

Natural Gas Refueling Station Equipment

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Introduction



Natural gas for vehicles comes in two flavors: compressed or liquefied. For many years, the key question for fleet operators to answer has been to go with **CNG** or **LNG** powered vehicles. In the design of a natural gas refueling facility, the distinction is becoming less clear.



CNG versus LNG

	CNG	LNG
Physical State	Compressed Gas	Cryogenic Liquid
Distribution	Pipeline	Transport
Fuel Stored on Site	< 1500 lbs	> 50,000 lbs
Transferred By	Compressor / Pressure Differential	Liquid Pump
On the Vehicle As	Compressed Gas	Cryogenic Liquid
To the Engine As	Low Pressure Gas	

NFPA Standards

- NFPA 52 – CNG Vehicular Fuel Systems Code

- ◆ Setbacks are 10 feet from a building or property line
- ◆ Fire Protection is one sentence (a single fire extinguisher is required)
- ◆ Specifies limits on fuel impurities & requires odorant

- NFPA 57 – LNG Vehicular Fuel Systems Code

- ◆ Setbacks are 10-75 feet from a building or property line, depending on tank size
- ◆ Fire Protection is an entire chapter
- ◆ No fuel standard, no odorant

Unique CNG Hazards



- Improperly maintained CNG cylinders may fail
- Natural gas is flammable in air in concentrations of 5-15%
 - ◆ Below 5% the mix is too lean
 - ◆ Above 15% the mix is too rich
- Potential for displacement of oxygen

Unique LNG Hazards



- Vaporized LNG can be negatively or positively buoyant
- Natural gas is flammable in air in concentrations of 5-15%
 - ◆ Below 5% the mix is too lean
 - ◆ Above 15% the mix is too rich
- Potential for cryogenic burns
- Potential for displacement of oxygen

CNG Station Operation

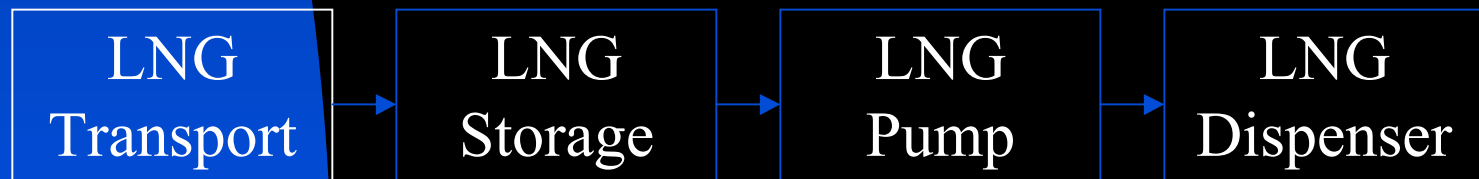
- Fuel is supplied via local pipeline
- NG is compressed and stored in ASME bottles
- Vehicles are fueled by pressure differential from the storage banks / compressor



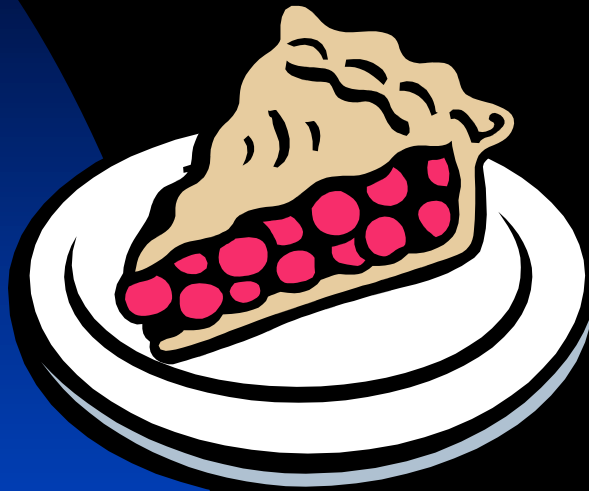
LNG Station Operation



- Fuel is brought in by 10,000-gallon transport trailers
- LNG is stored in a 15,000-gallon vertical tank
- Vehicles are fueled using a pump and a single fill hose



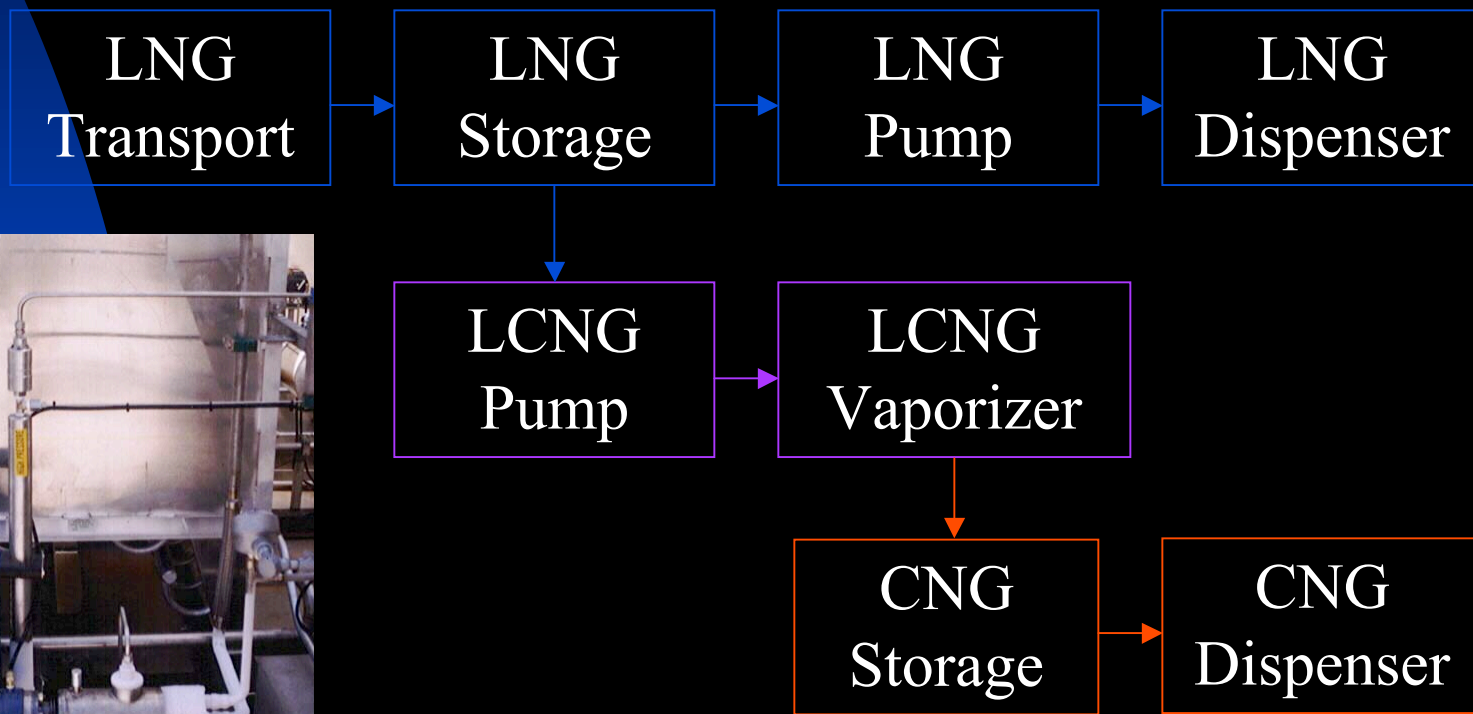
CNG or LNG ??



Why not Both? -- LCNG

LCNG Station Operation

- Add an LCNG pump and vaporizer
- Inject odorant and/or oil as required



Non-Traditional Stations

Fuel station design criteria are becoming less distinct:



- LCNG Systems
- Small-scale / Mid-scale LNG Liquefiers
 - ◆ On pipeline gas
 - ◆ On stranded wells
 - ◆ On landfill gas

Non-Traditional Fueling

More fuel purchase options have become available with NG:



- In the vehicle
- At the dispenser
- At your own fuel station
- In the pipeline
- In the ground

Choose a Path



Summary

Choosing natural gas as an alternative fuel continues to be an easy choice. Choosing the form in which you'd like the natural gas delivered and stored is becoming less restrictive than it used to be. Whether CNG, LNG, or LCNG, don't feel confined to a single path to achieve your goal!

