

Purchasing a Natural Gas Vehicle

Vehicle Options

There are three types of NGVs:

Dedicated: Runs only on natural gas, typically are light-duty vehicles

Bi-fuel: Has two separate fueling systems that can run on either natural gas or gasoline, typically are light-duty and medium-duty vehicles

Dual-fuel: Has fuel systems that run on natural gas but use diesel fuel for ignition assistance, traditionally limited to heavy-duty vehicles

There are three vehicle types of NGVs:

Light-duty: cars, vans, motorcycles, lift trucks, fork lifts

Medium-duty: school buses, transit buses, refuse trucks, step vans

Heavy-duty: long-haul/regional-haul trucks, vocational trucks, refuse trucks

Vehicle Operations ROI

Many aspects of a CNG vehicle and fueling infrastructure project combine to determine overall profitability. Due to lower fuel and maintenance costs, NGVs offer an 18 to 24-month payback. As production increases and fuel tank prices come down, vehicles will become less expensive and enjoy a shorter payback period. The greatest savings are currently being seen in heavy-duty, high mileage fleets.

- * No diesel particulate filter
- * No diesel particulate filter regeneration or waste disposal



CNG & LNG Station Options and Costs

In the U.S., there are more than 1,600 CNG fueling stations and 140 LNG fueling stations.

CNG Stations: There are essentially three types of CNG Stations with the main difference being the amount of storage capacity available and the size of the compressor which determines the amount of fuel dispensed and the time of CNG delivery.

Fast-fill: Provides immediate dispensing of fuel to vehicles (cars, trucks, buses), similar fill time to gas station

Time-fill: Allows vehicles to conveniently refuel over-

night, typically for central fleet depot refueling

Combination-fill: Features both a fast-fill and time-fill component in one system

LNG Stations: LNG is stored and dispensed as a super-cooled and liquefied gas so LNG dispensers deliver fuel to vehicles at pressures of 30 to 120 psi and the stations are structurally similar to gas stations.

Mobile: LNG is delivered by a tanker truck that has on-board metering and dispenser equipment.

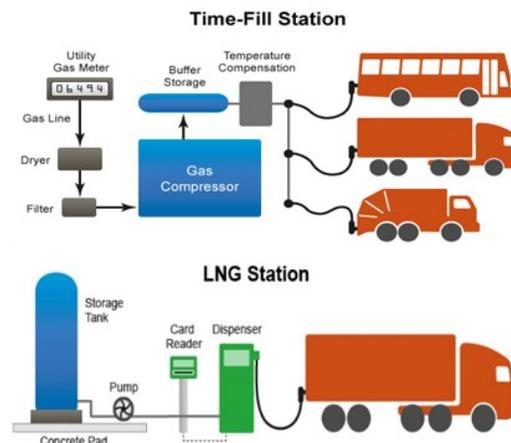
Containerized: Includes a storage tank, dispenser equipment, metering and required containment.

Permanent Large Station: Has greater storage capacity, tailored to meet fleets' needs.

Typical Cost of Installation:

Costs for installing a CNG fueling station can range between thousands to millions of dollars depending on the size, application, engineering, equipment, and installation.

- * A basic time-fill fueling unit that dispenses 5-10 GGE/day for 1-2 vehicles average \$10K or less.
- * A fast-fill starter station that dispenses 20-40 GGE/day can cost between \$35-\$75K depending on size and application.
- * A small station that dispenses 100-200 GGE/day can cost between \$250-\$600K depending on size and application.
- * A medium station that dispenses 500-800 GGE/day can cost between \$550-\$990K depending on size and application.
- * A large fast-fill station that dispenses 1,500-2,000 GGE/day can cost between \$1.2-\$1.8M depending on the application.



Technician & Operator Training

The fuel storage and delivery systems for natural gas vehicles (NGVs) are governed by the National Fire Protection Association (NFPA). NFPA 52, the Vehicular Gaseous Fuel Systems Code, spells out specific safety requirements for NGVs and their fueling facilities. In addition NFPA 30A applies to facilities that perform maintenance and repair of NGVs; NFPA 88A applies to parking garages.

Maintenance Facilities & Safety

Facilities that maintain vehicles fueled by natural gas require implementation of different safety measures because like any fuel, natural gas is flammable.

Things to know regarding safety with compressed natural gas (CNG):

CNG is composed of mostly methane (CH₄) with slight amounts of hydrocarbons.

CNG is lighter than air and will therefore rise to the ceiling of the maintenance facility and quickly dissipate rather than remain at floor level. It is also odorless and colorless in its natural state.

NGVs use a spark ignited engine that use a natural gas fuel storage and delivery system.

Things to know regarding safety with liquefied natural gas (LNG):

- * LNG is a cryogenic liquid stored at about -260 degrees F.
- * LNG is odorless so a leak is difficult to detect - this is why LNG vehicles and garages include electronic methane sensors to detect leaks.
- * The cold natural gas vapors of LNG are heavier than air when the initially leak so they will stay at ground level potentially causing a fire hazard.

Five elements to consider when developing a safe CNG vehicle maintenance facility:

Paths of Migration – must be controlled to prevent the released gas from entering unprotected areas of the structure

Ventilation – must provide enough air flow to reduce the concentration of the released gas and at the

same time evacuate the gas from the structure

Space Heating – must be designed in accordance with guidelines so that open flames/hot surfaces do not provide an ignition source

Electrical Wiring, Lighting, and Appliance Considerations – must be installed in such a manner that they do not provide sources of ignition due to sparking, design it to be “explosion proof”

Gas Detection, Alarm, and Control Systems – must provide defense against dangerous concentrations of natural gas by alerting personnel and disabling potential electrical ignition sources

CNG Fuel System and Tank Operations & Maintenance

Compressed natural gas (CNG) fuel systems require different maintenance than conventional fuel systems. Technicians should regularly inspect and replace the fuel filter, which removes any oil or contaminants in the CNG.

CNG Tank End-of-Life: CNG fuel tanks have a useful life of 15, 20, or 25 years, depending on their construction and how they were certified by the original manufacturer. Because there is no way to safely “requalify” tanks for extended use, once a tank reaches its expiration date, it must be replaced.

CNG Tank Replacement: CNG tanks should be replaced by a qualified service facility. This type of service facility will include properly trained personnel and equipment to safely vent the CNG from the tank and purge the tank with nitrogen to eliminate any pressure or fire danger associated with residual CNG in the tank. Once the tank is safely purged of any natural gas, the expired CNG tank must be rendered unusable and discarded.

CNG Tank Inspection: Performing a regular safety inspection of the CNG tanks is a critical maintenance requirement for CNG fuel systems. Owners can find certified inspectors by searching for “Certified CNG Fuel System Inspector” on the [CSA Group website](#). The CSA Group is the standards-writing body in the United States for natural gas appliances and related equipment.

FOR MORE INFORMATION, PLEASE CONTACT:

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