

Municipal “Green” Fleet Case Study

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Northeast Diesel Collaborative US EPA Webinar

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Fleet Motor Fuel Objectives

- Reduced fuel costs & emissions
- Use in new construction or retrofit
- Stress lifecycle cost over initial cost

Compressed Natural Gas Street Sweeper



1995 Ford / Elgin Sweeper

Two engines - one for propulsion, second for vacuum/sweeper

Cummins B5.9G- 190 HP *and* Chevrolet 3.0G- 115HP







McNeilus

52



52

**SLOW
DOWN**



Compressed Natural Gas

- **D**iesel **G**allon **E**quivalent of \$1.90 vs. \$3.27+ (including electricity, but not capital costs)
- Lowered emissions
- Much quieter
- No underground fuel tank
- No environmental liability or UST operational issues
- Eliminates current diesel engine complexities with vehicles used in **Pick up-and-Delivery** service (DEF, exhaust regen., etc.)
- Dedicated CNG engines vs. bi-fuel

CNG Vehicle Costs

- Heavy Duty (Class 7 or 8) – between \$25,000 and \$50,000 premium over diesel
- Light and Medium Duty (Class 2 thru 6) \$7,000 to \$10,000 premium over gasoline engine. Could be **less** than diesel option!
- US EPA and/or DOE money thru NYSERDA to empirecleancities.org for entire incremental cost

CNG Refueling Station



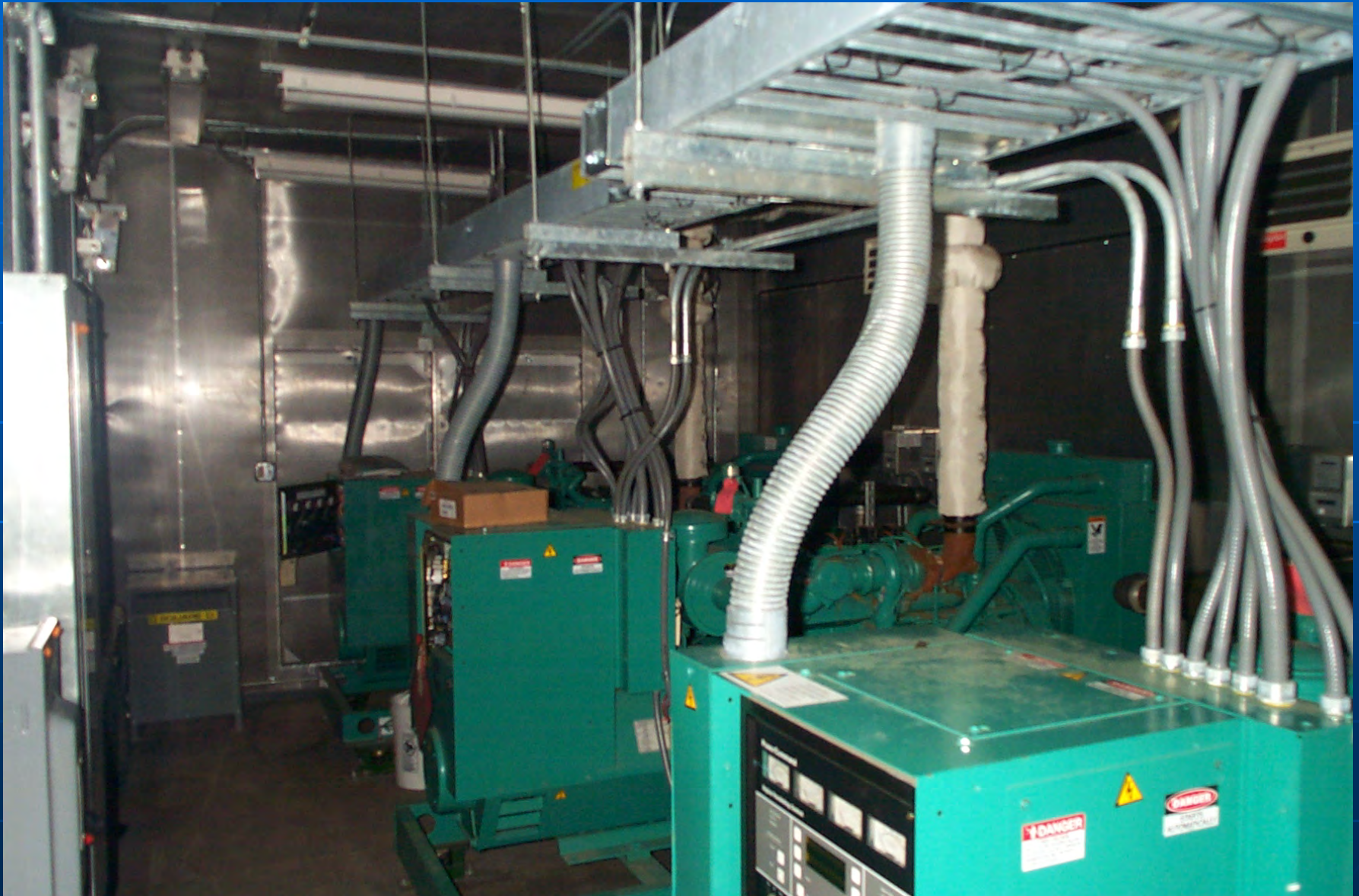
CNG Cascade Storage Tanks



CNG Dispenser



450 KW Natural Gas Parallel Genset



Natural Gas Genset

- Quieter than diesel, especially with hospital level silencing system
- Parallel system permits precise tailoring of power to load demand
- Cleaner than diesel without needing exhaust treatment
- Parallel system permits backup redundancy
- Use of single unit in less demanding applications promotes standardization
- Latest US EPA emissions regs. for stationary/standby engines - RICE

350 KW Diesel Standby Generator

- Replace aging diesel engine generator at Orchard Street Pump Station
- Kept as a backup

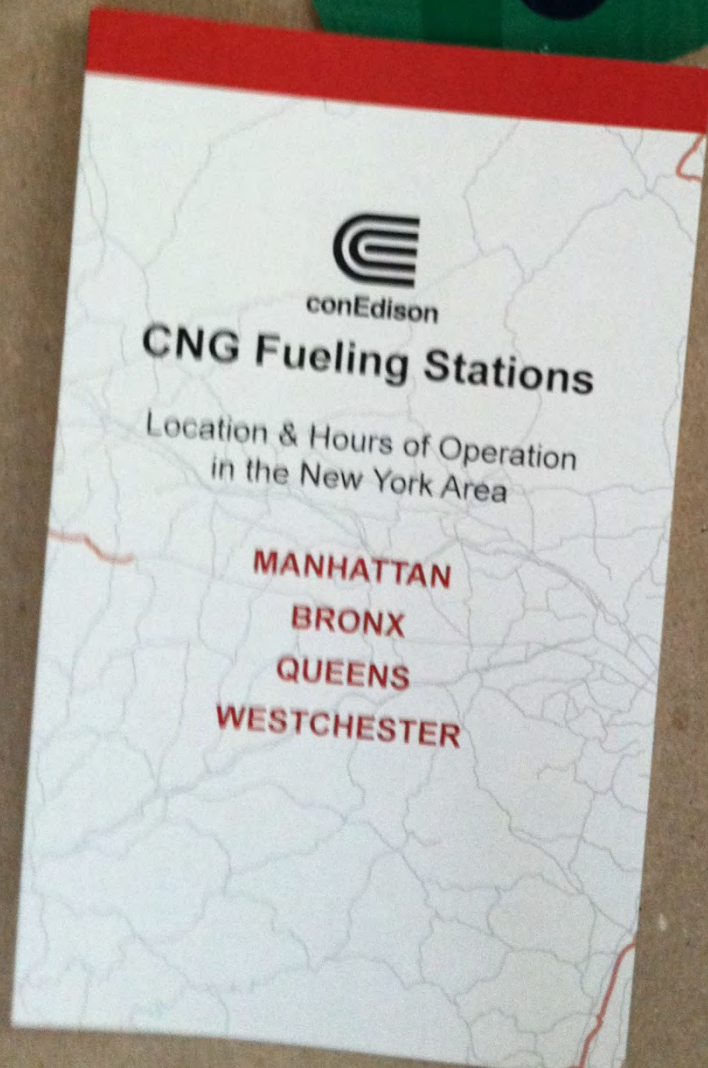


- **Recycle old asphalt using CNG heater and asphalt reclaimer**



Stationary Fuel Cell









NO PARKING
FIRE LANE

NO OPEN
FIRE

GEN. COM. I

DPW Central Vehicle Repair Facility – 65,000 Square Feet









REZNOR



Carbon Monoxide/Particulate Sensor

CNG Maintenance Facilities

- nyserda.org search for “Guidelines for Maintenance Facilities”
- cleanvehicle.org search for “Modifications for Adding Compressed Natural Gas Vehicles...”
- Air Changes per Hour (major vs. minor maintenance)
- Heating (open flame) not less than 18” to the underside of the roof

New York's First Hybrid Aerial Bucket Truck

- Eaton brand electric hybrid system
- Freightliner truck with Cummins 240hp diesel
- Hybrid drive 44kw electric motor - four Li-Ion batteries
- Fuel savings of 2,000 gallons per year
- Electrically operated PTO, used with diesel engine off
- Auxiliary power generation of 10,000 watts at 120V



Alcohol Refueling Station!?



Alcohol Refueling Station



Ethanol & Methanol

- 1,000 Gal. Per tank: Above-ground double-walled
- Self-contained dispensing pumps, no external plumbing

Flex Fuel Ford Ranger Pick-up



Ethanol Powered (program started in 1978)

E-85 for *POLICE CARS*



Reduce Dependency on Fossil Fuels

- **AFV's** (including hybrids and biodiesel)
- **Increase Vehicle Efficiency**
 - Fuel Efficient Drivelines
 - Lighter Weight Bodies
- **Reduce Usage**
 - Consolidate Fleet (Verify Need for Each Vehicle)
 - Eliminate Excess Idling

V6 Powered Police Cruisers





1993 Chevrolet V6 Police Car

Down (“right”) Sizing

Four Cylinder Diesel



Aluminum/Fiberglass Cab



**High Strength Low Alloy Steel
Packer Body**



Compact Truck that Thinks it's Full-Sized



Aluminum Dump Body (natural finish)



360

Polymer Lined Dump Body

- Aluminum body with "*Quicksilver*" polymer bed liner.

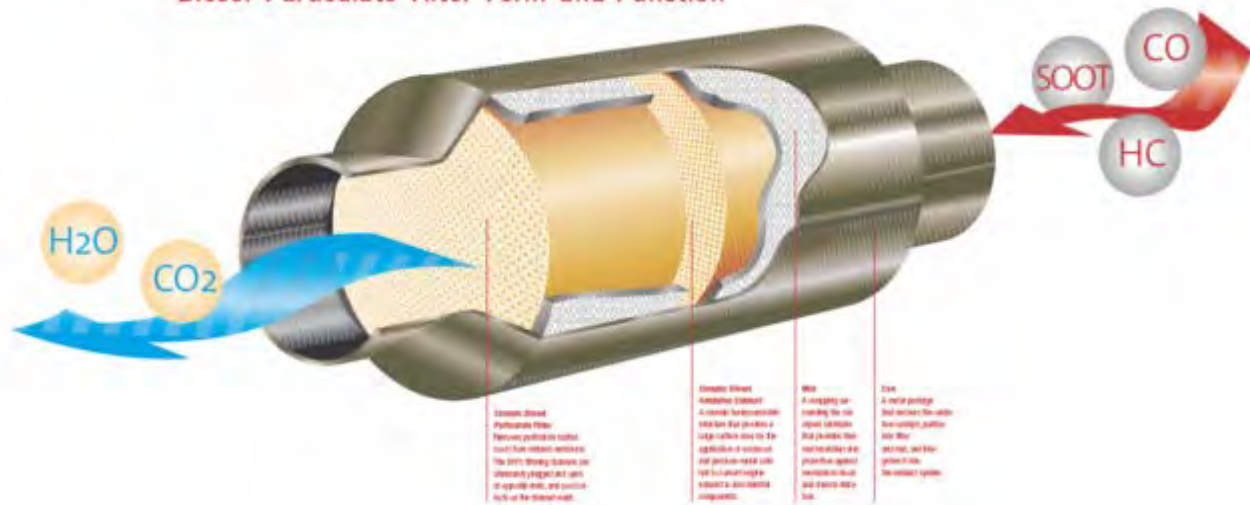


Improving Diesel Emissions

- Carefully specify the minimum engine size necessary to do the job. Analyze gearing, and usage
- Biodiesel (B20...) Displacement of over 30,000 gallons of diesel fuel annually
- Specify diesel exhaust after-treatment for off road equipment
- Retrofit Diesel Oxidation Catalyst (DOC) or Diesel Particulate Filters (DPF) to existing equipment (i.e.: Donaldson, Engelhard, Corning)



Diesel Particulate Filter Form and Function





Morbark Tub Grinder/Shredder



760 hp diesel engine has four (!) Diesel Particulate Filters; 90% soot reduction

Gasoline vs. Diesel ??

Fuel Injected Ford V6 Gasoline Engine

- Low Weight
- Low Emissions
- Low Initial Cost
- Quieter
- Low Maintenance
- Avoid need for DEF



Extend Oil Change Intervals



■ Synthetic Fluids

(Less frequent fluid changes = less waste oil)

- Valvoline Premium Blue engine oil
- Castrol Transynd automatic transmission oil
- Mobil synthetic axle and transfer case gear oil

Recap

- Most projects have three to five year payback; maximum of ten years
- Easier to incorporate in design of new equipment, but entirely possible to retrofit to existing
- Longer service life; reduced fuel consumption and pollution
- Stress lifecycle cost over initial cost
- Analyze everything from HVAC controls to roadway curbing!

