
Alternative Fuel Vehicle Program ... and Garbage Trucks

Transportation and Environment Committee
March 26, 2007



Purpose

- Review alternative fuel vehicle program
- Review factors to be considered in choosing refuse hauler equipment
- Recommend committee support of March 28th agenda item to purchase 14 LNG trucks
- Next steps to advancing program

Alternative Fuel Vehicle Program

- Largest portion (70%) of emissions in DFW is from on-road and off-road vehicles and equipment
- City began alternative fuel program in 1992
- Program to reduce emissions, specifically NO_x, generated by City fleet will lead to greatest air quality benefit
 - contributes to region's attainment status

Alternative Fuel Vehicle Program

Dallas fleet in 2007– approximately 4,700 units

- ❑ Dedicated CNG – 1,082
- ❑ Hybrid – 150
- ❑ Multi-fueled – 18
- ❑ Propane – 2
- ❑ Bio-diesel – 461
- ❑ **Total alternative fueled vehicles -- 1,713**

Alternative Fuel Vehicle Program

January 11, 2006 – Council approved support of Regional Transportation Committee's *Clean Fleet Policy*

- ❑ Vehicle acquisition shall be newest model year (or engine standard) only
- ❑ Vehicle acquisitions must show at least a 25% reduction in NOx emissions rate
 - Determined on a vehicle-by-vehicle basis

Alternative Fuel Vehicle Program

Environmental Management System – established objectives/targets in 2006

- Decrease NO_x, VOC, PM and CO₂ emissions by 5% for each pollutant by December '08
 - 100% of sedans must be CNG, Hybrid, or E85, when available (except emergency vehicles)
 - Purchase Tier III diesel engines, when available
 - Evaluate retrofits
 - Develop fuel / equipment strategy

Alternative Fuel Vehicle Program

City of Dallas ranked #5 of the 50 largest US cities for alternative fueled fleet in 2006*

- Survey based on percentage of each city's fleet using alternative fuels
 - Bio-diesel
 - Hydrogen
 - Ethanol
 - Compressed and liquified natural gas (CNG and LNG)
 - Electric vehicles and hybrids
- *Only Texas city to make top 10*

Alternative Fuel Vehicle Program

SustainLane's 2006 ranking of the Top Ten includes:

- 1) Las Vegas – 63% (includes vehicles using low-sulfur diesel)
- 2) Honolulu – 51%
- 3) Kansas City, MO – 45%
- 4) Albuquerque, NM – 42%
- 5) Dallas – 39%**
- 6) Denver 31%
- 7) Phoenix – 28%
- 8) Los Angeles – 25%
- 9) Seattle – 25%
- 10) Portland – 25%

Alternative Fuel Vehicle Program

- Fleet replacement program provides opportunity to expand the Alternative Fuel Vehicle program
- FY 2006-07 budget includes \$2.47M for replacement of 14 Sanitation Services refuse haulers for collection of residential garbage
- New units will replace trucks 7-8 years old (useful equipment life is 7 years, on average)

Factors to Consider

- Operability of equipment – equipment must meet operational requirements for service delivery
- Cost of equipment – as bid
- Fueling – fully burdened cost of fuel and accessibility to fueling stations
- Availability of technology – strategic considerations of current and evolving technology
- Maintenance and expected useful life – consideration of repair and upgrading costs over the expected useful life of equipment
- Verified Environmental Benefit – EPA, CARB or TERP verification that technology performs to emission rating

Factors: Operability of Equipment

- **Diesel** – currently in operation in all sanitation garbage collection equipment
- **CNG** – requires larger tanks that create operational problems
 - Either increases height of truck (if top-mounted) or extends truck length (if mounted behind cab)
 - *Both options create obstacles for operation in Dallas environment (i.e. alley pick-up)*
- **LNG** – no negative operational issues identified

Factors: Cost of Equipment

- **Bid Specifications**

- Conventional cab and cab-forward
- Options for 2007 diesel, CNG and LNG engines

- **Received five bids – opened 10-13-06**

- **Bidders**

- Chastang Enterprises
- Freightliner (Around-the-Clock)
- Metro AutoCar
- Rush Truck Center
- Southwest International

Factors: Cost of Equipment

■ Bids Received

- Diesel \$2,437,134 (\$174,081 each)
- CNG \$3,230,738 (\$230,767 each)
- LNG \$2,695,154 (\$192,511 each)
- *Budgeted: \$2,472,570 (\$176,612 each)*

■ TERP grant

- All bid engines are eligible for approximately \$9,600 grant
- stringent guidelines may prohibit acceptance of grant

■ EPAC tax credit

- CNG and LNG engines meet conditions for federal tax credit
- Vendor expects to pass on \$8,293 per truck to City, if approved (may increase to \$28,800 max credit per truck)

Factors: Fueling

■ Diesel

- ❑ City infrastructure in place
- ❑ Current cost: \$2.22 / gal
- ❑ Must project fuel cost for 6.5-year life of truck

■ CNG

- ❑ 2 stations in place (city / private partnerships)
- ❑ Current price of \$1.89 / gal equiv.
- ❑ 3-year master agreement in place after March 2007 for same price

■ LNG

- ❑ See next 2 pages
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Factors: Fueling

■ LNG

- Specialized fueling requirements
 - Cryogenic process to liquefy methane – fuel cooled to -180°F
 - Requires specialized training for fueling technicians
 - One hour of prep work prior to begin fueling
- City has no LNG fueling station
- DART has 2 stations for LNG buses
 - Ten years of positive experience in LNG fuel management
 - Expressed willingness to accommodate SAN trucks
 - May change fueling strategies after 2010
- Vendor (Clean Energy) offers to create non-permanent fueling station by leasing LNG tank and equipment

Factors: Fueling

■ LNG

- Option 1 – enter Interlocal Agreement with DART
 - City must work around DART's fueling schedule
 - Favorable fuel cost: DART's cost (\$1.98 / gal equiv) + operational mark-up
 - DART to renegotiate their fuel contract after 2010
- Option 2 – set up leased LNG tank with Clean Energy
 - Site preparation cost of \$75,000 (est.)
 - Must train fuel technicians to dispense fuel
 - Lease tank from Clean Energy for \$3,500/month fee
 - Fuel cost of \$1.78 - \$1.99 / gal equiv.
- Future option - City-owned tank and station, to be explored

Factors: Availability of Technology

■ Diesel

- Bid engine model meets 2007 emission standards
- More emission reductions required by 2010 for new purchases

■ CNG

- Bid engine model does NOT meet 2007 emission stds
- “Late 2007” engine exceeds requirements (meets 2010 stds)
- California cities moving away from CNG for refuse trucks; workable but not ideal

■ LNG

- Bid engine models does NOT meet 2007 emission stds
- “Late 2007” engine exceeds requirements (meets 2010 stds)
– and vendor will provide newer engine *at no additional cost*

Factors: Maintenance & Useful Life

- Diesel
 - ❑ No change in maintenance costs
 - ❑ 7-year equipment life
- CNG
 - ❑ Comparable maintenance costs
 - ❑ Additional training for Heavy Equipment mechanics
 - ❑ Methane sensors for repair shops
 - ❑ 6.5-year life (est.)
- LNG
 - ❑ Same as above
 - ❑ LNG fueling technicians required

Factors: Verified Environmental Benefit

Technology used should *minimize* air quality impacts

- ❑ Nitrogen Oxides (NO_x)
 - contributes to ozone and non-attainment
 - TCEQ indicates NO_x reductions result in best attainment benefit
- ❑ Volatile Organic Compounds (VOC)
 - secondary contributor to ozone and non-attainment
- ❑ Particulate Matter (PM)
- ❑ Carbon Dioxide (CO₂)
 - greenhouse gas
- ❑ Carbon Monoxide (CO)

Factors: Verified Environmental Benefit

For 14 refuse trucks and a 6.5-year est. life:

- Diesel – meets new 2007 emission standards
 - *NOx 54.6 tons and PM 9.1 tons*
- CNG and LNG – 2007 engine emits more NOx than diesel; however, “late 2007” engine (June) expected to meet 2010 standards, with:
 - *NOx 8.46 tons and PM 0.42 tons*
- Value of reduced emissions:
 - CNG and LNG emit 46.14 fewer tons of NOx
 - TCEQ uses a \$5,000 “value” per ton of NOx reduced in TERP grant calculations
 - Estimated value of emission reduction: \$230,700
 - Incalculable public health benefits

Factors	Diesel Engine	CNG Engine	LNG Engine
Operability of Equipment	<ul style="list-style-type: none"> Current and past choice for SAN 	<ul style="list-style-type: none"> Obstacles prevent normal usage (alley use impacted by height / length) 	<ul style="list-style-type: none"> No issues identified
Cost of Equipment	<ul style="list-style-type: none"> \$2,437,134 \$2,302,734 with TERP grant 	<ul style="list-style-type: none"> \$3,230,738 \$3,096,338 w/TERP grant \$3,114,629 w/EPAC credit 	<ul style="list-style-type: none"> \$2,695,154 \$2,550,754 w/TERP grant \$2,579,045 w/EPAC credit
Fueling – access and cost	<ul style="list-style-type: none"> City owns infrastructure. \$1,430,520 	<ul style="list-style-type: none"> 2 City/private CNG stations available. \$1,162,980 	<ul style="list-style-type: none"> Opt 1 – ILA with DART: \$1,283,520 Opt 2 – Vendor tank: \$1,989,020 Need long-term fueling option
Availability of Technology	<ul style="list-style-type: none"> Engines meeting 2007 emission standard available now. 	<ul style="list-style-type: none"> Bid 2007 engine emits more than diesel “Late 2007” engine meets 2010 stds; expected in June. Other cities moving away from CNG for refuse trucks. 	<ul style="list-style-type: none"> Bid 2007 engine emits more than diesel “Late 2007” engine meets 2010 stds; expected in June. Some move to LNG from CNG in refuse trucks.
Maintenance and Useful Life	<ul style="list-style-type: none"> No difference anticipated. 7-year life 	<ul style="list-style-type: none"> Similar maintenance costs Training required for mechanics. 6.5-year life (est.) 	<ul style="list-style-type: none"> Similar maintenance costs Training required for mechanics. Specialized fueling technicians. 6.5-year life (est.)
Verified Environmental Benefits (Air Quality)	<ul style="list-style-type: none"> NOx – 54.6 tons PM 9.1 tons 	<ul style="list-style-type: none"> Assume “later 2007” engine in June. NOx – 8.46 tons PM – 0.42 tons Value = (\$230,700) 	<ul style="list-style-type: none"> Assume “later 2007” engine in June. NOx – 8.46 tons PM – 0.42 tons Value = (\$230,700)
Financial Summary	<ul style="list-style-type: none"> \$3,867,654 	<ul style="list-style-type: none"> \$4,393,718 	<ul style="list-style-type: none"> Opt 1 - \$3,747,974 Opt 2 - \$4,453,474

Recommendations

- Support Council agenda item on March 28th to purchase 14 LNG refuse haulers
- Draft an interlocal agreement with DART to fuel equipment at DART's Northwest Center (Bachman) location; review at future meeting
- Evaluate feasibility of building a City-owned or City/Private infrastructure in order to accommodate expanded LNG fleet in future years

Future Steps

- Continue developing long-term strategy for Vehicle Purchases and Fueling Options
 - Emerging technologies may support expanding the LNG refuse fleet after 2007 - or may direct purchases elsewhere
 - Explore and evaluate developing technologies
 - hybrid prototypes
 - H-fuels
 - Others
 - Evaluate future need for City LNG fueling sites

Appendix – Review Participants

- Business Development & Procurement
- Efficiency Team
- Equipment and Building Services
- Office of Environmental Quality
- Sanitation Services