**Potential of electrified vehicles to contribute to petroleum and climate goals and implications for biofuels**

American crude oil imports have almost tripled since the early 1970s and now account for about half of the American petroleum supply, a dependence that is fueling climate change. Regulations intended to mitigate climate change, however, seek an 80% reduction in US greenhouse gas (GHG) emissions by 2050 in order to stabilize global GHG concentrations at low to medium levels. Within the transportation sector, the two main options for reducing petroleum use and GHG emissions are fuel-use reduction and fuel substitution. Given the current barriers to increasing ethanol-based biofuels (e.g. blend wall, slow growth in cellulosic biofuel production, regulatory uncertainty regarding the RFS), transportation electrification seems to offer a more immediate opportunity to displace gasoline. Electrified vehicles (hybrid, plug-in hybrid or battery electric technologies) could potentially replace, under favorable conditions, conventional gasoline vehicles. Researchers at the DOE’s Great Lakes Bioenergy Center were interested in the extent to which these vehicles could reduce petroleum consumption and GHG emissions, as well as the sensitivity of these impacts across various travel demand and technology scenarios, including: (1) Reference scenarios, which assumed no change to GHG intensity from current levels; (2) Petroleum-targeted scenarios, which assumed that electricity supply is decarbonized by 40% (which assumes most of the light duty vehicles are hybrid or plug-in hybrid); and (3) Climate-targeted scenarios, which assumed that electricity supply is decarbonized by 80%. The model showed that with high rates of electrification (40% of miles traveled), the petroleum-reduction benchmark could be satisfied, even with high travel demand growth. However, those same scenarios could not satisfy 80% of GHG-reduction targets, even assuming 80% decarbonized electricity, which includes a significant contribution from cellulosic biofuels. At a relatively high rate of electrification (40% of miles and 24% by fuel), an 80% GHG reduction could only be achieved with significant quantities of low-carbon liquid fuel in cases with low or moderate travel growth. Importantly, the model considered fuel demands only for light duty transportation, which is responsible for about more than half of the US petroleum used in the transportation sector, and for which there is already a significant level of electrification. However, electricity is not feasible for powering planes, heavy trucks, and marine vessels, suggesting that an even higher reliance on cellulosic biofuels would be needed to achieve comparable GHG targets across other transportation modes.

**References:** Meier, P.J., Cronin, K.R., Frost, E.A., Runge, T.M., Dale, B.E., Reinemann, D.J., and Detlor, J. 2015*. The Potential for Electrified Vehicles to Contribute to U.S. Petroleum and Climate Goals and Implications for Advanced Biofuels.* **Environmental Science & Technology**, doi: 10.1021/acs.est.5b01691.

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