

The Potential of Plug-In Hybrid Electric Vehicles to Reduce Petroleum Use: Issues Involved in Developing Reliable Estimates

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ABSTRACT

This paper delineates various issues involved in developing reliable estimates of petroleum use reduction by widespread introduction of plug-in hybrid electric vehicles (PHEVs). Travel day data from the 2001 National Household Travel Survey (NHTS) are analyzed to identify vehicle miles of travel (VMT) that can be transferred to grid electricity. Various PHEV charge depleting (CD) ranges are evaluated, and 100% CD mode and potential blended modes are analyzed. The NHTS data are also examined to evaluate the potential for multiple PHEV battery charging per day. Data from the 2005 American Housing Survey (AHS) are analyzed to evaluate the availability of garages and carports for at-home charging of PHEV battery. The AHS data are also reviewed by Census region and household location within or outside metropolitan statistical areas (MSAs). To illustrate the lags involved, the historical new vehicle market share increases by the diesel powertrain in France (a highly successful case) and the emerging hybrid electric vehicles in the United States are examined. A new vehicle technology substitution model is applied to illustrate a historically plausible successful new PHEV market share expansion. The trends in U.S. light-duty sales and light-duty vehicle stock are evaluated to estimate the time required for hypothetical successful new PHEVs to achieve the ultimately attainable share of the existing vehicle stock. Only when such steps have been accomplished will the full oil-savings potential for the nation achieved.

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