



**15th Annual LMOP Conference
Hilton Baltimore Hotel
January 18, 2012**

***LFG to RNG & Utilization of
CNG Fuel in Solid Waste Vehicles***



DeKalb County Sanitation



- DeKalb County is in Metropolitan Atlanta
- 1937 Sanitation began Collection & Disposal of MSW
- 1977 Seminole Road Landfill was opened
- 785 Activity and 365 Acres Buffer and Soil Borrow
- Collects MSW 159,000 Residents & 8,000 Businesses
- Disposes 400,000 MSW Tons annually
- Density 1,850 lbs per cubic yard – Compost as Cover
- Site Disposal Capacity 2091



North

Seminole Road Landfill

DeKalb County Public Works Department
DeKalb County, Georgia

Scale: 1" = 200'

Date of Photography: June 7, 2011

Seminole Road Landfill



- 2000 began to Flare Landfill Gas
- Today the site generates 2400 scfm of LFG
- Non-Attainment rating of 25 Tons of NOx
- 2006 developed a Green Energy Facility producing 3.2 MW of electricity and sale to Georgia Power using 1,100 scfm of LFG (1,300 remaining – 2,000 add't'l in 2018)
- 2006 began Feasibility Study with Mack Truck and Waste Management Converting LFG to LNG as Fuel
- 2007 Cummins Engine developed CNG for Heavy Duty Vehicles
- 2008 Diesel Fuel exceeded \$ 4.00 per gallon
- Natural Gas Prices doubled in price per mmbtu

Sanitation Collection



- Sanitation operates 306 over the road vehicles
- 2008 Sanitation used 1.5 million gallons of Diesel to Collect and Transport MSW
- Waste Collection Vehicles were converting to CNG
- Conversion to CNG from Diesel is expensive and could not justify unless there is a way to keep Natural Gas Prices Stable – LFG to RNG
- Most High Btu Gas from LFG was using a minimum of 2,500 scfm to justify the development
- 2009 New Technologies became available to drastically reduced the LFG volumes needed to develop a High Btu project

High BTU Option Evolves



- 2006 High Btu Facilities were only being developed with large volumes of Landfill Gas (3,000 or higher)
- 2009 High Btu Facilities were being developed with medium volumes of Landfill Gas (1,500 to 2,000)
- 2009 Sanitation began to visit other CNG and High Btu technologies projects in California, Ohio and Pennsylvania using lower volumes of LFG
- Today High Btu Facilities are being developed with lower volumes of Landfill Gas (500 to 1,000)
- 2009 Sanitation applied for ARRA Funding under the Clean Cities Petroleum Reduction Stimulus Grant

DOE – Petroleum Reduction Grant

- DeKalb County / Metropolitan Atlanta Alternative Fuel & Advanced Technology Vehicle Project
 - Issuing Authority – Department of Energy
 - 110 Applications
 - 25 Awards (\$300mil)
 - Federal Grant Award \$ 14,983,167
 - Lead Applicant – DeKalb County \$ 7,080,000
 - Partners



DeKalb County Project



- Development of Landfill Gas (LFG) to Renewable Natural Gas (RNG) Facility (1,000 scfm = 1.7 mm dge)
- Development of a Compressed Natural Gas (CNG) Public Access Fueling Stations (4 in DeKalb County)
- Utilize existing transmission pipeline to store and designate to CNG or LNG Fueling Stations (Green Tag Attributes – RIN's)
- Initially Deploy 40 CNG Fuel Sanitation Vehicles
- 39 additional units scheduled for 2012
- Retrofit the service shop to be able to accommodate CNG vehicles
- Marketing and Education of General Public

Natural Gas and RNG Resources



Natural Gas

- Fossil Fuel Resources
 - 200+ Years of Domestic Reserves
 - World NG Reserves 3x that of Oil
 - 20% use is for Power Generation

Renewable Natural Gas

- Renewable Natural Gas Resources
 - Municipal Solid Waste Landfills
 - 525 potential sites (500+ scfm with 50% methane)
 - Agricultural Waste Centers
 - Dairy Farms – 500 heads
 - Wastewater Treatment Facilities
 - WWT – 5 MMGPD flow
- Seminole Road Landfill
 - 80 Years Disposal Site Life
 - 100+ Years RNG - Methane Resources

DeKalb County Renewable Fuels Facility

- Owned by DeKalb County, GA
- Designed, Engineered, Built and to be Operated by Energy Systems Group
- Facility Operational April 2012
- Building Designed to be LEED (Leadership in Energy and Environmental Design) Certified
- Initial Input of Landfill Gas = 1300 SCFM
- Plant Expandable to Input = 2600 SCFM
- Compressed Natural Gas (CNG) Annual Production = 2,334,755 Diesel Gallon Equivalents (DGE)
- Landfill Gas (400 – 600 BTU/SCF) Processed to Renewable Natural Gas (\geq 950 BTU/SCF)

- Direct Site Emissions Reduced Over the Lifetime of the Facility:
 - Carbon sequestered by 197,266,825 tree seedlings grown for 10 years
 - CO2 emissions from 320,558,600 propane cylinders used for home barbecues
 - CO2 emissions from 865,400,050 gallons of gasoline consumed

GASEOUS COMPOUNDS	PRE-PROCESS	POST-PROCESS
Methane	50 – 55%	> 98%
Carbon Dioxide	35 – 40%	< 2%
Total Inert + Oxygen	5.5 – 14%	< 2%



www.energysystemsgroup.com | ©Energy Systems Group, LLC

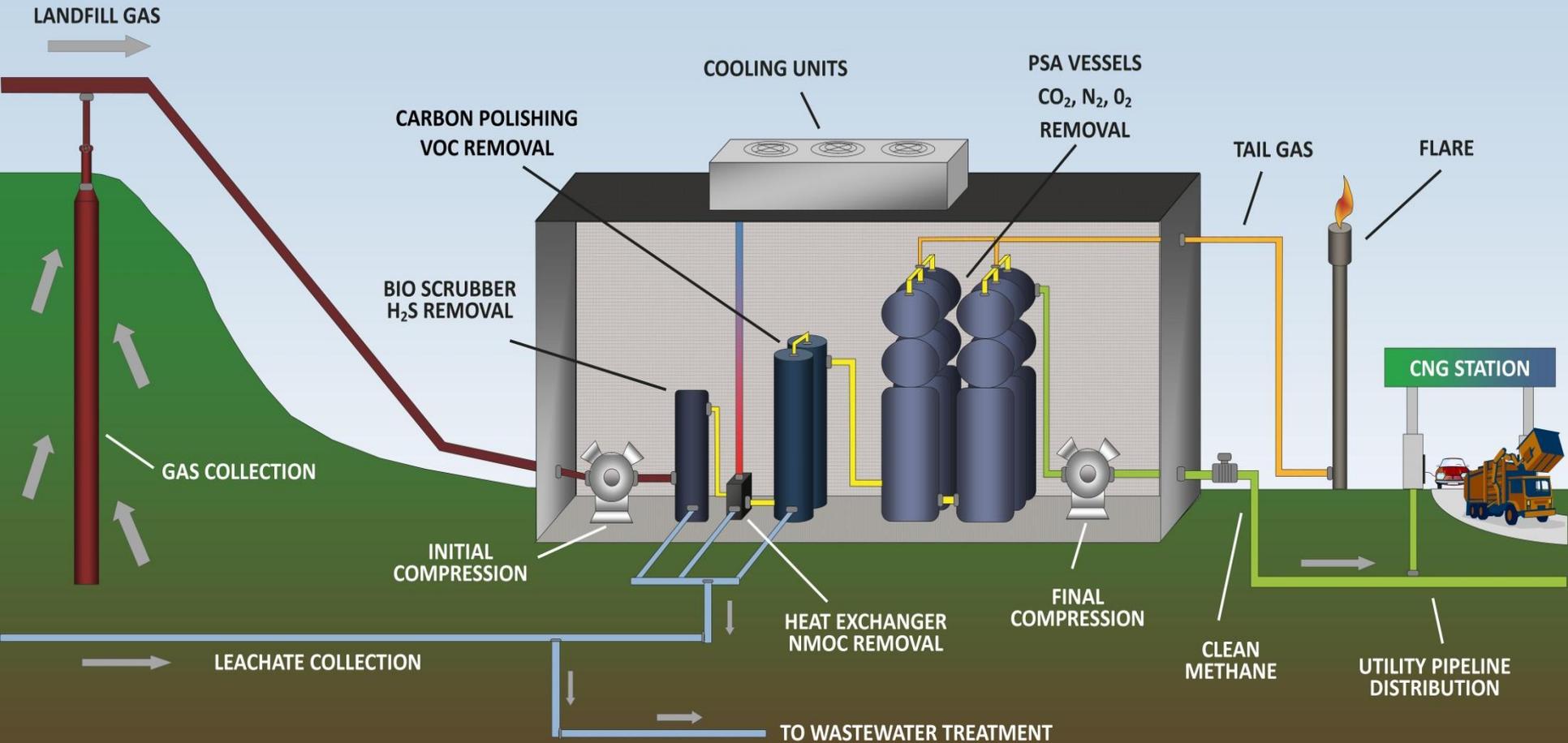
Project Oversight by:
Geosyntec
 consultants

Construction Progress



Landfill Gas to Renewable Natural Gas

HIGH BTU FACILITY



ESG ENERGY SYSTEMS GROUP

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Landfill Gas to RNG Transportation Fuel



**CO₂
Removal**



Utility Flare Seminole Landfill



CNG Fuel Station



Dryer



Compressor



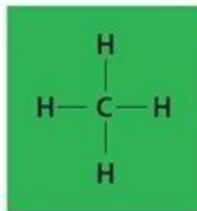
Storage Tanks



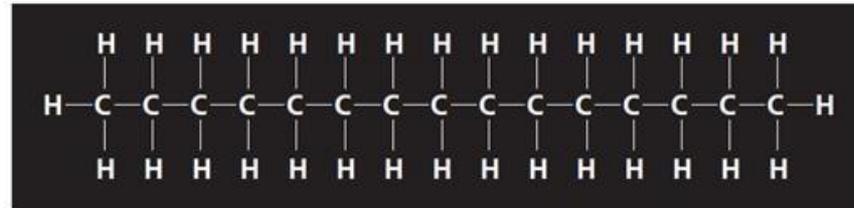
Cleaner & Quieter



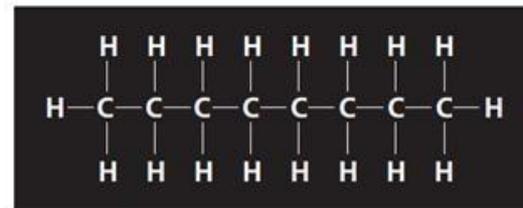
- With utilizing clean methane as vehicle fuel, the County realizes a major reduction in emissions
- CNG Vehicles are significantly quieter



Natural Gas
 CH_4



Diesel Fuel
 $\text{C}_{15}\text{H}_{32}$



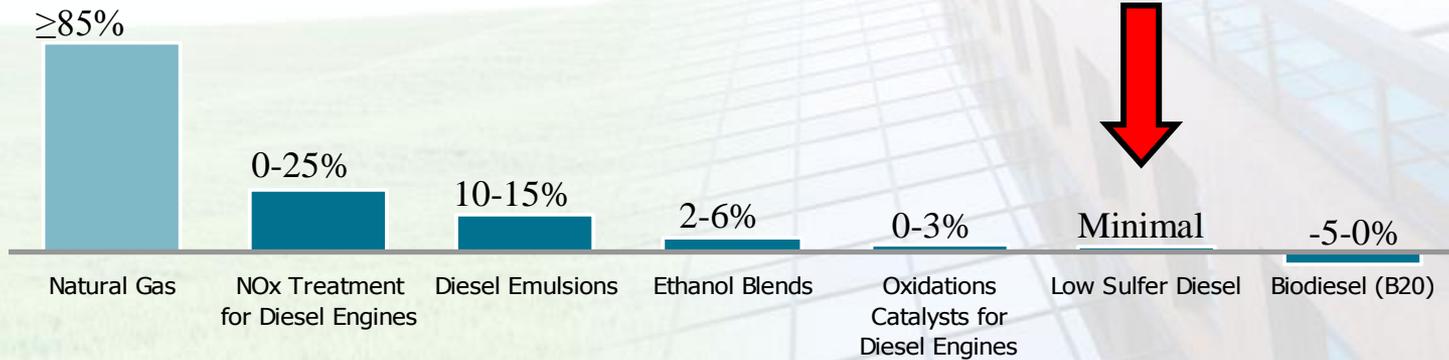
Gasoline
 C_8H_{18}

C_8H_{18}
gasoline

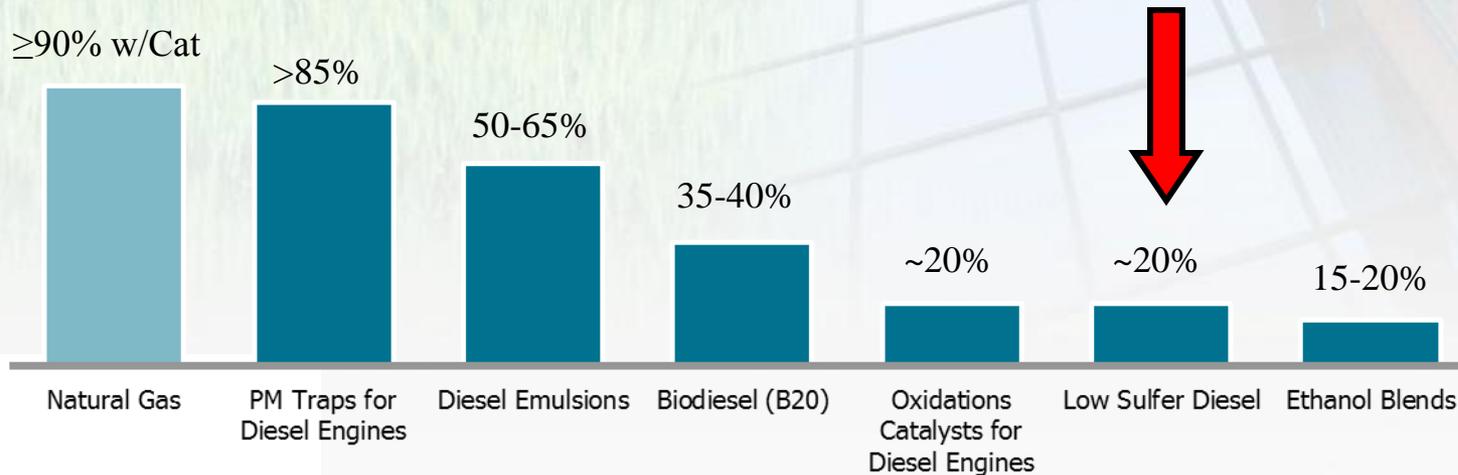
CNG Vehicles Produce Less Smog and Soot



NOx Reduction: Less Smog



PM Reduction: Less Soot



Summary and Conclusions



- Reduction in Overall Emissions from the Landfill
- Reduction in Vehicle Emissions
- Reduction in Noise from quieter CNG Vehicles
- Reduction in Vehicle Fuel Cost
- Predicable Vehicle Fuel Cost for the Long Term
- Increased Revenue from the Sale of Natural Gas
- Increased Revenue from the Sale of Green Tag Attributes
- Identifying Funding Opportunities to gain support from the BOC and the General Public in a Tight Economy
- Continued efforts to support the County's goal of being a Green and Sustainable County thru Innovation



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