

17<sup>th</sup> Annual LMOP Conference  
January 22, 2014  
Multiple Renewable Energy  
Production Practices at a  
Municipal Solid Waste Landfill

Billy Malone  
DeKalb County Sanitation  
Sanitation Director  
SWANA TDIBR-Landfills

# DeKalb County Sanitation



- ▶ **1937 - Sanitation began Collection & Disposal of MSW**
- ▶ **1977 - Seminole Landfill began disposal operations**
- ▶ **Collection - MSW 160,000 Residents & 8,500 Businesses**
- ▶ **Manage ~ 600,000 MSW, C&D, Yard, Recycling Items**
- ▶ **Density  $\geq$  1,850 lbs per cubic yard – Compost as Cover**
- ▶ **Site Life & Disposal Capacity 2110**

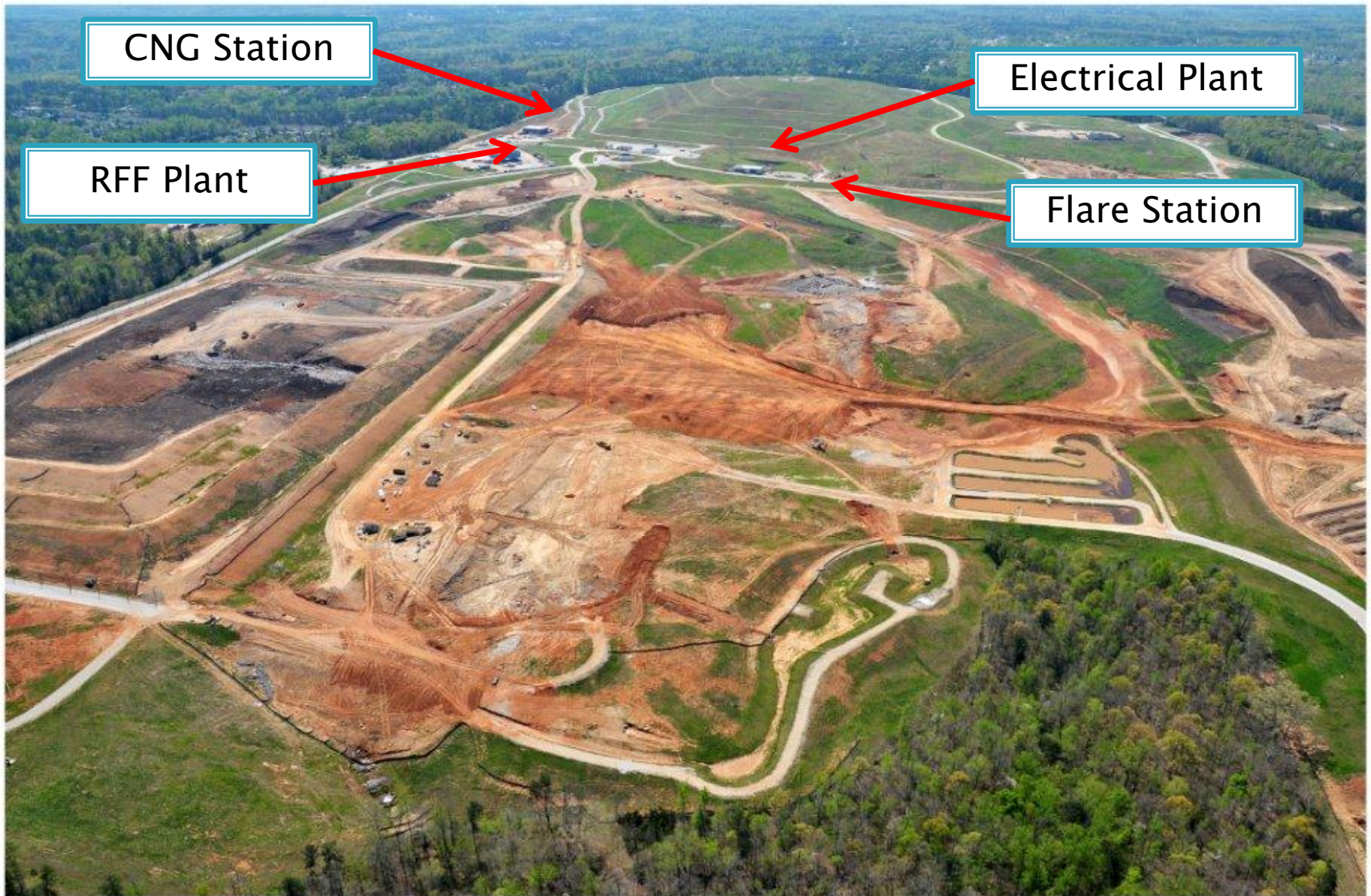
# Seminole Road MSW Landfill



- ▶ **2000 – Started Flaring Landfill Gas – Consent Order**
- ▶ **Today – Generates 2,200 scfm of raw LFG**
- ▶ **Future – Projection 4,200 scfm of raw LFG by 2022**
- ▶ **Site has a Non-Attainment rating of 25 Tons of NO<sub>x</sub>**
- ▶ **2006 - Green Energy Facility 3.2 MW of Electricity (First - Georgia Power G-Energy Program - 9 States)**
- ▶ **4.2 Years ROI - Return on Capital Investment (In- House)**
- ▶ **Electricity Generation uses 1,100 scfm of raw LFG**







CNG Station

Electrical Plant

RFF Plant

Flare Station



Seminole Road Landfill  
Phase 3, Unit 3  
DeKalb County, Georgia

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# CNG Development & Budget



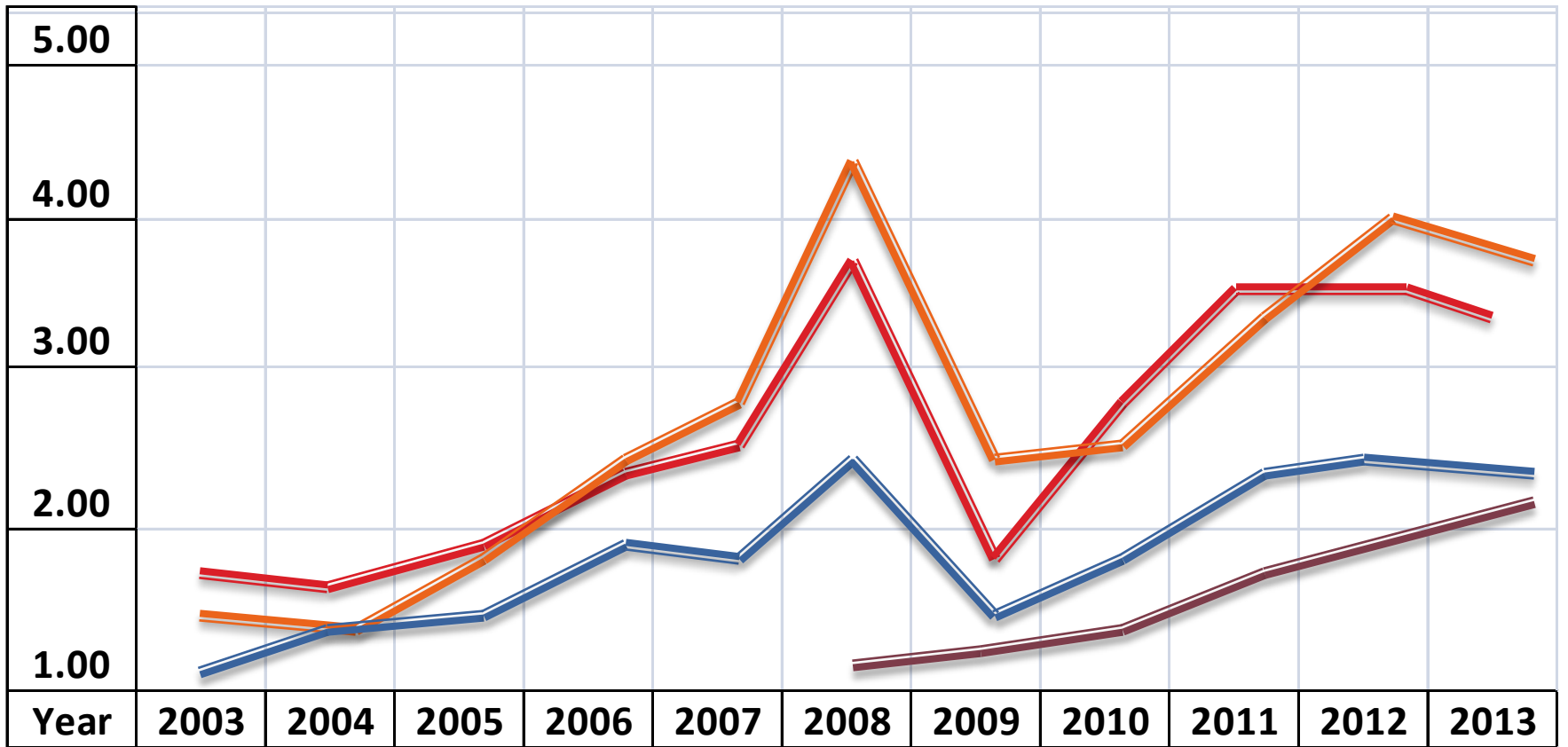
- ▶ **2006 - began Feasibility Study Mack Truck & WM**
- ▶ **Use MSW Landfill raw LFG to LNG as Vehicle Fuel**
- ▶ **2007 - Cummins Engine CNG for Heavy Duty Vehicles**
- ▶ **2008 - Diesel Fuel cost increased to \$ 4.22 per gallon**
- ▶ **2008 - Sanitation spent \$ 6,000,000 on Diesel Fuel**
- ▶ **2008 – Natural Gas cost increased \$ 0.40 per gallon**



# CNG Option Evolves

- ▶ **2008 - Sanitation operates 306 over the road vehicles**
- ▶ **2008 – Utilizes 1.5 million gallons of Diesel annually**
- ▶ **2008 - National Waste Companies began converting Solid Waste Collection Vehicles to operate on CNG**
- ▶ **\$ 30,000 to \$ 40,000 Cost to Convert to CNG**
- ▶ **To justify a project: Natural Gas prices must stay stable or you can produce Renewable Natural Gas from MSW Landfills**





Gas 1.61 1.48 1.97 2.23 2.30 3.91 1.86 2.64 3.69 3.65 3.34

Diesel 1.50 1.34 1.93 2.32 2.37 4.22 2.19 2.50 3.62 4.00 3.90

CNG 1.20 1.35 1.56 1.99 1.94 2.34 1.63 1.86 2.06 2.34 2.39

MSW LF 1.25 1.38 1.45 1.75 1.90 2.10

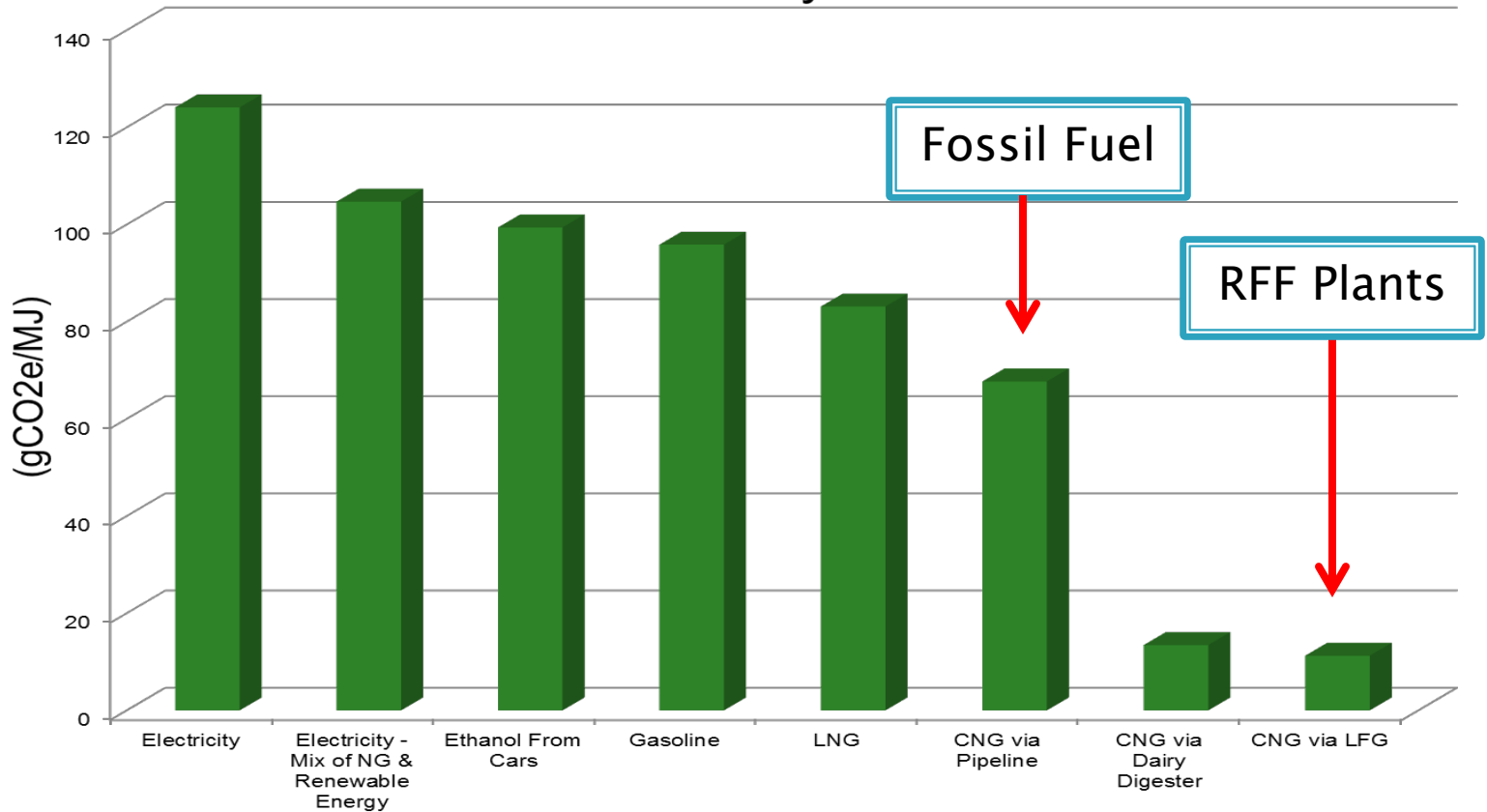


# LFG to RNG Evolves

- ▶ **2008 - High Btu - High Volumes (  $\geq$  3,000 scfm ) – EPA**
- ▶ **2009 - High Btu - Medium Volumes (1,500 - 2,000 scfm) - Trend**
- ▶ **2010 – High Btu – Lower Volumes ( 1,000 – 1,500 scfm) - Trend**
- ▶ **2013 – High Btu – Small Volumes ( 500 – 1,000 scfm) - Trend**
  
- ▶ **Based of 5 year or less ROI**
  - **less than 2 miles to a major natural gas pipeline (6” or greater)**
  - **$\geq$  45 % methane (active MSW landfills)**
  - **$\leq$  10 % nitrogen (difficult one to remove to meet gas pipeline specs)**
  
- ▶ **2012 – Transportation CNG Fuel on-site ( > 500 scfm )**
  - **Nitrogen and Oxygen still in the Fuel**

# Low-Carbon Fuel Standard Emissions Comparison for Various Fuel Sources

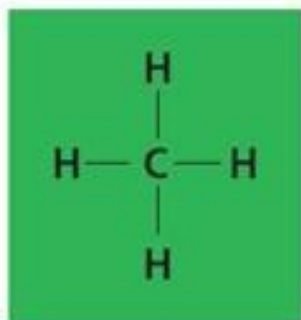
## Carbon Intensity Values



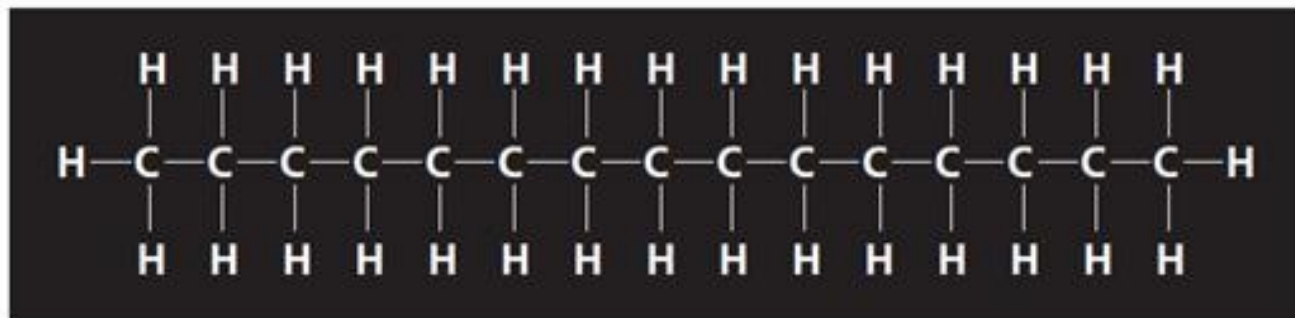
\* Values generated by California EPA Air Resources Board



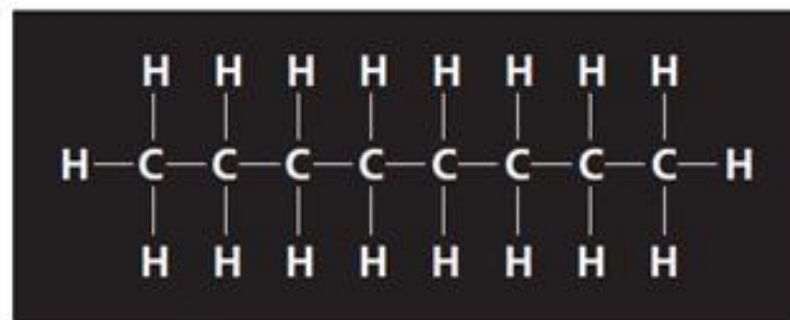
# Simple Hydrocarbon



Natural Gas  
 $\text{CH}_4$



Diesel Fuel



Gasoline



# Natural Gas Resources



## Natural Gas

### ▶ Fossil Fuel Resources

- ~ 200+ Years of Domestic Reserves
- United States has the largest known reserves of Fossil NG
- 20% use is for Power Generation
- **30% Cleaner GHG**

## Renewable Natural Gas

### ▶ Renewable Natural Gas Resources

- Municipal Solid Waste Landfills – 500 + scfm LFG
- Dairy Farms – 500 heads
- Wastewater Treatment Facilities – 5 MMG per day
- **90% Cleaner GHG Emissions**

# Regional Approach



## DeKalb County / Metro Atlanta Alternative Fuel & Advanced Technology Vehicle Project

- Issuing Authority DOE
- 110 Applications  
25 Awards (\$ 300 million)
- DeKalb Metro Atlanta Award  
\$ 14,983,167
- DeKalb Lead Applicant  
\$ 7,080,000



# DeKalb's Project – Hierarchy



## Design / Build RFP Facilities

- ▶ LFGTE Plant
- ▶ RFF Plant
- ▶ CNG Fuel Station
- ▶ Retrofit Shop
- ▶ 41 CNG Vehicles
- ▶ Tractor Trailers
- ▶ Front End Loaders
- ▶ Residential Rear Loaders
- ▶ Roll-Off
- ▶ Crew Cab Utility
- ▶ Passenger Vans
- ▶ Sedans

Geosyntec   
consultants

**GEORGIA POWER**  
A SOUTHERN COMPANY

**GAS SOUTH**

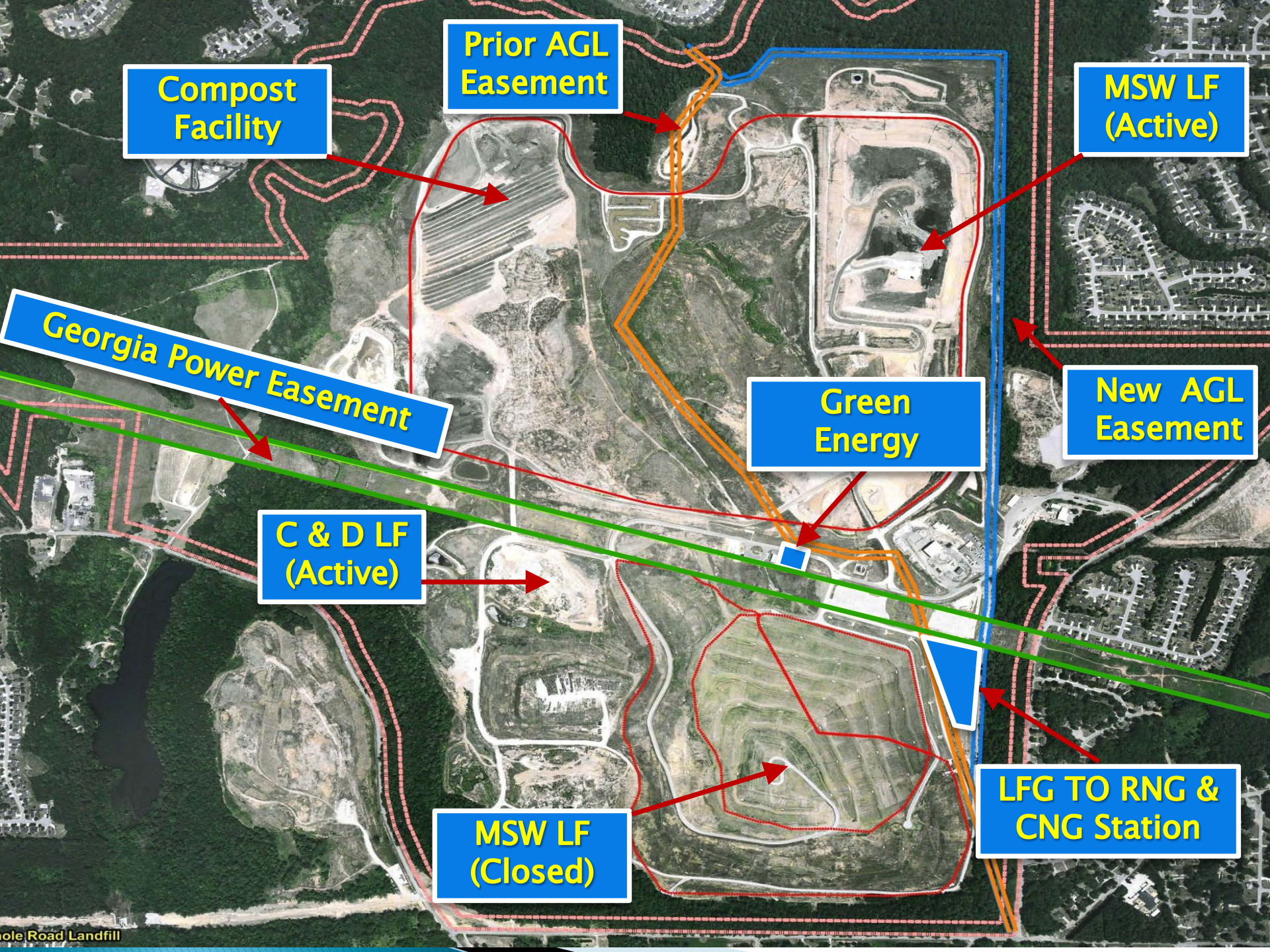
**ARC**  
TECHNOLOGIES

**ESG**  
ENERGY SYSTEMS GROUP

 Atlanta Gas Light®  
An AGL Resources Company

**WINTER** 

**SCS ENGINEERS**  
Environmental Consultants & Contractors



**Compost Facility**

**Prior AGL Easement**

**MSW LF (Active)**

**Georgia Power Easement**

**Green Energy**

**New AGL Easement**

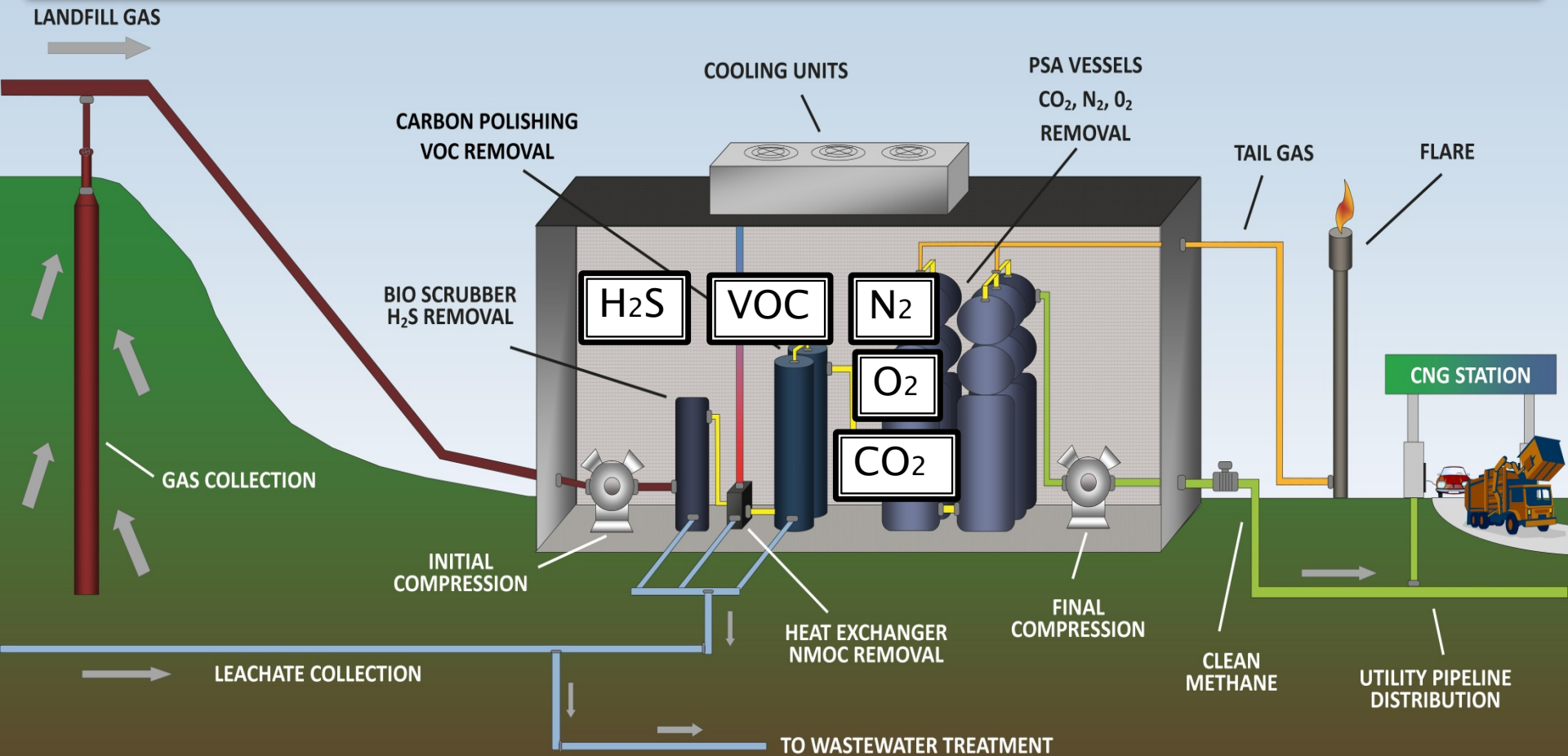
**C & D LF (Active)**

**MSW LF (Closed)**

**LFG TO RNG & CNG Station**



# Seminole Road Landfill



## Renewable Transportation Fuels Facility



Large glass entrance doors and windows.

Horizontal window with multiple panes.

Window with a small overhang above it.

**DeKalb County**  
Biosolids & Composting  
Public Works Department  
Wastewater Division  
Biosolids Plant Location  
10000 ...  
800-368-3636

Hand-painted blue markings in the parking lot, including the letters "CS" and white lines for parking spaces.

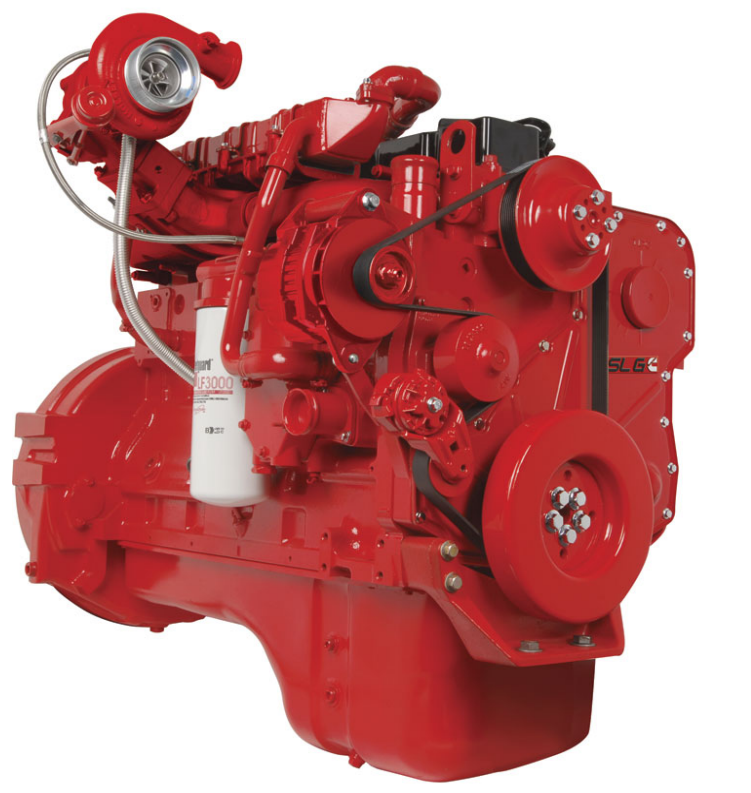




# DEKALB COUNTY

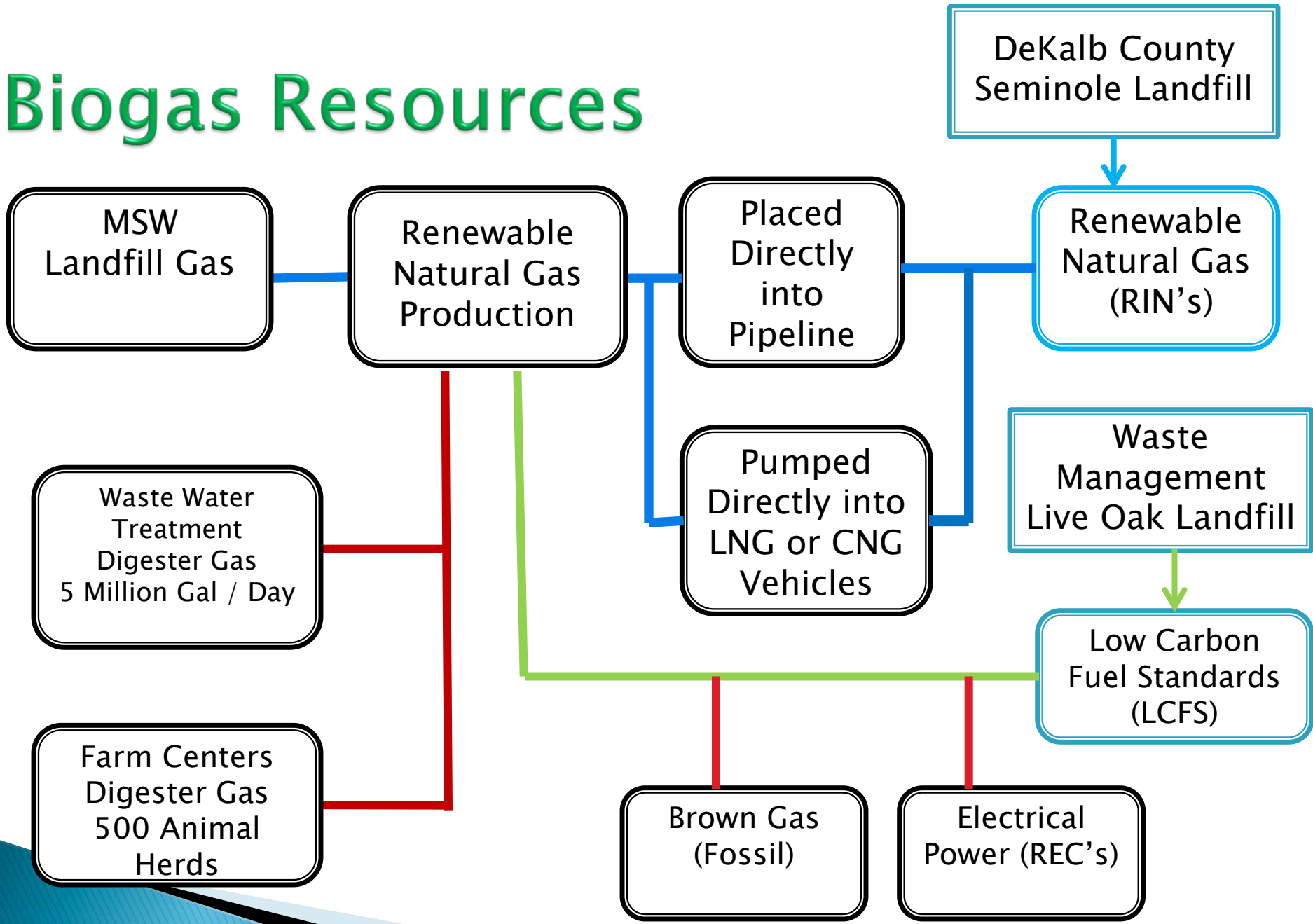


10.10.2012





# Biogas Resources



# Associated Cost



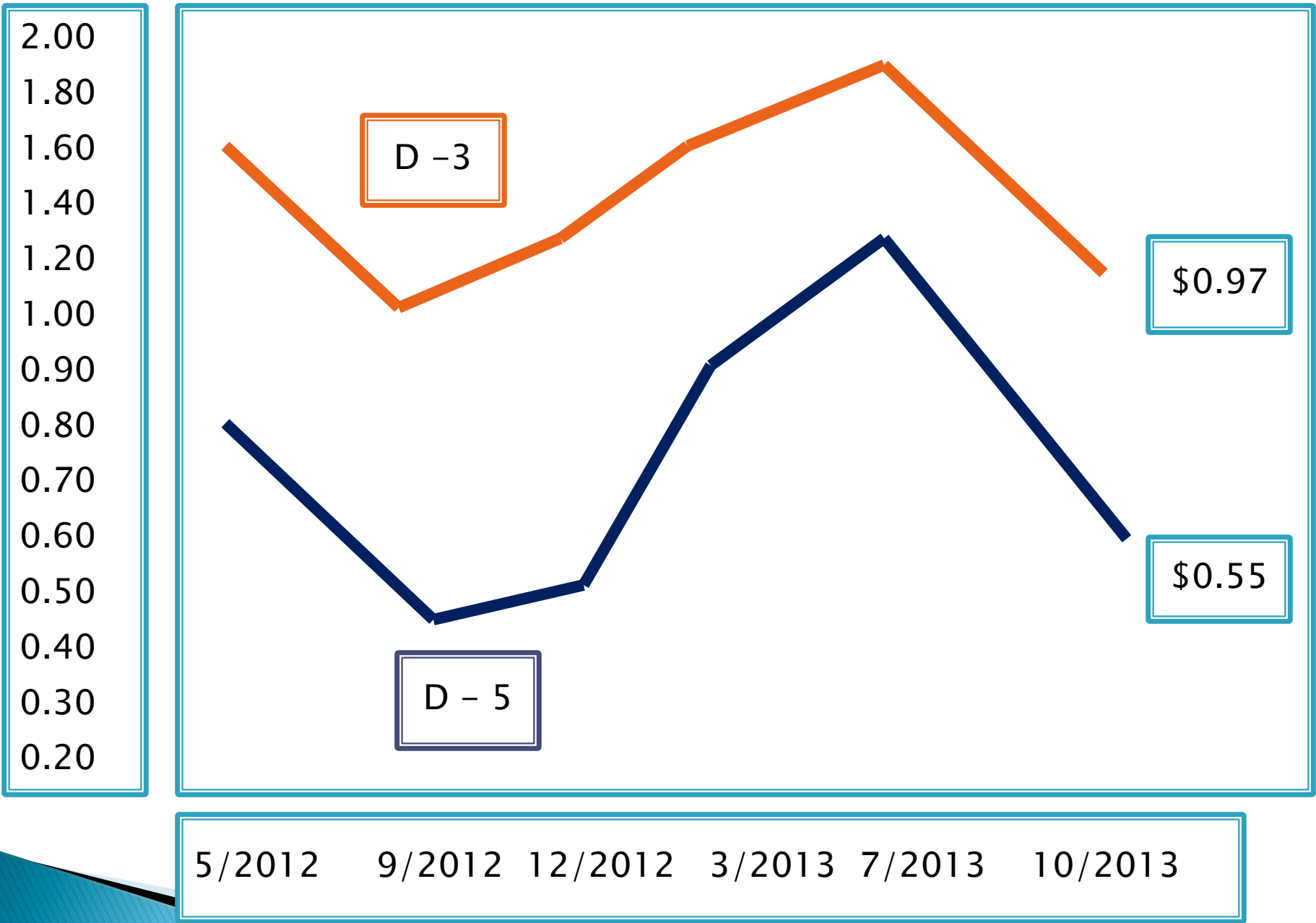
- ▶ **1,000 scfm produces 2.1 Million GGE Annually**
  - \$ 8 – 10 million depending on % Nitrogen
- ▶ **Fast Fuel CNG Station (\$ 0.50 / gallon IRS)**
  - \$ 1 – 2 million 4 hoses
- ▶ **Time Fill Fuel CNG Station (\$ 0.50 / gallon IRS)**
  - \$ 10,000 - 20,000 per hose connection
- ▶ **Transmission Pipeline (\$ 0.89 / gallon sale of RIN's)**
  - \$ 300,000 to 750,000 depending on volumes and pressure



# Federal Fuel Standard (RIN's)



- **The (RFS) was created under the Energy Policy Act (EPAAct) of 2005, and established the first renewable fuel volume mandate in the United States**
- **The original RFS program (RFS1) required 7.5 billion gallons of renewable fuel to be blended into gasoline by 2012**
- **Under the Energy Independence and Security Act (EISA) of 2007, the RFS program was expanded, requiring 36 billion gallons of fuel to be blended by 2022**
- **RFS2 allows biogas (Renewable Processes – MSW Landfills) that is used as Transportation Fuels are eligible credit for Green Tag Attributes or Renewable Identification Numbers (RIN's)**





# Ultra-Low NO<sub>x</sub> Flare

- ▶ Flare Industries CEB 1200, VOC destruction – 99.99 %
- ▶ Generates
  - 1) <15 ppmv of NO<sub>x</sub>
  - 2) <10 ppm CO at 3% oxygen
- ▶ Modular units combined / deleted to manage flows
- ▶ First to be permanently installed at a MSW Landfill in North America

Thermal Capacity MMBtu /Hr	LF Gas Flow SCFM /Hr	Electrical Consumption HP
41	639	41.6



# Global Impact



## ▶ SWANA – TDIBR – Landfills

- 525 active landfills flaring gas volumes of 500 to 1,000 scfm
- This equals 1 Billion diesel gallon equivalent (DGE) annually
- MSW Landfills can fuel all vehicles coming to their facility with just 1 / 3 of the landfill gas produced

## ▶ United States Dependence to Foreign Oil

- United States is 4.5% of World Population
- United States use 28% of Petroleum Reserves today
- 60% is used by the Trucking Industry
- United States has 150,000 vs. the World has 13 million CNG Vehicles

## ▶ EPA – Global Methane Initiative

- DeKalb Sanitation has hosted 16 delegations from foreign countries; Mexico, Serbia, Georgia, Haiti, China, Japan, Canada, South Africa, Ukraine, Venezuela, Colombia, Kenya, Germany, Poland, Zimbabwe, Italy and the territory of Puerto Rico
- DeKalb Sanitation is an EPA Instructor and Advisor (Indonesia)

# Contact Information

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SWANA – TDIBR Landfills

Board of Director Clean Cities –Georgia