# FUEL FOR THE FUTURE – Ethanol is Available Now to Provide HOLC Gasoline at Least Cost to Consumers

*Editor's Note: Reg Modlin is a Senior NRS Advisor and a veteran of 40-plus years in the automotive industry. Over the next several posts, he will examine the steps that have been taken – and need to be taken – to attain the transportation fuel that best serves our nation for years ahead. All blogs in this series will be made available here.*

In the first article for this series, we saw the need to look at each of the challenges we face in introducing a new gasoline to the market in turn. Identified were questions such as: "Can the agriculture sector provide the volume of biomass feedstocks needed?" "What does this mean for land use and pricing of food related portions of the market?" "Can the distribution infrastructure transition to a higher blend of ethanol? At what cost and in what timeframe?" "How should a clear, strong policy directive be created and broadcast?"

Why does octane matter? Spark ignition engines can be designed for higher efficiency with higher octane fuels. After review of hundreds of possible octane enhancing molecules, Department of Energy (DOE) data gathered under the Co-Optima study (a multi-sector supported analysis of factors that should be considered in future fuels) shows that adding ethanol is the most cost-effective approach to increasing octane rating. Higher efficiency translates directly to lower vehicle tailpipe emissions. When the fuel contains bio-derived or renewable content, lifecycle greenhouse gas emissions are further reduced. Defining a Higher Octane, Low Carbon (HOLC) test fuel will signal the automobile industry to use that fuel to optimize the performance of future engines. The engine technologies to use higher octane are well understood and applicable today.

Creating the volume of ethanol needed to supply a future high-octane gasoline first requires a sufficient quantity of corn, sorghum and other sources of biomass. Preferably, the needed corn should be available without competing with the needs of food production, nor at increased cost for either or both the food and fuel supply chains. Consider that an increase in ethanol demand will build over time. Automobile manufacturers will begin to offer products that need HOLC gasoline and will, over time, replace the internal combustion engines in the total car park. Recent analysis shows that historical and projected crop yield is capable of supporting production of enough gasoline needed to supply all vehicles that could be in the market capable of using it through 2023. Further, projected increases in crop yield could support the production of enough ethanol to convert the entire need for gasoline at a E25 level in the future. Therefore, crop yield is not, and will not be, a barrier to using more ethanol in gasoline.

Additionally, peer-reviewed studies show that use of land for agriculture will not increase as a result of using more ethanol in fuel. As crop yield continues to increase and analytical techniques continue to improve, land-use analysis now shows that increased production of corn and other biofuel feedstocks has not imposed significant changes to land use and that increases are not foreseen to be necessary to move toward an E25 future. An important consideration is that pressure to constantly improve fuel economy will continue. In light of that pressure, fuel consumption will decrease in coming decades. Assuming electrification is successful, liquid fuel demand would decrease at an accelerated rate.

Equally important, the production capacity for ethanol can accomplish the task of supplying current and future needs. The current ethanol plant capacity supports a fuel pool containing 10-percent ethanol. No one is concerned about the capacity to move that volume up to satisfy anticipated E15 volumes. Should the future need a capacity increase, ethanol plants are well understood, inexpensive, and capable of being located where greatest efficiency can be achieved in response to increasing demand.

The retail cost of the finished gasoline products must also be considered. Retail price may be the single most import feature that will drive commercial success of a future fuel. The fact that finished ethanol is projected to remain at a lower cost than regular blending stock assures the potential for an E25 product to achieve a lower cost at retail than comparable regular gasoline. This factor is demonstrated routinely when looking at contemporary pump pricing for E15 and E85 products currently in the market place. A new HOLC product on the pump island at a price lower that comparable regular and premium products would be a no-brainer for customers.

Notable here is that the refining sector, in support of a study conducted by the United States Council for Automotive Research (USCAR), concluded that increased refinery and infrastructure costs would have to be covered by higher retail prices. That study was limited by an assumption that not enough corn and ethanol could be produced to supply a high octane, mid-level ethanol market need. With that assumption removed (accepting that the corn and ethanol sectors can support increasing demand) the result dramatically changes to show the potential for widening pump price advantage using higher percentage ethanol blends.

With government support for increasing octane in domestic gasoline, and adoption of a corresponding Certification Fuel Specification, automobile manufacturers and fuel marketers have stated that they are capable of supporting deployment of fuel and vehicles by late 2023. Using 25-percent ethanol by volume, 98 RON can be achieved using current gasoline base stock as presently produced by refineries. This method will result in a retail product that is better than current Premium brands at a cost less that current Regular brands.

**Coming next – Can the distribution infrastructure support deployment of a HOLC gasoline?**