



A Review: Electrical Vehicles for Smarter Cities

Mrs. Vaijayti S Yeole¹, Mrs. Vidya Tanaji Patil²

vaijayanti.yeole@ybppolytechnic.ac.in, tvidya1946@gmail.com

¹Y. B. Patil Polytechnic, Akurdi, Pune

²Y. B. Patil Polytechnic, Akurdi, Pune

Abstract — Electric vehicles (EVs) are a promising technology for achieving a higher-level goal in future, due to their very low to zero-carbon emissions, low noise, and high efficiency. However, the large penetration of EVs is expected to affect the existing power grids, due to high loads. Uncontrolled charging of plug-in electric vehicles represents a challenging task for the energy system. Control charging of EVs—within the concept of smart city—can have a powerful effect on the power grid load, voltage, frequency, and power losses. In this way, smart charging has been planned, in order to avoid grid congestion and to integrate renewable energy. This chapter gives idea of transition to a new age of mobility and the challenges of charging mechanisms within the concept of the smart city. This chapter analysis the concept, framework, advantages, challenges, and boost strategies to vehicle-to-grid. Complete reviews of different strategies, smart charging strategy and relative benefits are also given.

Keywords: Smart charging, Zero carbon emissions.

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I. INTRODUCTION

The change in climate has been a buzzing issue since the past few decades. Environmental problems occurs due to traditional mobility using fossil fuels are well known. As large majority of people in the world lives in an urban environment at present and is anticipated to grow by 80% by 2050, a large amount of greenhouse gas emissions caused due to the urban transportability. While addressing environmental distress caused by the existing urban mobility is vital, and an electro-mobility is one of the foremost contenders for mitigating the impact of climate change and improving quality of life in an urban area. Since a traditional electric power grid architecture might result in unpredictable and substantial loads on the power grid, which might, in turn, trigger imbalances, leading to blackouts, modernization the existing electric grid, also known as smart grid, is taking place in many countries. Furthermore, the tendency toward electrification of transportation is also growing since electrified transportation can offer considerable benefits in terms of reducing CO₂ emissions and minimizing fossil-fuel dependence. In recent years, attraction to alternative urban mobility paradigms such as electric vehicles (EVs) is increasing since EV scan significantly contribute to minimize dependence on fossil fuel and reduce carbon emission in urban areas. Thus, EVs can not only provide a cleaner environment but also decrease operational costs of the electric power systems. Nonetheless, widespread adoption of EVs encounters several challenges including technological constraints that is long charging time and inadequate public EV charging network, limited driving range, limited efficiency and high initial investment. Only overcoming impediments of EV technologies can boost user acceptance for the use of EVs in urban areas. Moreover, as EV penetration increases in the urban areas, unusual charging could recognize power losses and undesirable voltage variation that may overload the electric power grid. Appropriate deployment of smart grid technology and EV-grid integration can allow EVs to communicate with the energy service provider (ESP) that, in turn, coordinates the charging activities. A huge number of public charging station networks may not come immediately in some urban areas due to many limitations such as financial, technological limitations etc. With the increased growth of EVs in urban areas, the extensive charging network would be in place to meet the anticipated Demand shortly. Anyhow, the number of available charging facilities could be inadequate, so an efficient smart EV charging management would be required for managing and allocating the limited EV charging facilities.

Advantages:

- Energy efficient. EVs convert over 78% from power of wheels.
- Maintenance is low due to an efficient electric motor
- Zero Tailpipe Emissions

II. Future Scope

1. Technology for electric vehicles has been around since the 80's in labs such as NASA. Today's technology will no doubt be far more advanced in a few years. We believe that we will soon see electric vehicles that can power themselves by harvesting energy from their environment. Such vehicles will require less maintenance and can even run off alternative energy sources such as wind.
2. Problem faced by EV is that they do not fit into majorly cars parking spaces. Advance system is done in technology, this problem will seem to be reduce further as time goes. Other problem are also that electric vehicles use electricity which results in a pollution problem. There are solutions to overcome both these issues. The charging stations for electric vehicles offer a way in which pollution can be reduced and help to create jobs in regions where employment is very less.
3. The future scope of electric vehicles is very enormous. As we had already seen that technology for these vehicles is here and becoming more advanced. We know that electric vehicles can provide us with great flexibility, and we will soon see that capacity in EV. It will also be interested to see the impact of regulations which will come into force from the EU and US. There will be a need to develop new zero emission technologies as earliest.

III. CONCLUSION

Developed and countries which are developing have become more active in EV introduction and diffusion. In developed countries, the government has led the program of next-generation environment-friendly vehicles. The demand for reliable, affordable, and environmentally sound wave energy grows more vital every year. With the support of the public, the federal government, and the states, renewable energy sources will play a larger role in achieving the goals. Renewable, along with the full range of other climate-friendly technologies including nuclear, energy efficiency, clean coal, carbon capture and storage, and plug-in electric hybrids—must all be a part of the electric power industry's long-term future.

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