

Encouraging the Use of Electric Cars in Parana: Charging Stations in Urban Areas

Leonardo N. Martinez-Casares¹ – Marcos E. Manavella²

Electronics and Electromechanical Engineering Department, Facultad Regional Paraná, Universidad Tecnológica Nacional

1033 Almafuerde Av, Paraná Entre Ríos, Argentina

¹ leonardomartinezcasares@alu.frp.utn.edu.ar

² marcosmanavella08@gmail.com

Summary—In Paraná, Entre Ríos, approximately 100,000 vehicles are in circulation, which means there is one vehicle for every 3.5 inhabitants. Only 5.6% of that figure represents electric vehicles. One of the reasons for the limited presence of electric vehicles is the lack of charging stations in the city. Our work aims to study how to promote greater use of electric cars by analyzing the implementation of charging stations for them.

Keywords: Electric cars, electric vehicle charging stations, sustainable vehicles.

Resumen—En Paraná, Entre Ríos circulan alrededor de 100.000 vehículos, es decir, hay un vehículo por cada 3,5 habitantes aproximadamente. Sólo el 5,6% de esa cifra son vehículos eléctricos. Una de las razones por las que no hay muchos vehículos eléctricos es la falta de estaciones de carga en la ciudad. Nuestro trabajo tiene como objetivo estudiar cómo promover un mayor uso de los coches eléctricos analizando la implementación de estaciones de carga para los mismos.

Palabras clave: Autos eléctricos, estaciones de carga para vehículos eléctricos, vehículos sustentables.

I. INTRODUCTION

This presentation is based on different areas of Paraná. In Parana, there are around 100,000 vehicles, that is, there is one vehicle for every 3.5 inhabitants approximately. Each vehicle releases 140 grams of CO₂ per kilometer, which greatly impacts on the environment. Only 5.6% of that number are electric vehicles, which causes less damage to the environment. One of the reasons why there are not many electric vehicles is the lack of charging stations in the city.

Our work aims to study how to promote greater use of electric cars, as it is observed in developed countries. This will bring a positive impact on the environment, reduce CO₂ emissions, but it will also bring economic savings for drivers and society in general. The purpose of this work is to analyze the implementation of charging stations for electric cars in Paraná.

In order to achieve this purpose, this paper is organized into three sections. Section 2 is going to define and analyze the problem of lack of charging stations for electric vehicles in Paraná. Section 3 is going to outline how to address the identified problem. Section 4 is going to present a conclusion.

II. PROBLEM DEFINITION AND ANALYSIS

A. Description of the Context

Entre Ríos is a province located in the central-eastern part of Argentina. It has a border with the province of Corrientes

to the north, the Uruguay River to the east, the province of Buenos Aires to the south, and the provinces of Santa Fe and Corrientes to the west. This province has 17 departments and a population of 1.3 million people. Its capital city is Paraná, which is the focus of our project.

Paraná is a city with an area of 137 km². In this city, there is a population of 391,962 people [1]. As shown in Fig. 1, at the top, the Paraná River can be seen. It is also surrounded by agricultural and livestock lands.

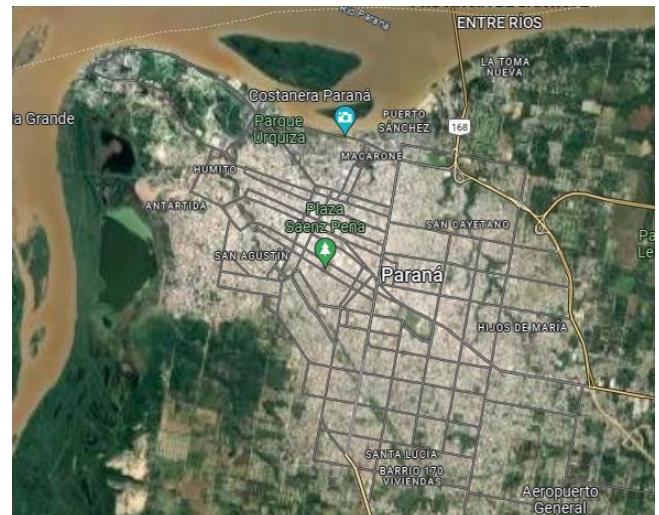


Fig. 1. Map of the city of Parana [2]

There is usually congested traffic in Paraná. As of May 2021, there were approximately 100,000 cars [3]. There are different makes and models but only a few are electric cars.

B. Problem Statement

Currently, in Paraná there is a lack of electric vehicles, which is an unfavorable situation for both society and the environment. The persistence in the use of combustion cars continues after considerable environmental pollution, as well as excessive noise. In addition, these vehicles require regular maintenance and are expensive in terms of fuel. If the use of electric cars were to be adopted, there would be significant improvements in all these aspects.

A possible solution to this problem would be to implement charging points for electric vehicles, as it has been done in other cities in Argentina. Throughout the country, there are currently more than 110 charging points available [4]. This initiative has boosted sales of electric cars in the country, with an increase of 33% in 2022 compared to 2021, and a notable increase of 231% compared to 2020 [5].

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C. Description of Scenes that Help Picture the Problematic Situation

Fig. 2 shows an image of the traffic area known as 5 esquinas (five corners) in Paraná. As observed, there are many non-electric vehicles, which generates significant noise and air pollution.



Fig. 2. Traffic in the city of Paraná [6]

In Fig. 3 there is a gas station located in the coastal area of Paraná. Some cars can be observed refueling with gasoline. There are more than 10 gasoline pumps, but there are no electric vehicle charging stations. There should be electric vehicle charging stations available at this gas station.



Fig. 3. Gas station in the city of Paraná [7]

Fig. 4 shows a car dealership located in the city of Paraná. It is the Haimovich dealership, an official seller of the Volkswagen brand. They also have a smaller number of cars from other brands available for sale.

As observed, there are many cars of different models and colors, but no electric cars are visible. It is evident that electric cars are not sold at this dealership.



Fig. 4. Car dealer in the city of Paraná [8]

In Fig. 5, there is a map displaying the locations of electric vehicle charging stations. It is evident that there are no charging stations in the city of Paraná and its surrounding areas.

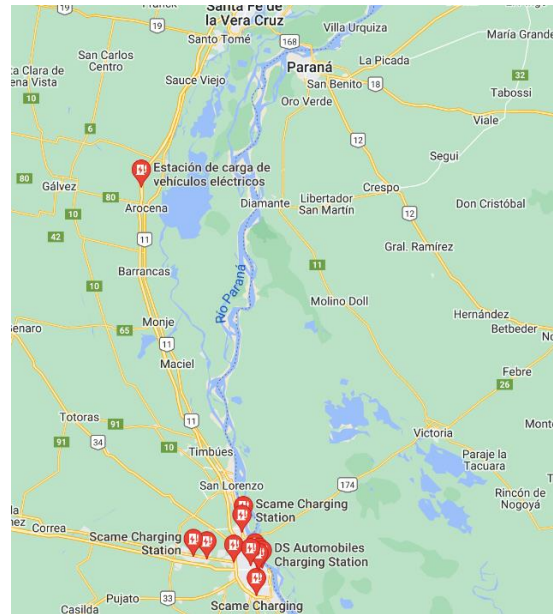


Fig. 5. Charging stations map [9]

These images clearly show the problem of lack of electric charging stations in Paraná. It is now necessary to analyze the causes and consequences of this issue.

D. Identification and analysis of causes or factors that give rise to the problem:

There are different factors that give rise to the problem of lack of electric charging stations in Paraná. To begin with, the lack of adequate and convenient charging stations could cause people not to choose electric vehicles. The fear of running out of electricity in places where there is no electric charging infrastructure is a significant barrier.

Another cause is related to the fact that, compared to conventional vehicles, electric vehicles are initially much more expensive, therefore, they are not commercialized on a large scale in Argentina, and Paraná is not the exception. This probably puts many people out of access to these types of cars, despite being aware of the benefits this would bring.

A further cause is connected to the lack of autonomy that electric cars have. Electric cars have evolved as time goes by and their batteries have improved as well. However, there are limitations in terms of autonomy compared to conventional cars. People may have problems with them when traveling long distances and their battery may not last very long and may not make it to a charging station.

E. Identification and Description of the Consequences

Because there are no charging stations, the lack of electric cars generates the following consequences. First, conventional vehicles produce high levels of noise. This leads to significant noise pollution in urban areas, causing detrimental effects on health. These effects can include

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hearing issues, stress, and anxiety. Based on the aforementioned, it is clear that it leads to a lower quality of life for the people in that area.

A second consequence has to do with the fact that having a significant international dependency on non-renewable resources like diesel, gasoline, and GNC makes people susceptible to oil crises and economic downturns during global events. Since these resources are non-renewable, it is possible that they will eventually run out, and their use contributes to climate change.

A further consequence is connected with the fact that emissions of polluting gases and harmful particles from internal combustion engine vehicles have a negative impact on air quality. This affects human health and biodiversity. This reduces the quality of life for society and the animals around us.

III. THE WAY FORWARD

A. Problem approach

To propose a possible solution to the lack of charging stations problem in Paraná, we have researched strategies implemented in other countries like the United States [10].

Our proposal is based on the implementation of financial incentives or municipal subsidy programs for companies and organizations to invest in the installation of electric charging stations. A long-term analysis should be conducted to strategically place these stations in the most densely populated and tourist areas and their surroundings to ensure user convenience.

Furthermore, it is imperative to establish regulations that define safety and quality standards for charging stations. This will ensure proper functionality and prevent future inconveniences, thereby instilling confidence in those who use them.

It would be of great importance for the Municipality of Paraná to conduct educational campaigns to inform the population about the benefits of electric vehicles and the availability of charging stations in the city. These campaigns would aim to raise awareness about the significance of electric vehicles and promote their adoption.

B. Strengths and Weaknesses of the Proposal

According to our research, the main strength of this proposal is in the reduction of environmental and noise pollution generated by conventional automobiles. Another significant strength is the decrease in people's monetary expenses, since they will not have to spend money on fuel.

Furthermore, by implementing this proposal in Paraná, new jobs will be created in the construction, installation and management of these electric charging infrastructures. It is expected that the presence of these stations in Paraná will increase the number of tourist visitors to the city.

The main weakness or disadvantage of this proposal is that to carry out the project a large investment of money is required, which would be a negative point if the necessary resources are not available.

In addition, these stations will take up a lot of space where they will be installed and will depend on a reliable and

efficient electrical network. In other words, if major power outages occur, these stations could stop working.

IV. CONCLUSION

In conclusion, the problem of the lack of electric vehicles in the city of Paraná due to the scarcity of charging infrastructure entails significant environmental and noise pollution. It also leads to a substantial economic burden and maintenance costs for owners of combustion engine cars.

As a solution to this issue, we propose the strategic installation of electric charging stations in high-traffic areas of the city. This initiative will not only encourage people to purchase electric vehicles but also reduce both environmental and noise pollution. By doing so, we aim to improve the quality of life for residents while promoting electric mobility.

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Leonardo N. Martinez-Casares is an Electronics Engineering student at UTN FRP: leonardomartienzcasares@alu.frp.utn.edu.ar. Marcos E. Manavella is a Civil Engineering student at UTN FRP: marcosmanavella08@gmail.com.

The present project is a skills integration activity in Inglés I at Universidad Tecnológica Nacional, Facultad Regional Paraná, carried out by EFL engineering students. The yearlong project requires students to delve into a problem in the city where they live and to address it by means of a simple project in English. Should

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the reader have any questions regarding this work, please contact Graciela
Yugdar Tófalo, Senior Lecturer, at gyugdar@frp.utn.edu.ar.