CHAPTER 1

INTRODUCTION

1.1 Project Background

Plug-in Hybrid Electric Vehicle (PHEV) is an electric vehicle which has two power sources. It has a rechargeable battery which can be recharge by plugging it into supply outlet. With a larger battery storage, and supported with gasoline makes PHEV more reliable than normal electric vehicles which solely depending on electric battery. Besides that, electric vehicle is well known for it reduced dramatically the emissions of harmful gasses after the combustion of gasoline such as carbon dioxide (CO2) which cause greenhouse effect and global warming, carbon monoxide (CO) happens when incomplete burning, hydrocarbons (CxHy), nitrogen oxides (NOx) and Particular Matter (PM) or known as soot[1].

Figure 1.1 Composition of exhaust emissions of petrol and diesel engines
Moreover, PHEV reduce the dependency of country on foreign oil. The increase of EVs and PHEVs usage could result in a magnificent dent in foreign oil dependence. At present, the transportation sector is the dominant consumer of foreign oil, with the nation spending nearly $1 billion per day on oil, sustaining this dependency. EVs and PHEVs could utilize idle electricity infrastructure to reduce foreign oil dependence by up to fifty percent, or 6.5 million barrels of oil per day.

According CEO and the founder of POD Point (UK top EV charging equipment supplier), Eric Fairbairn has present an info graphic while he was being interviewed. He did a prediction for the growth of Electric Vehicles and PHEV for the coming year base on the sales and the data collected over the past few years[2], [3].

Figure 1.2 Predictive Global Electric Vehicle Sales

This clearly define that most user are being aware of the benefits that PHEV and EV can provide benefits for the user and as well as to the country. Along with the rapid increase of
purchasing PHEV and EV cars, the demand for electric supply will linearly increase. For this, the charging point for EV and PHEV should increase as well.

Figure 1.3   Current Charge point installation focus

Besides the advantages, when large amounts of PHEV are brought into the community, a serious question arises whether the power grid can handle the extra load created by charging of PHEVs in the near future. Studies have been involved to examine the effect of PHEV on power grid system and distribution systems [4]. These studies have their focus on particular power grid system network or distribution circuit. In fact, the system level impacts can be very different from one form of circuit to another; therefore, we must consider the uncertainty in PHEV charging patterns and the diversity of circuit characteristic. Regarding on the uncertainty are the absolute information such as penetration levels, charging characteristic and charging pattern both partially and temporarily that is required for a PHEV due to varying causes. Thus, multiple studies need to be applicable to any utility or country. The impacts on a power grid distribution system due to uncontrolled charging activities may result in transformers, and cables overloaded and caused infringement of early planning’s limitation.