



## Five Things You Didn't Know About an Emerging Green Technology

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X-1R Corp, a Daytona Beach Florida based company best known for its NASA approved “Certified Space Technology” lubricant, has completed a long term research study at Sysco Intermountain, an industry leading food service distributor.

The project aimed to research and test a polymer based “green fuel additive,” developed to significantly improve the combustion process for large diesel truck fleets. The benefit to Sysco Intermountain truck is an immediate reduction of harmful diesel emissions combined with a momentous savings through improved fuel burning efficiency.

For over 18 months, X-1R’s Utah based fleet engineering team, consisting of truck fleet engineer, John Lorenzo, with University of Utah student in mining engineering, Gates Campbell, conducted long term testing at Sysco Intermountain’s fleet of 100+ trucks, overseen by Dr. Mike

Nelson, professor at University of Utah.

The technology tested at Sysco Intermountain is patented unique, polymer based diesel fuel additives formulated through long term studies, testing and research.

This technology has major environmental benefits, as well as cost saving opportunities for the trucking industry. Ultimately, the partnership provided the opportunity to complete this groundbreaking research.

Used in diesel engines, this technology can help save our planet, one mile at a time. As a first-of-its-kind product, it is an important example of the surprises that are often found in the world of green technology.

The technology being used throughout Sysco's truck fleet is simply a method for improving the combustion efficiency of internal combustion engines. Its cost effective fuel additive technology utilizing a scientific phenomenon called extensional viscosity to modify the physical properties of diesel fuel during injection and mixture formation.

The polymer in the fuel additive is viscoelastic - the property of materials that exhibit both viscous and elastic characteristics. As such, the additive augments the fuel by changing spray and vaporization behavior.

Thus, the injector spray produces a more uniform droplet size. The distribution of fuel over the cross section of the spray cone is also more uniform. Further, the viscous and elastic characteristics reduce growth-by-collision of the fuel droplets. The benefits gained from changes in spray and vapor behavior in fuel penetration, dispersion, and homogeneity of light and heavy fuel species in the air/fuel mixture are essential to mixture formation and makes it an ideal clean diesel additive, a combustion alternative.

**Here are five things that you may not know about this new fuel additive, and the green technology industry:**

**1. This fuel additive increased miles per gallon by 12%.**

As a baseline, the EPA equates the amount of carbon dioxide CO<sub>2</sub>, which is a greenhouse gas, for 1 gallon of diesel fuel burned results in 22.38 pounds of CO<sub>2</sub>. Using this additive increased fuel efficiency by a whopping 12% increase in MPG's in tractor trailer combinations on real world routes! At the Sysco Intermountain location saw a savings of 2,076,477 pounds, or 942 metric tons, of greenhouse gas emissions saved. According to the EPA, average CO<sub>2</sub> per vehicle is 5.2 metric tons. The savings from the additive at the Sysco Intermountain location is will be equivalent to taking 181 cars off the road for an entire year and they are just one of the many trucking companies operating on the Wasatch Front.

**2. Using the additive reduced NO<sub>x</sub> emission levels by over 30%.**

In addition to the savings of greenhouse gasses from less fuel consumption, this fuel additive also reduces the emissions from the burned fueled. The emissions showed a reduction by 38% in

NOx. NOx is linked to forming smog, which is a well-known air quality problem in Utah.

### **3. The additive showed a marked decrease in truck regenerations.**

Regeneration is the process of cleaning soot particles from the truck's exhaust filter, to prevent back pressure in the system. Fewer regenerations lead to less down time in the truck and less waste because the diesel particulate filters do not need to be replaced and/or cleaned as often.

### **4. This product was tested in a real-world setting.**

This is not the norm in the US, where most such products are tested only in the controlled setting of a lab, and actual results can differ greatly from those seen in practice. In Europe, more testing is moving to on-the-road car testing, but that has not been the norm either. Real world testing is difficult because there are many more variables and the operating conditions are more severe. The successful fuel additive testing procedure at Sysco Intermountain required extensive trial-and-error development. The test equipment had to be selected for the on-the-road environment, and had to be attached to the trucks so that it was safe and easily accessible.

In the end, data collection was mostly automated. Fuel consumption and regenerations were monitored and recorded by the truck's on-board computer. Emissions were recorded by an instrument attached to the truck's exhaust, and the emission recording system was continuously monitored by a researcher in the cab of the truck.

### **5. Realistic green technology research is difficult and limited, but we're collaborating to make it happen.**

Because of high cost, as well as time investments, it is difficult for most companies to justify such research. This is not the case with Sysco Intermountain and X1R, who collaborated with Dr. Nelson and Ms. Campbell on this study, which otherwise could have cost anywhere from \$200,000 to well over \$1,000,000. Sysco Intermountain understands how important it is to support research, and was a key partner in this groundbreaking study.

If you would like learn more about X1R'S fuel additive and other green technologies and products, please visit <https://x1rcorp.com/>