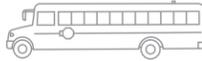
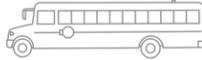




**ADAMS 12 FIVE STAR SCHOOLS
THORNTON, COLO.**

 **148 TOTAL BUSES**

 **12 PROPANE AUTOGAS**

Adams 12 Five Star Schools purchased its first propane-autogas-powered buses — 12 Blue Bird buses equipped with Ford 6.8 liter three-valve engines and Roush CleanTech propane autogas fuel systems — within the last two years. In total, eight percent of the schools’ fleet currently runs on propane autogas, with the remaining 136 buses operating on diesel.

Bruce Thomas, master technician with Adams 12 Five Star, has been working in transportation maintenance for more than 18 years. He has background working on a variety of fuels — diesel, gasoline, propane autogas, and CNG — and says that propane autogas buses have been the simplest and most cost effective to work on, especially when compared with diesel.

“There are a lot of hoops you have to jump through with diesel due to of all of the EPA emission standards,” Thomas explained. “New EPA-certified diesel buses have become much more expensive and difficult to maintain. For our district, the up-front costs have increased substantially just for equipment to pass newer emission standards.”

In order to meet stricter EPA and CARB emissions reduction standards, diesel engines require a number of things. Diesel particulate filters (DPF), complex emissions

aftertreatment devices, are required for all diesel engines. In addition, diesel exhaust fluid (DEF) is required for all selective catalytic reduction (SCR) diesel engines. According to Thomas, the best thing about propane autogas is that it doesn’t require any additional parts or maintenance to meet emission standards.

When it comes to preventative maintenance, Adams 12 Five Star Schools finds that the propane-autogas-powered engines are ‘simplified.’ The spark-ignited, direct-injection, liquid-powered engines have injection pressures far lower than the 30,000 to 40,000 per square inch seen with modern-day diesels. And overall, the district couldn’t be happier.

“We’ve been pleased. It’s only our second year, and I think the rest of the techs would agree that when it comes time to purchase more buses, propane autogas is a safe bet. They’re ideal on day-to-day routes, they’re quiet, clean, and environmentally friendly — a hands-down winner. We’re happy and looking forward to buying some more.”

Bruce Thomas
Master Technician
Adams 12 Five Star Schools

Data reflects each school district’s personal experience, and factors may vary when compared with other fleets.

Stewart has been with PPS for the last eight years working with both gasoline and propane autogas. When asked what advice he’d give to other fleets looking to add alternative fuels to their fleet, he stated that with new technology and improved dealer services on the buses, there’s no reason for districts to not give propane a try.

“You can’t go wrong with propane autogas,” Stewart said. “The simplicity and ease of the fuel is great, and it’s so similar to gasoline that you really don’t have to change the way you do things. After switching to the liquid injection technology, the power and start-up is no different than gasoline. If you got behind the wheel of one, you would never be able to notice a difference.”

FOR MORE INFORMATION

To learn more about the Propane Education & Research Council, visit propanecouncil.org.

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The Propane Education & Research Council was authorized by the U.S. Congress with the passage of Public Law 104-284, the Propane Education and Research Act (PERA), signed into law on October 11, 1996. The mission of the Propane Education & Research Council is to promote the safe, efficient use of odorized propane gas as a preferred energy source.



**MAKING THE SWITCH TO ALTERNATIVE FUELS:
MAINTENANCE MATTERS**



THREE SCHOOL DISTRICTS DESCRIBE THEIR EXPERIENCES WITH PROPANE AUTOGAS

Making the switch to alternative fuels in order to make a fleet greener is becoming more prevalent today than ever before, and school districts and private contractor fleets are leading the charge as transportation directors face tightening budgets and increasing pressure to reduce emissions. For many, propane-autogas-powered buses have been an easy, cost-effective, and green solution. In fact, propane autogas bus sales reached annual record highs in 2013, accounting for 12 percent of total school bus sales, and many states have approved propane-powered buses for inclusion in their specifications.

While savings and emissions are still top-of-mind for many schools and private contractors considering alternative fuels, it's equally important to consider the ease and operating costs before making the switch. Parts, service, repairs, and garaging are important considerations that can have a big impact on ROI and a fleet's success.

Three schools operating various propane autogas models in different parts of

the country — Tippecanoe School Corp., Portland Public Schools, and Adams 12 Five Star Schools — compared their experiences maintaining propane-autogas-powered buses with diesel, gasoline, and CNG. Each found that maintenance with propane autogas has an advantage when compared with conventional and other alternative fuels that goes well beyond the pump.

**TIPPECANOE SCHOOL CORP.
LAFAYETTE, IND.**



The Tippecanoe School Corp. (TSC) was formed in 1962 as one of Indiana's largest geographical school districts, with 19 schools covering 465 square miles. TSC currently owns 160 school buses, including five 78-passenger propane-powered Blue Bird Vision Type C school buses it purchased in spring 2012. Equipped with Roush CleanTech propane autogas fuel systems and Ford 6.8-liter engines, the buses have delivered top-of-the-line performance.

"Overall, it's been very simple and we've only had to perform routine maintenance on the propane-autogas-powered buses," said TSC's Certified Master Truck Technician Alan Fidler, recognized as America's Best Service Technician in 2011 and 2012. "It's been much easier than working with diesel because of all the emission controls on new diesel engines, which seem to have a lot of problems."

Compared with its diesel buses, TSC has noticed significant cost savings with propane autogas on routine maintenance such as oil changes and fuel filters. Fidler reports using 32 quarts of oil per oil change with their International and Cummins diesel engines versus only seven quarts with the Roush CleanTech propane autogas engines.



In addition, diesel engines call for two fuel filters that cost \$40 each while propane-autogas-powered buses use a single filter that costs substantially less.

"In sum, the school district could change the oil in a propane bus almost five times before matching the price of what it costs to change the oil once in the diesel bus." Fidler said.

"When you tally the cost of oil and what we spend on fuel filters, the savings really add up with propane autogas."

Alan Fidler
Certified Master Truck Technician
Tippecanoe School Corp.

The school district also has to contend with the cost of fuel additives with diesel during winter months. When the temperature drops, gel from diesel thickens and runs the risk of gumming up the engine. Propane, on the other hand, requires no additives and is ready to go in any temperature or climate.

"You have to either blend your diesel fuel with kerosene to avoid gelling, which can add up to \$3,000 to \$5,000, or you have to use an anti-gel," said Fidler. "The kerosene has a tendency to dry up the diesel, but if you don't blend, the anti-gel is even more expensive and can put the bus out for a longer time period. We don't have these issues with propane."

Years ago, Fidler worked on a propane-powered bus with an old vapor system. He recalled it having a bit of trouble starting up in the winter months, but propane engine technology has since been improved upon.

"The new liquid injection systems are much different than the old systems," Fidler said, "If I had any apprehension about the district purchasing new propane-autogas-powered buses at first, it was because I was worried

about their performance in the winter. But the new buses start right up in the cold unlike the old propane technology, and actually have an advantage of warming up a little bit quicker than our conventional diesel buses do."

All of TSC's maintenance technicians went through training before operating on the vehicles in order to learn how the Roush CleanTech fuel injection systems work and how to drain the tank in order to change the fuel pump. However, Fidler noted that the training was very simple, and he liked that the district did not have to make any adjustments to garaging or maintenance facilities to accommodate the alternative fuel.

"We service both our propane and diesel buses in the same area," Fidler explained. "We didn't have to add any special equipment or make any adjustments to the maintenance shop for the new propane autogas buses. It was a very turn-key process."

**PORTLAND PUBLIC SCHOOLS
PORTLAND, ORE.**



Portland Public Schools (PPS), a leader in alternative fuel transportation, has been using propane autogas for more than 30 years. The school district converted three Type C buses with CleanFuel USA propane autogas fuel systems. Thrilled with the fuel's obvious benefits — clean, cost effective, and maintenance friendly — PPS has since contracted with First Student to convert an additional 52 propane-autogas-powered school buses in addition to its 45 gasoline buses.

"We were one of the first districts in the nation to order the newer liquid injection

buses straight from the factory. We were sort of the guinea pig," explained Eric Stewart, lead mechanic at PPS. "We've got things down now. It's much easier to maintain these buses today than it has been in the past. Liquid injection propane autogas buses can be serviced at dealers now and maintenance is much simpler."

PPS has seen a visible difference between gasoline and propane autogas fuel systems when performing regular maintenance in the shop. Compared with gasoline, propane autogas is a much cleaner fuel.

"When I go to change a propane autogas fuel filter, it comes out tremendously cleaner than the gasoline filters. It's a difference you can actually see," Stewart said.

"If you weren't concerned with the factory warranty, you could extend your maintenance intervals with the propane buses and save on oil and filters significantly."

Eric Stewart
Lead Mechanic
Portland Public Schools

Much like TSC, PPS did not make any changes to its maintenance facilities when it switched to propane. In fact, Stewart says the maintenance techs have noticed another green benefit of the fuel: fewer exhaust fumes in the shop.

"Gasoline fumes can really choke you out of the shop if you don't direct them outside. When working on a propane autogas bus, this isn't necessary because the exhaust fumes inside the shop aren't as harmful due to the fuel's clean-burning properties," said Stewart.