

Estimating the impact of electric vehicle charging on Regional Greenhouse Gas Initiative carbon prices
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This presentation introduces results from a model that estimates the short-run effect of plug-in hybrid electric vehicle (PHEV) charging on electricity costs given the Regional Greenhouse Gas Initiative (RGGI) cap on CO₂ emissions from the electricity sector. In the short-run, cap-and-trade systems that cover the electricity sector increase the marginal cost of electricity production. The magnitude of the increase in cost depends on a number of factors including the stringency of the cap in relation to the demand for electricity. The use of PHEVs, which also has the potential to decrease net GHG emissions, would increase demand for electricity and thus increase the upward pressure on marginal costs. The model examines this effect for the New England electricity market, which as of January 2009 operates under the Regional Greenhouse Gas Initiative, a cap-and-trade system for CO₂. The model uses linear optimization to dispatch power plants to minimize fuel costs given inelastic electric demand and constraints on NO_x and CO₂ emissions. The model is used to estimate costs for three fleet penetration levels (1%, 5%, and 10%) and three charging scenarios (evening charging, nighttime charging and twice-a-day charging). The results indicate that PHEV charging demand increases the marginal cost of CO₂ emissions, as well as the average and marginal fuel costs for electricity generation. At all penetration levels the cost increases were minimized in the nighttime charging scenarios.