



CUTTING PRICES AT THE PUMP: 2 *Opportunities for Natural Gas in the Light-Duty Fleet*

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Natural gas prices in the United States have dropped almost 50 percent over the last decade thanks to the shale gas revolution. Oil prices, on the other hand, have more than doubled during that time. The change in the relative prices of these two fuels—combined with significant advances in both fuel and vehicle technologies—creates an opportunity to expand the use of natural gas in the light-duty fleet of cars and trucks and lower prices at the pump. Ethanol, methanol, compressed natural gas (CNG), and liquid petroleum gas (LPG) are four natural gas-based fuels that may be able to do just that.

Although these fuels could yield significant cost savings relative to conventional gasoline in the light-duty fleet, the principal beneficiaries of these fuel and technology trends are currently limited to the estimated 250,000 owners of CNG- and LPG-capable vehicles.

Another 10 million flex-fuel vehicles on the road today are capable of burning E85, a blend of 85 percent ethanol and 15 percent gasoline. Although E85 is not currently cheaper on an energy-equivalent basis at the pump than conventional gasoline in most areas, newly developed

technologies offer the promise that low-cost, natural gas-derived ethanol can be produced in the future.

In our recent research, we compared the costs of E85 produced using these new technologies with conventional gasoline, estimating the volume of fuel required to propel a vehicle the same distance (expressed in gasoline gallon equivalents). For the most favorable case, E85 could be produced and sold for \$0.31 to \$0.59 per gasoline gallon equivalent below the current price of gasoline in selected urban areas across the United States. This amounts to annual savings ranging from \$157 to \$439 for a vehicle driven 15,000 miles per year, depending on a range of assumptions. Based on 2015 fuel price projections by the US Energy Information Administration, these savings could increase substantially in later years.

Significant opportunities exist to convert conventional gasoline vehicles to E85. The US Environmental Protection Agency (EPA) has certified just one E85 conversion kit, costing \$1,300. However, there appears to be considerable potential to expand the number and type of approved kits and drive down the price substantially, perhaps

by 75 percent or more. Payback for such a conversion could be as short as six months, depending on location, timing, vehicle fuel economy, and miles driven.

For methanol, the information is less precise. Based on a range of assumptions, however, including those about the development of a methanol fuel network, we find that the development and production of methanol-capable vehicles could be an attractive economic proposition.

For both CNG and LPG, the conversion costs are considerably higher, on the order of \$5,000 to \$10,000 per vehicle. For these fuels, conversion makes economic sense only for large, heavy vehicles with high usage rates.

In our research, we assumed that the regulatory landscape will remain unchanged for the foreseeable future. However, one can imagine regulatory changes that could either help or hinder the development and deployment of natural gas fuels. An example of the former would be an expedited, simplified process for obtaining EPA certification of conversion kits, which would probably drive

down kit prices. An example of the latter would be an expanded mandate for the sale of biogenic ethanol, which could operate to bring more cellulosic-based E85 into the market and shrink demand for the natural gas-based product.

Despite our general optimism about the future for natural gas fuels in the light-duty fleet, there is clearly a chicken-and-egg issue of bringing the fuels to market and developing a sizable fleet of flex-fuel or dedicated vehicles capable of using them. We are at the beginning of a potentially long, complex, and highly uncertain process of market transformation. Success hinges on many factors, not the least of which are the ability and willingness of firms to produce and market E85 and other natural gas-based fuels at the forecast prices. Other uncertainties include the interest of conversion kit manufacturers in developing low-cost kits, as well as trends in natural gas and oil prices. ●

FURTHER READING

Fraas, Arthur G., Winston Harrington, and Richard D. Morgenstern. 2013. Cheaper Fuels for the Light-Duty Fleet: Opportunities and Barriers. Discussion paper 13-28.

The Social Benefits of Natural Gas-Based Fuels

Apart from bringing down fuel prices, the use of natural gas fuels also may improve energy security and benefit the environment. For example, sharp increases in world oil prices can reduce US aggregate consumption and demand, potentially triggering a recession. Substituting inexpensive natural gas fuels for gasoline made from crude oil shields us from this effect. Put into monetary terms, this energy security benefit could be on the order of \$0.20 per gallon of gasoline saved.

With respect to air pollution benefits, current estimates indicate that (with a few exceptions) the emissions of light-duty vehicles using conventional gasoline and their natural gas-based alternatives are comparable. And although the shift to alternative fuels may decrease emissions of certain gasoline-related air toxics, such as benzene, it is likely to increase aldehyde emissions. More research is needed on the potential trade-offs between these pollutants.

The situation remains similarly murky regarding local environmental consequences of shale gas development, as well as the uncertain greenhouse gas emissions resulting from leakage during the production and transport of the gas.