

# THE FUEL TRUTH

The Internal Combustion Engine has powered our equipment for a hundred years and has served us well. For half of that time we have learned of its dire consequences. Tetra-ethyl lead was added early on in the gasoline engine as an octane booster as raising the compression ratio increased the efficiency and performance. Lead was later removed when the harmful effects to humans was found.

The higher the compression the higher the efficiency on gas or diesel engines as it reduced the clearance volume, which is the fill space between the piston and the head.

This higher compression also comes with higher combustion temperatures creating large levels of Nitrous Oxide, Benzopyrine, Carbon Monoxide and other poisonous gasses as well as unburned fuels and particles.

Recent laws have been passed declaring Carbon Dioxide as a Green House Gas to be regulated. Any thing burned with Oxygen will produce Carbon Dioxide. However if it comes from a growing plant source it is a trade off as the plant absorbs Carbon Dioxide and omits Oxygen. In the burning process the CO<sub>2</sub> admitted is equal to the CO<sub>2</sub> burned making it neutral.

As for the so-called Fossil Fuels, they have been encapsulated in the earth for milliana. Burning this fuel is a one-way street. There is no carbon exchange. The new biofuel offer a new answer, as they are liquid fuels derived from plant growth. It is divided into two categories, ethanol for gas fueled cars and biodiesel for diesel vehicles. Ethanol extraction is a costly process and has a lower power output. Gasoline has approximately 19,500 BTU/Lb and Ethanol is approximately 12,000 BTU/Lb. Using alcohol in a car results in less mileage than the same tank with gasoline.

Ethyl alcohol is made from distilling fermented grains like corn or sugar cane. Methyl alcohol is made from the destructive distillation of wood or other cellulose plant material, or is made synthetically. Ethyl alcohol, or grain alcohol, is C<sub>2</sub> H<sub>5</sub> OH, and methyl alcohol is C H<sub>3</sub> OH. Grain alcohol is used for beverages, and methyl alcohol is poisonous. Ethyl alcohol for fuel use often has dangerous additives mixed into it to prevent human consumption, such as formaldehyde. Methyl alcohol is corrosive to a number of metals, particularly the fuel systems in older automobiles.

Both are hydroscopic and absorb water, which enhances the corrosion problem over time.

The use of any alcohol or E85 does not reduce the CO<sub>2</sub> pollution from the exhaust pipe.

Special E85 engines are now being built to help this situation. The burning of alcohol based fuels do not appear economically feasible as the extra refining and competition with food supply will drive up prices. The gasoline engine will not run on biofuel as it must run in a higher compression engine. The best fuel for a gasoline engine is still gasoline.

Of course a large supply of gas and diesel comes from unfriendly sources and is still an environmentally dirty fuel.

Mercedes-Benz does not recommend the use of pure bio-fuels in their automobiles, or at least no more than 5% be added to the regular Diesel fuel. The concern is for the steel

injector pump pistons and cylinders in older cars, and the components in the injection nozzles. Bio-fuels for Diesel engines need further processing to remove the glycerin that can cause piston ring damage. Manufacturers are complaining because the added exhaust equipment is going to significantly increase the price of the Diesel engines and require added maintenance.

Of course the low sulphur fuels have driven diesel prices over gasoline prices. Diesel engines cannot run on gasoline or Ethanol, the automobile and truck manufacturers are complaining that the future air quality laws will not be able to be met. Which is true, especially after working on improvement in this area for almost fifty years, thousands of engineers and billions of dollars spent with some, but limited progress.

Perhaps when considering the now greatly added costs to the gasoline and Diesel engines of adding so much computer controlled fuel systems and pollution control additions, one must again look most carefully at the external combustion engine. The external combustion engine is not fuel sensitive and can cleanly burn any light liquid fuel that is pumped to the burner with NO added pollution control equipment

The external combustion Cyclone engine burns its fuel at very low pressures, inches of water and not pounds per square inch, and the long residence time of any fuel particle in the burner means complete and clean combustion. It does not produce any unburned hydrocarbons or CO, and when using pure bio-fuel, there is minimum CO<sub>2</sub> produced.

The Cyclone engine creates almost no CO or NoX as it burns at temperatures below 2300 degrees Fahrenheit at atmospheric pressure. The internal combustion engine will burn incompletely at 3000 degrees under extremely high pressures; during which time the toxic fumes are created.

The Cyclone burner uses additional secondary air to effect lower flame temperatures, below the point where NOX is produced. The Cyclone engine is a closed loop system using deionized water as the working fluid and the lubricant. Therefore, neither oil changes nor oil filter changes are required keeping maintenance costs to a minimum and keeping the vehicle on the road not in the shop. It has far fewer parts than an internal combustion engine, needs no radiator, no transmission, no muffler, no catalytic converter, no carbon filters and no urea tanks or other accessories added on to complicate and add cost to the system.

The Cyclone engine is a complete and total package, only 12 volts DC and the fuel line need to be connected. Everything else is contained in a neat and most compact package, which will make an easy installation in yachts and boats, automobiles, trucks, and small generators for RVs and marine use. It is also smaller and lighter than the IC engine it replaces. It is also silent and vibration free.

The Cyclone engine is a step towards the true goal of energy independence and is the answer to environmental concerns. When all the facts are weighed, the Cyclone Engine is the only answer.