Talking Points for Ultra Low NOx

Overview

This document provides facts about nitrogen oxides (NOx) and ROUSH CleanTech's ultra-low 0.02 NOx certification on Ford's 6.8 L V10 3V propane autogas engine. These talking points can be used in external and internal communications.

NOx transportation emissions are regulated by our government.

- Nitrogen oxides, known as NOx, are highly reactive gases composed of nitrogen and oxygen. They form when fuel is burned at high temperatures.

- The primary source of NOx is motor vehicles. According to a University of California Riverside study, diesel-fueled medium- and heavy-duty vehicles are the number one source of NOx emissions in almost every single metropolitan region in the U.S.

- Approximately 55 percent of man-made NOx emissions come from motor vehicles[1].

- NOx emissions are measured through a calculating system known as "grams of pollutants per brake horsepower hour." This g/bhp-hr provides information on the amount of work of an engine.

- Over the years, the Environmental Protection Agency has set tougher emissions standards on NOx. Since 2010, the NOx engine standard has been 0.2 g/bhp-hr. In 2007, the NOx standard was 1.2 — or five times dirtier than today's standard. In 1998, the NOx standard was 4.0 — or 20 times dirtier than today's standard.

- Propane autogas is naturally lower in NOx than diesel and gasoline.

According to the EPA[2] and other studies[3], NOx emissions can be harmful to our health and to the environment.

- NOx are regulated under federal air quality standards because they are known to be harmful to human health and to the environment.

- Exposure to NOx exhaust can trigger health problems, such as asthma, bronchitis and other respiratory issues.

- In the developing lungs of children, exposure to NOx causes negative health effects, like asthma, which is the leading cause of school absenteeism.

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[1] U.S. Energy Department, Alternative Fuels Data Center, https://www.afdc.energy.gov/vehicles/emissions_pollutants.html

[2] Environmental Protection Agency's National Service Center for Environmental Publications: NOx: How Nitrogen Oxides Affect the Way We Live and Breathe.

[3] University of California Riverside: NOx Fact Sheet, November 2016.

- Emissions from NOx contribute to acid rain, smog and other air-quality issues.

- Diesel vehicles emit increased exhaust emissions filled with tiny soot particles and toxic gases.

ROUSH CleanTech vehicles substantially lower NOx.

- The Ford 6.8L V10 3V engine equipped with a ROUSH CleanTech fuel system is certified to 0.02 grams per brake horsepower-hour. This engine is 90 percent cleaner than the current EPA's most stringent heavy-duty engine standard.

- At the 0.02 low NOx level, it takes 10 propane autogas vehicles to emit as much NOx as one clean-diesel vehicle.

- You would have to operate 100 propane autogas vehicles to produce as much NOx as one diesel bus manufactured before 2007.

- At 0.02 g/bhp-hr, ROUSH CleanTech offers the lowest NOx levels of any propane autogas engine in Class 4-7 vehicles.

- At 0.02 g/bhp-hr, ROUSH CleanTech offers the first available engine certified in a Type C school bus (the Blue Bird Vision Propane).

- CARB established optional low-NOx standards below the EPA standard. Manufacturers may choose to certify engines to the California Optional Low NOx Standards of .10, 0.05 or 0.02 g/bhp-hr. Our propane autogas engine meets the absolute lowest optional level.

- This low-NOx level covers all ROUSH CleanTech 6.8L V10 3V propane autogas engines for bus and commercial truck engines. (It currently does not include the Ford E-350 / E-450 cutaway, which has a two-valve propane autogas engine).

- ROUSH CleanTech achieved 0.02 low NOx with minimal increased incremental cost to the engine.

Propane autogas school buses offer a reliable, safe and cost-effective solution to reduce harmful emissions.

- Almost 1 million students in more than 850 school districts across the U.S. ride to school in propane autogas school buses.

- One diesel school bus certified at the current standard produces more NOx than 10 Blue Bird Vision Propane buses at the 0.02 NOx level. One diesel bus manufactured before 2007 emits more NOx than 100 Blue Bird Vision Propane buses.

- There are thousands of school districts around the nation operating diesel buses manufactured before 2007. An estimated 250,000 school buses on today's roads were manufactured before 2007.

- Children who ride in propane autogas school buses breathe cleaner air every day.

- Students riding in propane autogas school buses have significantly reduced exposure to NOx and other harmful substances (like soot, carbon monoxide and particulate matter).

- In a dollar-for-dollar comparison of Type C school buses, buses fueled by propane autogas reduce NOx the most. Propane autogas buses cost $91 per pound of NOx reduced. Diesel buses cost $1,330 per pound of NOx reduced, making propane autogas 93 percent more cost-effective. Electric buses cost $268 per pound of NOx reduced, making propane autogas 66 percent more cost-effective.

School districts and organizations can use funding to modernize their fleets.

- A $2.9 billion Environmental Mitigation Trust from the Volkswagen emissions settlement is being used to fund transportation projects that reduce NOx emissions.

- School, shuttle and transit buses and Class 4-7 medium-duty trucks equipped with our low NOx engines may qualify for this funding. Learn more at roushcleantech.com/volkswagen-settlement/.

- School districts and organizations that deploy propane autogas vehicles may be eligible for federal and state funding and fuel tax credits. The Energy Department's Alternative Fuels and Advanced Vehicles Data Center provides information and resources at www.afdc.energy.gov/laws/.

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