

This document answers questions about converting light-duty vehicles (i.e., cars, pickup trucks, vans and smaller SUVs) to run on natural gas. This includes questions and answers about: conversion system availability; installation, service and warranty issues; costs; and available tax credits.

Q Why are people converting their vehicles?

A The rising cost of gasoline and diesel fuel is prompting many people to investigate options to retrofit or convert their car or pick-up truck to run either (1) solely on natural gas, which is referred to as “dedicated” or (2) to run on gasoline or natural gas, which the federal government refers to as “dual-fuel” although the accepted nomenclature for such vehicles is “bi-fuel.”

Q What about heavy-duty trucks?

This document does not address conversion of heavy-duty vehicles over 14,000 pounds, such as buses, many shuttles and/or work trucks. In general, very few systems have been approved for converting vehicles over 14,000 pounds. However, there is a great deal of interest in the industry, so we expect more systems to be available in the future. In addition, new OEM vehicles can be purchased with engines designed to run on natural gas. The federal government’s current guidance on the use of aftermarket conversion systems is available at http://iaspub.epa.gov/otaqpub/display_file.jsp?docid=23319&flag=1

Q How much does it cost to convert a vehicle?

A Converting a new vehicle provides the greatest opportunity to save fuel cost and, thereby, pay back the conversion cost and generate life-cycle savings. The costs range from \$12,000-\$18,000 and include the retrofit system, fuel tanks and related tubing/brackets, and the installation. The amount of fuel capacity requested by the customer significantly impacts cost. Potential customers should contact manufacturers directly about vehicle conversion costs.

Q What impact will converting my vehicle have on the original warranty?

A Generally, installing aftermarket parts does not affect the original equipment manufacturer’s warranty. This is the case with the installation of aftermarket conversion systems. EPA has stated that the “vehicle's original manufacturer remains liable for warranty of any systems which retain their original purpose following conversion, except in cases where the failure of such a system is determined to be caused by the conversion.” In addition, EPA guidance states that “the conversion

system manufacturers would be responsible for the emissions warranty for any parts or systems added by the conversion.” For more information on warranty provisions, the parts covered, and the duration of these warranties, see EPA guidance here -- www.epa.gov/OMS/cert/dearmfr/cisd0602.pdf

Q What federal or state tax credits apply to conversions?

A In 2011 there are no federal tax credits for conversions of vehicles to run on natural gas, but Congress has introduced legislation that, if passed, would provide a tax credits for conversions. In addition, some states also offer tax credit for converting a vehicle to natural gas. These tax credits are state-specific and some are temporary. To see what incentives are available in your state, see <http://www.ngvamerica.org/incentives/stateNGV.html> or check with your appropriate state taxation office concerning availability of state tax credits.

Q Where can I refuel my CNG Vehicle?

A Before you convert your vehicle to run on natural gas – or purchase a used CNG vehicle -- be sure to investigate your fueling options. While there are about 1,000 CNG fueling locations in the U.S. (and the list is growing), about half are not open to the public. Others allow public refueling only after an account has been established (referred to as limited public access), while still others allow public fueling with convenient credit card and/or proprietary billing card access (referred to as full public access).

Q Where can I find a list of CNG fueling stations?

A The most comprehensive lists of CNG stations are available from the following web sites:

http://www.eere.energy.gov/afdc/fuels/natural_gas_stations.html
(U.S. DOE- maintained site of U.S. stations)

<http://apps.usa.gov/alternative-fuel-locator/>
(U.S. DOE mobile phone app)

<http://www.cleancarmaps.com/home/>
(WestStart/CALSTART- maintained web site)

Q What if I am planning a long trip?

A Generally, CNG vehicles are best suited to applications where the vehicle remains in one area to allow for regular refueling at existing fueling sites. While fueling networks are developing in many markets, there are gaps between markets that may make long-distance travel more challenging. Use the above websites, then contact the station you plan to use on your trip to confirm the information is up to date.

Q My home is heated with natural gas. Can I tap into my home system to fuel my vehicle?

A. Yes. Homeowners with an existing natural gas supply line may be able to purchase a home refueling system designed to fill their vehicle overnight. Gas from the same supply line that feeds their house is compressed and stored onboard the vehicle by a “vehicle fueling appliance”. Some of these devices are about the size of an outdoor house air-conditioning unit and the unit is installed outdoors, usually adjacent to your garage. There also is a unit called the Phill that is smaller and can be installed in the garage. The larger (outdoor) vehicle refueling appliances compress and dispense about 0.9 gasoline-gallon-equivalent per hour. The Phill compresses and dispenses about 0.4 gasoline-gallon-equivalent per hour. For more details, see <http://www.impco.ws>

Q Are there tax credits for installing home CNG refueling systems?

A Home CNG refueling devices qualify for a federal tax incentive \$1,000 and may qualify for additional state tax incentives or grant subsidies. The credit had been worth \$2,000 for systems installed in 2009 and 2010. This incentive is set to expire at the end of 2011. Congress has proposed but not yet adopted legislation that would extend this incentive beyond 2011. Some states also have tax credits for home refueling. More information about the available federal tax incentive can be found at <http://www.ngvamerica.org/incentives/index.html>

Q How would you describe the certification requirements for aftermarket systems?

A Both the federal Environmental Protection Agency (EPA) and the California Air Resources Board (CARB) require the manufacturers of aftermarket systems to certify that their conversion systems meet emissions and onboard vehicle diagnostics interface requirements. EPA and CARB can levy substantial fines for violating this requirement, since it is against the law to tamper with emissions systems on vehicles if the result is greater emissions. Up until recently, the only way to protect against a tampering violation is to have valid certificate of conformity from EPA or a CARB Executive Order for the conversion system. As of March 2011, aftermarket manufacturers who sell systems for vehicles that are more than two model years old can obtain “approval” of such systems via EPA new streamlined regulations. Systems intended for use on vehicles that are two model years old or newer must have a certificate of conformity. In order to be legal, all systems must either have a valid certificate (EPA or CARB) or have gained approval via EPA new process. (See below for more information on older vehicles or or beyond “useful life” vehicles)

Q How does the EPA have this authority?

A The EPA has the authority under the Clean Air Act to regulate vehicle emissions for all new motor vehicles. Moreover, it also has authority to regulate modifications of in-use vehicles if the modification tampers with the vehicles emission control systems. For a history of EPA’s regulatory authority, see http://www.ngvc.org/gov_policy/fed_regs/fed_AfterMarket.html

Q How does the law work in California?

A Federal law authorizes California to carry out and enforce its own more stringent vehicle emissions regulations for vehicles sold or registered in California. These California-specific requirements are promulgated by the state’s Air Resources Board (CARB).

Q Are any other states given the same authority?

A Under federal law, other states are permitted to adopt California’s emissions regulations for *new* vehicles. States adopting – or phasing in adoption of – the California new vehicle standards include: Arizona, Colorado, Connecticut, Florida, Maine, Massachusetts, Maryland, New Jersey, New Mexico, New York, Oregon, Pennsylvania, Rhode Island, Utah, Vermont and Washington. EPA has indicated that – unless these states have specifically adopted California’s *aftermarket* regulations or implemented similarly restrictive rules - used vehicles operated in these states may be legally retrofitted using EPA-certified systems. Vehicle owners and qualified retrofit system installers should check with their own state motor vehicle and/or air quality agencies to determine the definitions of new and used vehicles and what other engine retrofit systems guidelines apply.

Q How many companies are offering certified systems?

A The number of Small Volume Original Equipment Manufacturers (SVM) continues to increase as new companies with automotive engineering expertise see the aftermarket retrofit opportunity. Currently, there are nearly a dozen manufacturers offering EPA-certified systems for about a dozen GM and Ford light-duty “engine families” covering about 40 vehicle models (and various iterations of the same base models). These include the GM 3.5L, 3.9L, 4.8L, 5.3L, and 6.0L engines and the Ford 2.0L, 2.3L, 4.6L, 5.4L, 6.2L and 6.8L engines. Note: Not all vehicles with these engines are covered in the engine test groups for which certifications have been granted. In addition, there are no certified natural gas engine conversion systems available in the U.S. for any other light-duty vehicle brands.

Q Where can I find a list of manufacturers?

A Visit <http://www.ngvamerica.org/pdfs/marketplace/MP.Analyses.NGVs-a.pdf> for an up-to-date list of EPA- and CARB-certified engines retrofit and repower systems.

Q How do retrofit system manufacturing companies get engines certified?

A To obtain an EPA Certificate or a CARB Executive Order, the retrofit system manufacturer must submit substantial emissions performance data and related documentation for each test group or engine family to be reviewed. Additionally, new converters may be asked to submit a converted vehicle for rigorous testing to verify this data.

Q Why is this testing required?

A This testing ensures that the retrofitted vehicle meets the same stringent emissions requirements as original equipment vehicles. The testing also ensures that the retrofit system works seamlessly with the on-board diagnostics system to warn the driver when emissions are outside of approved parameters and to log those anomalies in the computer memory for downloading by the automotive service technician. This is an important criterion, since systems that do not do this will fail state and local emissions tests.

Q How expensive is it to comply with these requirements?

A The process of engineering, manufacturing, installing, pre-testing and then submitting a proposed retrofit system to an EPA- or CARB-approved laboratory for certification is a time-consuming and expensive process that may cost as much as \$200,000 or more per engine family.

Q How long does this certification last?

A EPA certification applies only to the installation of that system for a limited time period, usually no longer than December 31 of the year following the year the certificate was granted. Manufacturers may opt to ‘carry-over’ their certifications into future years by filing additional documentation and paying a fee, thus allowing them to convert a previous model-year vehicle (for which they obtained certification) in later years. However, Executive Orders issued by the California Air Resources Board for a particular vehicle model year and test group do not expire. In addition, EPA’s March 2011 final rule provides that aftermarket systems may now legally be sold under an expired certificate if the system is to be installed on a vehicle that is more than two model years old.

Q Are used natural gas vehicles available for sale?

A Government agencies have been the largest purchasers of light-duty natural gas vehicles, and many sell their vehicles after reaching a specific age or mileage benchmark. Examples include federal, state and local government agencies, airport and transit authorities (light-duty sedans and pick-up trucks are often used by security, route supervisors and/or maintenance personnel). While these vehicles do not qualify for the vehicle purchase tax credit because they were already placed in service, they are often low-cost and have remaining life on them. The federal government (GSA) site for auctions is: <http://autoauctions.gsa.gov/autoauctions/home.seam>

Q What about retrofitting older vehicles?

A In March 2011, the U.S. EPA revised regulations covering the conversion of older vehicles. Under the new rules, manufacturers who offer aftermarket conversion systems intended for use on vehicles that are more than 2 model years old no longer are required to obtain a certificate of conformity for such systems and they no longer have to pay certification fees. The new rules, however, do require that EPA “approve” systems after reviewing test data submitted by the manufacturer. In order to encourage additional aftermarket systems, the rules streamline some testing requirements and allow manufacturers increased ability to combine vehicle and engine test groups, alleviating some of the costs associated with demonstrating emission benefits of natural gas systems. In the past, few manufacturers had been interested in offering systems for older vehicles due to technical complications associated with certifying such vehicles, but the new rules may change this.

Q What about vehicles that EPA considers beyond their useful life?

A EPA also finalized new requirements for vehicles or engines that have exceeded their useful life. For light duty vehicles, the useful life can be 8 – 10 years, or 100,000 to 150,000 miles in some cases. Ages and mileage for heavy-duty engines vary. As in the case of vehicles that are more than 2 model years old, EPA will no longer require manufacturers to obtain a certificate of conformity or pay a certification fee. Manufacturers, however, must obtain EPA approval in advance of selling such systems and they must provide a detailed description of their systems and indicate a basis for believing the systems will not comprise emissions when installed. It is likely that manufactures of systems intended for such vehicles or engines will need to conduct some initial emissions testing to demonstrate the robustness of the strategies they employ and the capabilities of their equipment. EPA will provide an electronic posting of information concerning systems that it has approved.

Q What if a system is certified in another country?

A To meet the U.S. requirements, a system must be certified by either the U.S. EPA or the State of California. The fact that a system is certified or approved in another country is irrelevant. These systems also are not eligible for the federal income tax credit.

Q Are aftermarket installers certified?

A Neither the federal government nor California require the businesses or individuals who install aftermarket conversion systems to be certified or licensed to do conversions. Because of the liability for in-use emissions and safety, manufacturers of EPA- or California-certified conversion systems train companies, often referred to as qualified system retrofitters, to install their systems, and typically they do not sell their system to untrained or unapproved installers. In addition, some states, including Oklahoma, have established state retrofit system installer training and certification requirements.

Q Can I install this system myself?

A Installation by a non-qualified installer could damage the retrofit equipment or the engine, compromise vehicle performance, or render the vehicle unsafe to operate.

Q Are there other safety considerations?

A The installer is responsible for obtaining the fuel storage system components (cylinders, high-pressure tubing, press release device, brackets, protective plates) and for installing them in accordance with the National Fire Protection Association's Vehicular Fuel System Code (NFPA 52). These safety-oriented issues are the domain of the local fire marshal, and most jurisdictions have adopted NFPA 52 as their standard for proper installation of natural gas vehicle systems. Consumers should ask installers to confirm that the installation meets NFPA 52 requirements.

Q How can I find the names of the qualified system retrofitters?

A They are available from the individual manufacturers.

Q What about routine maintenance?

A Because natural gas engines work essentially the same way as gasoline engines – an air-fuel mixture is injected into the intake manifold, drawn into the combustion chamber, and then ignited by a sparkplug – most engine service issues are very similar and can be handled by a dealer or automotive shop. If there is a retrofit issue, such as a faulty injector or loose compression fittings, these would be taken care of by the

installer. Occasional inspection of all vehicle systems is generally good practice, regardless of fuel type. See below for safety inspection requirements.

Q What safety requirements apply to natural gas cylinders?

A The National Highway Traffic Safety Administration, the federal agency with jurisdiction over vehicle safety, requires that all CNG fuel storage cylinders conform to federal safety standards found in FMVSS 304 (49 CFR 571.304). Natural gas cylinders also must have a label that (1) states the date of manufacture and the date that the cylinder is required to be removed from service (typically 15-20 years), and (2) instructs the vehicle owner/operator to have a qualified visual inspection of the tank every 36,000 miles or every 3 years (whichever occurs first) and/or after an accident or fire. Inspections are performed to look for tank and bracket damage (e.g. gouges, cuts, abrasions, dents, corrosion, rust, general wear, etc). Converters and vehicle owners should have documentation that this safety inspection has been done, especially if installing used cylinders that still have remaining life (as noted on the cylinder manufacturing label).

Q Where do I find a qualified cylinder inspector?

A Qualified cylinder inspectors are located throughout the US and Canada. The cost/time associated with a cylinder inspection is minimal. More information about CNG cylinder inspections and links to certified inspectors is available at <http://www.cleanvehicle.org/technology/cylinder.shtml>. Check with the manufacturer or the qualified system retrofitter concerning recommended service practices and warranty coverage.

If your general question was not answered by this document, please contact us at questions@ngvamerica.org.

Disclaimer: These questions and answers are provided for informational purposes only. If legal advice or other expert assistance is needed, the services of competent professional should be sought.

4/8/11