Abstract

Transportation is one of the sectors that directly touches the major challenges that energy utilities are faced with, namely, the significant increase in energy demand and environmental issues. In view of these concerns and the problems with the supply of oil, the pursuit of alternative fuels for supplying the future energy demand of the transport sector has gained much attention. The future of transportation is believed to be based on electric drives in PEVs and PHEVs. For this transition to plug-in vehicles some studies should be considered. In this thesis according to demand response program in Iran, power demand in different zones, fuel cost and premium cost of these vehicles, economic analysis has be done and some methods are proposed to make these vehicle economically viable.On the other hand, in this thesis power systems studies have be prepared for the possible impacts of these new types of loads on the system by considering the electricity grid constraints.. This thesis investigates the technical and economic feasibility of transition to these types of vehicles in different zones of Iran. These planning models are based on decomposing the region under study into different zones, where the main power generation and electricity load centers are located, and considering the major transmission corridors among them.An emission cost model of generation is first developed to account for the environmental impacts of the extra load on the electricity grid due to the introduction of PHEVs. This analysis was done on Iran's grid according to forecasting development for different sectors by 2025. Applying the models requires the development of models for Iran's transmission network (400 and 230 kV transmission line are considered), generation capacity and base-load demand during the planning study.Applying this model and power flow between these zones based on grid constraint show that Iran has potential to have this transition to PHEVs in different zones.