



Research Paper

Creating A Platform to Foster The Growth Of Electric Vehicles In Indian Market by Increasing the Electric Vehicle Public Charging Stations

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Abstract:- India is the third largest market for the automobiles. But less than 1% of total automobiles on-road in India are Electric vehicles, one of the factor is lack of charging infrastructure in India. This paper refers how to increase charge stations by utilizing electricity from electric poles and convert it into DC to charge the electric vehicles, while charging rate is limited through a controller which takes the input from electronic data capture machine. Hence every electric pole has a potential of becoming charge station. This improvement in charging infrastructure will foster the growth of electric vehicles in Indian market.

I. INTRODUCTION

As the world is progressing in a rapid rate in terms of technologies, utilizing fossil fuels we are moving away from greener earth. There is a need in finding alternative sources of energy which can sustain the geological balance of our earth and compensate for the depleting fossil fuels.

To cope up with the above mentioned issues and crisis electric vehicles are brought out which are our near future. But is just the production of electric vehicles sufficient? There should be a good charging infrastructure to support the growth and use of electric vehicles in a country. India is the third largest market for automobiles in the world. There are only 224 electric vehicle charging stations [2] whereas there are approximately 45,000 petrol/diesel refueling stations in India [4]. This is one of the factors why the electric vehicles make less than 1% of total vehicles in India.

1.1. Existing electric vehicle charging infrastructure in many developed countries:

Table 1. Specifying the different types of charging, time required and the types of Connectors/ plugs used in charging the electric vehicle.

Type	Current Specifications	Charging Rate	Time For Full Battery Charging	Connectors/ Plugs Used
AC level 1	120v AC	3.2km to 8km/ hour of charging	6-8 hrs	NEMA 5-15 connector
AC level 2	240v or 208v AC	16km to 32 km/ hour of charging	3-4 hrs	NEMA 5-15 connector
DC fast	240v DC Or maximum 600v DC	80km to 113 km/ 20 min of charging	10-20 min	CHAdEMO SAE J1772

(Source: AFDC, a resource of the U.S. Department of Energy's Clean Cities program)

1.2. Existing electric vehicle charging infrastructure in India:

Charging infrastructure will play a pivotal role on electric vehicle deployment. In India the number of electric charging stations can be counted on fingertips, indirectly leading to lower sales of electric vehicles. There are only 224 charging stations of Mahindra Reva e20 car across

17 cities of India but these are concentrated to particular area of those cities. These charging stations include both paid and free stations. When other OEM's want to release their EV then they have to build their charging stations first.

II. IMPLEMENTATION / METHODOLOGY OF CHARGING STATIONS IN INDIA

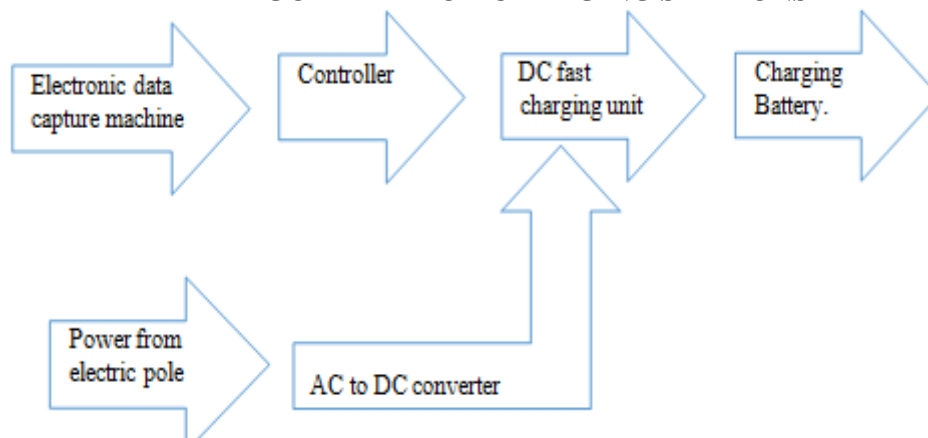
There is only one brand of electric car in India while there are around 13 brands of EV's in USA because the numbers of charging stations are more in USA. The free stations in India are free only for e20 and if another brand enters India they have to pay. This paper refers to how easily we can increase the charge stations in India without the stake-holder incurring any loss. As the number of charge stations increase, this will provide a platform for other OEM's to release their electric vehicles to enter Indian market. The selection of type of charging stations depends on the area selected. These charging stations can be implemented in supermarkets, malls, parking places, cinema-theater and wherever the electric poles are present.

Wherever the electric poles are present within city limits, the DC fast charging station may be installed so that the vehicle is charged quickly. The DC fast charging takes 208v to 420v three phase AC as input. The charging station contains following components- a swipe machine, a controller, electric vehicle charge equipment, AC to DC converter, connector/plug. This charging station initiative has to be taken by the Government. For the charging equipment the power supply is taken from the electric poles where 230-240 v of electricity will be flowing.

The electric charge flowing in the grid will be AC which has to be converted to DC for DC fast charging unit. This charging unit is connected to a controller which controls the flow of electric charge in to the battery while charging. The controller is given the inputs from the electronic data capture machine. The connector / plug should be SAE J1772 so that there will be no compatibility issues.

The methodology or the working of the charging is – whenever the electric vehicle needs to be charged the driver steps out, uses his ATM/Debit card for the payment through the swiping machine. The money is transferred from the driver's account to the stake-holder of that charging station. The driver is allowed to choose for what amount his vehicle should be charged through the electronic data capture machine. This input from the electronic data capture machine will be fed to the controller. The controller takes the input and controls the flow of electric to charge the battery. The amount per unit of charge will be decided by the stake-holder. After the battery is charged for desired money the controller stops the flow of electricity.

III. ALGORITHM FOR CHARGING STATIONS



IV. CONCLUSION

Increasing number of charging stations in India will encourage the electric vehicle ownership. This in turn will support the OEM's to release their products in India. The stake-holders are benefitted as well. The electric vehicle market increases in India.

Other opportunities being that, different government and non-government organizations have an opportunity in fulfilling this project, as the scope for electric vehicles will be high as they are eco-friendly. This will help in strengthening the “MAKE IN INDIA” concept since the electric vehicle OEM’s increase as well.

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