# Visualization of Statistics on the Incentives for Zero-Emission Vehicles (iZEV) Program

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## DATA*6200: DATA MANIPULATION AND VISUALIZATION

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# ABSTRACT

The "Incentives for Zero-Emission Vehicles (iZEV) Program" addresses the challenge of elevated upfront costs for zero-emission vehicles (ZEVs), aiming to make them more accessible and promote the adoption of clean technology. The Incentives for Zero Emission Vehicles Program and tax write-offs for businesses are helping to make it more affordable. The iZEV Program offers point-of-sale incentives for ZEV buyers and lessees, with two incentive levels based on the vehicle's electric range: up to 5,000 CAD for longer-range ZEVs and up to 2,500 CAD for shorter range ZEVs.

This project utilizes the "Statistics on the iZEV Program" dataset released by the Government of Canada in September 2023 to create an insightful and visually comprehensive Tableau Dashboard. **A careful analysis reveals a significant surge in iZEV Program adoption in the last two years, particularly after the program's decision to enhance Vehicle Eligibility in April 2022. There is a noticeable increase in Electric Vehicle awareness across Canadian provinces, suggesting a potential move towards achieving Zero-Emission status by 2035.**

Link to the Tableau Dashboard: iZEV Statistics Dashboard

# INTRODUCTION

Statistics dataset of the Incentives Program has information for Incentives on Zero-Emission Vehicles in Canada from where we have extracted the data to do this analysis. The data spans from May 2019 to September 2023 across multiple provinces, making it an ideal for geographical and temporal analysis. In this project, we will try to understand the impact created by this program in the span of these 4 years and if the government should boost this program or attempt to improve its outreach and impact. This dataset includes the following variables:

- Province from which the claim was made
- Vehicle Make and Model (including Model Year)
- Engine type (i.e., Battery Electric vs. Long Range Hybrid Vehicles)
- Recipient type (i.e., individual or organization and whether it was purchased or leased)
- Date of Incentive Application
- Incentives Provided

# iZEV STORY DESIGN AND VISUALISATION

We have created a Visual Story on Tableau Dashboard that aims to measure the performance and the impact of this iZEV program using intuitive visuals to describe the KPIs as described below:

### *1. Spatial-Temporal Heat Map*

**Objective**: Illustrate the program's popularity growth across provinces.

**Description**: The heat map visually represents the impact of iZEV across the provinces over time, utilizing a color gradient from Green for Highest to Red for Lowest. The intuitive color scheme allows for a quick understanding of the program's influence on each province.

### 2. *Temporal Stacked Bar Graph*

**Objective**: Depict trends in Vehicle Make and Model demand over time.

**Description**: This dynamic graph portrays the evolving demand for Vehicle Makes and Models over time. The temporal aspect describes how the contribution of each Vehicle Make has trended, providing insights into the recency of effects and comparisons with other vehicles.

### 3. *Line Graphs with Forecasting Model*

**Objective**: Visualize the program's growth trajectory with future predictions.

**Description**: Utilizing Tableau's Exponential Smoothing Forecasting Model, this visualization generates a predictive curve, offering a glimpse into the program's probable growth trajectory in the future. The line graphs help stakeholders anticipate and plan for potential future trends.

### 4. *Percentage Growth Table and Line Graphs*

**Objective**: Compare Electric and Petroleum Vehicle registrations and depict growth trends.

**Description**: This visualization method compares Electric and Petroleum Vehicle registrations, showcasing growth trends over time for the Top Contributing Provinces. The combination of a table and line graphs provides a comprehensive view of contribution dynamics, aiding in understanding the evolving landscape of electric vehicles in the specified regions.

# KEY PERFORMANCE INDICATORS

## 1. PROGRAM GROWTH SINCE 2019 AND PROVINCIAL IMPACT:

To visualise the answer, we have used Spatial-Temporal Heat Map to show that there has been **significant growth in Ontario, British Columbia and Quebec**. There has been **moderate growth in Alberta, Saskatchewan, Manitoba, Newfoundland and Labrador**. In other provinces, the contribution to the program seems small due to lower volume reflecting lower population in those provinces. However, as we compare in the later section, we will realize that the effect in %age terms are equally effective (i.e. The quantum for other maritime provinces is lower, however, the percentage contribution is the same as other provinces).

## 2. MOST IN-DEMAND ELECTRIC VEHICLE BRANDS:

As we see the Temporal Stacked Bar Graph, we can clearly see that some Vehicle Models such as *"Tesla Model 3"* is among high demand (**20% contribution**) in Electric Vehicles, and it is making most use of this program's incentives. Some other Models such as *"Hyundai Kona Electric", "Toyota Prius Prime", "Outlander PHEV"* and *"Tesla Model Y"* have also recently grown demand (**26% contribution**). Other Models, however low in demand for each, are still contributing to 54% of the Electric Vehicle registrations which ultimately offers a variety of different models to consumers.

## 3. PROGRAM GROWTH RATE AND FUTURE PROJECTION:

We have used Line Graph with Forecasting Model to create a visual trend pattern of this program's growth rate, which clearly shows that there has been a significant Month-On-Month growth in both Purchased and Leased Vehicles since last 2 years after the program loosened the eligibility criteria on Vehicle Models which provided various different models to consumers to choose from to easily switch to electric vehicles from petroleum habits. The Forecast model pre-built by Tableau, uses Exponential Smoothing models and selects the best prediction basis the exponential growth trend in the data and **it indicates a significant 2.23x Growth in Vehicle Registrations in the next 6 months!**

## 4. IMPACT ON SWITCHING TO ELECTRIC VEHICLES OVER PETROLEUM:

Using Petroleum Vehicles dataset that we have fetched from Statistics Canada, we have drawn comparison between how the shift from Petroleum to Electric Vehicles over the last 5 years has been. We can observe from the Table that, in the Top Contributing 3 Provinces, there has been a dip in Petroleum Vehicle registrations and a steady increase in Electric Vehicles. Also, we can see that in these provinces, **roughly 20% of Vehicles in 2023 were Electric out of which roughly 45% are iZEV Incentivised**. We can conclude that the government should focus on improving the awareness of this program and add more Eligible Vehicles on their website to promote more growth in Electric Vehicles. **If we compare out of total vehicles, how many being put out on the streets are iZEV Incentivised, it is significant 8% as compared to two years ago.**

# Conclusion and Feedback for the iZEV Incentive Program

The dashboard analysis concludes that the iZEV Incentive Program is successfully raising awareness across the provinces, leading to a surge in Electric Vehicle production. The forecast suggests significant future growth. **Feedback includes expanding the program's outreach, emphasizing its importance to the public nationwide, adding more Vehicle Models to the eligibility list and adding more Electric Refueling Stations across all provinces.** This will provide consumers with a broader range of choices, contributing to the goal of achieving Zero-Emission status by 2035.

# References:


iZEV Dataset:

https://open.canada.ca/data/en/dataset/42986a95-be23-436e-af15-7c6bf292a2e1

Statistics Canada Dataset for Petroleum Vehicles:

https://www150.statcan.gc.ca/t1/tbl1/en/tv.action?pid=2310030801