ROUSH CLEANTECH

ALTERNATIVE FUELS

Program Overview
2017

THE ZERO COMPROMISE
ALTERNATIVE FUEL SOLUTION

Together we put the **customer** first.

Together we make a **quality** product.

Together we live by **process.**

Together we practice **environmental** responsibility.

Together we are **innovative.**

Together we **succeed.**

CORPORATE OVERVIEW

SINCE 1976, Roush Enterprises has delivered OEM-level engineering, prototyping, testing, manufacturing and assembly services for companies around the globe. Employing more than 4,000 people worldwide, Roush Enterprises offers services for a multitude of industries—motorsports, military, entertainment and performance vehicles.

QVM QUALIFIED VEHICLE MODIFIER

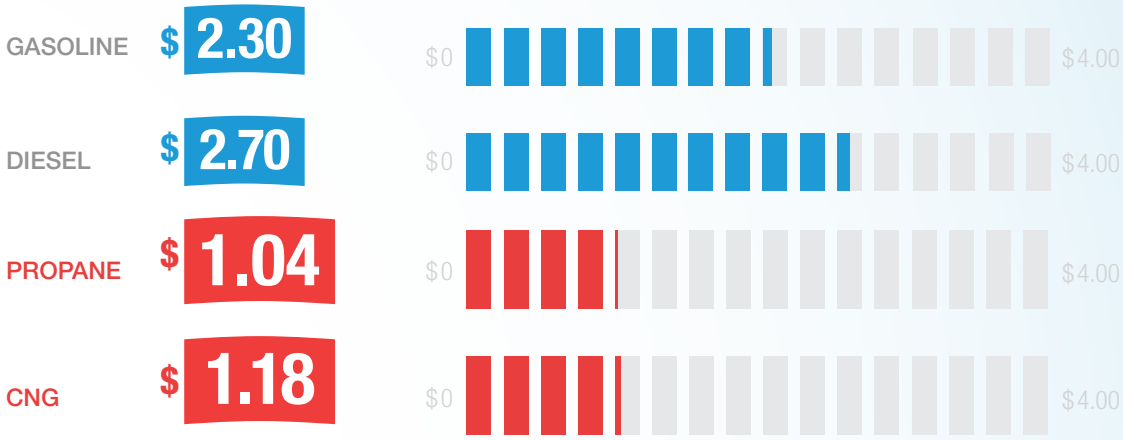
ROUSH CleanTech is a Ford QVM developer and installer of dedicated propane autogas fuel systems.

Organizations with QVM status from Ford create the engine calibration, complete the on-dynamometer calibration testing, comply with all Ford engineering requirements, and develop a vehicle component package.

COST SAVINGS

Reduce:

- Fuel Costs
- Maintenance Costs
- Total Operating Costs



Gasoline and Diesel: U.S. Energy Information Administration 2017 projections. **Propane and CNG:** U.S. Energy Information Administration Futures.

Reduce Dependence on Foreign Oil

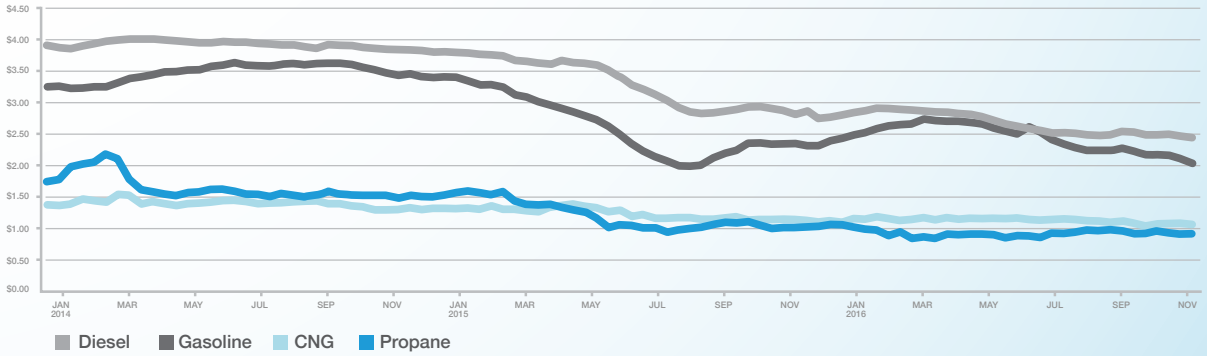
Propane is DOMESTICALLY PRODUCED

90% comes from the U.S.

...of that, almost...

75% comes from natural gas production

Wholesale Price Comparison



2017MY OPTIONS

Ford F-450 / F-550 Chassis Cab
2017 6.8L V10

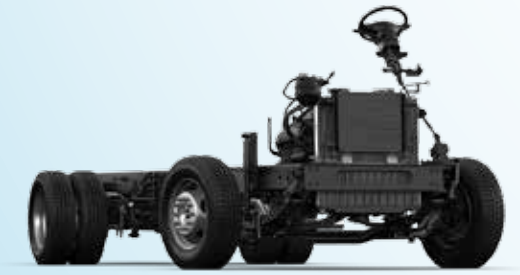
Single saddle tank only available on 84" CA and longer

Applications	4x4 or 4x2 All bed configurations All body configurations All axle configurations
Tech Specs	EPA & CARB approved GVWR: 16,500 – 19,500 lbs.
Fuel Capacity	Single saddle tank: 35 gal. usable Extended range tank: 65 gal. usable
Pricing	Single saddle tank: $15,900 Extended range tank: $21,900

Ford F-650 / F-750 Chassis Cab
2017 6.8L V10

Applications	All cab configurations All wheelbase configurations 6-speed automatic transmission
Tech Specs	EPA & CARB approved GVWR: <33,000 lbs. Requires 98G gaseous fuels prep and frame punch holes Contact ROUSH CleanTech for VSO code and other options
Fuel Capacity	Dual short tanks: 54 total gal. usable Single saddle tank: 50 gal. usable Extended range tanks: 70 gal. usable
Pricing	Dual short tanks: $21,900 Single saddle tank: $15,900 Extended range tanks: $21,900

Ford F-53 / F-59 Stripped Chassis
2017 6.8L V10



Applications	All wheelbase configurations All rear-axle configurations 6-speed automatic transmission
Tech Specs	EPA & CARB approved F-53 GVWR: <26,000 lbs. F-59 GVWR: <22,000 lbs. Requires “98G” gaseous fuels prep
Fuel Capacity	Single saddle tank: 45 gal. usable Extended range tank: 65 gal. usable
Pricing	Single saddle tank: $15,900 Extended range tank: $17,900

Ford E-450 DRW Cutaway and Stripped Chassis
2017 6.8L V10

Extended warranty available through
Green Alternative Systems

Applications	158" / 176" wheelbase 186" / 190" / 208" stretched chassis 6-speed automatic transmission
Tech Specs	EPA & CARB approved GVWR: <14,500 lbs. Requires “91G” gaseous fuels prep
Fuel Capacity	Aft-axle tank: 41 gal. usable Extended range tank: 64 gal. usable
Pricing	Aft-axle tank: $15,900 Extended range tank: $18,600

RETROFITS AVAILABLE

Ford F-250 / F-350 Pickup Truck
2012-2016 6.2L V8

Applications	4x4 or 4x2 All rear axle configurations All bed configurations (including chassis cab) All body configurations
Tech Specs	EPA approved GVWR: 8,500 – 14,000 lbs. Requires “98F” gaseous fuels prep
Fuel Capacity	In-bed tank: 38 gal. usable

Ford E-150 / E-250 / E-350 Van & Wagon
2012-2014 5.4L V8

SULEV II
Super Low Emissions Vehicle

Applications	Extended or regular Cargo van, club wagon All rear-axle configurations 4-speed automatic transmission
Tech Specs	EPA & CARB approved GVWR: <10,000 lbs. Requires “91G” gaseous fuels prep
Fuel Capacity	Mid-ship tank: 25 gal. usable

SCHOOL BUS PRODUCT OVERVIEW

BLUE BIRD

Blue Bird Vision
2018 6.8L V10

AVAILABLE WITH PROPANE CNG GAS

Micro Bird G5
2017 6.8L V10

MICRO BIRD by GIRARDIN

PROPANE

Applications	Micro Bird G5 school bus Micro Bird G5 commercial bus 5-speed automatic transmission
Tech Specs	EPA & CARB approved GVWR: 14,500 lbs. Up to 30 passengers
Fuel Capacity	Aft-axle tank: 41 gal. usable
Wheelbase	158" / 176" / 186" / 190"

PROPANE

Applications	Blue Bird Vision Blue Bird MFSAB / activity bus
Tech Specs	EPA & CARB approved GVWR: 33,000 lbs. Up to 77 passengers
Fuel Capacity	Short tank: 47 gal. usable Standard tank: 67 gal. usable Extended tank: 93 gal. usable
Wheelbase	169" / 189" / 217" / 238" / 252" / 273" / 280"

CNG

Applications	Blue Bird Vision Blue Bird MFSAB / activity bus
Tech Specs	EPA & CARB approved GVWR: 33,000 lbs. Up to 77 passengers
Fuel Capacity	Three (3) Type 3 cylinders: 53 DGE Fuel tanks are certified for 20 years
Wheelbase	217" / 252" / 273"

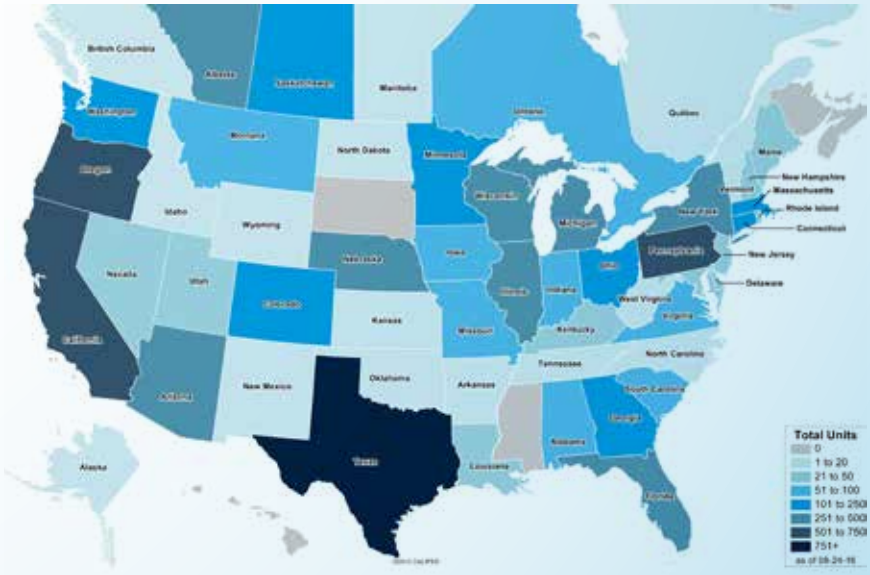
GAS

Applications	Blue Bird Vision Blue Bird MFSAB / activity bus
Tech Specs	EPA & CARB approved GVWR: 33,000 lbs. Up to 77 passengers
Fuel Capacity	Standard tank: 60 gallons Extended tank: 100 gallons
Wheelbase	189" / 217" / 238" / 252" / 273" / 280"

Contact your local Blue Bird dealer at **www.blue-bird.com/find-a-dealer** for pricing.

PROPANE SCHOOL BUSES ACROSS NORTH AMERICA

- Over 9,500 propane buses in North America
- More than 650 school districts operating propane buses



LIQUID PROPANE AUTOGAS

Fuel System Technology

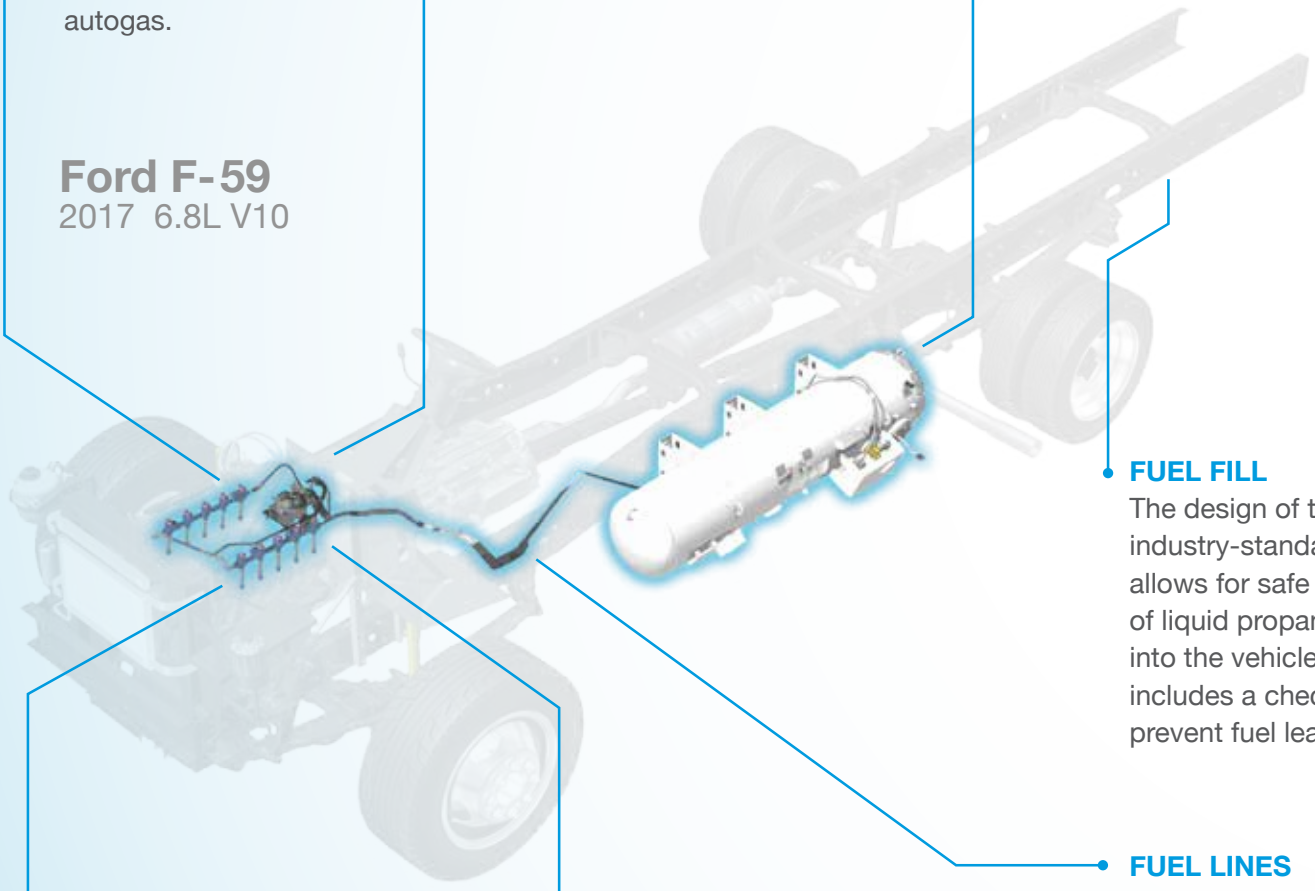
The ROUSH CleanTech liquid propane autogas fuel system seamlessly integrates into the vehicle. Fuel lines follow the OEM routing and the fuel tank generally replaces the standard gasoline tank location. The system delivers propane autogas to the engine in liquid form, ensuring zero compromise in vehicle performance.

FUEL RAIL
Our signature anodized aluminum fuel rails operate under the varying temperatures of liquid propane autogas.

FRPCM
The fuel rail pressure control module improves vehicle start-up times, lowers start-up emissions and provides consistent power.

FUEL TANK
The fuel tank meets ASME certification standards. It's built 20 times more puncture-resistant than gasoline tanks and is made in the U.S.

Ford F-59
2017 6.8L V10



FUEL FILL
The design of the industry-standard valve allows for safe passage of liquid propane autogas into the vehicle. It also includes a check valve to prevent fuel leaks.

FUEL LINES
Made of high-durability stainless steel to handle varying temperatures and pressures and designed to route through the factory line locations.

FUEL INJECTORS
Special fuel injectors inject liquid propane autogas into the engine for ignition.

RECALIBRATED PCM
We reprogram Ford's on-board computer that controls the engine to allow the vehicle to operate properly on propane autogas.

SERVICE NETWORK

FIELD SERVICE & OPERATIONS TEAM PROVIDES:

- Training and education to customers on propane autogas vehicles, maintenance and service requirements
- Robust service and warranty support program
- Web-based training
- Technician training videos
- Issue resolution and technical support
- Efficient web-based claims process

WARRANTY COVERAGE:

- Ford factory powertrain warranty maintained
- Pre-titled vehicles: 5 year / 60,000 mile limited warranty
- Ford F-650 / F-750: 5 year / 100,000 mile limited warranty
- Post-titled vehicles: 12 month / 12,000 mile limited warranty
- Warranty conforms to both EPA and CARB regulations
- Contact ROUSH CleanTech for extended warranty options

MORE WARRANTY AND SERVICE INFORMATION:

CALL: Toll-free technical hotline at 800.59.ROUSH

VISIT: ROUSHcleantech.com/Service

ROUSH CleanTech offers an expanding service network with more than 400 locations across the country.

CERTIFICATION AND COMPLIANCE

EPA	CARB	FMVSS	NHTSA	NFPA-58
Yes	Yes	Yes	Yes	Yes

PROPANE OVERVIEW

Propane, discovered in 1910 by chemist Dr. Walter Snelling, is a by-product of natural gas processing and petroleum refining. About 90 percent of propane consumed in the United States is **domestically produced**, and an additional 7 percent comes from Canada. Propane autogas is a safe, domestically produced engine fuel with a robust infrastructure and **financial efficiencies.** Transportation managers choose propane autogas to fuel their organization's vehicles because of **economics, energy security and environmental factors.**

Lower 48 States Shale Plays

This map shows the vast deposits of shale available for use in the United States for natural gas and propane processing.

Quick Connect Nozzle

- May be operated with one hand.
- Does not require the user to wear protective eyewear or gloves.
- Unable to be cross-threaded.
- Releases fewer emissions per connection.

Propane Safety

- Fuel tanks are 20 times more puncture resistant than gasoline tanks.
- Propane operating pressure ~ 200 psi.
- Propane temperature -44°F.
- Propane autogas poses no harm to groundwater, surface water or soil.
- Propane autogas is a nontoxic, non-carcinogenic and non-corrosive fuel.

PROPANE education & research COUNCIL

Please visit **Propane.com** for additional information.

FUELING INFRASTRUCTURE

READILY AVAILABLE

Propane autogas is the third most common engine fuel in the U.S. and the world. With a national infrastructure already in place, finding publicly accessible fueling is easy. ROUSH CleanTech can help.

EASY TO USE

Fueling a propane autogas powered vehicle is just like fueling with gasoline or diesel, with one exception. The fueling process is "closed," meaning a seal is made between the fueling nozzle and the vehicle's fuel-fill port. That means no more fuel spills, which is a significant source of groundwater pollution with other transportation fuels.

COST EFFECTIVE TO INSTALL

Propane autogas fueling is less expensive than other fueling systems, giving you the flexibility to fuel right at your place of business. Many propane marketers will install infrastructure at little- to no-cost to you.

ACCESSIBLE SPACE

Fueling tanks can be installed in a variety of shapes and sizes, depending on space and volume needs.

Propane Emissions

Octane Rating of **105**

Nontoxic and insoluble in water

Released as a gas, so it doesn't spill, pool or leave a residue

Propane Autogas vs. Gasoline*

- 20% less nitrogen oxide
- 24% fewer greenhouse gases
- 60% less carbon monoxide

Propane Autogas vs. Diesel

- 60% less nitrogen oxide
- 80% fewer hydrocarbons
- 100% less particulate matter

* Propane Education and Research Council

"Bimbo Bakeries USA introduced propane autogas vehicles into our Chicago, Denver and Washington, D.C., regions to help accomplish our corporate environmental goals while lowering our bottom line."

Gary Maresca
senior director of fleet services
Bimbo Bakeries USA

CUSTOMER SUCCESS

Alpha Baking Co., Inc.

VEHICLES
22 Ford E-450 trucks

FUEL SAVINGS
50% in fuel costs alone

EMISSIONS SAVINGS
2.3 million lbs of CO_2 reduction

BIMBO Bakeries USA

VEHICLES
84 Ford F-59 trucks

FUEL SAVINGS
$.50 per gallon in fuel costs alone

EMISSIONS SAVINGS
16.1 million lbs of CO_2 reduction

Kyrene School District

VEHICLES
98 Blue Bird Propane Visions

FUEL SAVINGS
Approx. 40% in fuel costs alone

EMISSIONS SAVINGS
Over 1,400 lbs of particulate matter per year

Partners in education
Orland School District 135

VEHICLES
79 Blue Bird Propane Visions

FUEL SAVINGS
50% in fuel costs alone

EMISSIONS SAVINGS
More than 98,000 lbs of NOx reduction

Bibb County Schools

VEHICLES
62 Blue Bird Propane Visions

FUEL SAVINGS
28% savings in fuel costs

EMISSIONS SAVINGS
More than 18,850 lbs of NOx reduction

RIDE SMART

VEHICLES
74 Ford E-450 cutaways

FUEL SAVINGS
Nearly $2 million over vehicle lifetime

EMISSIONS SAVINGS
More than 6 million lbs of CO2 reduction