Case Study: Propane School Bus Fleet

Grain Valley School District – Grain Valley, Missouri

Over the years state reimbursements for school transportation have significantly dropped, and districts have had to tap their own general funds to make up the shortfall. To improve their bottom line, districts across the country have begun implementing alternative fuels into their fleets.

We sat down with Shawn Brady, Director of Transportation at the Grain Valley School District, a growing suburb of Kansas City, to learn how he led the charge to deploy propane autogas buses in 2018 that not only save the district money, but are greener and cleaner for their community's most precious cargo: its kids.

Though Grain Valley's population has grown rapidly over the past 15 years, the district operates a relatively small fleet of 49 buses. With that in mind, the district settled on a single fueling pad, with two 1,000-gallon tanks, along with a dispenser and card reader system to meet its needs. The card reader system precisely tracks fuel consumption, and station communication software notifies the district's fuel supplier when propane is running low, eliminating another routine task for district personnel. Ease of fueling by drivers was also a concern, so they chose a fueling system equipped with the Staubli nozzle, which is now the industry standard for propane fleet implementation. It allows drivers to do the fueling with no substantive difference than fueling a conventional vehicle with gasoline.

Fleet & Infrastructure Profile

Total Bus Fleet: 49

Propane Bus Fleet: 21

Annual Miles Traveled: 9,000 per bus (2018-2019 school year)

Propane Bus Make & Model: 2019 IC Bus Propane Autogas CE Series (14) & 2021 Blue Bird Propane-Powered Vision School Bus (7)

Year Deployed Propane: 2018, with additional buses deployed in 2020

Propane Provider: Ferrellgas

No. of Onsite Propane Stations: 1

Fuel Savings: $14,500 + $21,719 Alternative Fuel Tax Credit rebate (2018-2019 school year)

Interview with Grain Valley School District

Interview responses have been edited for clarity and length.

What led the district to choose propane over other alternative fuels?

It was primarily based upon how much the new vehicle would cost vs. the same diesel vehicle. Basically, we had to find out what is the upcharge on the electric (or other alternative fuel) vehicle, and how much would the fueling infrastructure cost. We knew the cost of fuel was tremendously less expensive, but we needed to see how quickly we could overcome the upcharge on the equipment with the fuel savings.

We looked at both CNG & propane, but propane was a better choice for our district because of the lower asset cost for both the vehicle and the fueling station. As we saw with [two larger] school districts, the CNG fueling station cost was very high and upgrades were needed to the shop where you do the maintenance on the buses. You have to do enhancements and improvements for ventilation to protect from an explosion, which you don't have to do for propane, on

top of a new fueling station just to get into doing CNG. We just aren't a big enough school district and don't run the miles per year on the vehicles to recover that investment.

Propane Facts

- Propane is the world's third most common transportation fuel.
- It is considered an alternative fuel under the Energy Policy Act of 1992.
- Propane typically costs less per gallon than gasoline and offers a comparable driving range
- The potential for lower maintenance costs makes propane a popular choice for high-mileage vehicles.
- Propane school buses reduce nitrogen oxide (NOx) emissions by 5-15% compared to diesel.
- For Type C school buses, propane buses have 6% fewer GHG emissions than diesel.

**Information taken from https://afdc.energy.gov/fuels/propane.html*

Once the buses were deployed, were there any initial obstacles or issues you had to overcome?

No. I think the only thing that would fall under that category would be our worries about long distance trips. The buses we have are the smaller fuel capacity tanks (67-68 gallons), which give us roughly a 200-mile range. Occasionally, we will go to Springfield or St. Louis, and those are greater than 200 miles roundtrip, so we had to plan for when we send the propane buses. Our solution was to get fueling cards/accounts with truck stops that provide propane. The two truck stops that we found on our routes are Pilot Flying J Travel Centers and Love's Travel Stores.

Every place that we go also has a propane vendor for their community, probably more than one. If we send a bus to St. Louis, and it doesn't work out for us logistically to get to a truck stop that has the propane, then we will work ahead of time with the local propane vendor for an onsite refuel. Every vendor has trucks that can come to you, or you can go to them, and they work seven days a week. The propane infrastructure across the country is there. It has been there because propane is used for home heating in many small communities. Getting on-site fueling when traveling might cost a little extra, especially if it's a vendor we don't usually work with.

In addition to savings on maintenance and fuel costs, what other benefits have you seen since deploying the buses?

The drivers love them because they are quiet, they warm up faster than a diesel, and they have plenty of power. With a quieter ride overall, they can hear much more behind them since sound is not masked by noise from their diesel engine.

Schools, the principals, the parents, the teachers, the kids love the propane buses too. They love that the bus sitting in front of their school is almost silent as it is idling. They love that there is no exhaust smell or any smoke coming out the tail pipe. They appreciate the cleaner, quieter bus for their kids.

Has the deployment spurred conversations about implementing alternative fuel vehicles in other fleets?

Yes. Our operations department is looking at replacing some of our larger mowers for the district with propane mowers. The district will be going out to bid to replace the box trucks the district uses to move mail and food with propane vehicles. All other fleet vehicles in the district may be replaced with propane too.

They would not be doing it if we were not leading the way and did not have onsite fueling. It will break the ice for more opportunities for the district to save money because the majority of the district's vehicles do not leave the area. It would be easy for them to get refueled and save money with less expensive propane fuel.

Deployment Best Practices

- Contact your local Clean Cities Coalition for resources & support.
- Educate your administration and school board on the benefits and safety of alternative fuels.
- Ensure there is a local service shop to do warranty and continuing work on buses before purchasing.
- Inquire if your bus manufacturer and fuel provider have incentives or grant funding available.
- Inquire if your bus manufacturer provides training support with lease or purchase agreements.
- Research whether trade associations supporting your fuel have incentives available.

What advice do you have for districts that are considering implementing alternative fuels in their fleets?

My experience is with propane, not other alternative fuels, but anytime I talk to my peers I ask, "What are you waiting for?" Especially now, diesel engines have gone through yet another 2020 upgrade that has made a diesel engine in a school bus more expensive than propane. Now there is a disincentive to stay with diesel. The only expense a school district might have to make the switch to propane is the fueling station, which is not that much in comparison to the fuel savings. For the bigger districts that have bigger budgets, that is nothing, even if they do not get a grant.

Project Data & Timeline

Grant: Accelerating Alternative Fuel Adoption in Mid-America – U.S. DOE, managed by Metropolitan Energy Center

Total Infrastructure Costs: $16,500

Grant Reimbursement: $7,425

Project Timeline:

- **Spring 2017:** Grain Valley begins initial grant application process.
- **October 2017:** DOE grant subaward authorized by MEC.
- **Nov. 2017:** Grain Valley begins purchasing equipment and submits MOPERC grant application for propane buses.
- **May 2018:** Concreate, conduit, fencing, and bollards in place, ready for propane provider.
- **June 2018:** Ferrellgas installs onsite fueling station & Grain Valley receives propane buses.
- **Aug. 2018:** Grain Valley deploys first 14 propane buses.
- **Jan. 2020:** Grain Valley deploys an additional 7 propane buses.

How have you worked with the Kansas City Regional Clean Cities Coalition?

We used them in our exploratory phase when we were looking at alternative fuels. It is how we got education about what was the best fuel for us to use economically. And then obviously helping us get attached to one of their larger grants to get the fueling station. The money jump-started our program and made it happen.

They also gave us the connections we needed to ask vendors questions. Their open houses allowed us to see what the different product options were and the actual vehicles so we could ride in them to see what they were like. Since then, there have been ongoing training opportunities for us to learn about the safety of alternative fuels at our operation. It has been one steady support mechanism that has been really terrific. If it weren't for them, we would not be where we are today.

Working with Your Clean Cities Coalition

Shawn Brady and the Grain Valley School District first connected with Kansas City Regional Clean Cities at a 2013 propane workshop co-hosted by the coalition and the Kansas City chapter of the Missouri Association of Pupil Transportation. In the intervening years, Shawn leaned on the peer fleet network through other workshops on alternative fuels, accessed technical assistance and information from coalition staff, and became familiar with KC Clean Cities' work to secure project funding. KC Clean Cities regularly applies to funding opportunities through the U.S. Dept of Energy and the U.S. Environmental Protection Agency. While funding is not guaranteed through these competitive proposals, our success rate is high. By 2017, Missouri's Environmental Mitigation Trust bus program was underway, and the Missouri Propane Education and Research Council (MOPERC) was also running propane autogas incentives. These programs made it possible for the Grain Valley district to handle the costs of adding 21 new propane buses to its fleet during a period of about 18 months. MOPERC provided incentive payments of $2,000 per bus during the district's second round of propane bus purchases.

Now, the District needed financial support mainly for its fueling setup. When MEC solicited applicants to a joint proposal to U.S. Department of Energy funding in 2017, Grain Valley was prepared.

KC Clean Cities was able to bring the lessons learned from Grain Valley's experience to a larger audience by hosting an Autogas Answers workshop in April of 2019 with nearly 50 participants. The event focused on propane applications in school fleets. Attendees took part in presentations on propane properties and costs from industry experts with Grain Valley's real-world results front and center. The event generated several new inquiries about propane school bus fleets, two more of which are now underway in the KC market.

About Metropolitan Energy Center and the Kansas City Regional Clean Cities Coalition

Metropolitan Energy Center (MEC) is a nonprofit organization with a 38-year history of transforming energy use in the building and transportation sectors in the Kansas City region and beyond. It manages both the Kansas City Regional and Central Kansas Clean Cities Coalitions. Clean Cities is a national network of nearly ninety coalitions designated by the U.S. Department of Energy. Coalitions work with stakeholders of all types—fleets, fuel providers, manufacturers, government agencies, fuel retailers, and community groups—to increase knowledge about alternative fuels, encourage integration of alternative fuels into private and public sector fleets, and to decrease air emissions from transportation. This strong network also draws upon the technical skills of national laboratories like Argonne, Oak Ridge, and the National Renewable Energy Laboratory, providing excellent value to our fleet members.

If you are located in Kansas or Missouri visit MEC's website to contact the Kansas City Regional and Central Kansas Clean Cities Coalitions, or visit DOE's Coalition Directory to find a Clean Cities coordinator in your region.

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