Nathan Borchelt

A Proposal of Not Swapping toE15

With the sudden rise in gas prices, the Biden administration has begun to investigate options to bring cheaper prices to consumers. Two years ago in April 2020, gas prices hit the low of the pandemic, with a national average of $1.938 per gallon, and the average of April 2022 is $4.213 per gallon. That is a 117% increase in the span of two years and is worse than the prices during the Recession of 2008, when gas hit $4.114 in July of 2008 before crashing down to under $2 per gallon.

These prices have inflated due to multiple factors. Covidian restrictions have begun to release across the nation and people are beginning to travel more. This naturally leads to a spike in demand from what had previously become a standard of low demand. There is currently an issue where the supply is could be very elastic with groups such as OPEC already setting an oliguric limit on what they produce. While gasoline is very inelastic due to everyone needing to go to work and public transit is not America’s strong suit, people will find ways to make their demand more elastic whenever prices spike.

The government is trying its hand at trying to curb these prices by allowing standard gas to be E15 instead of the current E10. The “E” of gasoline is the ethanol content as a percentage. There are pros and cons for having ethanol in gasoline. Pure gas, E0, is the densest form of gas has about 114,000 British thermal units (BTUs) per gallon of energy while pure E100 has a rating of 76,100 BTUs per gallon. This means the ethanol has ⅓ less the energy per volume than an equivalent volume of gas. This effects the fuel economy of a car because if you want the ability to produce the same amount of power, you need more fuel. E10 has a rating of 110,210 BTUs per gallon, a decrease of about 3.3% of energy, leading to a decrease in fuel economy in cars. While E15 is already sold, it does have an even lower rating of 108,315 BTUs per gallon, a decrease around 5% compared to E0 and about 1.7% less energy than the E10. This is where it starts to get interesting with the math, while 1.7% is not a large amount, that means that your fuel economy also falls with it.

This delta of two percent will steam small to most people, but with a national average of 36 MPG, a 1.7% decrease in fuel density leads to a loss of 0.612 MPG. On a fifteen-gallon tank, the travel distance would drop from 540 miles per tank to about 530 miles. To travel the same distance, you need roughly a ¼ gallon extra of gasoline. For the price delta to positively impact, the national average would have to fall by around 7.1 cents for a break even for the consumer.

The question then becomes whether the companies would lower their prices. Who would notice a half of a mile per gas missing? Many consumers would put the decreased efficiency of their car down to “aggressive” driving habits. This would allow for a minor increase of demand because the worsened fuel economy, and because the price is no longer increasing, a consumer would be unlikely to change their habits. This would increase profits of the companies within the gas creation pipeline by simply selling you a less pure product.

The issue of reliability of the car also starts to come into question. The rubber seals and tubing of a car is designed for a certain set of tolerances. If you go in excess of the limit, the line will soak the ethanol as expand. This expansion also lowers the structural stability of the hose and could lead to ruptures. Therefore cars have to be explicitly labeled “flex fuel” because the E85 will cause issues for your traditional engine. The ruptured lines will also have different levels of severity depending on the way the fuel is fed to the engine. Old-fashion carburetors only require four PSI, which is low in comparison to the commonality of port-injection, where you get upwards of sixty PSI. These numbers pale in comparison to gasoline direct injection (GDI) engines, which are the most fuel efficient, that can have injectors that produce two thousand PSI. If the O-rings on the injectors fail in a GDI engine, you have the explosive pop from the combustion cycle, and now an injector spraying high pressure fuel everywhere in the engine bay many thousands of times per second. The hot engine will ignite the fuel and total the car.

This would affect consumer confidence in driving so much. There are remedies to lower the ethanol of gas, so those may see a small increase in sales, but there is the issue of how many stations can handle E15 due to the seals on the hoses. Of the roughly 145,000 gas station withing the US, only a small part supply E15. There are near 2,300 station that supply E15 across 30 states, meaning only 1.6% of stations can actually help this spike in prices. There is also the issue that the plan is to allow the sale to be extended to the summer.

Current regulations only allow for E15 in the winter due to a link to the creation of smog. So, this would only allow for the sale of E15 to continue for this summer and would not supply long term support for Americans who are struggling with the high gas prices.

Sources:

<https://www.eia.gov/dnav/pet/hist/LeafHandler.ashx?n=pet&s=emm_epm0_pte_nus_dpg&f=m>

<http://www.ethanolproducer.com/articles/13684/blog-ethanol-advantages-outweigh-btu>

<https://afdc.energy.gov/fuels/ethanol_e15.html>

<https://www.api.org/oil-and-natural-gas/consumer-information/consumer-resources/service-station-faqs>