

US Department of Energy – Case Study of School Buses Using Propane Fuel, Conducted by Argonne National Laboratories, 2014

Summary of Major Findings

MAJOR FINDINGS

- Cost Savings – Some of the school districts in this study save nearly 50% on a cost per mile basis for fuel and maintenance relative to diesel.
- Payback Period – The incremental cost of the propane buses and fueling infrastructure can be recouped in 3–8 years.
- Improved Efficiency – The newest propane engine technologies are more efficient than older technologies still in use.
- Typical Usage – Propane buses in this case study traveled around 14,700 miles per year on average and achieved fuel economy of 7.2 miles per diesel gallon equivalent (DGE).
- Energy & Environmental Impact – The total petroleum displacement was 212,000 DGE per year for these 110 buses, while greenhouse gas (GHG) reductions were approximately 770 tons per year.

Motivation for Adopting Propane

All of the school districts chose propane for financial reasons. Fleets are able to secure advantageous fuel prices for propane to achieve significant operating cost savings. These districts also mentioned the importance of emission reductions with propane, but emission reductions were secondary to cost reductions as a motivator.

Financial Benefits

As will be described in more detail later in this case study, these fleets have seen financial benefits as a result of using propane buses. These fleets have saved between \$400 and \$3,000 per propane bus per year, with the range of savings dependent on the fuel prices and the maintenance cost savings realized. Maintenance cost savings for propane engines can potentially come from several areas, including less-frequent oil changes and less-complicated emission control systems that do not use diesel exhaust fluid.

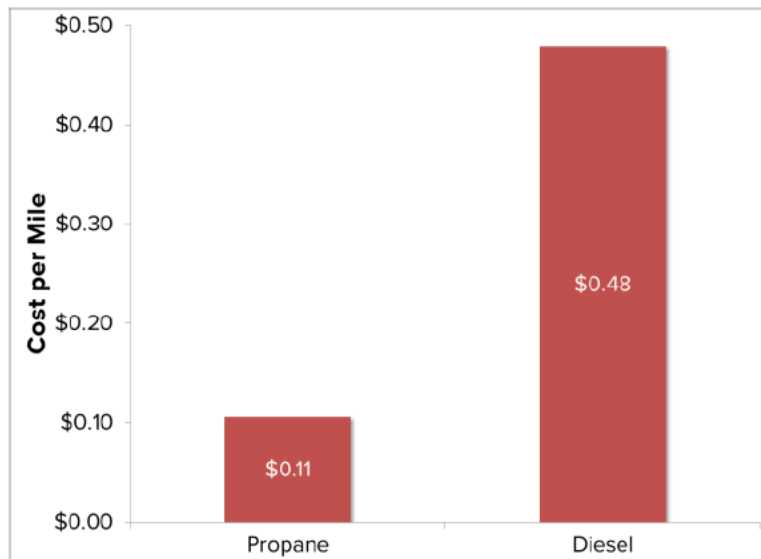


Figure 3. Maintenance costs per mile for Alvin propane and diesel buses.

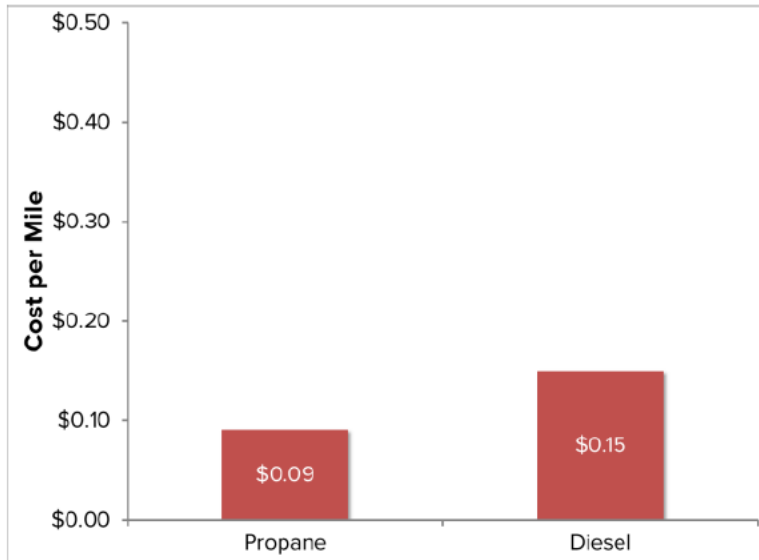


Figure 4. Maintenance costs per mile for Gloucester propane and diesel buses.

Conclusion

With the aid of the Recovery Act and other funding sources, school districts in Texas and Virginia have successfully deployed propane school buses. This study considered five of those fleets. The buses have been generally well received by the fleets in this study, which continue to consider propane for considerable fuel cost savings.

Overall fuel economy for the propane vehicles is close to that of comparable diesel vehicles, on an energy-equivalent basis. In total, these fleet vehicles are annually displacing around 212,000 DGE of petroleum and around 770 tons of GHG emissions. Data in this case study showed that propane school buses exhibited a smaller fuel efficiency penalty relative to diesel buses than typically expected. Data submitted by the fleets show the potential for fuel cost and maintenance cost savings, depending on the price spread between propane and diesel. Favorable business cases can be demonstrated through the information gathered from these fleets.

New propane engine technology is showing potential efficiency improvements over older engines. The fleets included in this study have not encountered any significant technical or management hurdles associated with the deployment of propane buses, and most of them are exploring ways to expand their use of propane in the future.