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Adoption of Electric Vehicles: Policies, Adoption and Importance

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ABSTRACT

This paper talks about policies, adoption and the importance of Electric Vehicles(EVs). It speaks about policies implemented by India, The Netherlands and The United States of America and makes a comparison between them. It also questions if EVs are really sustainable or not, with there being pros and cons to them. It also talks about the challenges affecting implementation of wide- scale EV infrastructure and full adoption of Evs.

Keywords: Electric Vehicles, Policy making, Netherlands, India, USA, FAME

I. INTRODUCTION

India stands at an important juncture in its efforts to transform its main transportation towards sustainability, with a focus on electric vehicles (EVs). Recognizing the urgent need to reduce greenhouse gas emissions, reduce air pollution, and improve energy security, the Indian government has introduced a series of policy reforms to allow easier spread and a bigger market for Evs.

In addition to financial incentives, the government has also implemented other measures to promote EVs. The introduction of GST in 2017 reduced the tax rate on EVs from 12% to 5%, making them more cost-effective compared to normal, fuel - powered vehicles. The government has set a target of making 30% of India's vehicles EVs by 2030, demonstrating its commitment to a cleaner and more sustainable future.

Despite these initiatives, some challenges need to be addressed to accelerate the adoption of EVs in India. These include the need for more charging infrastructure, doubts of range in buyers, and more collaboration between government, industry, and other stakeholders. Addressing these challenges will require continued policy support and investment in development of infrastructure. Moving to electric vehicles is essential as it will help reduce pollution in India- a problem that has run rampant in the 21st century. Electric vehicles do this by limiting greenhouse gasses and tailpipe emissions and thus helping in combating climate change and making the air clean.

II. FAME

These reforms aim to address large obstacles and hindrances such as high costs, limited charging points, and consumer awareness. One of the main initiatives driving EV adoption is the Faster Adoption and Manufacturing of (Hybrid &) Electric Vehicles in India (FAME India) scheme, launched in 2015. Under this scheme, the government provides financial incentives to manufacturers and consumers to promote the production and purchase of EVs. The scheme has been important in increasing the affordability and accessibility of EVs in the Indian market.

“The second phase (FAME II) is a 3-year subsidy programme. It aims at supporting the electrification of public and shared transportation: around 7,000 electric and hybrid buses, 500,000 lakh electric three wheelers, 55,000 electric four wheeler passenger cars, and 1 million electric two wheelers.

The programme also finances charging infrastructures. Until July 2022, a total of 532 charging stations have been installed.” (“Faster Adoption and Manufacturing of Hybrid and Electric Vehicles (FAME) Scheme - Phase I & II – Policies”)

III. CHALLENGES

The cost of EVs is much higher than conventional cars as “The cost of EV components, such as batteries and electric motors, is currently higher than that of conventional fuel engines. This higher cost can deter many potential buyers, making electric vehicles less accessible. This cost could also mean that other related costs, such as car insurance for four-wheelers, will be relatively higher.”(Bajaj Allianz 2023,).

The cost of batteries is also very high, which accounts for a large portion of the cars cost. The cost of batteries also may deter the average consumer from buying electric vehicles. The availability of charging infrastructure is also a large problem. While countries like the Netherlands have robust charging infrastructure, India does not. This can prove a challenge for the adoption of EVs.

“Range anxiety is a term commonly used to explain the anxiety that EV owners or drivers may feel regarding the distance their vehicle may be able to cover with the charging, whether it be full or partial. Limited driving range and the lack of charging infrastructure contribute to this concern. India's vast geographical expanse adds to the range anxiety problem, as long distances between charging stations can cause apprehension among potential buyers. Increasing the driving range of electric vehicles and expanding the charging infrastructure can help alleviate this issue.”(Bajaj Allianz 2023,)

The transition from regular fossil fuel powered cars to EVs is not going to be fully clean as the electricity used to charge the cars is generated from the usage of fossil fuels. A full green and eco-friendly transition will only be possible when charging infrastructure companies figure out a way for large-scale usage of clean energy to power EVs.

One large challenge for India is also the climate. In certain place like the capital city of Delhi, the temperature in the winters can drop down as low as 7 degrees Celcius and the temperature can rise as high as 42 degrees Celsius in the summer. These extremities can lead to battery degradation and reduce the efficiency of EVs. India will need to develop batteries that can withstand such conditions in order for it to adopt Electric Vehicles.

Quote directly from policy documents

“Faster Adoption and Manufacturing of (Hybrid &) Electric Vehicles in India (FAME India) Scheme Phase-II is being implemented by the Ministry of Heavy Industries for a period of five years commencing from 1st April,2019 with a total budgetary support of Rs. 10,000 crore. This phase mainly focuses on supporting electrification of public & shared transportation, and aims to support through demand incentive 7090 eBuses, 5 lakh e-3 Wheelers, 55000 e-4 Wheeler Passenger Cars and 10 lakh e-2 Wheelers. In addition, creation of charging infrastructure is also supported under the Scheme”.- Ministry of Heavy industries

A comparison of similar state policies with the US reveals that

“Federal tax incentives are designed to help close that gap and promote EV purchases in this country.³ Currently, a purchaser of a new EV can take a federal tax credit of up to \$7,500 per vehicle.⁴ Additionally, property owners and businesses can take a tax credit for 30 percent of the cost of purchasing and installing EV infrastructure, up to \$1,000 for individuals or \$30,000 for businesses. This helps defray the costs of home-charging for car buyers able to take advantage of it, as well as for business owners who may wish to deploy charging infrastructure for employees or customers.”(Cooke, 2021)

A comparison of policies with Netherlands

Netherlands is the country heading the charge of adopting battery electric vehicles in Europe with policies such as: Exempting BEVs from road tax, registration tax and BiK tax, which is company car tax. It is also exempt from profit tax, which encourages people to invest in charging infrastructure of EVs by giving them deductions in profit tax.

“The Netherlands, despite of its 21% VAT rate on the purchase of BEV (versus 0% rate in Norway), is the world’s leader for adopting electric vehicles which is a result of country’s long term planning and early investments into charging infrastructure.”(Global Vat Compliance, 2021)

The Netherlands has 1 charging station for every 5 cars on the road, which is more than any other country in the European Union. As of 2021, there were 78,729 regular charging points and 49,228 public charging points.

“For EV and fuel-cell vehicles the subsidized amount is 9,000 EUR which consists of a federal share (6,000 EUR) and a manufacturer’s share (3,000 EUR). For BEVs with a net price between 40.000 EUR and 65.000 EUR, the total subsidy is 7,500 EUR . When adhering to certain conditions, car leasing is also eligible. As of November 2020 it was possible to combine the federal subsidy with other local incentives.”(Global Vat Compliance, 2021)

Conclusion of the comparison

With this comparison, we can conclude that the Netherlands is clearly the most advanced country in terms of adopting EVs, with the most infrastructure and the most lenient policies out of all the 3 countries. While the USA does have many tax incentives like property owners and businesses being able to take a tax credit for 30 percent of the cost of purchasing and installing EV infrastructure. India, in the meanwhile is still yet to develop many policies, with the only large and effective ones being FAME and its subsidy FAME II.

IV. SUSTAINABILITY

There are many aspects to the sustainability of an EV. There are pros and cons. One example is this. “ A study conducted by the IVL Swedish Environmental Research Institute states that manufacturing an electric car battery requires around 350 to 650 Megajoule of energy per kWh and a regular battery pack of an EV can generate 80 to 90 grams of CO₂. Add to that, the emissions from power plants that produces the electricity to power such vehicles.

While it cannot be discounted that the air pollution levels in major cities across the country have reached alarming proportions, putting people at the risk of contracting severe respiratory disorders, EVs are not the ideal solution to this problem as they are not an ideal environmentally sustainable alternative.

While we know that electric vehicles do not emit perilous greenhouse gases and nitric oxide, they run on electricity that are generated by combusting dirty fossil fuels, hence there is actually no clear benefit to the environment. If we take into consideration the aggregate carbon footprint, it is the same for a battery-powered EV and a traditional fuel based vehicle.”(Malhotra, 2021)
But, there are alternatives to this. Methane powered gasoline engines or hydrogen motors can reduce CO₂ emissions by 1/3 and do away with diesel in the long run.

V. CONCLUSION

To conclude, India needs to make more policies for the adoption of EVs and reduction of carbon emissions. For example, India's capital city is the most polluted capital city in the world. Even though measures like odd- even in which only cars with an odd number at the end of their license plate can drive on certain days and cars with even number plates can drive on certain days are put in place, it has been unable to improve the quality of the Delhi citizens life by reducing pollution.

If widespread use of EVs occurs, this problem will be solved. They have less tailpipe emissions and thus reduce emissions from the vehicle. However, electric vehicles are not fully clean as the electricity used to charge them comes from fossil fuels and the mining of lithium to make lithium batteries emitting lots of pollutants and greenhouse gas emissions. If these problems along with others such as high prices and less adaptability to extreme weather are solved, EVs can become a suitable replacement for gasoline and diesel powered cars.

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