

Natural Gas

CAPCOA Diesel Emissions Reduction Conference
for Public Agency & Utility Fleets
Mike Eaves – California NGV Coalition

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Vehicles that use Natural Gas

- Light-duty vehicles
 - Dedicated NGVs (compressed natural gas) *
 - Bi-fuel (natural gas and gasoline)
- Heavy-duty vehicle
 - Dedicated compressed natural gas *
 - Dedicated LNG *
 - Dual fuel – natural gas with diesel
 - Dual fuel – natural gas with diesel pilot *

* Denotes vehicles optimized for emission reductions

Compressed Natural Gas (CNG)

- Delivered through utility gas distribution system
- Needs to be compressed at point of dispensing
- Compressed to 4,000 – 4,500 psig
- Dispensed at 3,000 or 3,600 psig
- Vehicle storage has to accommodate dispenser pressures

CNG Station Equipment

- Gas dryer
- Multi-stage compressor (w/intercoolers)
 - Number of stages depend on inlet feed pressure
- Oil separators/filters
- High pressure buffer storage
 - 30,000 SCF @ 4,000 psig (equivalent to 230 gallons)
- Dispenser(s)
 - Multi hose – multi pressure
- Card reader

CNG Infrastructure

- Compression equipment can be scaled to demand
 - Fast fill (transit)
 - Timed fill (refuse, school bus, etc.)
 - Combination
- Scale directly impacts cost of station
 - Incentives
 - Tax credits
 - Fuel Savings
 - Fuel Credits (new Energy Bill)

Natural Gas Fuel Specifications

- California only state with commercial fuel spec for natural gas (CARB spec)
- Central coast, San Joaquin Valley, and pockets in Los Angeles basin have locally produced gas that doesn't meet CARB spec
- Utilities with off spec pipeline gas won't connect to NGV stations unless special provisions are adhered to

LNG

- Can be very high methane content 95-99%
- Cryogenic liquid (-260 degrees)
- Higher fuel density than CNG – smaller on-board storage for given fuel capacity
- Delivered by tanker trucks
- Current LNG production capacity in Calif limited
- Growing potential of LNG supply with Calif production and LNG terminals

LNG Station Equipment

- LNG storage tank with containment
 - 15,000 gallon
- Cryogenic pump to pump LNG liquid
- LNG Dispenser (with safety protection)
- Optional
 - Heat Exchanger
 - CNG Dispenser

Emission Benefits

- CNG/LNG engines and vehicles have lowest emissions of all vehicles (both LD and HD)
- HD Natural Gas engines have met 2007 PM standard since 2003
- HD Natural Gas engines plan to meet 2010 NOX standards in 2007 (0.2 gram NOX)
- 2007 HD technology will be more energy efficient with a simple 3-way catalyst for emissions control

Cost

- Higher first cost for vehicles (engine and fuel storage)
- HD slightly lower efficiency
- Infrastructure costs (not insignificant but can be better managed than some have done in past)
- Lower fuel costs than gasoline/diesel
- Life Cycle Costs – TIAX Report
 - Future CNG and LNG options will be lower cost alternative to diesel with oil costs above \$22, \$28, \$31 per barrel

TIAX Report – Refuse

