

The Large Scale Roll-Out of Electric Vehicles: The Effect on the Electricity Sector and CO2 Emissions

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Abstract The UK government has set the ambitious targets of 20 and 50% reduction in greenhouse gas emissions by 2020 and 2050 respectively. The transport sector accounts for 21% of total CO₂ emissions in the UK and can, therefore, be important for achieving the emissions reduction targets. Within the transport sector, electric vehicles (EV) are considered as one of the important mitigation options. However the effect of EVs on emissions and the electricity sector is subject to debate. We use scenario analysis to investigate the emission reduction potential of EVs and their interaction with electricity sector. We show that managing the charging patterns could reduce adverse effects of EVs on the electricity sector while the number of EVs remains the factor affecting the mitigation potential. Our findings indicate that in the UK, by 2030, EVs could result in up to 32% emissions reduction compared to advanced internal combustion engines. We also found that the need for new electricity generation and distribution capacity to meet the conventional electricity demand and demand from EVs could be reduced by up to 12% from 70.6 to 61.8 GW if the EV's electricity demand is managed.

Keywords Electric Vehicles, CO₂ Emissions, Electricity Demand Management

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