



Comments at Governor's Office Five Pillars Symposium  
"Rethinking Transportation in California"  
Sacramento, California  
July 8, 2015

My name is Cleve Livingston (cleve.livingston@gmail.com). I am representing today the Fuel Freedom Foundation. The Foundation is a non-profit organization based in Irvine, California promoting cleaner, cheaper fuels for passenger cars and light duty trucks. Our goal is to reduce U.S. petroleum consumption. We are fuel agnostic but have identified alcohol fuels—ethanol today and methanol in the future—as alternatives to gasoline that can be produced, distributed, and retailed at prices much less than gasoline. Less expensive fuels at the pump are necessary for consumer adoption, but these fuels must also be coupled with more affordable vehicle technologies—like flexible fuel vehicles or FFVs—that achieve low emissions and high efficiency.

Fuel Freedom is focusing on high level ethanol blends today since there are 17 million FFVs in the U.S. fleet and there are a small but growing number of E85 fueling stations. Ethanol today is mostly produced from corn but several companies are investing in ethanol production from natural gas. Cellulosic renewable technologies are also being developed. E85 is now being successfully retailed in several markets in Texas and Fuel Freedom is working with three states—Utah, Colorado, and Pennsylvania to replicate this success.

Current E85 FFVs are slightly more efficient on ethanol than gasoline since the vehicle's calibration can take advantage of the **higher octane** of alcohol fuels. Future vehicles can be designed to take full advantage of alcohol fuels by increasing engine compression ratio and coupling with direct injection, turbocharging, downsizing and down-speeding. These technologies will substantially increase ICE efficiency and mpg performance. Adding vehicle electrification—start/stop, hybridization, and ultimately plug-in hybridization—can achieve California's goals of 80% reduction in GHG emissions. Increasing vehicle electrification will reduce costs making electric vehicles more competitive in the future.

Current E85 FFVs have achieved lower NO<sub>x</sub>, PM, and toxic emissions compared to gasoline vehicles. Future high efficiency vehicles using alcohol can also be designed to minimize these emissions. These reductions are needed now to meet ozone and PM<sub>2.5</sub> attainment and protect public health.

Based on alcohol fuels environmental and petroleum reduction benefits, Fuel Freedom recommends that ARB consider alcohol fuel technologies as possible pathways to achieving California's goals of ozone and PM<sub>2.5</sub> attainment, lowering toxic emissions from motor vehicles, displacing petroleum, and substantially lower the GHG impact of light duty vehicles (another tool in ARB's tool box). Alcohol fuel technologies have the potential to achieve these benefits at lower costs than other alternatives and, therefore, the potential to be adopted in the market place at significant volumes. Specifically, Fuel Freedom recommends that ARB integrate alcohol fuel technologies into ARB's existing policies including the low carbon fuel standard, vehicle emission standards, state implementation plan, and upcoming update of the GHG reduction scoping plan.