



# Georgia Retrofit Program

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# Overview

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- Health risks of diesel engines
- What Are Retrofits?
- Georgia School Bus Retrofit Program
- Participating School Systems
- Funding





# Why Retrofit School Buses

- Diesel contains 41 chemicals identified by the State of California as toxic air contaminants
- Over 90% of particulates are less than 1 micrometer in size
  - Decreased lung function
  - Enters blood stream and exacerbate heart conditions
- Children are more susceptible to health effects of diesel exhaust
  - Lung development
  - Narrower airways
  - Faster metabolism
- Effects on children
  - Decreased lung function
  - Increased risk of bronchitis and asthma
- California South Coast Air Quality District estimates that 71% of cancer risk is associated with diesel emissions





# School Buses

- Over 98% of the school buses in the U.S. are diesel
- CARB study has found significantly higher concentrations of pollutants on school buses than general ambient conditions and roadside conditions
- Causes
  - Exhaust entering from bus's own engine
  - Closed windows doubled pollutant concentrations
  - Riding behind other diesel vehicles increased concentrations
  - Idling



# Other School Bus Studies

- California Air Resources Board
  - Characterizing The Range of Children’s Pollutant Exposure During School Bus Commutes
  - <http://www.arb.ca.gov/research/schoolbus/schoolbus.htm>
- Environment and Human Health
  - Children’s Exposure to Diesel Exhaust on School Buses
  - [www.ehhi.org](http://www.ehhi.org)
- Southern Alliance For Clean Energy
  - A Safer Ride To School: How to Clean Up School Buses and Protect Our Children’s Health
  - <http://www.cleanenergy.org/resources/reports/SACE%20Diesel%20Report%20FINAL.pdf>
- Union of Concerned Scientist
  - Rolling Smokestacks: Cleaning Up America’s Trucks and Buses
  - [www.ucsusa.org](http://www.ucsusa.org)

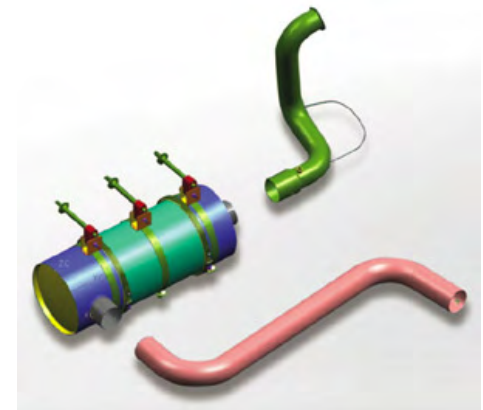


# What Are Retrofits?

## (1) Installation of emission control devices

- Diesel Oxidation Catalysts (DOCs)
- Partial Flow Through Filters (PFTFs)
- Diesel Particulate Filters (DPFs)
- Crank-case Filters (CCFs)
- Exhaust Gas Recirculation (EGR)
- Engine Recalibration (Reflash)

- Catalysts and Filters are primarily PM controls
- EGR and Reflash are Nitrogen Oxides controls





# What Are Retrofits?

## (2) Refuel – Use of cleaner fuels

- Early use of ULSD
- Biodiesel blends – reduce PM up to 15% with B20
- Natural Gas
- Propane

Special Note: Straight vegetable oil, yellow grease, and chicken fat are not considered cleaner fuels – they will eventually ruin your engine if not processed into biodiesel



# What Are Retrofits?

## (3) Rebuilds / Engine Upgrades

- Refers to rebuilding an older engine to meet newer emission standards
- Use of manufacturer recommended upgrades or kits
- Must be EPA or CARB certified or verified





# What Are Retrofits?

## (4) Engine Repowers

- Refers to the removal of an existing engine and replacing it with an engine meeting a cleaner emission standard
- Includes replacing an engine with one that is compatible with retrofit technologies (i.e. replacement of mechanically controlled engine with an electronically controlled one)
- Replacing diesel engine with alternative fuel engine (natural gas / propane)



# What Are Retrofits?

## (5) Replacement

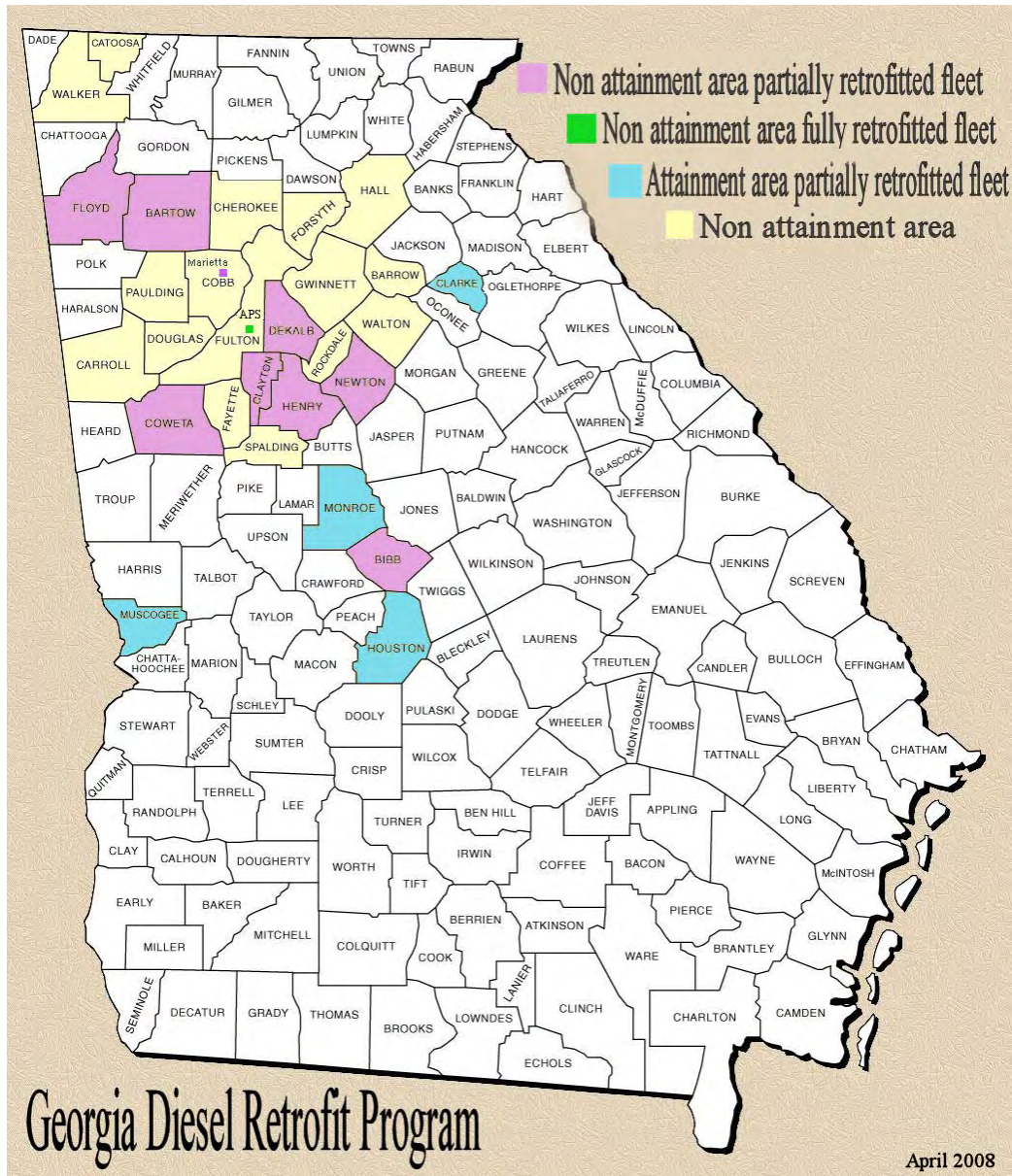
- Replace older existing heavy-duty diesel vehicle with new HDDV meeting a cleaner standard
- Replace HDDV with alternative fueled vehicle
- Replaced vehicle must be scrapped from fleet or engine sent to manufacturer to be rebuilt to cleaner standard
- Must be an early replacement of existing vehicle (e.g. new vehicle cannot be an addition to the fleet or a scheduled replacement)



# What is the Georgia School Bus Retrofit Program

- Voluntary Program
  - To equip school buses with emission control devices to reduce Particulate Matter (smoke)
    - Diesel Particulate Filters
    - Diesel Oxidation Catalysts
    - Partial Flow Through Filters
    - Crank Case Filters
  - To reduce idling through the implementation of unnecessary idling reduction polices
  - To use cleaner fuels such as ULSD and biodiesel
- In the near future, the retrofit program will include the use of advanced technology vehicles such as hybrid electric school buses





Retrofit School Systems

Atlanta Public Schools

Bartow County Schools

Bibb County Schools

City of Marietta Schools

Clarke County Schools

Clayton County Schools

Coweta County Schools

Dekalb County Schools

Floyd County Schools

Henry County Schools

Houston County Schools

Monroe County Schools

Muscogee County Schools

Newton County Schools

Biodiesel (when cost permits)

Bibb County Schools

Burke County Schools

Carrollton City Schools

Floyd County Schools

Gordon County Schools

Murray County Schools

Wilkerson County Schools



# Georgia School Bus Retrofit Program

- Has resulted in 942 retrofits with emission control devices to date
- Another 106 are planned already for 2008
- At least 7 schools have used blends of biodiesel ranging from 10% to 20%
  - 2 of the 7 are continuing to use it
  - 5 have stopped temporarily due to high costs
- All of the school systems that have retrofit programs also have unnecessary idling reduction policies



## Retrofit Vendors

Distributor	Contact Name	Phone #	E-mail	Address	City, Zip
Cummins South	John Gant	813-626-8888	John.e.gant@cummins.com	5912 East Hillsborough Ave	Tampa, FL 33610
Donaldson	John Garrertt	952-887-3898	john.garrett@donaldson.com	1632 Lost Creek Dr	Columbia, SC 29212
Engine Control Systems	Dana Brewster	440-840-2511	dabr@enginecontrolsystems.com	9463 Ravenna Road	Chardon, Ohio 44024
International (bus)	Bill Hewitt	404-212-1885	bill@nalleybusgroup.com	2560 Moreland Ave	Atlanta, GA 30315
International (Truck)	Dennis Rosser	404-622-1921	drosser@nalleytrucks.com	2560 Moreland Ave	Atlanta, GA 30315
Yancey Bros	Harold Gray	770-941-2424	Harold_Gray@Yanceybros.com	259 Lee Industrial Blvd	Austell, GA 30168
Yancey Brothers	Marvin Tiersler	770-941-2424	Marvin_Tiersler@YanceyBros.com	259 Lee Industrial Blvd	Austell, GA 30168
Williams Detroit Diesel	William Bizjak	404-366-1070 ext 206	wbizjak@wwwwilliams.com	2849 Moreland Ave S.E.	Atlanta, GA 30315
Rhodia	Thomas Gennety	248-797-2829	Tom.gennety@rhodia.com	1909 McDonald	Royal Oak, MI 48073



# Lessons Learned

- Cleaner fuels (ULSD and Biodiesel)
  - Know the side effects of switching fuels and plan maintenance budgets accordingly
  - Check all additives for compatibility
- Emissions Control Devices
  - Datalog a broad sampling of fleet before deciding on type of equipment to use
  - Choose proper equipment for your application
  - Educate bus drivers on what idling can do to emissions control equipment
  - Do not put DPFs on special needs buses!



## What Makes A Successful Retrofit Program

- Research into emissions control equipment to determine what is a best fit for your school bus fleet
  - Information from GA EPD and your local emissions control equipment distributors
- Knowledge of what is needed to maintain the chosen emissions control equipment
  - Specific information on maintenance schedules and any filters or other parts should be obtained from your emissions control technologies distributor
- Datalogging of a broad sample of your fleet to make sure that the equipment requirements are met
- Keeping buses on the same or similar routes
- Educating drivers on what to changes to expect and how to monitor backpressure displays.
- Communication
  - If you don't know or are confused, ASK QUESTIONS. Call the equipment distributor



# Funding

- Past and Current Funding Sources
  - Supplemental Environmental Projects
    - Georgia Pacific ~ \$3.6 million
      - Resulted in 573 retrofits and expect to retrofit approx. 140 more buses
      - Implemented through EPD
    - Toyota Clean Buses For Kids
      - Directly applied for by school systems
      - Resulted in 236 school bus retrofits
  - Clean School Bus USA
    - Administered by U.S. EPA
    - Resulted in 70 retrofits



# Near Term Funding

- Diesel Emission Reduction Act (DERA)
  - Administered by the U.S. Environmental Protection Agency and Diesel Collaborative (e.g. Southeast Diesel Collaborative)
  - DERA State Grant
    - Each state will receive \$196,880
    - Georgia will receive another \$98,440 by matching the state apportionment dollar for dollar
    - Match is expected from the incremental cost of biodiesel purchased by project partners
    - \$251,000 will be used to retrofit 22 to 30 buses
  - DERA Competitive Grant
    - EPD is applying for an additional grant to retrofit buses outside of PM nonattainment counties
    - Announcement of Project Selection to occur by Sept. 15, 2008



# Current CMAQ Retrofit Projects

- Congestion Mitigation and Air Quality(CMAQ)
  - Administered through the Georgia Department of Transportation
  - Can only be used in non-attainment counties
  - School Bus Retrofit Project
    - \$2 Million in federal funds: 2005 & 2006 FY
    - Each project would require 20% match
      - Cash match
      - In-Kind
      - GRTA has provided \$40K in cash match
      - State will provide \$250K in matching funds
  - General Retrofit Project
    - \$3.35 million available from FY 2005 & 2006
    - Retrofit any public fleet
    - Requires 20% match



# 2007 PM<sub>2.5</sub> CMAQ Solicitation

- EPD submitted project for \$11.2 million in retrofits to be spread over FYs 2009 – 2012
  - No match is required for FY 2009 funds ~ \$5.4 million
  - 20% match will required for FYs 2010 – 2012
- Announcement of final project selection expected in June
- Project must then be approved by the DOT Board
  - July or August 2008



# Additional Information

- William Cook, GA EPD: 404-363-7031
  - E-mail: [william\\_cook@dnr.state.ga.us](mailto:william_cook@dnr.state.ga.us)
- Stacy Allman, GA EPD: 404-363-7033
  - E-mail: [stacy\\_allman@dnr.state.ga.us](mailto:stacy_allman@dnr.state.ga.us)
- Websites
  - [www.epa.gov/otaq](http://www.epa.gov/otaq)
  - [www.gaepd.org](http://www.gaepd.org)
  - [www.southeastdiesel.org](http://www.southeastdiesel.org)