



## **FUTURE OF ELECTRIC VEHICLES IN INDIA: REVIEW**

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### **ABSTRACT**

By 2030, 80% of two and three-wheelers, 40% of buses, and 30 to 70% of cars in India will be electric vehicles, says the NITI Aayog. As the nation gears towards its 'Zero-emission' 2070 dream, funds and focus are directed towards electric mobility

In March 2022, Minister for Road Transport and Highways, Nitin Gadkari mentioned in the Parliament that between 2019-2020 and 2020-2021, the two-wheeler EVs rose by 422% ; three-wheelers by 75% and four-wheelers up by 230%. The number of electric buses also increased by over 1,200%.

India's road to a fully-electric ecosystem still has a few hurdles – High cost, inadequate infrastructure, lack of high performing EVs The electric variants of the 2 and 4 wheelers are often priced much higher than regular fuel options. This is the most important reason for the slow adoption of electric mobility.

### **1. INTRODUCTION**

Over 60% of consumers believe that an EV is beyond their budget.

The maintenance costs are high mainly due to the lack of necessary amenities. There are more than 65,000 petrol bunks in India but only 1640 EV charging stations. The EVs in India so far have only been variants of the already available fossil-fuel driven 2 and 4 wheelers. High performing luxury variants or supercars like the Teslas are yet to hit the Indian markets.

Hoping to convert more consumers into Electric Vehicle owners, the government is offering subsidies for purchasing electric vehicles. A tax exemption of Rs 1.5 lakh is also given for people buying electric cars on loan.

Under two phases of the FAME or faster adoption and manufacturing of hybrid and electric vehicles scheme, the government has been trying to improve the infrastructure for electric vehicle manufacturing in the country. There is also a plan for 22,000 EV charging stations to be set up by Oil Marketing Companies across the country.

In the 2022 budget, a battery swapping policy was announced as an easier way to charge EVs. Last year, the government also announced a Production Linked Incentive scheme for automakers, a part of which aims to boost electric vehicles

## **FUTURE OF ELECTRIC VEHICLE**



India offers the world's largest untapped EV market, especially in the two-wheeler segment. With several automakers rolling out EV vehicles at a rapid pace, the penetration of these vehicles has increased significantly in the past few years. As per a recent study, electric vehicles (EVs) market is expected to be worth around at least ₹475 billion by 2025. The penetration of electric two-wheelers is projected to reach up to 15% by 2025 from 1% currently.

## ELECTRIC VEHICLE VS FUEL VEHICLE –

Technology has its own way of emergence and it works hand in hand in the automobile industry. Every day there is new technology and innovation comes as a result. Today, automobile inventors are more likely to produce environment-friendly vehicles keeping in mind the reduction of fossil fuels. Probably they are looking for a renewable source of power for the vehicle. For this, **electric vehicles** are a more suitable option as they are non-polluting and reliable in terms of linear performance. The performance of the electric vehicle is the main factor. Whereas, fuel vehicles have their own features and benefits. As fuel vehicles need little time to be powered, but electric vehicles need a long time to get charged.



As the growing pollution has become a serious concern, **electric cars** are quite a relief. And, according to the research electric cars are better for the environment. Whereas, the fuel vehicle emits harmful gases like carbon due to petrol or diesel. But, electric vehicles produce fewer greenhouse gases and air pollution than petrol. That's why interest in purchasing an electric vehicle is increasing. It is important to know how electric vehicles impact nature. As per the research by the European Energy Agency, the carbon emissions of an **electric car** are around 17-30% lower than driving a petrol or diesel car. When low carbon electricity is used, the emissions from electricity generation improve.

### Associated Challenges

#### 1) Battery Manufacturing:

It is estimated that by 2020-30 India's cumulative demand for batteries would be approximately 900-1100 GWh.

However, there is concern over the absence of a manufacturing base for batteries in India, leading to sole reliance on imports to meet rising demand.

As per government data, India imported more than \$1 billion worth of lithium-ion cells in 2021, even though there is negligible penetration of electric vehicles and battery storage in the power sector.

#### 2) Consumer Related Issues:

In 2018, India was reported to have only 650 charging stations, which is quite less than the neighboring counterparts who already had over 5 million charging stations.

#### 3) Lack of charging stations:

makes it unsuitable for the consumers in covering long range. Moreover, it takes up to 12 hours for a full charge of a vehicle at the owner's home using a private light-duty slow charger.

Also, the cost of a basic electric car is much higher than the average price of a car running on conventional fuel.

#### 4) Policy Challenges:

EV production is a capital intensive sector requiring long term planning to break even and profit realization, uncertainty in government policies related to EV production discourages investment in the industry.

#### 5) Lack of Technology and Skilled Labour:

India is technologically deficient in the production of electronics that form the backbone of the EV industry, such as batteries, semiconductors, controllers, etc.

EVs have higher servicing costs which require higher levels of skills. India lacks dedicated training courses for such skill development.

#### 6) Unavailability of Materials for Domestic Production:

Battery is the single most important component of EVs. India does not have any known reserves of lithium and cobalt which are required for battery production.

#### 7) Dependence on other countries:

For the import of lithium-ion batteries is an obstacle in becoming completely self-reliant in the battery manufacturing sector.



## 2. ELECTRIC CARS WORK

All-electric vehicles also referred to as battery electric vehicles (BEVs), have an electric motor instead of an internal combustion engine. The vehicle uses a large traction battery pack to power the electric motor and must be plugged in to a wall outlet or [charging equipment](#), also called electric vehicle supply equipment (EVSE). Because it runs on electricity, the vehicle emits no exhaust from a tailpipe and does not contain the typical liquid fuel components, such as a fuel pump, fuel line, or fuel tank.

### Key Components of an All-Electric Car:

**Battery (all-electric auxiliary):** In an electric drive vehicle, the auxiliary battery provides electricity to power vehicle accessories.

**Charge port:** The charge port allows the vehicle to connect to an external power supply in order to charge the traction battery pack.

**DC/DC converter:** This device converts higher-voltage DC power from the traction battery pack to the lower-voltage DC power needed to run vehicle accessories and recharge the auxiliary battery.

**Electric traction motor:** Using power from the traction battery pack, this motor drives the vehicle's wheels. Some vehicles use motor generators that perform both the drive and regeneration functions.

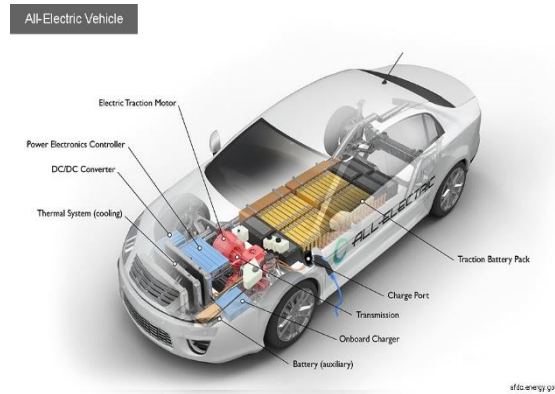
**Onboard charger:** Takes the incoming AC electricity supplied via the charge port and converts it to DC power for charging the traction battery. It also communicates with the charging equipment and monitors battery characteristics such as voltage, current, temperature, and state of charge while charging the pack.

**Power electronics controller:** This unit manages the flow of electrical energy delivered by the traction battery, controlling the speed of the electric traction motor and the torque it produces.

**Thermal system (cooling):** This system maintains a proper operating temperature range of the engine, electric motor, power electronics, and other components.

**Traction battery pack:** Stores electricity for use by the electric traction motor.

**Transmission (electric):** The transmission transfers mechanical power from the electric traction motor to drive the wheels.



## ADVANTAGES:

### 1) No Emissions-

The biggest advantage of an electric vehicle is its green credential. Electric cars are 100 percent eco-friendly as they run on electrically powered engines. It does not emit toxic gases or smoke in the environment as it runs on a clean energy source.

### 2) More Convenient-

The electric vehicle is easy to recharge, and the best part is you will no longer need to run to the fuel station to recharge your car before hitting the road! Even a normal household socket could be used for charging an electric car.

### 3) Savings-

These cars can be fuelled for very low prices, and many new cars will offer great incentives for you to get money back from the government for going green.

### 4) Popularity-

EV's are growing in popularity. It is nearly three times as efficient as cars with an internal combustion engine, according to Wikipedia.

### 5) Safe to Drive-

Electric cars undergo the same fitness and testing procedures test as other fuel-powered cars. An electric car is safer to use, given their lower center of gravity, which makes them much more stable on the road in case of a collision.

In case an accident occurs, one can expect airbags to open up and electricity supply to cut from the battery.

## DISADVANTAGES:

### 1) Recharge Points-

Electric fuelling stations are still in the development stages. Not a lot of places you go to on a daily basis will have electric fuelling stations for your vehicle, meaning that if you're on a long trip or decide to visit family in a rural or suburban area and run out of charge, it may be harder to find a charging station.

### 2) Short Driving Range and Speed-

Electric cars are limited by range and speed. Most of these cars have a range of about 300-400Km and need to be recharged again. You just can't use them for long journeys as of now, although it is expected to improve in the future.

### 3) Longer Recharge Time

While it takes a couple of minutes to fuel your gasoline-powered car, an electric car takes about 4-6 hours and sometimes even a day to get fully charged.

### 4) Silence as a Disadvantage

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Silence can be a bit disadvantage as people like to hear the noise if they are coming from behind them. An electric car is, however, silent and can lead to accidents in some cases.

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### 3. CONCLUSION

As is demonstrated in our timeline, we hope that over the course of the next decade technological advancements and policy changes will help ease the transition from traditional fuel-powered vehicles. Additionally, the realization and success of this industry relies heavily on the global population, and it is our hope that through mass marketing and environmental education program people will feel incentivized and empowered to drive an electric-empowered vehicle. Each person can make a difference, so go electric and help make a difference!

### REFERENCES

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