**Electric Vehicle Analysis Power BI Report**

**1. Project Overview**

This Power BI dashboard provides an in-depth analysis of electric vehicle (EV) adoption trends in the United States. The report aims to present key insights into EV distribution by model year, manufacturer, state, and eligibility for Clean Alternative Fuel Vehicle (CAFV) incentives. Various DAX (Data Analysis Expressions) functions have been implemented to enhance data calculation and visualization.

**2. Data Sources & Transformation**

The dataset used for this analysis includes information on electric vehicle registrations, model specifications, manufacturer details, and eligibility criteria. The data was cleaned and transformed using Power Query and DAX calculations to ensure accuracy and usability. Key transformations include:

* Filtering out data before the year 2010.
* Creating calculated columns for percentage breakdowns (e.g., % of BEV, % of PBEV).
* Aggregating total vehicle counts by state and manufacturer.

**3. Dashboard Insights**

The dashboard presents multiple key metrics and visualizations:

* **Total Vehicles Analysis**: Displays the total count of EVs, along with breakdowns of Battery Electric Vehicles (BEVs) and Plug-in Hybrid Electric Vehicles (PHEVs).
* **Trend Analysis**: A line chart visualizes the growth of EVs by model year, showing a significant rise in adoption post-2015.
* **State-Wise Distribution**: A geographic heatmap highlights the concentration of EVs across different U.S. states.
* **Manufacturer and Model Analysis**: Bar and tree maps showcase leading manufacturers like Tesla, Nissan, and Chevrolet, along with their top-selling models.
* **CAFV Eligibility**: A donut chart illustrates the proportion of EVs that qualify for clean alternative fuel incentives.

**4. DAX Functions Used**

Several DAX functions were used to compute key metrics and enhance data visualization:

* **SUMX**: Used for calculating total vehicle counts dynamically.
* **CALCULATE**: Applied to filter and segment data (e.g., calculating BEV vs. PHEV percentages).
* **FILTER**: Used in conjunction with other functions to refine data views based on user selections.
* **DIVIDE**: Employed for percentage calculations to avoid division errors.
* **RELATED**: Used to fetch data from related tables for enhanced analysis.
* **% of BEV** = [BEV vehicles]/[Total Vehicles]
* **% of PBEV** = [PBEV vehicles]/[Total Vehicles]
* **BEV vehicles** = CALCULATE([Total Vehicles], Electric\_Vehicle\_Population\_Data[Electric Vehicle Type] = "Battery Electric Vehicle (BEV)")
* **PBEV vehicles** = CALCULATE([Total Vehicles], Electric\_Vehicle\_Population\_Data[Electric Vehicle Type] ="Plug-in Hybrid Electric Vehicle (PHEV)")
* **Total Vehicles** = DISTINCTCOUNT(Electric\_Vehicle\_Population\_Data[DOL Vehicle ID])

**5. Conclusion & Future Improvements**

The Power BI dashboard successfully provides a comprehensive overview of EV trends, enabling stakeholders to make data-driven decisions. Future enhancements could include:

* Incorporating real-time data updates.
* Adding predictive analytics for future EV adoption trends.
* Integrating external datasets such as charging station locations and environmental impact assessments.

This project demonstrates the power of Power BI in analyzing and visualizing complex datasets, with DAX functions playing a crucial role in data manipulation and insight generation.

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