ISSN (Online) 2395-2717

International Journal of Engineering Research in Electrical and Electronic Engineering (IJEREEE)
Vol 5, Issue 1, January 2019

Charging Station for E-Vechicles

[1] R.Gunasekari, [2] Harshith H , [3] Bharath HP, [4] Meghana S N, [5] Sowmiya C
[1] Professor
[1][2][3][4][5] EEE Department, Sri Sairam College of engineering, Bengaluru, India
[2] souharshith@gmail.com, [3] bharathhp007@gmail.com

Abstract: -- **Over the years, there has been a tremendous increase in road transportation and vehicular traffic due to an exponential growth in economic development and consumption habits throughout the world. The effect of vehicular pollutant emissions is significantly more pronounced in an urban scenario, as compared to regional or global scale. As a world is progressing at a rapid terms of technologies, by utilizing fossil fuels we are moving away from greener earth. There is a need in finding alternative source of energy which can sustain geological balance of our earth and compensate for the depleting fossil fuels. To overcome these crises, electric vehicles are introduced. At present days, India is the largest market for automobiles with electric vehicle constituting less than 1% of total automobiles on road. There is just production of vehicles but there is no proper charging infrastructure. To overcome this public charging infrastructure is introduced. One of the key problem is public charging infrastructure**

Keywords —DC Direct current, OEM- Original Equipment Manufacturers, EV- Electric vehicle, AFDC- Alternative Fuel Data Centre, AC-Alternate current

1. INTRODUCTION

In India, marketing of automobiles supported by approximately 45000 petrol/diesel refuelling stations. In comparison there are only 224 charging stations of Mahindra Reva e20 Car across approximately 17 cities of India. Also the public charging stations tend to be concentrated to particular areas of those cities. This charging station includes both paid and free stations. The major challenge faces by the OEMS is the installation of charging infrastructure to support their EV customer base and distribution Many countries have already developed a systematic charging infrastructure to boost the market acceptance of Electric Vehicles (EV).

2. RELEVANCE AND APPLICATION TO FIELD

- Greenhouse effect: Electric vehicle produces no harmful emissions while driving.
- Efficiency: Electric drive motors have high degree of efficiency up to 95% compared to IC Engines that have an efficiency of 35 – 40%. The electric drive motor is highly efficient particularly in lines and bumper – to – bumper traffic.
- Maintenance: Electric drive motor is very robust and requires little maintenance. It is only subject to minor mechanical wear and EV does not require any lubricant oil.
- Noise pollution: Electric drive motors run quieter than IC Engines. The noise emissions from electric vehicles are very low.
- Energy saving: Electric vehicles require energy only when the user needs it when compared with conventional vehicles.
- Easy Charging to electric vehicle: The high voltage battery can be charged at home, in a car parking and by using any accessible socket the charging connector on the vehicles and on public charging stations has been standardized and use by all manufacturers.

3. METHODOLOGY OF IMPLEMENTATION

A method to implement the Public charging stations follows:

- Recharging stations
- Battery swapping stations

Recharging station: It is an element in an infrastructure that supplies electric energy for the recharging of electric vehicles, such as plug in vehicles.

There are three types of recharging:

- Normal AC Charging Stations
- Fast AC Charging station
- DC fast charging station

ISSN (Online) 2395-2717

International Journal of Engineering Research in Electrical and Electronic Engineering (IJEREEE)
Vol 5, Issue 1, January 2019

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

Type: 1 (AC Level 1)
In order to meet the specification of type ac level from 230V used for domestic purpose, another step down transformer used to convert from 230V to 120V for charging electric vehicles by using NEMA 5-15 Connectors. So that electric vehicles charging can be done at home during night hours, parking slot at office area during working hours.

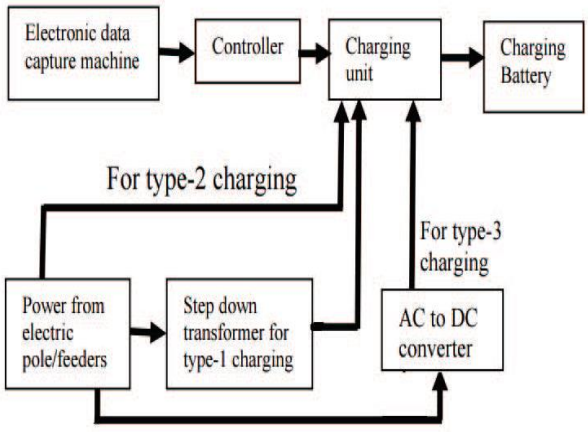
Type: 2 (AC level 2)
In order to meet the specification of type ac level 2 from 230V used for domestic purpose can be used for charging vehicles by using NEMA 5-15 Connector. Same technique as ac level 1, but compared to the above said technique is much better. Charging time is less compared to AC level 1 technique. AC level 2 technique can be used house, apartment at night, parking lot at complexes q11111 Comparing to type 1 this type is better and sometimes need step down transformer in case of 440v and 220v supply for domestic consumption. This can done through a socket outlet by using a connector.

Type: 3 (DC Fast Charging)
As the name indicates is a DC fast charging system where battery can be charged with in a minutes comparing to type1 & type2 dc does not require more time but pose certain amount of difficulty due to requirement of ac to dc converts .this method can be implemented by using a grids or using converts in stations .

As with any system, the infrastructure changes for charging station need to be evaluated in terms of existing infrastructure, current demand, customer charging patterns and anticipation of future growth
Public charging stations need to be equipped with smart payment solutions. Typical charging station consists of following components- a swipe machine, a controller, electric vehicle charge equipment, AC to DC converter, connector/plug. For the charging equipment the power supply is taken from the electric poles where 230-240 v of electricity is available. 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.

Algorithm for Charging Stations

The methodology overview for charging can be through the use of ATM/Debit card for the payment via the swipe machine. The money is transferred from the owner's account to the stake-holder of that charging station. he owner 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 electricity to charge the battery. The amount per unit of charge will be decided byte stake-holder. After the battery is charged for desired money the controller stops the flow of electricity. The algorithm is as depicted in Figure 1.



ISSN (Online) 2395-2717

International Journal of Engineering Research in Electrical and Electronic Engineering (IJEREEE)
Vol 5, Issue 1, January 2019

Battery Swapping Stations

A battery swapping station is a place at which a vehicle's discharged battery or battery pack can be immediately swapped for a fully charged one, eliminating the delay involved in waiting for vehicle's battery to charge.

4. INFRASTRUCTURE

Longer charging times for Type 1 charging increases the burden on the infrastructure through vehicle waiting space and period. The realistic threat of theft of both electricity and its equipment for unmanned charging stations can be hindrance. The equipment should be capable of handling voltage fluctuation which affects the vehicle charging systems. Changes in weather must also be accommodated for safety reasons. These factors directly influence the installation and maintenance costs.

5. CONCLUSION

Using the existing electric network is the key to faster adoption of Electric Vehicles and also an opportunity for the distribution companies to contribute towards lowering emissions and increasing their sphere of work. Increasing number of charging stations in India will encourage Electric Vehicle ownership. This in turn will boost the OEM's to release their products in India and foster the growth of Electric Vehicles.

REFERENCES

1. Petroleum,"Indian petrol stations", http://www.petrolpump.co.in/
2. Mahindra Reva e2O,"Charging stations", http://mahindrareva.com/e2o-owners/charging-points
3. SMEV (Society of Manufacturers of Electric Vehicles), http://www.smev.in/
4. "Electric Vehicle Charging Infrastructure Deployment Guidelines British Columbia" by Electric Transportation Engineering Corporation in July 2009.