.
6. **Total Vehicles by State**: Identifying regions with higher EV adoption rates.
7. **Top 10 Total Vehicles by Make**: Highlighting the leading EV manufacturers.
8. **Total Vehicles by CAFV Eligibility**: Understanding the impact of incentives on EV adoption.
9. **Top 10 Total Vehicles by Model**: Identifying popular EV models in the market.

### **4. Visualizations and Insights**

#### **Total Vehicles by Model Year (From 2010 Onwards)**

**Visualization**: Line/Area Chart

**Insights**:

* The number of EVs has been steadily increasing since 2010, with a significant spike in 2022 (27.8k vehicles) and 2023 (37.1k vehicles).
* This growth indicates rising consumer interest and advancements in EV technology.

#### **Total Vehicles by State**

**Visualization**: Map Chart

**Insights**:

* Washington (WA) has the highest number of EVs (150,082), indicating strong regional adoption.
* States with higher EV adoption rates could be influenced by state-specific incentives and infrastructure.

#### **Top 10 Total Vehicles by Make**

**Visualization**: Bar Chart

**Insights**:

* Tesla leads the market with 68,942 vehicles (52.70%), followed by Nissan (13,497) and Chevrolet (12,025).
* Tesla's dominance reflects its brand strength and technological leadership in the EV market.

#### **Total Vehicles by CAFV Eligibility**

**Visualization**: Donut Chart

**Insights**:

* A significant portion of EVs (46.33%) have unknown CAFV eligibility, followed by 41.81% eligible and 11.86% not eligible.
* The impact of CAFV incentives on EV adoption needs further exploration.

#### **Top 10 Total Vehicles by Model**

**Visualization**: Tree Map

**Insights**:

* The top EV models reflect consumer preferences and market trends, with certain models consistently leading in adoption.

### **5. Insights from the Dashboard**

* **Market Growth**: The EV market has shown robust growth, particularly in recent years, indicating increased consumer awareness and acceptance.
* **Technological Advancements**: The average electric range of EVs is improving, reflecting advancements in battery technology and efficiency.
* **Regional Adoption**: States with high EV adoption rates are likely influenced by favorable policies, incentives, and infrastructure.
* **Manufacturer Dominance**: Tesla's market dominance underscores the importance of innovation and brand strength in the EV industry.
* **Incentive Impact**: The role of CAFV eligibility in EV adoption highlights the significance of government incentives in driving market growth.

### **6. Conclusion**

The analysis of the EV landscape reveals a rapidly growing market with significant technological advancements and regional variations in adoption rates. Key manufacturers like Tesla continue to lead the market, while incentives play a crucial role in promoting EV adoption. As the industry evolves, continuous monitoring of these KPIs will be essential for stakeholders to make informed decisions and drive further growth in the EV market.

This report provides a comprehensive overview of the current state of the EV market, leveraging data-driven insights to highlight trends and inform strategic planning. Future analyses should focus on emerging trends, consumer behavior, and the impact of new technologies and policies on the EV market.

#### **Recommendations**

1. **Increase Awareness and Adoption of CAFV Incentives**: Enhancing awareness of CAFV incentives can further boost EV adoption.
2. **Support Regional Infrastructure Development**: Regions with lower adoption rates can benefit from improved charging infrastructure and supportive policies.
3. **Encourage Technological Advancements**: Continued focus on increasing the electric range and efficiency of EVs will enhance consumer confidence and adoption.
4. **Promote Diverse EV Models**: Encouraging the availability and promotion of a diverse range of EV models can cater to different consumer preferences and needs.
5. **Monitor and Address Market Trends**: Regularly monitoring market trends and consumer preferences will help in adapting strategies to support EV growth.

By following these recommendations, stakeholders can continue to foster the growth and adoption of electric vehicles, contributing to a sustainable and eco-friendly future.