Power BI Project Report

Electric Cars Data Analysis:

1. Project Overview

The goal of this project is to analyse the **Electric Vehicle (EV) population dataset** to uncover insights about adoption trends, vehicle types, manufacturers, states, and ranges. The report also studies **CAFV (Clean Alternative Fuel Vehicle) eligibility**, cost (MSRP), and EV performance across regions.

This project provides **data-driven insights** to policymakers, EV manufacturers, and energy utilities for promoting electric mobility and planning infrastructure.

Problem statement:

KPI'S Requirement

1. Total EVs:

- Understand the overall landscape of electric vehicles, encompassing both BEVs and PHEVs, to assess the market's size and growth.

2. Electric Range:

- Determine the average electric range of the electric vehicles in the dataset to gauge the technological advancements and efficiency of the EVs.
- Determine maximum and minimum electric range of the electric vehicles in the dataset.

3. Total BEV Vehicles and % of Total BEV Vehicles:

- Identify and analyse 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 analyse 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.

5. City and State with Most EVs:

- Identify City and State with most EVs to get region with biggest size of EV business.

2. Dataset Description

- **Source**: Electric_Vehicle_Population_Data.csv
- **Key Columns**:
    - VIN (1-10) → Unique identifier

- County, City, State → Geographic info
- Postal Code, Legislative District
- Make → Manufacturer (Tesla, Nissan, Chevrolet, etc.)
- Model, Model Year
- Electric Vehicle Type (BEV – Battery EV, PHEV – Plug-in Hybrid EV)
- Electric Range (in miles/km)
- Base MSRP (price)
- CAFV Eligibility (Clean Fuel Vehicle program status)

3. Data Cleaning & Preparation (in Power BI)

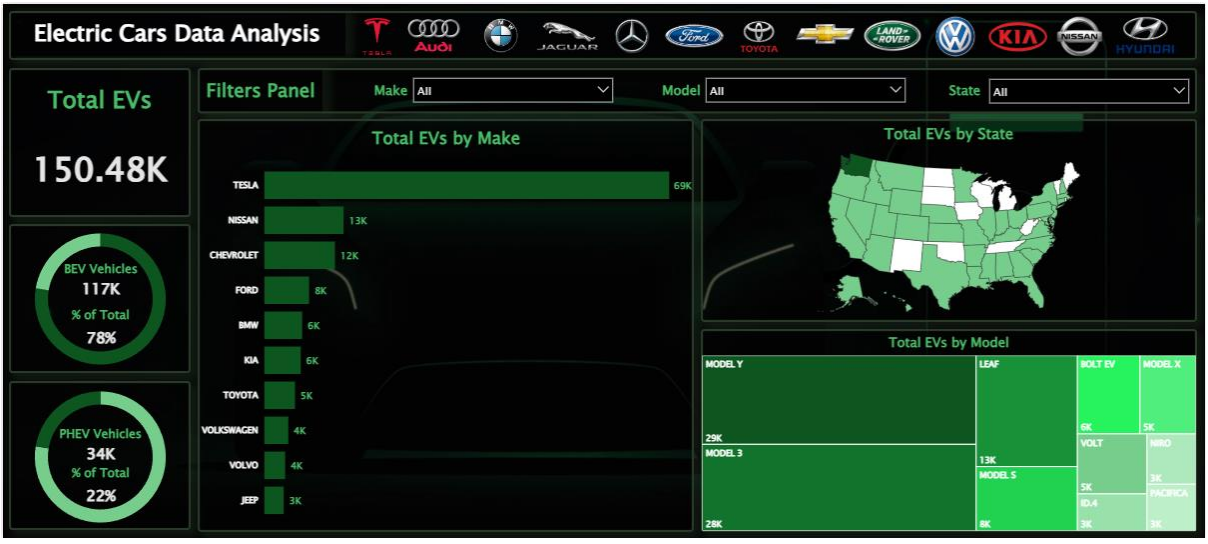
- Removed duplicates based on VIN.
- Standardized categorical columns (Make, Model, CAFV Eligibility).
- Created calculated columns:
  - **Total EVs** = COUNT of VIN.
  - **EV Type %** = Distribution of BEV vs PHEV.
  - **Average Range (Km)**.
  - **Average MSRP**.

4. Dashboards & Visualizations

Dashboard 1 - EV Population Overview

- **Total EVs:** 150K+
- **Distribution by Make:** Tesla dominates with **69K EVs**, followed by Nissan (13K) and Chevrolet (12K).
- **Distribution by Model:** Model Y (29K) and Model 3 (28K) are top.
- **EVs by State (Map):** Higher adoption in coastal and urban states.
- **BEV vs PHEV:**
  - BEV - 117K (78%)
  - PHEV - 34K (22%)

📌 **Insight**: Tesla leads EV adoption, and BEVs dominate the market.

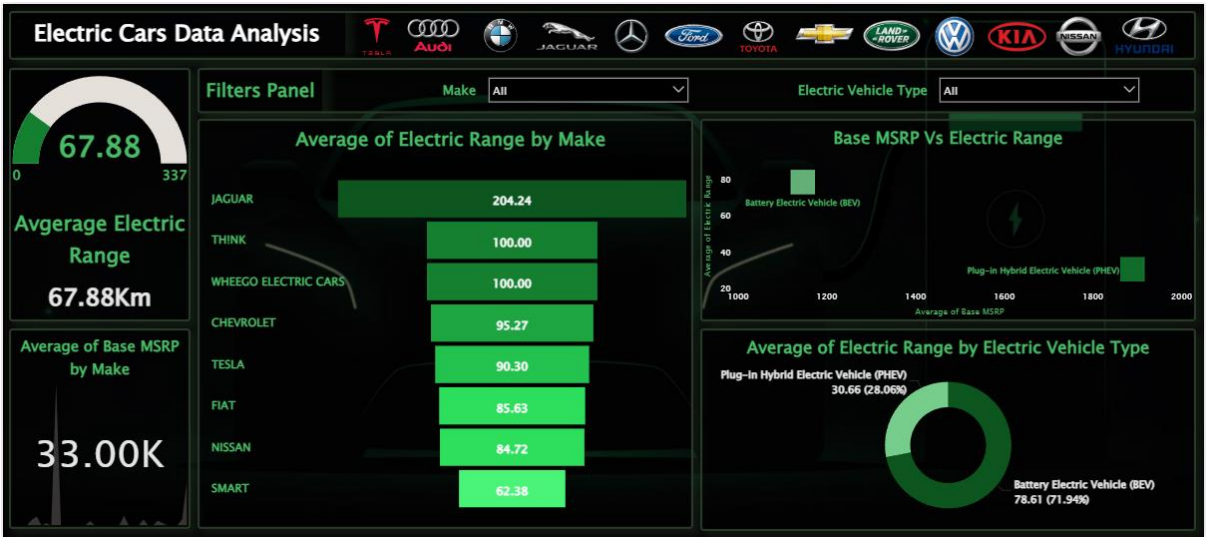


Dashboard 2 – Electric Range & Cost Analysis

- **Average Electric Range:** 67.88 km

- **Top Manufacturer by Range:** Jaguar (204 km).
- **Base MSRP vs Range:**
  - BEVs - lower MSRP, higher range.
  - PHEVs - higher MSRP, lower range.
- **Range by EV Type:**
  - BEV Average range: 78.61 km
  - PHEV Average range: 30.66 km

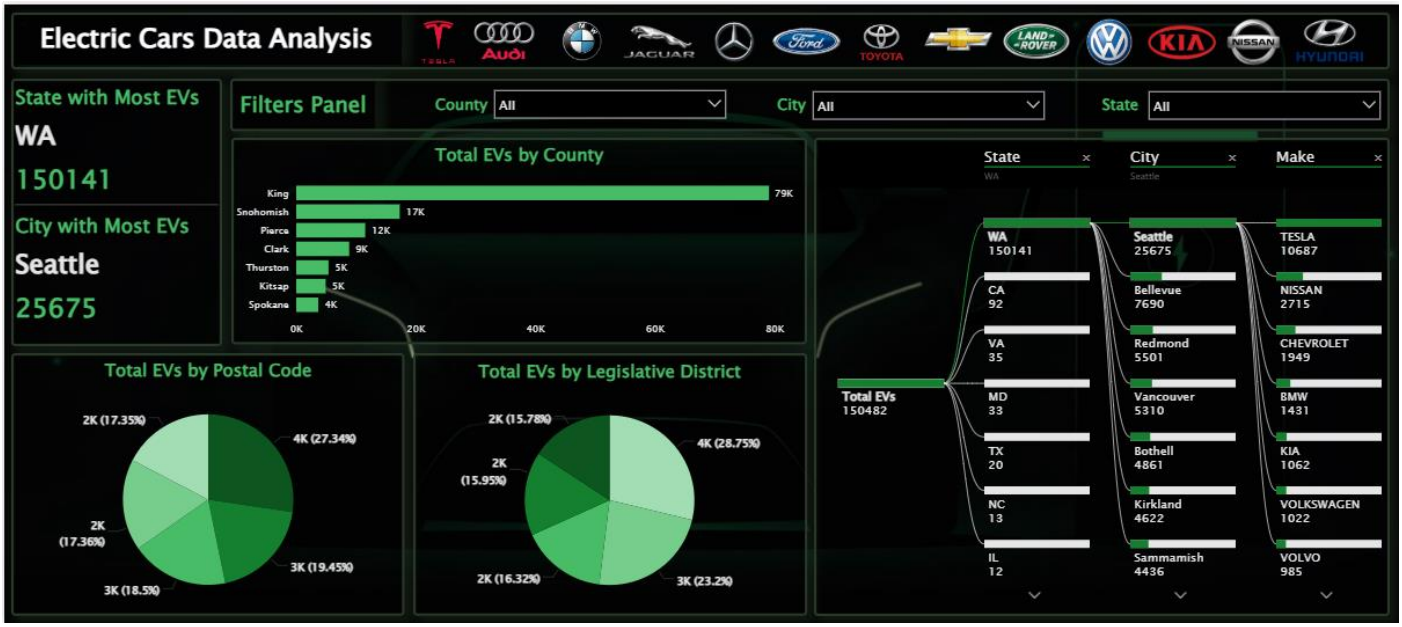
📌 **Insight**: BEVs provide better value (longer range at lower cost). Luxury makers (Jaguar) offer the longest ranges.



Dashboard 3 – Geographic Analysis

- **State with Most EVs:** Washington (WA) → 150K EVs
- **City with Most EVs:** Seattle → 25K EVs
- **Top Counties:** King (79K), Snohomish (17K), Pierce (12K).
- **EV Distribution:** also analysed by Postal Code & Legislative District.
- **Make Distribution by City:**
  - Seattle - Tesla leads with 10K EVs
  - Other cities like Bellevue, Redmond, Vancouver also contribute heavily.

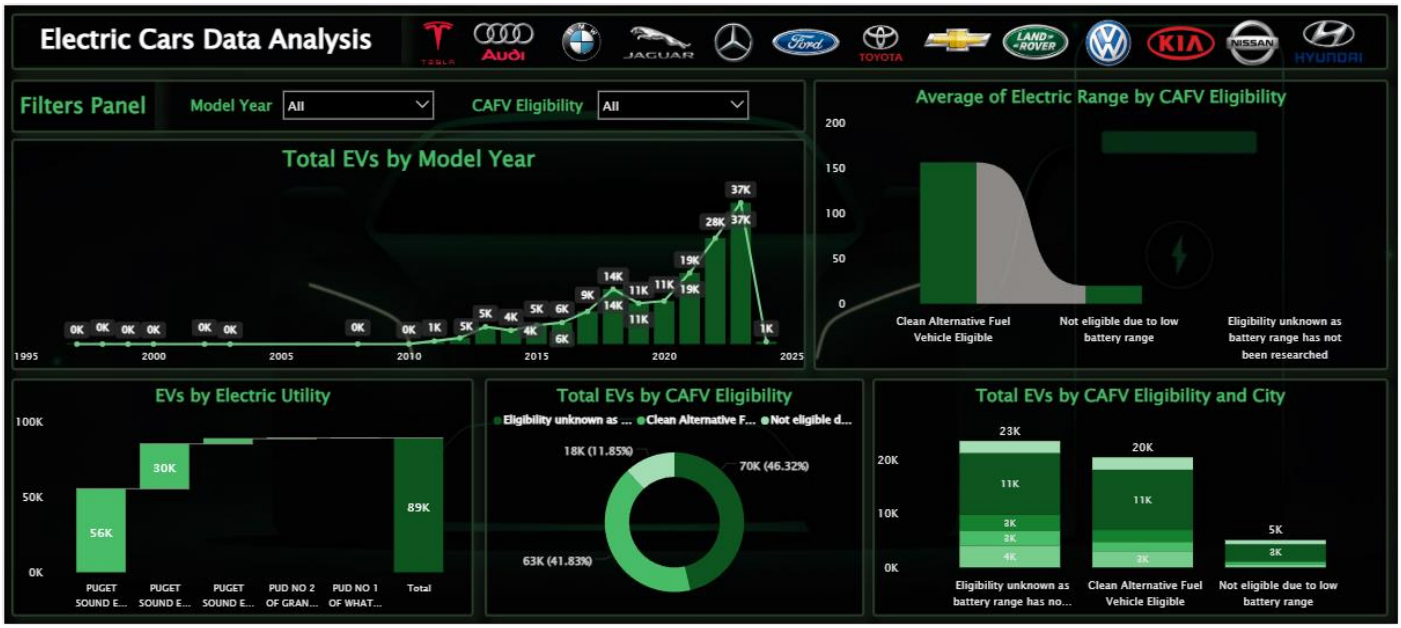
📌 **Insight**: Washington, especially Seattle metro, is a **key EV hub** in the US.



Dashboard 4 – EV Growth & CAFV Eligibility

- **EVs by Model Year:** Strong growth post-2015, peaking around 2020–2022.
- **CAFV Eligibility:**
  - 46% → Eligible
  - 42% → Unknown
  - 12% → Not eligible (low battery range).
- **Electric Utilities:** Puget Sound Energy serves most EVs (56K).
- **Range by CAFV:** Eligible vehicles have higher ranges (>150 km).

📌 **Insight**: Policy-driven incentives (CAFV eligibility) align with longer-range EVs, encouraging adoption.



5. Key Insights

1. **Tesla dominates** the EV market in both sales and range.
2. **Washington (Seattle metro)** is the largest EV adoption region.
3. **BEVs are more cost-efficient** than PHEVs (better range & lower cost).
4. EV adoption **spiked after 2015**, showing maturity in the market.
5. **CAFV eligibility** boosts EV adoption, especially for long-range models.

6. Business Recommendations

- **Government & Policy Makers**: Expand CAFV programs nationwide to push adoption.
- **Manufacturers**: Focus on BEVs as they dominate both market share and customer preference.
- **Utilities**: Increase charging infrastructure in EV hotspots (Seattle, Bellevue, Redmond).
- **Consumers**: BEVs (Tesla, Nissan, Chevrolet) offer the best balance of cost and range.