

Adoption of E- Vehicles: Trend in Urban Areas

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Abstract: E- vehicles have emerged as a promising eco-friendly alternative to internal combustion vehicles. The technological advancements in battery system, energy efficiency and charging infrastructure have enhanced the adoption of EVs. E- vehicles represent a viable future transportation system, contributing significantly to ecological conservation and sustainable development.

Keywords: E- vehicles, Eco-friendly.

Introduction - Science permits every aspect of our life. Science is a fundamental force shaping our lives. Its impact is evident in the technology we use, the way we communicate, the food we eat, the health care we found immediately, more efficient travelling etc. Science enables us to live comfortably, stay healthy and connect with the world.

Transportation is an integral part of modern life shaping our economics, societies and environment. For convenient and faster travel and efficient travel of goods, Road, Rail, Water and Air Transports are applicable. As technology continues to advance new models of transportation are being developed promising even faster and more efficient ways to move people and goods in the future.

E- vehicles are revolutionizing the transportation industry, offering a promising path towards sustainable and efficient mobility. They are offering an alternative to traditional vehicles and better for environment concerns. The present study deals with trends of adoption of e-vehicles in urban areas as they are offering low maintenance costs, lower pollution rates with many challenges.

The Key components of EV: An electric vehicle consists of a battery pack, electric motor, power electronics, inverter management system. These components work together to power control and manage the electric vehicles operations.

Battery pack: Also known as electric vehicle battery. It powers the electric motors of an electric vehicles. The battery act as an electrical storage system. It stores energy in the DC current form. The life time of a traction battery pack is estimated to be 200000 miles.

Electric Motor: It is the main component of EV. The motor converts the electric energy into kinetic energy. This energy helps to rotate the wheels.

DC-DC Converter: The DC -DC converter distributes the

output power that coming from the battery to a required level. It also provides the voltage required to charge the auxiliary battery.

Power Converter: It converts DC power from the battery to AC power. It also converts the AC current generated during regenerative braking in to DC current. This is further used to recharge the battery.

Onboard Charger: This converts AC power from the external source in to DC power for charging the battery.

Thermal Management system: This keeps the battery and other components at optimal operating temperatures. It consists radiators, fans and coolant pumps.

Charging System: It includes charge post and related electronics. AC power is converted to DC outside of the vehicle and sent directly to the EV battery by charger.

Vehicle Control unit: It acts as the brain of the vehicle. The VCU receives information, speed, temperature etc. from various sensors and systems and ensures that the vehicle operates efficiently and safely. It communicates with other units to ensure all systems are working together.

EV Benefits: E- vehicles in their all forms can help improve fuel economy, lower fuel costs and reduce emissions. Using electricity as a power source for transportation improves public health and the environment. More detailed look at the benefits:

1. Zero emissions (Tailpipe): E- vehicles produce no exhaust fumes, reducing air pollution and improving air quality. It also eliminates emissions of pollutants like carbon dioxide, Nitrogen oxide and particulate matter.

2. Reduced Greenhouse Gas emissions: E vehicles reduce green house gas emissions compared to gasoline powered vehicles, contributing to smaller carbon footprint.

3. Reduced reliance on fossil fuels: E- vehicles reduce dependence on fossil fuels and provide a way for more sustainable transportation system powered by renewable

energy.

4. Reduced Noise Pollution: E-vehicles are much quieter, thus reducing noise pollution in urban areas.

5. Lower operating costs: E- vehicles have lower running costs due to lower price of electricity compared to gasoline. They also require less maintenance due to simple design.

6. Increased efficiency: E- vehicles are more efficient than gasoline powered vehicles, utilizing energy more efficiently.

7. Convenient charging: EVs can be easily charged at home, so there is no need to wait at fuel stations. Public charging infrastructure is also.

8. Tax benefits: The government offer tax incentives and rebates to encourage the adoption of electric vehicles. These includes lower registration fee, road tax exemptions and other financial benefits.

9. Better Performance: They are quieter than ICE vehicles, providing a peaceful driving. It also offers responsive handling.

Challenges towards EV:

1. High Initial Cost: The purchase price of EVs is higher than that normal vehicle due to cost of batteries.

2. Charging infrastructure: Widespread charging network is not easily available. Long charging time is another issue. Most EV charging still happens at home but challenges for those who lived in shared housing or who have to park on street.

3. Battery Technology: Mostly Li-ion batteries are used and they have their limitations as energy density, charging speed and safety. Their recycling is also challenging.

4. Environmental Concerns: Extraction of raw materials for batteries and the energy acquired for manufacturing and charging has many environmental impacts which are adverse.

5. Limited selection: There is a still limited selection of EVs compared to gasoline powered cars, only few models are available.

6. Trained technicians: Relatively few EV repair technicians and qualified independent shops.

Government initiatives to promote EVs: There are some important government initiatives to promote EV adoption.

1. FAME Scheme II: faster adaption and manufacturing of EVs, which provides incentives for manufacturers and buyers. These includes subsidies, tax rebates, registration fee etc.

2. NEMMP: National Electric Mobility Mission Plan sets out the target to achieve maximum sales of EVs.

3. PLI: Production linked Intensive Scheme provides incentives for the manufacturing of scrapping of EVs and components.

4. Vehicle Scrapping Policy: Policy provides incentive for the scrapping of old vehicles and purchase of new electric vehicle.

5. Go electric campaign: Creates awareness on the

benefits of EVs and EV charging infrastructure.

6. EV 30—30 campaign: India is among this global campaign which aims for at least 30% new vehicle sales to be electric by 2030.

7. Model Building Bye-laws 2016: Ministry of housing and urban affairs amended a setting aside 20% of the parking space for EV charging facilities in residential and commercial buildings.

Trends of EV adoptions in the area - In Nimar Region of Madhya Pradesh when we observe current sales trends during last years, it is found that dominance of two- wheelers as most popular segment. Electric three wheelers replacing diesel variants in urban areas.

Private company are gradually expanding the charging network along major highways. In the rural areas there is an emerging trend of using electric cargo three wheelers for transporting agricultural products, Local dealers are available with EV showrooms.

Concluding Remarks: Madhya Pradesh is actively promoting electric vehicles (EVs) through its EV policy.

Madhya Pradesh has an EV policy with the current version being the MP EV policy 2025. The policy aims for 25% EV adoption in a vehicle registration by 2026. Conversion of government vehicles and commercial fleets to EVs by 2028 and conversion of public transport buses to electric in top five cities by 2028.

The policy emphasizes the development of charging infrastructure network and designates specific cities as model EV cities, which includes Bhopal, Indore, Jabalpur, Gwalior and Ujjain.

In this policy the state offers various incentives including:

1. Exemption from motor vehicle tax and registration fees.
2. Subsidies for electric vehicle purchases.
3. Subsidies for the development of charging infrastructure.
4. Reduced import duty for fully built e- vehicles.

Specific Initiatives: The state has already launched initiatives like deploying 80 electric buses in Indore city under central schemes.

Future Focus: Madhya Pradesh is also focusing on skill development and job creation with EV sector.

Vision: To promote substantial electric mobility and bring about a material improvement in MP air quality by bringing down emissions from transport sector.

References :-

1. Ding N etal. (2017), The electric vehicle: a review, International Journal of Electric and Hybrid vehicles, 9(1), pp- 49-66.
2. Mohammed M.etal.(2018), Study on electric vehicles in India, opportunities and challenges, International Journal of scientific research in environmental science and technology.
3. Pandya C. and Agrawal A. (2021), A detailed study on electric vehicles, International Journal of creative research thoughts, Vol.9-(7), pp- 875-879.