

DIFFUSION OF ELECTRIC VEHICLES IN BRAZIL: CHALLENGES AND INCENTIVE POLICIES

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Overview

The concern about the climate effects of CO₂ emissions, which comes largely from the transport sector, has motivated the search for less polluting alternatives in this sector. The introduction of electric vehicles is one of the vectors promoting the decarbonization of the matrix energy. In addition to the climatic aspects, the diffusion of electric vehicles could help to achieve other objectives, such the reduction of oil dependence in importing countries, the reduction of noise in urban areas, as these vehicles have quiet operation, and improved air quality. Thus, this paper will present the challenges in the introduction of electric vehicles in the Brazilian market. Brazil has specific characteristics that should influence the way in which electric vehicles will be introduced. The high share of biofuels makes the issue of emissions less relevant. The high cost of batteries makes it difficult to adopt these vehicles in low-middle-income countries developed, which implies a concentration of the fleet in popular models, segment in which vehicles have less competitiveness. The lack of recharging infrastructure is also a challenge in a country with continental dimensions. Thus, public policies play an important role in encouraging the adoption of electric vehicles. These policies can be effective in the dissemination of these in the Brazilian market, considering the international experience and the characteristics of this sector in Brazil.

Methods

In order to analyze the challenges in the diffusion of electric vehicles in the Brazilian market, we will review the literature on electric cars, about experiences with the introduction of these vehicles in others countries and on the Brazilian specificities regarding the insertion of alternative automotive technologies, specifically ethanol. The indirect network effects approach will also be used because of the interdependence between the adoption of electric vehicles and the investment in charging stations. Users have advantages with the expansion of the network and can even reduce the issue of range anxiety, that is the concern about the existence of properly distributed charging stations. In addition, the product life cycle approach will also be used to analyze the diffusion of electric vehicles in the world, considering that electric vehicles are in the introductory stage of life cycle.

In order to evaluate the attractiveness of the acquisition of an electric vehicle in Brazil, we will make a feasibility study technical and economic comparison of electric, hybrid and flex vehicle acquisition. The result of this cash flow can be interpreted as the amount of subsidy needed to enable the diffusion of electric cars or hybrids. It is important to note that attractiveness is not limited to financial elements. Therefore, we will also evaluate the need for recharging infrastructure in Brazil and other elements, such as the availability of maintenance and secondary markets for used vehicles.

Results

Considering the dynamics of the diffusion of the automobile to ethanol and the flex-fuel car, we can assume that an alternative to conventional technology, such as hybrids and electric vehicles, has the potential to spread in Brazil. For this, this technology must be stimulated by the government, in order to get a significant share of the Brazilian market. It is important to note that with the introduction of electric vehicles, electricity would not necessarily compete with the ethanol and oil, it can be a complement through hybrid cars. In addition, the spread of the electric car is expected to happen later than in other countries due to some factors. We can highlight the fact that the country has a well-developed biofuels sector, which could hinder the introduction of electric cars, considering that the use of ethanol already allows the reduction of greenhouse gas emissions. Another relevant factor is that electric cars in Brazil is introduced as a good of the high-income classes, once that the price range does not make them competitive when compared to the internal combustion vehicles. This issue may delay the diffusion of electric vehicles in Brazil, since the Brazilian automotive market is composed mostly of low value cars.

Conclusions

Considering the particularities of each country, the diffusion of electric vehicles should happen in an asymmetric way around the world. Experiences from other countries should be analyzed to identify which initiatives have had the best results and can be applied in Brazil. However, it is necessary to pay attention to the specificities of the Brazilian market. Although electric vehicles are not widely diffused in the Brazilian market initially, since these vehicles have a high acquisition value, these cars can increase the market share in the coming years.

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