

"There is no 'Silver Bullet'-no single technical or fuel solution that exists today."
From the 2009 **08-ALT-1 "Advisory Committee Meeting"** on the Alt Fuels
Investment Plan –California Energy Commission

Imagine if there was a "Silver Bullet," one that would address the technical and fuel solutions we face today. What would it look like? More than likely it would look very simple - it might even be right in your face simple. Yes, there are interesting technologies being considered for the future but we need effective solutions that can be implemented today.

Leading Edge Sciences proposed the "Silver Bullet" solution to Mike McCormack of the California Emerging Fuels and Technology Center in 2006. The "Silver Bullet" was, and still is, the blueprint that Joe Colucci delivered in his keynote address to the 2005 SAE Powertrain and Fluid Systems Conference in San Antonio, Texas. Joe Colucci was the co-leader of the U.S. Auto/Oil Program and invested a 40 year career directing the GM Research Labs and R&D Center - Fuels and Lubrication Department.

The key points from Mr. Colucci's blueprint, which I recommend California Emerging Fuels and Technology Center focus on, are:

1. Gasoline detergency and vehicle octane requirement increase
2. Trained vehicle service personnel who understand the effects of gasoline blends and effective fluid maintenance programs
3. Ethanol integration into gasoline that addresses environmental and supply issues

Gasoline detergency and vehicle octane requirement increase (ORI) go hand in hand, and need to be addressed immediately. Gasoline with detergency, which diminishes vehicle octane requirement increase, needs to be brought to market for all grades of gasoline, instead of being commonly marketed only for selected brands of premium grades. The reduction of vehicle octane requirement increase can lead to what is known as octane optimization. Essentially, if you can reduce or eliminate vehicle octane requirements back to the original OEM condition, this saves gasoline resources, which is an essential way to reduce emissions.

The effectiveness of gasoline should be tested as part of regular vehicle maintenance which would likely drive competition among gasoline suppliers, ultimately benefiting consumers and the environment. For example, by inspecting the middle cylinder of the combustion chamber with a boroscope, a trained vehicle service technician can assess the effectiveness of the gasoline detergents. Vehicle service personnel also need to be trained to understand the components of blended gasoline and how it affects vehicle performance.

Vehicle fluid maintenance programs can no longer be left up to unqualified service personnel. These technicians hold a significant responsibility (and a huge opportunity) to the public. Attention to fluid systems, engine oil and the role they play in reducing performance-robbing vehicle deposits need to be addressed, especially with more complex EGR (exhaust gas recirculation) systems. Engine oil needs to be analyzed at time of scheduled maintenance in order to determine the condition of the engine and engine oil. Communication to consumers regarding recommendations for appropriate oil and fluid system change intervals, as well as performance claims from fuel and fluid manufactures, need to be verified.

Ethanol integration needs to be addressed. Blending ethanol into gasoline results in refinery pool shrinkage due to the fact that LPGs need to be removed from gasoline

to accommodate ethanol. However, reacting ethanol with LPGs, produces ETBE, a superior gasoline blending component. ETBE has low volatility, follows Clausius-Clapeyron behavior (which ethanol does not), and offers better stoichiometric air-fuel and vapor-liquid ratios.

Leading Edge Sciences has researched the European expansion of Bio-ETBE, and this product is technically the only bio-alternative fuel on the market, and is ready to go now. Gasoline blended with ETBE provides improved vehicle performance over ethanol, while it reduces carbon monoxide, VOC's, ozone precursors and CO2 emissions. Also, more components are available for refiners to integrate into the fuel supply. ETBE extends gasoline supplies beyond ethanol volumes, with no additional crude oil usage. ETBE contains 42% ethanol, and can be blended into gasoline at ranges of 20% or more.

It is clear that real work needs to be done before it is too late, and more time is wasted into this worldwide crisis. The California Energy Commission seems to have invested in plans that are now, as the CALSTART presentation points out, "on life support @ low oil prices." The markets are not focusing on the real issues.

Leading Edge Sciences is focused on the real issues: gasoline detergency and ORI, trained vehicle service personnel, and ethanol integration. FuelGuru.com has the mission to bring this change to the market.

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