Large-scale adoption of moving electric vehicle (EV) loads significantly accelerates the integration of power and traffic systems. This paper proposes an approach to assess and alleviate the impacts of stochastic EV charging and movement in an integrated power and traffic system. Level of Congestion (LoC), Nodal Voltage Deviation (NVD) and Energy Loss Rate (ELR) are proposed as nodal indices to spatially and temporally assess the impacts due to the inter-node movement of EVs on power system operation. Nodal Time-of-Use (NTOU) price and Road Traffic Congestion (RTC) price are developed to shift the charging and movement of EV loads. EV driver's charging and driving decisions are modeled by fuzzy logic inference system in response to NTOU and RTC prices. Two transportation systems have been developed and integrated with the Roy Billinton test power system (RBTS) to illustrate the proposed technique and model.