

Fairfax County School Bus Diesel Retrofit Project



Fairfax County

Department of Vehicle Services

May 25, 2005

Background



- **Air quality non-attainment**
- **Prior interest in alternative fuels**
- **Grant programs for emissions improvements**

Project Goals



- **Reduce school bus contribution to air pollution**
- **First phase of complete diesel fleet retrofit**
- **Concurrent initiatives**
- **2-year project for school buses**
- **5-year window for entire diesel fleet**

Concept



- Replacement of mufflers with diesel oxidation catalysts
- Reprogram of ECMs on T444E engines
- Limited number of early demonstrations

Candidate technologies



- **EPA Voluntary Diesel Retrofit Program “Verified Technologies”**
 - Diesel Oxidation Catalyst (DOC)
 - Diesel Particulate Filter (DPF)
 - Fuel treatments
 - Alternative fuels
- **Other technologies accepted by EPA**

Candidate technologies --



DOC

- + High reduction (50%) of HC (ozone precursor)
- + Easy to install
- + Fairly widely available
- + Lower cost
- + No periodic maintenance
- + Useable on any diesel engine
- + No special fuel
- Lower emissions reductions than others
- No NOx benefit

Candidate technologies --



DPF

- + High reduction of HC, CO, and PM
- + Easy to install
- + Widely available
- No NOx benefit
- Moderately high cost
- Requires periodic maintenance
- Electronically controlled engines only
- Requires ULSD

Candidate technologies -- Fuel treatments



- **PuriNOx**
- **B20 (Biodiesel)**
- **Cetane enhancers**
- **Fuel-borne catalyst**

Candidate technologies -- Alternative fuels



- **CNG**
- **Propane**
- **M100 (Methanol)**
- **B100 (Biodiesel)**

Project structure



Contracted retrofit (parts and labor) for all buses with 3 years or more remaining life

- **Reprogramming of predominant electronic engine ECM (T444E)**
- **DOC treatment of choice**
- **Documentation of processes**

Bid evaluation



- **Cost per bus**
- **Reductions beyond benchmarks (Task B only)**
- **Compliance with specification**
 - EPA-accepted
 - No special fuel or additive
 - No additional maintenance
 - Meets minimum emissions reductions

Procedures



- **Two “tasks,” multiple awards possible**
- **Offered County work space, or vendor could use own**
- **Both winners chose to work outside where buses were parked**
- **Most retrofits conducted while bus was in for PM**

Other provisions



- **Provided list of bus configurations**
- **Evidence of ability to complete work**
- **Additional work procedures**
- **Minimum number of buses**
- **Must bid on all buses in Task**
- **Vendor removes scrap**
- **County QC audits**
- **Documentation of processes**
- **Minimum warranty of one year**

Timeline



- **Pre-bid conference Feb. 5, 2004**
- **Awarded April 2, 2004**
- **Work began July 2004**
- **2-year completion goal**
- **Last buses completed Feb. 1, 2005**

Cost-Benefit



- **436 buses retrofitted with ECM+DOC**
 - 25% NO_x reduction
 - 175 tons over remaining life of buses
 - Cost: \$1.3M (\$7,324/ton)
- **576 buses retrofitted with DOC only**
 - 50% HC reduction
 - 30 tons over remaining life of buses
 - Cost: \$487K (\$16,000/ton)

Further information



- **Contract Administrator:**

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