Market Potential of Plug-in Electric Vehicles Using Multiday GPS Data

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Abstract:

GPS data for a year's worth of travel by 255 Seattle households illuminate how plug-in electric vehicles can match household needs. The results suggest that a battery-electric vehicle (BEV) with 100 miles of range should meet the needs of 50% of one-vehicle households and 80% of multiple-vehicle households, when charging once a day and relying on another vehicle or mode just 4 days a year. Moreover, the average one-vehicle Seattle household uses each vehicle 23 miles per day and should be able to electrify close to 80% of its miles, while still meeting 100% of the travel needs, using a plug-in hybrid electric vehicle (PHEV) with 40-mile all-electric-range. Households owning two or more vehicles can electrify 50 to 70% of their miles using a PHEV40, depending on how they assign the vehicle across drivers each day. Cost comparisons between the average single-vehicle household owning a Chevrolet Cruze versus a Volt PHEV suggest that when gas prices are $3.50 per gallon and electricity rates at 11.2 ct per kWh, the Volt will save the household $535 per year in operating costs. Similarly, the Toyota Prius PHEV will provide an annual savings of $538 per year over the Corolla.