An Overview of Electric Vehicles In India

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Abstract- *In the current situation, India is quite concerned about air pollution. Numerous Indian cities are among the most polluted in the world, according to a new worldwide report. The industrial and transportation sectors are the two main sources of air pollution. The industrial sector is responsible for 51% of this air pollution, and the transportation sector is responsible for 27%. 2 million Indians die prematurely each year as a result of air pollution. Electric vehicles (EVs) can be a godsend in reducing GHG emissions in order to reduce air pollution. Electric vehicles provide a number of benefits, including lower pollution levels and less expensive oil imports. Despite the fact that there are numerous obstacles to the development of electric vehicles in India. This essay offers a succinct summary of the literature on electric vehicles and lists the benefits and drawbacks of EV promotion in India.*

Keywords- Electric Vehicle (EV),internal combustion engine Emission, Charging station, Battery Technology

I. INTRODUCTION

One of the biggest challenges to the globe today is air pollution, and in a nation with the second-largest population in the world—nearly 130 million people, or 17.7% of the world's population—people are finding it difficult to breathe in most major cities. Since a decade ago, India has been dealing with significant air pollution problems, which are getting worse at an alarming rate. The key contributors to this exponential rise in pollution levels are poor fuel quality, aging cars, bad maintenance, backed-up traffic, deteriorating roads, outdated automotive technology, and outdated traffic management systems.

Hydrocarbons, nitrogen dioxide, lead, carbon monoxide, sulphur dioxide, and particulate matter are the main pollutants released by automobiles. India's massive automobile sector, which ranks as the fourth largest in the world, is the cause of a significant portion of vehicular pollution. In India, the number of electric vehicles is growing at a pace of 37.5%, according to Reference [1]. Additionally, the government is paying increasing attention to charging stations and electric vehicles [2, 3]. According to reference [4], the positioning of charging stations has been suggested to maximize their effectiveness and supply the required amount of power.

II. WORKING PRINCIPLE OF EVS

Figure 1 shows the functional principle of an electric vehicle. The electric motor receives energy from a controller that draws power from the battery. Electric vehicles work on the electric principle. The battery supplies electricity to the electric motor. The electric motor therefore uses the energy received from the rechargeable battery to spin the transmission system and turn the wheels. Additionally, the car's accelerator pedal is fitted with a potentiometer that tells the control unit how much power to give to the electric motor

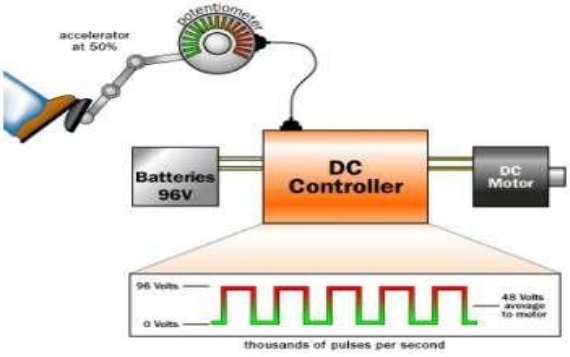

Fig.1.PrincipleofElectricCar[5]

III. ADVANTAGES OF EVS

To reduce air pollution, we need to switch to alternative modes of transportation to traditional internal combustion engines. Electric vehicles serve as an alternative mode of transportation and offer many benefits to consumers, including:

A. EVs are environment friendly

Compared to ICE vehicles, electric vehiclesdo not produce smoke, so they do not cause pollution. Electric vehicles don't even have an exhaust system, meaning they don't emit any emissions. And since gasoline-powered vehicles are a major contributor to greenhouse gas emissions, switching to electric vehicles could help make the planet healthier.

B. Electric Vehicle is cheaper than gasoline

Per km, the cost of electric cars is cheaper than ICE cars. There's no denying that many electric cars run for as little as a third because electricity is significantly cheaper than gasoline. And since consumers spend most of their time charging electric vehicles in garages, installing solar panels at home can save even more money.

C. Low maintenance required

Since electric vehicles do not have an internal combustion engine, maintenance requirements become less.

IV. CHALLENGES AHEAD

Currently, there are many other challenges to address in establishing the future of electric vehicles. The main role in the regulation of electric vehicles in India is electricity generation. Without electricity, we cannot imagine the future of electric vehicles. Thus, the responsibility of the distribution network increases to provide consistent power without problems. This can be done with proper network monitoring. The Phasor Meter (PMU) [6-10] measures voltage and current in real-time and protects the network from failures. In reference [11], the problem of voltage stability was discussed and solved using the installed PMU and busses of the power system.

A. High Cost

The cost of buying an electric car is quite high compared to an ICE car i.e. the average cost of an electric car in India is around 13 Lakhs (INR), much higher than the average 5 Lakh INR for running popular cars. on conventional fuels. This is mainly due to the import of lithium for battery production, and since batteries account for about 50% of the vehicle's cost, electric vehicles are more expensive. Lithium is a rare metal with large reserves in countries such as Chile, Australia, and Argentina.

B. Lack of charging infrastructure

The main obstacle to the commercial viability of electric vehicles in India is the lack of charging infrastructure. India had just 650 charging stations in 2018, while China had more than 456,000 charging points in the same year. Another reason for concern is the battery charge time. The efficiency of battery chargers, according to available technologies worldwide, fluctuated in percentage from the 70s to the 90s [12].

C. Range anxiety

Range anxiety is one of the biggest barriers to electric vehicle adoption. Electric vehicles often have a shorter operating range, which creates a fear of charging in the minds of consumers. Currently, the longest-range electric vehicle available is the Tesla. which has a range of 370 miles per charge. However, because Tesla has not entered the Indian market, Indians do not have access to this premium vehicle. Electric vehicles currently available in India do not have a range of more than 500 km per charge. This has profound implications for the lack of charging infrastructure in the country, and while conventional vehicles can be refueled at gas stations, this is not the case with electric vehicles.

V. OPPORTUNITIES AHEAD

The electric vehicle market is expected to grow thanks to the government's ambitious plans and initiatives. The government has taken several steps to encourage and promote the deployment of electric vehicles and public charging infrastructure to achieve substantial electrification by 2030. India aims to reduce oil imports excessively and reduce pollution levels in cities in the coming years. Electric vehicles will play an important role in achieving this goal.

VI. INDIA'S POLICY ON ELECTRIC VEHICLES

In 2012, the National Electric Mobility Mission Plan (NEMMP) 2020 was established, under which a program to promote, Faster Adoption and Production of Hybrid and Electric Vehicles (FAME), was established. implemented in 2015 to reduce the cost of hybrid and electric vehicles and to reduce the cost of electric and hybrid vehicles. encourage their market penetration. The FAME program provides subsidies on the retail price of passenger cars. These subsidies range from INR 11,000 to INR 24,000 for light hybrids, from INR 59,000 to INR 71,000 for strong hybrids; and 60,000 to 1,34,000 INR for tram. The subsidy also applies to two-wheelers, three-wheelers, light commercial vehicles, and buses

The FAME scheme subsidy is not the only incentive mechanism impacting the hybrid and electric vehicle market in India. The central government of India and some state governments, such as the National Capital Territory Government of Delhi (NCT of Delhi), offer preferential tax incentives for hybrid and electric vehicles over public companies. conventional technology. According to the recent announcements by Finance Minister Nirmala Sitharaman during the presentation of the 2020 union budget, the government has increased import tax on electric vehicles to boost production in India.

VII. LITHIUM RESERVES REVOLUTIONISE THE EV SECTOR IN INDIA

Stockpiles of lithium, a rare metal needed to make batteries for electric vehicles, have been discovered in Mandya, 100 kilometers from Bangalore. This will be a major breakthrough in the production of batteries for electric vehicles in the country. Researchers from the Directorate of Atomic Minerals, a unit of the Atomic Energy Commission of India, have estimated lithium reserves at 14,100 tonnes on a small plot of land surveyed in the southern district of Karnataka. Among other countries, Chile is estimated to have lithium reserves between8 million tons, while 2.8 million tons have been discovered in Australia. Argentina is believed to have reserves of up to 1.7 million tons of lithium. According to the data, Portugal also haslithium reserves of 60,000 tons, significantly higher than India's lithium reserves. Detailed information on lithium-ion batteries has been given in [13].

VIII. CONCLUSION

High cost is one of the reasons why customers are reluctant to buy electric cars. To achieve this, the government has promoted the wider adoption of electric vehicles by introducing subsidies for commercial vehicles. But electric cars are still at least 30% more expensive, mainly because of imported batteries. The Center's 2015 Faster Hybrid and Electric Vehicle Adoption and Production (FAME) program introduced subsidies for electric vehicles. Experts say the main challenges facing the electric vehicle industry are inadequate charging infrastructure and reliance on imported batteries and components. But 2020 could change all of that. The cost of importing batteries will certainly decrease thanks to the discovery of lithium reserves in Bangalore. In the past quarter, automakers have announced several new electric models that promise longer ranges – even beyond the 80-90km range an electric vehicle currently offers. Even at this year's Auto Show in Greater Noida, electric cars are still the star.

AmongAmong the electric models that caught everyone's attention at the show were the Maruti Suzuki Nexon EV's Futuro-e Tata Motors and the AltrozEV. Chinese company Great Wall Motors made headlines with the Ora R1. Another major challenge facing electric vehicles in India is inadequate charging infrastructure. The charging infrastructure needs urgent attention as India has only 2,636 charging stations. Rishabh Jain, director of CEEW, Center for Energy Finance, a public policy think tank, said India has no shortage of generating capacity to power these cars.The analysis shows that passenger cars and four-wheel utility vehicles consumed 21.3 million tons of gasoline and diesel in 2017-2018. If the distances these vehicles travel are measured in EV-km equivalent, it is estimated that nearly 50 billion units of electricity will be needed to charge the electric vehicles.

This represents 3.2% of the electricity produced in the same financial year. According to the Central Electricity Authority, the installed solar generation capacity in India is 31 GW. This means there is enough electricity for the electric vehicle. However, we just need to have a policy of installing charging points, and to do this, for example, power distribution companies should modernize their transmission infrastructure to meet the demand for vehicles. electricity.Experts point to business prospects in this segment. There are several possibilities for powered and battery-powered readers. Even electric vehicle charging stations offer small-scale business opportunities. This can boost the “Make in India” initiative and provide opportunities for Indian companies. By developing these segments, India can reduce its dependence on imported oil and gas.Another good opportunity that can be exploited is to store excess solar energy in electric vehicle batteries to sell back to the grid.

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