Case Study:

Hannibal Public School District #60 Operates 'Flawless' Propane School Buses

District: Hannibal Public School District #60
Industry: Education
Location: Hannibal, Missouri
Vehicles: Blue Bird propane school buses (8), IC propane school buses (2)
Fueling: On-site propane autogas stations (1)

Challenge
Replace outdated diesel school buses by adopting alternatively fueled models that have the power and range to handle the hilly terrain and harsh winters of northeastern Missouri as well as travel regular routes and long distances for field trips.

By the Numbers

- 10 propane autogas school buses.
- One propane autogas fueling station.
- 44% reduction in per gallon fuel costs.

District and Fleet Background
Located in a hilly area of northeastern Missouri along the Mississippi River, the town of Hannibal comprises about 18,000 residents. Hannibal Public Schools serves approximately 3,500 students, transporting 2,000 of those students via a combination of 25 in-town and rural routes daily.

In 2020, the school district began researching clean alternative fuels to replace their diesel models. Leadership explored everything from compressed natural gas (CNG) to electric buses. "CNG was an intriguing fuel, but complicated and expensive," said Scott Speer, transportation director for Hannibal Public Schools. "And when we crunched the numbers for electric buses, we couldn't justify the costs. The technology for electric buses hasn't been around long enough to have case studies for us to learn from."

Propane Set Itself Apart
When Speer evaluated propane autogas as an option, he noticed plenty of benefits that would make sense for the community both in the near future and over the long term. He immediately noted how propane buses offer major cost savings, reduce emissions, perform well in cold weather and reduce noise levels.

Speer was pleasantly surprised with the advancement in propane engine technology. He learned that today's propane engines are so clean that propane school buses drive toxic nitrogen oxides down to ultra-low levels and beat federal requirements by an average of 54% across the greenhouse gas family. All of the district's 2023 model year Blue Bird propane buses equipped with ROUSH CleanTech propane fuel systems emit 90% less nitrogen oxide emissions than the Environmental Protection Agency's strictest standard.

Cold weather performance was top of mind for Speer since Hannibal averages about three months of below-freezing temperatures annually. "We talked with districts that have harsher winters than we do and propane did great," said Speer. "We had an unusually cold winter this year, and the cold weather performance of the buses was excellent."

Ultimately, Speer and district representatives determined that propane was the best fit and Hannibal Public Schools received its first round of propane school buses in August 2022. "Propane separated itself from the other fuels because of the following: A long-standing history of use by the National Park Service since the 1970s, improvements in fueling technology in the past decade, long-term sustainability, a low cost of facility conversion, affordability of the fuel source and fit for our community," said Speer.

Financial Incentives and Viability

A big driver for the decision to go with propane autogas was years of data showing the strong financial viability of the buses. Speer found that buses fueled by propane autogas have the lowest total cost of ownership of any fuel — alternative or otherwise. Some school districts report saving $3,700 annually per propane school bus. A case study from the U.S. Energy Department's Alternative Fuels Data Center shows that five school districts saved nearly 50% on a cost-per-mile basis for fuel and maintenance relative to diesel.

"The initial purchase cost of propane buses isn't much more than diesel. It was roughly $8,000 more for us than diesel," said Speer. "And they are tremendously more affordable than electric."

To help offset up-front and infrastructure costs, district leadership accessed funds from state and federal incentive programs. In addition to funding from the Environmental Protection Agency's Clean School Bus program, Hannibal Public Schools received $20,000 in rebates from the Missouri Propane Education & Research Council (MOPERC), and $10,000 in infrastructure support from its propane supplier, Big River Oil.

Through a two-year contract with Big River Oil, the district is saving 44% in per-gallon fuel costs. The school district can also take advantage of the alternative fuel excise credit and alternative fuel infrastructure tax credit, which have been extended for multiple years. "Every dollar saved in fuel reallocates to general funds that have gone to raises, particularly to school bus drivers," said Speer. "We were able to offer a 17% pay increase to our drivers, increase the number of transportation staff and invest more funds into our students."

Affordable, Flexible and Scalable Infrastructure

A major decision for the school district was how to fuel the propane buses. Propane has one of the most robust and flexible fueling infrastructures of any fuel type. With propane autogas, school districts have

many options: access any of the public fueling stations nationwide, utilize onsite fuel delivery or install a low- to no-cost onsite fueling dispenser. Speer chose the latter. Propane suppliers specialize in helping fleets choose the right fueling option based on the fleet size, routes, budget and facility space.

With support from propane supplier Big River Oil, the district kept infrastructure costs very low. “Big River Oil has been very good to us,” said Speer. “They paid for the cost of pumps, plumbing and dispensers. Their willingness to walk beside us was an important part of the puzzle. Our only costs were re-routing a fence to get power to the area and running electrical.”

The district’s school bus drivers fuel their own buses via two onsite fueling dispensers. No specialized fueling training is required, and fueling time is similar to diesel or gasoline. Big River Oil delivers propane autogas about twice per week to keep the 2,000-gallon propane station full. Speer is pleased with the decision to install onsite infrastructure, as this option is scalable for when the district’s propane fleet increases.

The district is currently paying $1.69 per gallon of propane and $3.00 per gallon of diesel.

Partnerships and Community Support Make the Difference

Speer is grateful for the strong partnerships and community support he’s seen during this process. “Strong partnerships have made the whole experience a no-brainer,” he said.

In addition to the fruitful partnership with Big River Oil, Hannibal Public Schools has received support from many other organizations, including MOPERC, St. Louis Clean Cities, ROUSH CleanTech and Blue Bird.

“MOPERC has been invaluable in this process to help answer questions and set up the infrastructure process,” said Speer. “And, of course, we’re grateful for their rebate program, too.” MOPERC has pledged $1 million to help school districts in Missouri transition from diesel to propane buses. Its clean bus replacement program offers rebates of $2,000 per propane bus, up to 10 per district, at the time of delivery. Rebates can be used to pay down the cost of the bus, for fuel or infrastructure, or used for teachers or classroom needs — however the district wants.

Representatives from Blue Bird and ROUSH CleanTech hosted a training session with the district’s drivers where all questions were answered and “everything was addressed. It was great training,” said Speer.

“We feel blessed to have a community and school board that supports taking steps toward cleaner air but that hasn’t forced us into any specific initiative,” he continued. “Our community organically wants to save money and reduce emissions.”

Hannibal Public Schools is part of a large community of schools operating propane school buses. There are more than 1,000 school districts operating 22,000 propane school buses that transport 1.3 million students across North America.

Propane Bus Envy

When discussing feedback from transportation staff, students and parents about the new buses, Speer only had positive notes. “We actually have some ‘propane bus envy’ from some of the school bus drivers,”

said Speer. “And students ask why the bus is so quiet. They’re especially good for students with sensory issues.”

While most of the district’s propane school buses are used for regular daily routes, two of the propane buses are used to transport students with special needs. “The benefits that we have noticed for our special education students and their parents include little to no exhaust fumes around the bus while loading and unloading, a quieter bus ride with less sensory overload and buses that warm up faster than our diesel buses in the winter months,” said Speer.

One of the propane buses recently transported students on a field trip across state lines. Usually, the district uses diesel buses for after-school activities and field trips. However, the district recently completed its first long field trip to Kansas City with a propane bus. “It was flawless,” said Speer. In order to coordinate fueling, the district reached out to a propane supplier to provide fuel through mobile fueling.

The district’s technicians report that working on the buses is enjoyable and simple because there are less maintenance parts and the work stations are cleaner than with diesel buses. Propane school buses virtually eliminate particulate matter (black smoke) without adding maintenance burdens and extra costs to the fleet like diesel does. Propane is a nontoxic, non-carcinogenic and non-corrosive fuel.

Proven Reliability

Hannibal Public School’s success with propane school buses has led the district to make the decision to transition to a fleet that runs 100% on propane autogas. The plan is to replace three diesel buses per year with new propane school buses.

Speer says that more and more people are becoming interested in propane as a viable alternative fuel option. “I believe that propane is one of the major alternative fuel options,” he said. “It’s got a track record of proven reliability.”

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About Hannibal Public School District #60: Missouri’s Hannibal School District believes that significant learning will occur with significant relationships. Utilizing a growth mindset, the district sets high expectations for every student. The Hannibal School District develops each student's unique potential by maintaining high expectations in a safe and nurturing environment while developing innovative leaders.

About MOPERC: The Missouri Propane Education & Research Council is a not-for-profit organization authorized by the Missouri Legislature. Dedicated to propane education and public awareness, MOPERC provides industry training, consumer safety, appliance rebates and market development programs. The council is composed of 15 volunteer directors and administered by an executive staff. Visit PropaneMissouri.com.

(Case study completed 2024)