LUBE TECHNI-GRAM

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CLEARING THE AIR ON DIESEL FUELS

A wave of legislation and air quality management agreements that started in 1999 has set off a flurry of industry publications, advertisements, and many questions about "new" diesel fuels and their potential impact on diesel engine emissions and clean air legislation. There has been a lot of information and *misinformation* surrounding the technologies the various promoters of "future fuels" advertise. The following information is not intended as an endorsement or denunciation of any claims associated with the various fuel products, and is only intended to offer our customers clarification on the new diesel fuel terms such as **bio-fuel**, **bio-diesel**, **green diesel** and **ultra-low-sulfur diesel fuel**:

Diesel Fuels Reduce Sulfur Content

Recent hardware changes by major diesel engine manufacturers, such as exhaust gas recircutlation (EGR) and Exhaust after-treatment, are proving to be the most cost-effective means of controlling diesel NOx's and particulate emissions. From this perspective, fuels can be viewed as emission control *enablers* that allow engine hardware and after-treatment devices to operate properly over the life of the engine.

In this context, the most important fuel property appears to be sulfur content. The sulfur content of diesel fuel contributes directly to particulate emissions. Further, the sulfur content can affect the durability and service life of the engine components and after-treatment devices that will be required to meet future emission regulations. After-treatment devices such as De-NOx catalysts and NOx absorbers are very sensitive to sulfur poisoning, and will require greater fuel sulfur reductions to enable their widespread use. Engine manufacturers and oil companies have tried to portray these so-called "green diesel" fuels as being as clean as cleaner alternative fuels such as natural gas. But, diesel fuel is an inherently dirtier fuel. While "green-diesel" technology relies on after-treatment devices, which can significantly reduce particulate emissions, the diesel engines themselves can degrade over time, thus increasing the emission levels.

Bio-Fuel vs. Bio-Diesel

Under Executive Order 13149, all Federal Agencies with fleets of 20 or more vehicles must reduce their annual *petroleum* consumption at least 20% by 2005. As a result, many government fleets, public utilities, garbage and recycling companies, school districts, public transit authorities, and national parks…or any fleet manager covered by alternative fuel requirements… are experimenting with bio-fuels in order to comply with Executive Order 13149. Basically, **bio-fuel** is defined as 100% bio-fuel made from any fat or vegetable

oil…typically soybean oil. It contains no petroleum but can be blended with diesel fuel at any level. The term **bio-diesel** is generally used to define a blend of bio-fuel and petroleum diesel.

On the positive side, bio-fuel has the highest BTU content of any alternative fuel, as well as having good cetane and lubricity qualities. These qualities are especially advantageous when considering blending a bio-fuel with ultra-low-sulfur diesel.

On the negative side, the availability and cost of bio-fuel is within a broad range based on region, feedstock, and volume purchased. Bio-fuel currently sells for about $.05 to $.20 more per gallon than diesel fuel. And, as previously mentioned, adversaries of this new technology, such as the American Lung Association, feel it is a poor substitute for natural gas technology. The single largest disadvantage of bio-fuel is its lack of oxidative stability. As the vegetable oils break down, they form deposits.

Summary

With all of the furor surrounding the scramble to meet lower diesel engine emissions, it may appear as though legislators and environmentalists alike are determined to regulate diesel engines out of existence. Nothing could be farther from the truth. In fact, most research points to diesel technology as the most effective means to achieve a cleaner, healthier environment.

It has long been known that diesel engines are more fuel efficient than gasoline engines. Diesels operate at up to 55% fuel efficiency vs. 35% for gas engines.

Diesel engine reliability, durability, and performance are affected by fuel quality. The cetane *number* is the measure of the ease with which diesel fuel is ignited during the compression stroke. When injected into the combustion chamber of the cylinder, fuel must quickly mix with air then ignite with no other ignitions force. The time between the beginning of fuel injection and the start of combustion is called “ignition delay”. Higher cetane number fuels result in shorter ignition delay, providing improved combustion, lower combustion noise, easier cold starting, faster warm-up, better fuel economy, increased power and reduction of emissions. According to current industry publications, diesel fuels treated with the right chemical additives are the best possible solution to ensure proper equipment operation at all times…especially during cold weather.

While some governmental agencies are forced to utilize bio-diesel alternative fuels to comply with Energy Policy Acts, typical fleet managers can rely on quality fuel improvers such as SWEPCO’s 501 Premium Diesel Fuel Improver to optimize fuel efficiency, reduce emissions and prevent operational problems throughout the entire life of their equipment. SWEPCO 501 Premium Diesel Fuel Improver and SWEPCO 501 PDI “Winter Formula” pay dividends to the fuel users that far exceed their nominal cost.