Electric Vehicle Charging Demand Forecasting

1 INTRODUCTION

- As the adoption of electric vehicles (EVs) accelerates globally, efficient energy management at charging stations becomes essential. This project focuses on forecasting EV charging demand using weather and time-based patterns to improve planning, reduce congestion, and enhance user experience.

2 ABSTRACT

The aim of this project is to analyse and predict electric vehicle charging demand by integrating EV usage data with weather information. By creating time-based visualizations and a forecasting model, we identify demand patterns that can help optimize charging infrastructure. The project uses Excel for data transformation and forecasting, and Tableau for interactive data visualization through heatmaps and charts.

3 TOOLS USED

- Microsoft Excel - Data cleaning, forecasting model

- Tableau - Data visualization (heatmaps, line charts, dashboards)

- (Python was intended but not used)

4 STEPS INVOLVED IN BUILDING THE PROJECT

1. Data Preparation

- Merged EV usage and weather datasets in Excel.

- Cleaned time formats and extracted relevant time-based features (weekday, hour).

2. Visualization in Tableau

- Created heatmaps showing EV demand by weekday and hour.

- Visualized demand trends under varying weather conditions (e.g., temperature, rain).

- Developed dashboards for clearer insights.

3. Forecasting Model in Excel

- Used Excel's built-in forecasting feature to model hourly EV demand.

- Plotted line charts with confidence intervals to identify expected usage.

4. Optimization Strategy

- Identified peak demand hours.

- Suggested charging during low-demand periods.

- Analysed the impact of weather on usage behaviour.

5 CONCLUSION

This project demonstrates how simple tools like Excel and Tableau can provide deep insights into electric vehicle charging behaviour. Forecasting future demand helps in reducing station load, managing power efficiently, and enhancing the overall EV user experience. The approach is scalable and can be enhanced with advanced tools in the future, such as Python-based time-series models.