

NATURAL GAS VEHICLE USER WEBINAR

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David Smith,
General Manager, Seneca Landfill



VALLEY
WASTE SERVICE, INC.

Lego-V
RENEWABLE ENERGY



Vogel Companies

Tri-County
INDUSTRIES, INC.
WASTE & RECYCLING REMOVAL SERVICES

Seneca
LANDFILL, INC.



**OHIO
VALLEY**
WASTE SERVICE, INC.

Vogel
DISPOSAL SERVICE, INC.



SHANK
WASTE SERVICE



Compressed Natural Gas (CNG) Vehicles Fueled by Renewable Natural Gas (RNG) from Seneca Landfill



95 Total CNG Trucks

- 53 Waste Collection Trucks
- 18 Tractor Trailer Transfer Trucks
- 5 Triaxle Dump Trucks
- 4 Service Vehicles
- 15 Support Vehicles



CNG Engines - Heavy Duty Collection Trucks

- 12 Liter | 762 CU IN | 6-Cylinder
- 400 hp & 1,450 lb-ft of torque
- Governed Speed: 2100 rpm
- Near Zero Emissions
- 90% fewer NOx emissions than current NA EPA Standard



CNG Fuel Tanks - Heavy Duty Collection Trucks

- Frame, Roof, & Tailgate Mounted
- Truck Type (FL, RL, RO, SL) dictates tank mount
- ~80 Diesel Gallon Equivalent (DGE)
- ~350 Gallon Tanks
- ~9,000 CF of Compressed Gas @ 3,600 psi
- Composite Tanks 55% lighter than steel (carbon fiber epoxy)
- Burst Protection – 2.25 times service pressure

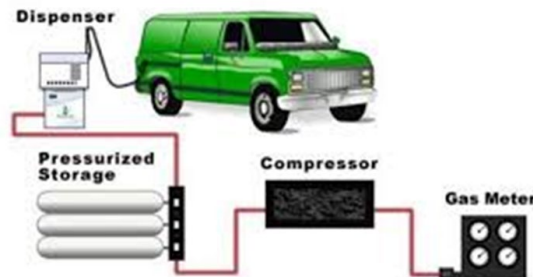


Refueling – Slow Fill (Time-Fill)

- Vogel Disposal Service, Tri-County Industries, & Valley Waste
- Gas from Utility Gas Line through Dryer/Compressor to Trucks
- Trucks are Refueled Overnight
- Filling is slower at 3 gallons per minute



Refueling – Fast Fill



- Fast Fill Stations are located at Seneca Landfill (Lego-V) & Tri-County Industries
- Lego-V uses Landfill Gas (50% Methane & 50% Carbon Dioxide) and processes it into Renewable Compressed Natural Gas (RNG) (98% Methane)
- Tri-County Industries uses gas from the utility gas line, as well as, mobile RNG vessels from Lego-V
- RNG from the Lego-V process is very dry gas unlike utility gas from pipeline
- Compressors at fast fill stations compress gas from approximately 125 psi to 4,000 psi
- Compressed Gas is then stored in on-site storage vessels then to the fueling dispensers
- Filling Time can range anywhere from 5 – 10 minutes

CNG Benefits vs Diesel

- Engines are Cleaner
- No Diesel Fuel Spills (Can't Spill CNG)
- Plenty of Power for Collection Vehicles
- Reduced Maintenance Costs
- Use our own CNG (RNG) & Filling Station from gas generated at the Seneca Landfill – A Renewable Natural Gas
- Better Emissions without a Regeneration System
- Benefits to maintenance with no Diesel Regeneration System:
 - Reduced Filter Maintenance
 - Eliminates - Diesel Exhaust Fluids (DEF) – Urea (Used to breakdown NOx)
 - Reduced Road Calls due to Regeneration
 - Reduced Route Down Time due to Forced/Parked Regeneration (Residential Routes)



Lessons Learned

- 9 Liter Engines are too small for waste hauling
- Alloy Pistons would start failing around 7500 miles
- Engines need Steel Pistons versus alloy Pistons
- Verify Moisture in Natural Gas - Moisture in Peoples Gas Line – Purchased 2nd Desiccant Dryer Unit at Vogel Disposal Service to handle moisture in pipeline
- On a mile per BTU comparison, diesel engines get slightly better gas mileage than CNG. However, the environmental benefits of CNG far outweigh this difference.



Future Plans – Expanding Renewable Energy

- Truck Replacement Plan – Diesel Engine Trucks being replaced with CNG Engine Trucks
- 2021 – Projecting another 20 CNG Trucks added to the fleet
- Expanding CNG Fleet to our Ohio Valley operation with 7 new CNG Collection Trucks
- Expanding Fast Fill Operations to Vogel Disposal Service and Valley Waste Service
- Expanding Virtual Pipe Line (using RNG from Lego-V using Mobile Trailers) to Vogel Disposal Service & Valley Waste Service.
- Exploring 3rd Party Options for supplying Renewable Compressed Natural Gas from Seneca Landfill



Questions?

David Smith

General Manager

Seneca Landfill

dsmith@senecalandfill.com