



BLUE BIRD®

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CLEANTECH

Case Study:

Propane School Buses Perform Economically in Below Zero Temperatures

Challenge

School systems across North America need reliable school bus transportation that will start and operate in cold weather.

By the Numbers

- More than 12,000 Blue Bird Vision Propane buses.
- 750 school districts operating propane school buses.
- Unaided cold-weather starts to -40 degrees Fahrenheit.

Cold Weather Performance

Cold weather should not be an operational barrier when it comes to school bus transportation. The Blue Bird Vision school bus equipped with a ROUSH CleanTech fuel system alleviates cold-weather start problems with its propane technology.

In the Blue Bird Vision Propane school bus, propane remains in a liquid state until it reaches the cylinder. This cutting-edge technology has alleviated cold-weather start issues associated with vapor technology propane systems of the past. In fact, the fuel system provides for unaided cold-weather starts to minus 40 degrees Fahrenheit.

Testimonials from school district transportation directors demonstrate that, in cold-weather conditions, buses fueled by propane autogas start and operate better than their diesel-fueled counterparts, where the fuel may gel at extremely cold temperatures — and at reduced costs.

Howard-Winneshiek Community School District, Iowa

Howard-Winneshiek Community School District in Cresco is located in northeast Iowa. The district's school buses travel up to 15,000 miles each per school year on long rural routes. The weather can be extreme, with cold-weather months of negative 30 degree temperatures and

snowfall, and warmer months in the low 80s with dusty conditions. The school district's school bus fleet is comprised of seven propane buses (with two more slated for delivery later in 2018) and 23 diesel models.

"Our propane buses perform flawlessly," said Director of Transportation Brian Swestka. "They warm up substantially quicker than our diesel buses. The propane buses are ready to go in just a few minutes compared with at least 20, sometimes, 30 minutes for diesel to warm up."

For the school district's diesel buses to operate during the winter months, the maintenance crew plugs the engine block heater to an electrical outlet at night, costing both time and money. This is not needed for the propane buses.

"Every time we do any type of service, it costs us money. Propane buses require less maintenance than our diesel buses, and that means lower costs," added Swestka, who said the school district's yearlong data showed the average cost per mile for its propane buses to be about 60 percent lower than its diesel buses.

Cost savings benefit the school district, but the biggest difference for the drivers and the passengers has been the warmer and quieter performance of the propane buses. On very cold days, the school district's diesel buses often don't get warm enough to get to a comfortable temperature inside the bus, which is not the case with the propane models. Also, the school district's drivers can hear traffic around the propane buses better and hear the students inside the bus with more clarity.

Buses fueled by propane autogas reduce noise levels by producing sound lower than diesel-fueled buses, resulting in about 50 percent less noise.

Brandon School Division, Manitoba, Canada

Brandon School Division in Manitoba covers a landscape containing both urban and rural areas. Temperatures average in the mid-80s in the warmer months, and down to negative 35 degrees Fahrenheit in the colder months, with wind chills as low as negative 60. Average yearly snowfall is 40 inches. Its school bus fleet is made up of 12 propane buses and 31 diesel buses.

The propane buses have performed consistently for the school district. "We get temperatures from extreme cold to quite hot, and there is no change in how the propane bus performs, which is consistently great," said Supervisor of Transportation Ron Harkness.

Prior to purchasing its first propane bus, the school district tested a demo propane bus for its cold-weather performance. It found that the demo bus did not need to be plugged into block heaters and that they started right up. The diesel models are always kept plugged.

The drivers are equally impressed with the propane buses. “The propane buses heat up quickly, which our drivers appreciate,” said Harkness. “The student and driver comfort is fantastic. Students even need to tell the drivers to turn the heat down — that never happens with the diesel buses.”

In addition to the warmth provided by the propane buses, Harkness says that the students and community also benefit from the reduction in carbon dioxide and particulate emissions coming out of the tailpipe. He also noted that the district’s school board was able to reduce the transportation department’s overall operating costs due to propane bus savings, redistributing those funds to other school programs.

Proctor Public Schools, Minnesota

Proctor Public Schools in Proctor, Minnesota, operates a school bus fleet of 30 with nine Blue Bird Vision Propane buses. The buses travel rural and mountainous terrain. Nearly three-quarters of the area is serviced by gravel roads and the elevation significantly changes throughout the district. During the summer, temperatures reach into the 90s, with temps dipping to as low as negative 30 degrees during the winter with negative 50-degree wind chill. Average snowfall is 75 inches annually.

Transportation Supervisor Curt Benassi has found that his propane school buses are outperforming their diesel buses in these conditions. “When it’s cold out, our diesel buses take forever to warm up and we need to check them to see if they work,” Benassi said. “Even when it’s 40 below, our propane buses start up with no trouble and no additional time needed.”

Benassi says that on cold days lower than 20 degrees, his maintenance crew must dump fuel conditioner into the diesel fuel to avoid it from being turned into a wax. Each bottle of condition fuel is \$9 per bus per time. Sometimes in the district’s diesel buses, a block heater doesn’t work to warm up the antifreeze, and they can’t use the bus. He often has diesel buses that don’t start up due to cold weather. In comparison, Proctor Public Schools’ propane buses do not need fuel conditioner or electric block heaters to start.

The school district’s school bus drivers and students also benefit from the ability of the propane buses to start up and stay warm inside the cabin. “Our drivers love how warm the propane buses get,” said Benassi. “From front to back, the temperature remains at a consistent 70 degrees. Students sometimes tell the driver to turn the heat down, which never happens in diesel. Compare that to the front of the diesel bus that might be only 30 degrees — throughout the entire bus route. Drivers often cover themselves with blankets in diesel buses, and, on extremely cold days, almost all of the floor is covered with frost during the route.”

The school district, which has received support and interest from its community about the alternative fuel buses, plans to switch its entire fleet to propane as its older diesel buses are replaced.

During cold-weather months, propane school buses across North America are proving to perform consistently and economically at temperatures well below zero.

About Blue Bird Corporation: Celebrating their 90th year in business, Blue Bird (Nasdaq: BLBD) is the leading independent designer and manufacturer of school buses, with more than 550,000 buses sold since its formation in 1927 and approximately 180,000 buses in operation today. Blue Bird's longevity and reputation in the school bus industry have made it an iconic American brand. Blue Bird distinguishes itself from its principal competitors by its singular focus on the design, engineering, manufacture and sale of school buses and related parts. As the only manufacturer of chassis and body production specifically designed for school bus applications, Blue Bird is recognized as an industry leader for school bus innovation, safety, product quality/reliability/durability, operating costs and drivability. In addition, Blue Bird is the market leader in alternative fuel applications with its propane-powered and compressed natural gas-powered school buses. Blue Bird manufactures school buses at two facilities in Fort Valley, Georgia. Its Micro Bird joint venture operates a manufacturing facility in Drummondville, Quebec, Canada. Service and after-market parts are distributed from Blue Bird's parts distribution center located in Delaware, Ohio. For more information on Blue Bird's complete line of buses, visit www.blue-bird.com.

About ROUSH CleanTech: ROUSH CleanTech, an industry leader of alternative fuel vehicle technology, is a division of ROUSH Enterprises based in Livonia, Michigan. ROUSH CleanTech designs, engineers, manufactures and installs propane autogas fuel system technology for medium-duty Ford commercial vehicles, and Type A and Type C Blue Bird school buses, and compressed natural gas fuel systems for Type C Blue Bird school buses. As a Ford QVM-certified alternative fuel vehicle manufacturer, ROUSH CleanTech delivers economical, clean and domestically produced fueling options for fleets across North America. Learn more at ROUSHcleantech.com or by calling 800.59.ROUSH.

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