

November 13, 2017

Ms. Tricia Treece
Arkansas Department of Environmental Quality
5301 Northshore Drive
North Little Rock, AR 72118-5317

Re: Using Volkswagen settlement funds for cost-effective corridor-based NOX reductions

Dear Ms. Treece,

As Executive Director of the Arkansas Propane Gas Association, Inc., representing all the propane dealers in the great state of Arkansas, I thank the ADEQ for its efforts in developing a Beneficiary Mitigation Plan. Your focus on a school bus pilot program is a smart investment for the state of Arkansas since over 5,000 school buses transport 250,000 children to and from school in Arkansas. Many of these buses are pre-2007 school buses, which are 6 times or 95% dirtier than 2010 or newer school buses.

The state's limiting of eligibility to only CNG school buses reduces the amount of cost-effective NOx reductions it could achieve. Propane powered school buses offer virtually the same NOx emissions as CNG, and the use of propane school buses will help Arkansas meet its air quality goals and the objectives of the program since they offer a cost-effective reduction to NOx emissions and improve public health.

Propane school buses often have improved cost-effectiveness versus CNG due to its lower incremental vehicle cost, lower infrastructure costs, and no required upgrades to maintenance facilities. If ADEQ would expand eligibility to include propane, even more vehicle replacements and corresponding NOx reductions could be achieved. These vehicles are also a safe transportation solution because propane is non-toxic, non-carcinogenic and non-corrosive, and because their vehicle fuel tanks are 20 times more puncture-resistant than gasoline or diesel tanks.

Propane fuel tanks operate under approximately 250 PSI versus CNG tanks that are pressured to 3600 PSI. With the average fuel consumption of 16 to 20 gallons of propane per day per bus, an 80-gallon propane fuel tank will operate a school bus 3 to 4 days between fill-ups.

While Arkansas does not list propane fueling stations on the Alternative Fueling Station Locator developed by the Department of Energy, propane fuel infrastructure is already in place throughout the state with almost 400 registered dealers and over 1200 certified employees that have the ability to dispense propane as a motor fuel. Propane motor fuel is also offered along the interstates via truck stops such as Flying J, Pilot, Loves, and other certified propane outlets that dispense propane.

We request that Arkansas Department of Environmental Quality include **propane** as an **equal partner** with CNG under the proposed CNG School Bus Pilot Program.

The 2016 version of AFLEET, developed by Argonne National Laboratory, to model NOx reductions and cost effectiveness. Our analysis compares the replacement of a model year 2007 diesel school bus with new diesel, propane, CNG or electric school buses. It is clear that propane is the most cost-effective option at reducing NOx emissions

Propane school buses are shown to be 33% more cost-effective vs diesel and 28% more cost-effective than CNG school buses.

Standard Argonne AFLEET Emissions Outputs				
Fuel	Purchase Price	NOx Reduced	\$/lb	Cost Effectiveness vs. Propane
Propane	\$ 93,000	537.0	\$ 173	
Diesel	\$ 85,000	330.5	\$ 257	-33%
Electric	\$ 350,000	593.4	\$ 590	-71%
CNG	\$ 125,000	518.3	\$ 241	-28%

We request ADEQ open up the alternative fuel grant program to include propane vehicles as a priority in addition to CNG and electric, and when reviewing applications that ADEQ prioritize actions that achieve the best cost effectiveness and are sustainable beyond the states investment. It is important that the alternative fuel program is able to continue after grant funding is depleted.

¹ The new propane engine is 75 percent cleaner than today's cleanest diesel engines that are compliant with the model year 2010 standard of 0.2 g NOx / bhp-hr. What's more, our new propane buses will be 99 percent cleaner than the oldest, pre-2007 model year buses still operating in many school districts today.²

¹ "Executive Order A-344-0074". California Environmental Protection Agency, Air Resources Board, May 15, 2017. https://www.arb.ca.gov/msprog/onroad/cert/mdehdehdv/2017/roush_hdoe_a3440074_6d8_0d05_lpg.pdf.

² For model year 1998 to 2003 diesel engines, EPA established a NOx emission standard of 4.0 g NOx / bhp-hr. Please refer to EPA's [summary table](#) of diesel engine exhaust emission standards for further detail.

Propane Economics for Arkansas

Arkansas' propane market is a source of economic growth across a variety of industries, including production, transportation, storage, wholesale, and retail. In 2012, the retail propane market through Class One Dealers contributed over 650 jobs and \$270 million in the state's gross domestic product (GDP).³ The propane market supplied nearly \$24 million in direct labor income to Arkansas workers.

The following analyses assumes that Arkansas invest 60% of its Volkswagen settlement funding in a propane school bus program. Further, it assumes that the state provided a 25% rebate per bus to the school districts

With these assumptions, ADEQ could deploy 378 propane school buses, which is over 17% of the total pre-2009 school bus fleet operating in Arkansas currently. If the state were to limit propane solely to CNG, these funds would only be able to replace 281 CNG school buses.

Table 1: Arkansas can more cost-effectively replace school buses by including propane as an eligible fuel.⁴

60% of AR Funding / 25% Rebate Scenario	TOTAL
Total Buses Operating in State (# Units)	5,263
Est. Pre-2009 Buses in Operation (# Units)	2,177
Est. Cost of 2019 Model Year Diesel Bus (\$)	\$85,000
Est. Cost of 2019 Model Year Propane Bus (\$)	\$93,000
Est. Cost of 2019 Model Year CNG Bus (\$)	\$125,000
Propane Bus Incentive (\$), Based on 25% of Total Bus Cost	\$23,250
CNG Bus Incentive (\$), Based on 25% of Total Bus Cost	\$31,250
Number of Estimated Bus Replacements, Propane Scenario	378
Number of Estimated Bus Replacements, CNG Scenario	281

Over the 15-year service life of a school bus, the following total program impacts could be achieved using the propane school bus scenario.

Table 2: Total program impacts assuming a 60% funding investment in a propane school bus pilot program.⁵

	POTENTIAL IMPACT
# of Propane School Bus Replacements	378
% of Pre-2009 AR Bus Fleet Replaced	17.36%
Total Funding Proposed: 60% of AR VW Allocation (\$)	\$8,788,625.40
Total NOx Reduction (lbs)	203,002
Petroleum Reduction (gallons)	10,206,146

³ "Arkansas Propane Market". ICF International, November 2016. Please see Appendix A for additional details.

⁴ Pricing is an estimate for the average base cost for a 2019 model year diesel, propane and CNG school bus. Costs do not include infrastructure, maintenance facility upgrades, etc.

⁵ Assumptions: 378 school buses replaced, 2007 average model year replaced with 2019 model year Vision propane bus, 15-year service life, 12,600 miles per year

Natural Gas wells in Arkansas not only produce natural gas in a raw stage, they also produce propane as a Natural Gas Liquid (NGL) that is imbedded within the natural gas. After the water and condensates are removed from the raw gas, it is shipped via pipeline to Natural Gas processing plants to remove the contaminants and recover the NGLs from the raw gas. After it is processed, the natural gas is ready to be delivered to the end consumer via pipeline, and the propane and other liquids are transported to their destination via trucks or rail.

These processing plants are outside of Arkansas so both natural gas and propane, while produced in Arkansas, are both transported back into our state after processing.

Lyon Oil Company has a refinery in El Dorado, AR that refines gasoline and diesel and a byproduct of that refining is propane, which is transported to dealers in Arkansas and surrounding states to then be delivered to the end consumer.

Natural gas and propane are 'natural state' fuels produced right here in Arkansas and adds to Arkansas state coffers in the form of road taxes, property taxes, income taxes, etc. If propane is not consumed here in America, it will be exported to other countries.

Corridor-Focused Funding Will Generate More Effective Public Health Benefits

School buses operate along dedicated corridors each day and repeatedly expose the same population to harmful emissions. Thus, cleaning them up by replacing with CNG or propane versions will yield air quality benefits in areas that bear a disproportionate share of the air pollution burden. Their localized operations also make the measurement of their benefits easier in that all of the emissions reductions can be attributed directly to these areas.

These alternative fuel school buses significantly reduce children's, operators', and the general public's exposure to emissions that are associated with pre-2007 diesel buses, including increased asthma emergencies, bronchitis, and school absenteeism, especially among asthmatic children. CNG and propane school buses also effectively eliminate diesel particulate matter emissions that are associated with cancer and thousands of premature deaths nationwide every year.

Thank you for considering our request to make **propane** an **equal partner** with the proposed CNG School Bus Pilot Program.

Sincerely,

Sherman Murray
Executive Director
Arkansas Propane Gas Association
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