# Study on Electric Vehicle: A Pollution Free Future Hope

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***Abstract*----Nowadays Electric Vehicles (EVs) are becoming a point of focus to the entire world due to several factors, including the price reduction as well as it does not harm the climate and environment. This paper presents a advances study of EVs regarding battery technology trends, charging methods, as well as new research challenges and open opportunities. More specifically, an analysis of the worldwide market situation of EVs and their future prospects is carried out. Given that one of the fundamental aspects in EVs is the battery, the paper shows the electric vehicles classification according to their engine technologies and settings. Moreover, we review the different standards that are available for EVs charging process, as well as the power control and battery energy management proposals. Finally, we conclude our work by presenting our vision about what is expected in the near future within this field, as well as the research aspects that are still open for both industry and academic communities.**

***Keywords--- Electric Vehicles; Economic benefits, Environmental concern, Plug-In Hybrid Electric Vehicle.***

## I. INTRODUCTION

For more than a century the automobile industry started to progress in a kinetic motion. The fuel price hike and other issues make the customers to attract over the Electric Vehicles[1]. It is usually three types. (HEV; PHEV; BEV) For many years all people around the world have been accustomed to fuel-powered vehicles. Which is usually separates the environment from its own form. So at that time, due to the efforts of some scientists, the spread of technical knowledge was seen after the emergence of something new. Just then, in1832, the Scottish scientist Robert Anderson invented the first electric motor vehicle. Although in 1830 Joseph Henry introduced the first DC powered motor. Then in 1834 the first electric vehicle was built by Thomas Davenport. The first two passenger electric vehicles were built in 1847, and at that time there was no electric battery to run the electric vehicle. So it was shut down. Then the French Scientist Gaston Plante first invented the storage battery in 1859. And in 1881, it was further modified. Thus began the renaissance of technology. Now we need to know what is Electric vehicle and how HEV-Hybrid Electric Vehicles. It gets power from petrol engine and electric motor together. PHEV-Plug-in Hybrid Electric Vehicles. It is usually battery operated using electric motors. BEV-Battery Electric Vehicles. It collects charges on its own without the help of other engines. Now we need to know why electric vehicles are becoming so popular nowadays. In fact, with the help of car manufacturers, electric cars have become more environmentally friend. It's protecting our environment from pollution. At present electric vehicle is one of the ways to reduce the petrol dependence of our country .The downside of electric vehicles is that they need to be charged after driving up to a certain mile. But Ford's current electric car can run up to 100 miles on a single charge, and their plan is to charge in the future without wireless charging technology[2].

## II. PRINCIPLE

Basically, electric vehicle is necessary for saving fossil fuel. The figure shows the simple construction of electric vehicle. It consists of battery, motor controller, motor which is connected to the transmission system. Here, battery is the energy source which is charged by taking electric current from the grid (In Solar power electric vehicle, Battery is charged with the use of solar pv panel which is attached on the roof of the vehicle). These batteries are rechargeable [3]. Most electric vehicle uses lead acid battery but in new type of electric cars, use lithium ion batteries because it can store more energy than lead acid battery in same physical space. The efficiency and life span of battery is far better than other type of batteries, but it is costlier than lead acid battery. After that controller control the flow of energy from energy source to the motor. Motor transmit the power to the wheels of the vehicle by the use of transmission system.

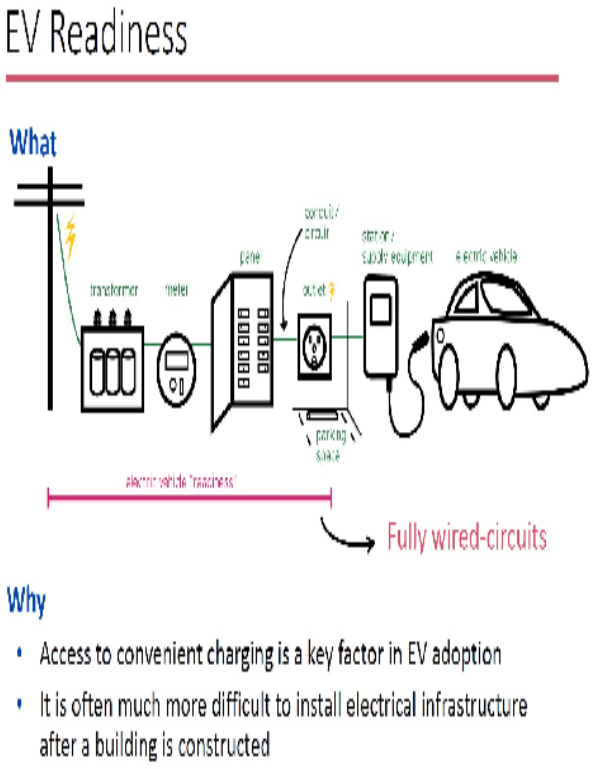


Figure. 1 Infrastructure of Electric vehicle charging

- Transformer

A transformer is a device used in the power transmission of electric energy. The transmission current is AC. It is commonly used to increase or decrease the supply voltage without a change in the frequency of AC between circuits. The transformer works on basic principles of electromagnetic induction and mutual induction.

- Rectifier

A rectifier is a device that converts an oscillating two-directional alternating current (AC) into a single-directional direct current (DC).

## III. CLASSIFICATION OF ELECTRICAL VEHICLE

Nowadays, we can encounter different types of EVs, according to their engines technology. In general, they are sorted in five types EV - An electric vehicle is a vehicle that uses one or or more electric motors or traction motors for propulsion. An electric vehicle may be powered through a collector system by may be self-contained with a battery, solar panels, fuel cells or an electric generator to convert fuel to electricity [4] . EVs include, but are not limited to, road and rail vehicles, surface and underwater aircraft and electric spacecraft.

HEV-provides an introduction to hybrid vehicles, which include purely electric, hybrid electric, hybrid hydraulic, fuel cell vehicles, plug-in hybrid electric, and off-road hybrid vehicular systems [5]. It focuses on the power and propulsion systems for these vehicles, including issues related to power and energy management

PHEV- Plug-In Hybrid Electric Vehicles (PHEVs) hybrid vehicles are propelled by a conventional combustible engine and an electric engine charged by a pluggable external electric source [6]. PHEVs can store enough electricity from the grid to significantly reduce their fuel consumption in regular driving conditions.

FCEV- Fuel Cell Electric Vehicles (FCEVs) These vehicles are provided with an electric engine that uses a mix of compressed hydrogen and oxygen obtained from the air, having water as the only waste resulting from this process. Although these kinds of vehicles are considered to present “zero emissions”, it is worth highlighting that, although there is green hydrogen, most of the used hydrogen is extracted from natural gas.

E-REV - The extended-range electric vehicle (E-REV) is effectively an all-electric vehicle, with all the motive power provided by an electric motor, but with a small ICE present to generate additional electric power. Alternatively, it may be viewed as a series hybrid with a much larger battery. When the battery is discharged to a specified level, the ICE is switched on to run a generator that, in turn, supplies power to the electric motor and/or recharges the battery.

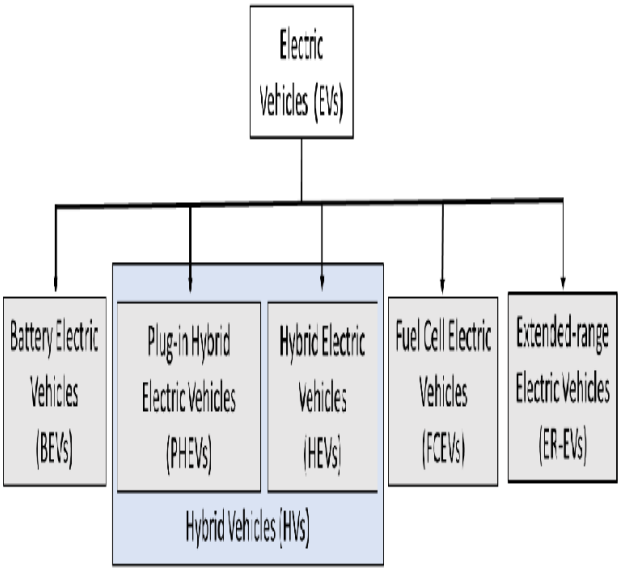


Figure. 2 Electric vehicles classification

## IV. CONCLUSION

EV adoption in India is right now in a nascent stage, people are unfamiliar and hence may be sceptical for a move towards EV. Preference for EV will evolve as technology advances, and as familiarity, penetration and SoC. Hundreds of thousands of studies have already done globally on the trend of adoption of Electric vehicles among the customers. The fuel price hike is the main cause for the customers to becoming more fascinated over the EVs. After going through several papers and lots of research work, it is found that there are enough scopes remain a jar for the new researchers to study and invent something new on this topic. The recent

initiatives and various subsidies by the Indian Government will help push the e-mobility drive in India. The development of a new concept of Vehicle-to-Grid can either deliver power to the grid or can be used to charge the battery when non-conventional energy sources are not available. This technology is an important aspect of energy security, renewable energy, and giving a great scope to deal with global warming issues. This topic is quite interesting one several new studies and researches will led us to new paths. The acceptance of EVs is increasing in the global market time to time.

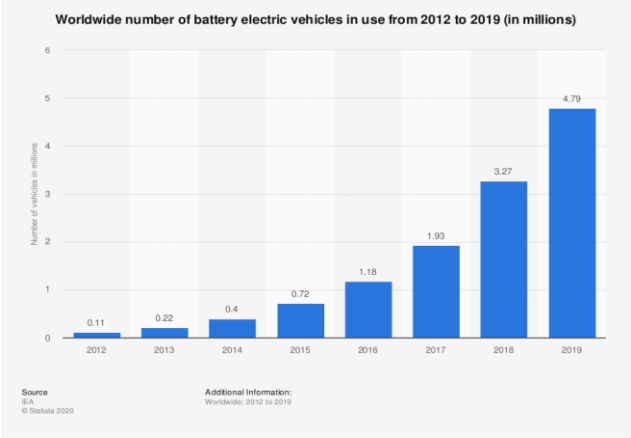


Figure. 3 Increasing Trend of EV

However there are many factors like battery cost, high cost of the EVs , lack of availability of car models, which may distract the buyers . The previous studies already estimated that short distance travelled per full charge of the battery is one of the barrier for the customers to the adoption of EVs .We should have to surpass this barriers because EVs are totally pollution free and comfortable also , they don't spread any toxic gases in the nature while travel. So, we should have to promote the EVs across the world. Car manufacturers should start more and more production of EVs i.e customers can get more options in their hands before purchasing an EV. If more and more EVs will available in the market then other problems like high price, battery availability will also be decreased.

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