



2011

COMMERCIAL TRUCK

ALTERNATE FUEL BUYER'S GUIDE



FORD COMMERCIAL TRUCK

your alternate fuel resource.



Drive green.

Alternate Fuel Buyer's Guide

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Ford is the clear choice when it comes to commercial trucks

Ford also has significant history with alternative fuels and environmentally friendly technologies.

Consider the following:

- Ford has more than 5 million flexible fuel vehicles on the road globally.
- By 2012, half of Ford vehicles will be capable of running on alternative fuels.
- By 2020, Ford is targeting a 30 percent reduction in CO2 emissions from Ford vehicles in the U.S. and Europe.
- Ford Motor Company is pursuing multiple technologies and working with high quality modifiers to find affordable, fuel efficient, environmentally responsible solutions.

Ford Motor Company is committed to offering customers affordable environmental technologies in the vehicles they want and value.

Ford knows your business needs, offering practical solutions that can get your truck ready for real work.

NO COMPROMISE

FORD COMMERCIAL TRUCK ALT FUEL CHOICES AT A GLANCE

Vehicle	Transit Connect	E-Series Cargo Vans	E-Series Cutaways & Stripped Chassis	E-Series Wagons	F-Series Super Duty Pickup	F-350-F-550 Super Duty Chassis Cabs	F-650/F-750 Super Duty Chassis Cabs	F53 & F59 Stripped Chassis
Flex Fuel (E-85)	-	⬆	⬆	⬆	⬆	⬆ ⁽¹⁾	-	-
Biodiesel	-	-	-	-	⬆	⬆	⬆	-
CNG/LPG ⁽²⁾	⬆	⬆	⬆	⬆	⬆ ⁽⁴⁾	⬆ ⁽⁵⁾	⬆ ⁽⁴⁾	⬆
Hybrid ⁽³⁾	-	-	⬆	-	-	-	-	-
BEV ⁽³⁾	⬆	-	-	-	-	-	-	-

(Note: See rear cover for a listing of vehicles and Modifiers)

(1) F-350 Chassis Cab w/6.2L V8 Engine Only.

(2) Capable of conversion to CNG/LPG when equipped with optional prep engine.

(3) Upfitted by 3rd party modifier on Ford products.

(4) Available 3rd Quarter 2011.

(5) 6.8L V10 engine available now, 6.2L V8 available 3rd Quarter 2011.

Ford Sustainability Strategy - No Compromise

The commercial truck market is comprised of many unique vocations and vehicle requirements. One size does not fit all! That's why Ford is collaborating with reliable and qualified upfitters to deliver the completed vehicle.

The CNG/LPG Gaseous Engine Prep Packages have been developed and tested by Ford Motor Company.

Although vehicles with Gaseous Prep Engines can be driven as delivered on gasoline, most vehicles are transported to endorsed modifiers that install the CNG/LPG tanks and hardware.

Ford has released Upfitter Guidelines and our engineers work with the upfit companies to help ensure consistent and reliable performance.

Ford maintains the Engine and Powertrain Limited Warranty (5 years or 60,000 miles*) and the upfitter is responsible for the system component warranty.

Given the number of unique applications, this strategy provides the greatest flexibility of commercial applications – NO COMPROMISE.

* See dealer for details

Ford is Easy to Work With

From dealer order through customer delivery

- 1 Dealer and customer determine appropriate vehicle based on application, payload and range
- 2 Dealer places vehicle order, and vehicle is delivered to upfitter
- 3 Upfitter installs alternative fuel components and system
- 4 Vehicle is delivered to dealer and dealer delivers vehicle to customer



Ford Engineering Support

Ford released a Qualified Vehicle Modifier (QVM) bulletin on 11/1/2009 to provide guidance on modifying Gaseous Prep Engines.

This bulletin contains the following information:

- Proper engine order codes required for CNG/LPG conversion
- Conversion requirements to protect factory limited warranty on the base engine
- Required government emission and safety (FMVSS) certification
- Future revisions will include new powertrains and vehicles as they are released
- Explanation of the importance of engines that utilize hardened valves and seats to reduce valve recession, preventing reduced engine performance and driveability

QVM Bulletin Q-185 can be found on Ford's Fleet website:

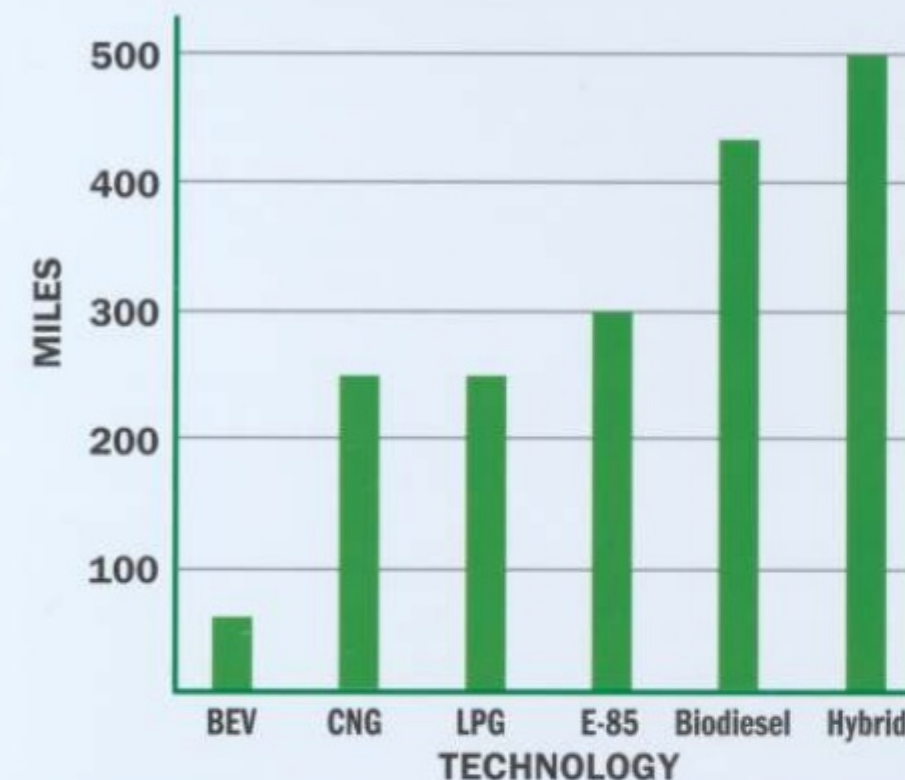
www.fleet.ford.com/truckbbas, refer to BULLETINS tab.

Requirements for conversion:

- Vehicles must be ordered with the appropriate sales order code for Gaseous Fuel Prep Engine
- Vehicle modifier is responsible for U.S. Federal, California or Canadian emission and safety requirements when converted to CNG/LPG
- Modifier is responsible for warranty of the new or modified fuel system components
- Modifier must provide information to the customer that explains CNG/LPG fuel system operation and maintenance, identify unique components associated with the CNG/LPG conversion, and provide proper contacts for parts and service of the CNG/LPG fuel system
- New engine calibration must maintain engine operating limits specified (cylinder pressures, exhaust, valve, spark plug tip and piston temperatures and engine speeds)

Range

Mileage estimates are based on the operator's drive cycle (range, cargo and daily drive routine), vehicle and tank size. The following charts can help select the appropriate technology.



Payload Weight

VEHICLE	GVWR RANGE (lbs.)	PAYLOAD* RANGE (lbs.)
Transit Connect	Wagon 4,965	1,421
	Van 5,005	1,600
E-Series Cargo Van/ Wagon	8,520	3,260
	9,500	3,920
E-Series Cutaway/ Stripped Chassis	9,600	4,898
	14,500	9,040
F-Series Super Duty Pickup	9,400	3,060
	13,300	6,580
F-Series Super Duty Chassis Cab	10,000	2,645
	19,500	12,966
F-Series Super Duty Stripped Chassis F53/F59	16,000	10,365
	26,000	19,014
F-650/750 Super Duty Chassis Cabs	22,000	13,321
	37,000	28,489

* Does not include upfit weight. See dealer for revised payload based on upfit package.

Refueling Stations

The alternative fuel industry is growing and expanding rapidly. The best source of current refueling stations can be found at one of the following internet sites:

www.drivealternatives.com	Largest online database of LPG, CNG, E-85 and Hydrogen refueling stations.
www.cleanenergyfuels.com	One of the leading providers of natural gas fuel in North America.
www.cngnow.com	Provides a "Locator" for CNG refueling stations, as well as a great source for CNG information.
www.ev-chargeamerica.com	This website provides information about electric vehicle charging stations and provides a list of dealers that can install both home and commercial chargers.
www.switchtopropane.com/fueling_stations.html	Provides a "Locator" for propane refueling stations, as well as a great source for propane information.

Financial Incentives and Rebates

There are a number of financial incentives for purchasing and operating alternative fuel vehicles.

Information regarding Federal and State incentives can be found at the following web sites:

www.fueleconomy.gov	Information about Federal and State tax incentives for purchasing alternative fuel vehicles.
www.afdc.energy.gov/afdc/laws/	U.S. Department of Energy allows you to search database of Federal and State laws and incentive programs related to alternative fuel vehicles.

Sustainable Technologies

Flex Fuel **Flexible-Fuel Vehicles (FFV)** are alternative fuel vehicles with an internal combustion engine designed to run on more than one fuel, usually gasoline blended with ethanol (E-85), and both fuels are stored in the same common tank. Flex-Fuel Engines are capable of burning any proportion of the resulting blend as fuel injection and spark timing are adjusted automatically according to the actual blend detected by electronic sensors. E-85 is the most common Flex Fuel and many of the Ford engines are capable of using E-85.

Advantage – Ethanol/E-85 is clean-burning and substantially reduces CO and CO₂ emissions. Compared to gasoline, E-85 has a higher octane rating, provides the same or more horsepower and burns cooler.

Corn and other cellulosic plants are readily available.

Consideration – E-85 produces less energy by volume than gasoline. One gallon of gasoline is the equivalent of 1.56 gallons of E-85 used to travel the same distance.

Due to the increased volume required and the fact that alcohol is corrosive, fuel system components must be upgraded.

Biodiesel **Biodiesel** refers to a vegetable oil-based or animal fat-based diesel fuel.

Blends of biodiesel and conventional (hydrocarbon-based) petrodiesel fuels are products most commonly distributed for use in the retail diesel fuel marketplace. A system known as the "B" factor is used to state the amount of biodiesel in any fuel mix:

- 100% biodiesel is referred to as B100, while
- 20% biodiesel is labeled B20
- 5% biodiesel is labeled B5
- 2% biodiesel is labeled B2

Advantage – Biodiesel burns cleaner than petrodiesel, with reduced emissions.

Consideration – Biodiesel may be more expensive than petrodiesel and in low temperatures may require a special additive or fuel tank heater to flow properly.

CNG **Compressed Natural Gas (CNG)** is a fossil fuel substitute for gasoline or diesel. It is safer than other fuels in the event of a spill (natural gas is lighter than air, and disperses quickly when released).

CNG is made by compressing natural gas which is mainly composed of methane. It is stored and distributed in hard containers at a pressure of 2,900–3,600 psi.

CNG is used in traditional gasoline internal combustion engines that have been modified to operate on CNG.

Advantage – CNG is an extremely clean burning fuel and significantly reduces CO, CO₂ and NO_x compared to its gasoline counterpart.

CNG has an octane rating of 130 and has the potential to optimize the engine's thermodynamic efficiency by utilizing a higher compression ratio.

Consideration – CNG has slightly less energy than gasoline per unit volume and requires a larger fuel tank/container.

Refueling time and infrastructure are also a consideration.

(continued on the next page)

LPG

Liquefied Petroleum Gas (LPG) is a mixture of hydrocarbon gases, most commonly propane and butane. A powerful odorant, ethanol, is added so that leaks can be detected easily.

As opposed to relying on foreign oil sources, approximately 90% of the United States propane supply is produced domestically. 70% of the remaining supply is imported from Canada and Mexico.

Propane is non-toxic and cannot get into the water table if there is a leak in the storage container.

From an economic perspective, propane is an effective alternative to conventional transportation fuels when capital cost (vehicle and infrastructure), operation and maintenance are all taken into consideration. Of all available fuels, propane offers the best mix of vehicle driving range, durability and performance.

Advantage – Power, acceleration, payload and cruise speed are comparable to an equivalent vehicle fueled by gasoline. Propane has a high octane rating of 104, in-between Compressed Natural Gas (CNG) at 130 and unleaded gasoline at 87.

Since it burns completely, there is less carbon build-up. Spark plugs, exhaust system and oil changes are needed less frequently.

Consideration – Because of the low vapor pressure of propane, in extremely cold conditions, starting could be an issue.

Hybrid – HEV – PHEV

Hybrids are a type of vehicle that typically utilize an internal combustion engine AND an electric motor to propel the vehicle. Hybrids are split into two groups: HEVs (Hybrid Electric Vehicles) and PHEVs (Plug-in Hybrid Electric Vehicles).

HEV – Hybrid Electric Vehicles combine an internal combustion engine with an electric motor and battery. Electric power is used for vehicle launch and lower-speed operation. The internal combustion engine takes over for higher-demand operation and charges the battery.

PHEV – Plug-in Hybrid Electric Vehicles are similar to conventional hybrids, but they have a larger battery that can be charged by plugging into an electric outlet. PHEVs are usually designed with an electric-only range of 10 to 40 miles, blended with a gasoline engine to achieve higher speeds and loads. After the electric-only range is exceeded, the vehicle continues to operate as a hybrid vehicle using a gasoline engine or generator.

Advantage – Hybrid vehicles offer significant fuel economy advantages over gasoline internal combustion engine vehicles, especially in urban driving situations with lots of stop and go. By substituting grid energy for gasoline, plug-in hybrids can offer an additional improvement in fuel economy and emissions, especially for drive cycles with significant low-speed driving.

Consideration – The vehicle essentially has two powertrains. Combining powertrains increases vehicle weight, reduces payload and towing capability.

BEV

Battery Electric Vehicles (BEV) use chemical energy stored in rechargeable battery packs.

As with other electric vehicles, BEVs use electric motors and motor controllers instead of an internal combustion engine for propulsion.

The concept utilizes on board batteries for propulsion and recharges the batteries using the electric grid.

Advantage – Vehicles that run solely on electric power require no warm-up, run almost silently and have excellent performance. Electric vehicles can be recharged at night when generating plants are under utilized.

Electric vehicles produce zero tailpipe emissions. Even when emissions from the generating plants are factored in, electric vehicles emit less than 10 percent of the pollution of an internal combustion vehicle.

Consideration – Pure electric vehicles still have limited range, typically, no more than 100 to 120 miles.

Depending on the charge voltage, most vehicles must be plugged-in overnight for the battery to fully recharge.

Current Engine and Vehicle Modifiers

Ford is working with a number of modifiers and installers. The following companies have developed packages for the vehicles and engines shown below.

Refer to the Fleet website, www.fleet.ford.com, for new product capabilities and modifiers as they are added.

Vehicle	Engine/ Sales Code	GASEOUS FUEL UPFITTERS				ELECTRIFICATION
		BAF	ROUSH	LANDI/ RENZO	BRC/ IMPCO	AZURE DYNAMICS
Transit Connect	2.0L 4V/90G		-	-		
E-Series Cargo Vans	5.4L 2V/90G 6.8L 2V/91G					-
E-Series Wagons	5.4L 2V/90G 6.8L 2V/91G					-
E-Series Cutaway & Stripped Chassis	5.4L 2V/90G 6.8L 2V/91G		(1)	-		
F-Series Super Duty Pickup	6.2L V8/98G	(2)	(2)	(2)	(2)	-
F-Series Super Duty Chassis Cabs	6.8L 3V/98G			-		-
F53 & F59 Stripped Chassis	6.8L 3V/98G		-	-	-	-

(1) E-450 6.8L School Bus Package currently available through Roush and Girardin Bus.

(2) Available 3rd Quarter 2011.

Upfitter Links

Below is a list of current modifiers and installers that Ford is working with. Visit their websites to learn more about the specific products and services they offer.

Company	Website	Product Offerings
BAF®	www.baftechnologies.com/products	CNG, LPG
ROUSH®	www.switchtopropane.com	CNG, LPG
Landi/Renzo®	www.landiusa.com	CNG, LPG
BRC/IMPCO®	www.impcotechnologies.com/automotive-product.asp	CNG, LPG
Leggett & Platt®	www.leggettcorp.com	CNG, LPG
OMC (Adrian Steel)	www.adriansteel.com	CNG, LPG
National Fleet Services	www.nationalfleetservices.com/afv	CNG, LPG
Dejana	www.dejana.com	CNG
Azure Dynamics	www.azuredynamics.com	BEV/HEV



Ford Division
Commercial Truck Sales & Marketing

Data from multiple industry sources.

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