

# Using Natural Gas as a Transportation Fuel

Presented by

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# Overview

- ▶ Brief overview of IGS Energy CNG Services
- ▶ Compressed Natural Gas (CNG) Terms
- ▶ Reasons to use CNG for Transportation
- ▶ Current CNG Landscape
- ▶ Available CNG Vehicles
- ▶ CNG Station Options and Designs
- ▶ CNG Tax Credits
- ▶ Vehicle Payback Examples
- ▶ Questions?



# About IGS Energy

- ▶ Natural Gas and Electricity supplier headquartered in Dublin, Ohio
- ▶ 400 employees
- ▶ Operations in 13 states and over 30 utilities
- ▶ Approximately 1,000,000 gas and electric customers
- ▶ Founded in 1989
- ▶ Privately held with revenue over one billion per year
- ▶ Corporate headquarters recently awarded LEED Platinum status by the U.S. Green Building Council



# Natural Gas Vehicle Terminology

- ▶ **Gasoline Gallon Equivalent (GGE)**  $\approx$  115 cubic feet of natural gas (114,1180btu)
- ▶ **Diesel Gallon Equivalent (DGE)**  $\approx$  130 cubic feet of natural gas (129,500btu)
- ▶ **Dedicated:** Vehicle that runs on CNG only
- ▶ **Bi-Fuel:** Runs on CNG or Gasoline
- ▶ **Dual-Fuel:** Runs on CNG and Diesel
- ▶ A “Full Fill” in the USA is 3600psi
- ▶ GGE takes up 3–4 times more space



# CNG vs. Other Fuels

## NATIONWIDE AVERAGE PRICE (IN GGEs)

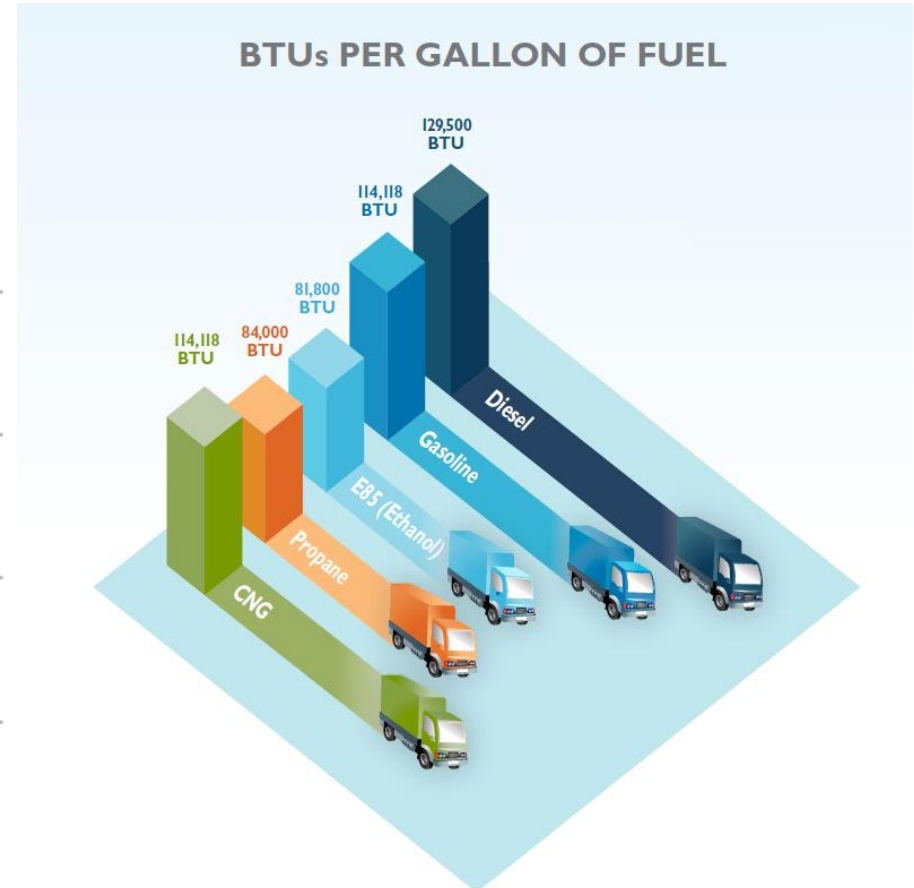
**Gasoline:** **\$3.29**

**E85 (Ethanol):** **\$4.48**

**Propane:** **\$3.70**

**CNG:** **\$2.10**

**Diesel:** **\$3.55**



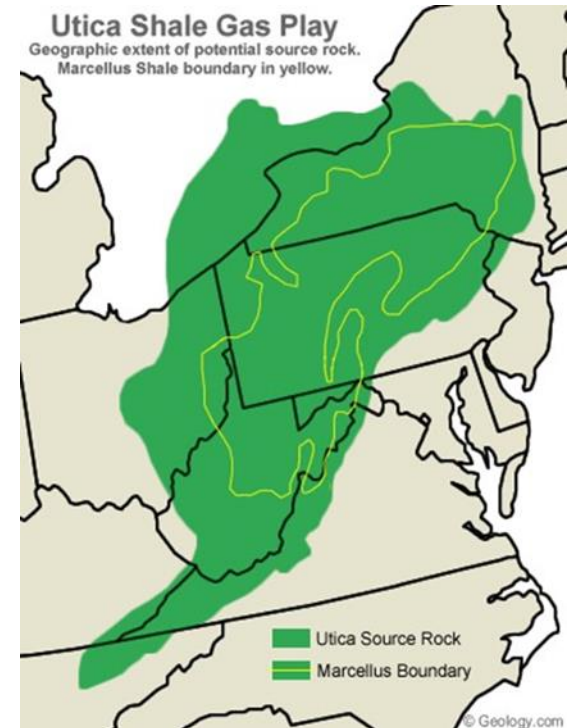
Source: U.S. Department of Energy – Clean  
Cities Alternative Fuel Price Report



# Why CNG?

**Advancement in production technology allows previously unobtainable gas to be extracted economically**

- ▶ **Abundant:** We now have an estimated 100 year supply of natural gas
- ▶ **Affordable:** Retail cost of \$2.00–\$2.50 per GGE
- ▶ **Clean:** Reduces CO<sub>2</sub> by 30%, NO<sub>x</sub> & partial matter by 90%
- ▶ **Domestic:** 98% of all natural gas used in the United States comes from North America

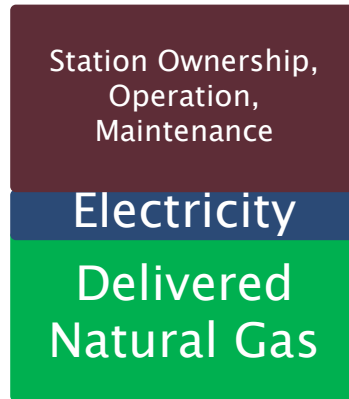


# What Makes up the Price of a GGE?

**\$4.00**  
**Gasoline**



**\$2.10**  
**CNG**



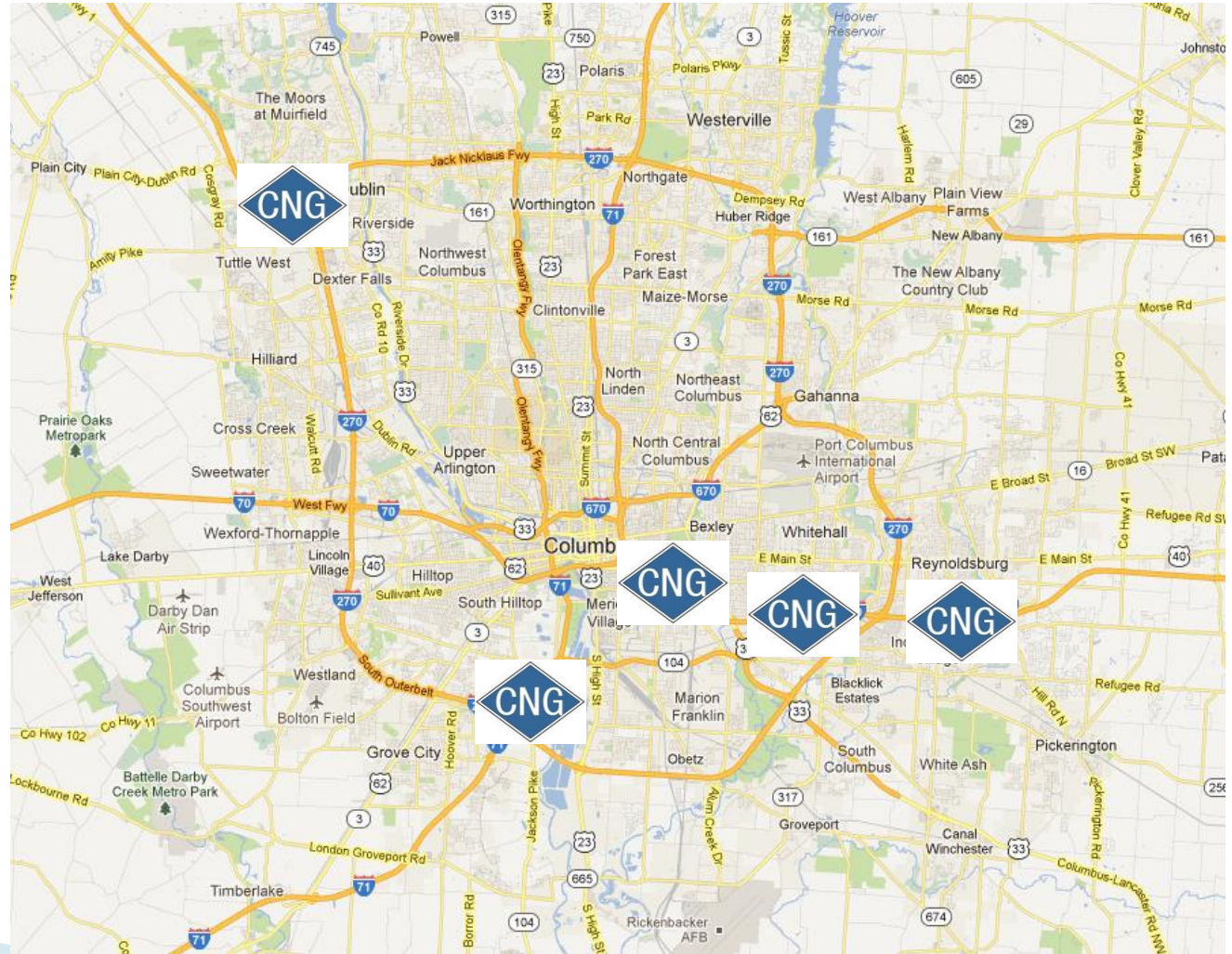
## Natural Gas Futures

<u>Date</u>	<u>Last</u>	<u>Change</u>	<u>High</u>	<u>Low</u>
Mar-13	3.427			
Apr-13	3.912	0.040	3.965	3.898
May-13	3.949	0.040	4.003	3.914
Jun-13	3.991	0.039	4.043	3.979
Jul-13	4.031	0.036	4.082	4.001
Aug-13	4.044	0.036	4.094	4.043
Sep-13	4.038	0.035	4.084	4.035
Oct-13	4.047	0.034	4.092	4.036
Nov-13	4.105	0.021	4.156	4.105
Dec-13	4.266	0.022	4.314	4.266

# CNG Stations in Columbus

## What has changed in one year?

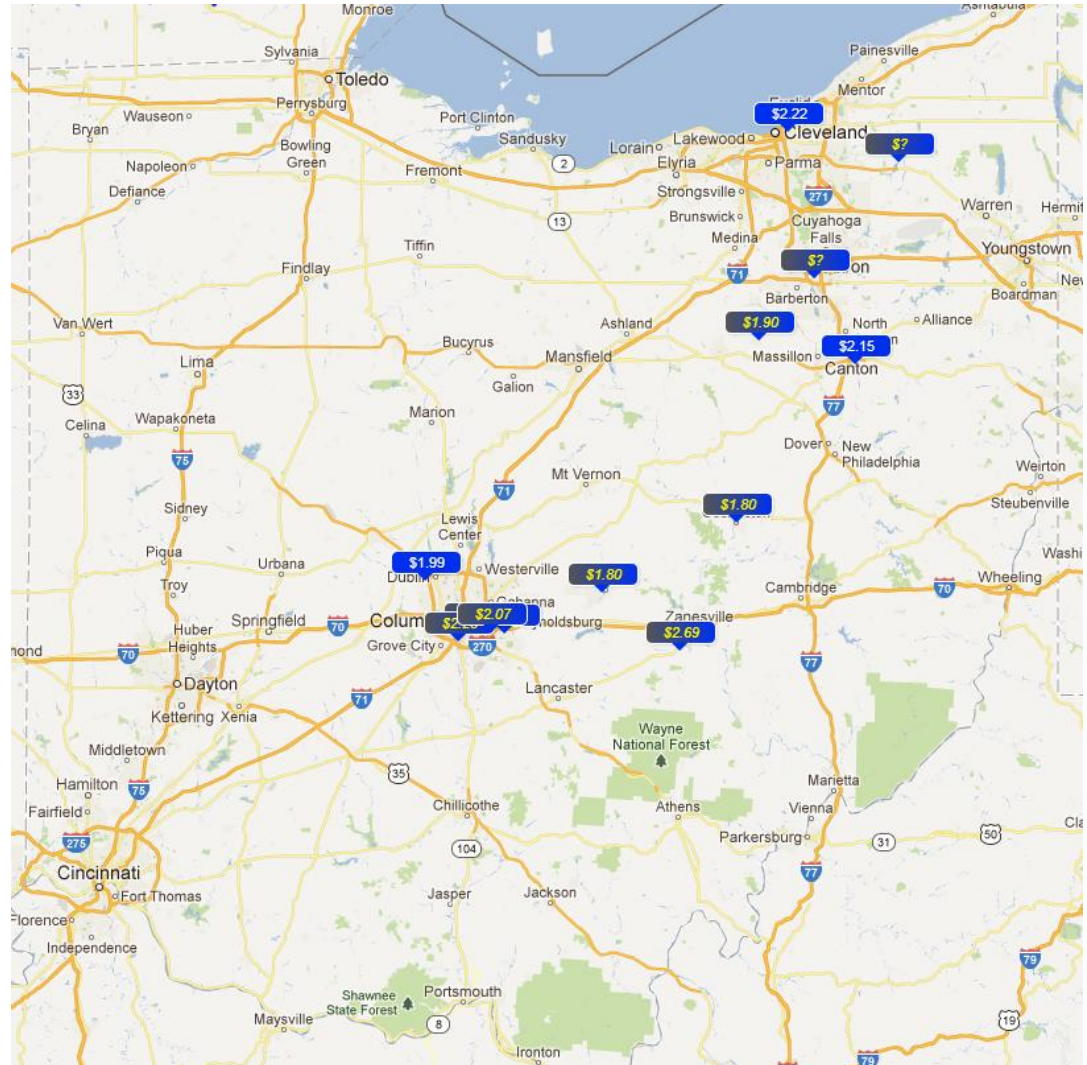
**Four NEW CNG Stations in Columbus just in the last 12 months!**





# CNG in Ohio

**11 Active CNG  
Refueling  
Stations in Ohio  
compared to  
just three one  
year ago**



# Market size: global CNG snapshot

Of the 15 million NGVs in the world only 123,000 are located in the United States

## People per NGV

South America: 88.8

Europe: 419.95

Asia-Pacific: 517.16

North America: 3,853.5

Africa: 6,496.6



Source: International Association for Natural Gas

# CNG Vehicles

- ▶ Similar MPG and horsepower
- ▶ Engines likely will last longer.
- ▶ Usually lower maintenance costs, depending on engine type.



## School & Transit Busses

Brands: Bluebird, Thomas, Gillig

Incremental Cost: \$40,000+



## Refuse Trucks

Brands: McNeilus, Autocar, others

Incremental Cost: \$32,000+



## Light Duty Vehicles

Brands: GM, Honda, Ford, Chrysler

Incremental Cost: \$10,000+

# Light Duty CNG Vehicles

## OEM CNG Vehicles

- Honda Civic
- Chevy Silverado 2500
- Chevy Express Van
- Dodge Ram 2500



## EPA Certified Kits for

- Chevy Impala, Malibu
- Ford Focus, Fusion
- Ford Transit Connect
- GMC Sierra
- Chevy Silverado
- Ford F-Series
- Ford E-Series
- Ford Expedition
- Chevy Tahoe, Avalanche
- Dodge Ram
- GM Savanna & Express



# Time-Fill CNG Equipment

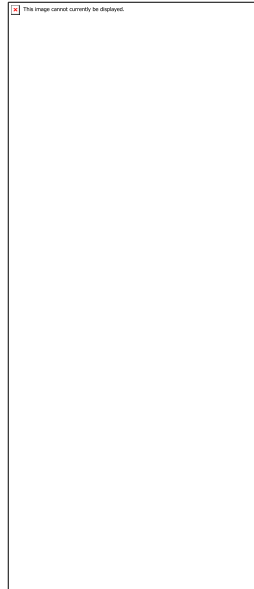
## Phill

0.4 gge per hour  
220v Single Phase  
Min inlet pressure: 7"wc  
(14" ideal)



## Small Q

1.0 gge per hour  
220v Single Phase  
Min inlet pressure: 7"wc  
(14" to 2psi ideal)



## Big Q

4.0 gge per hour  
220v Single Phase  
Min inlet pressure: 2 psi  
(3 to 5psi Ideal)



# Simple FuelMaker Economics

4 light duty CNG Vehicles

Usage: 10 gge per vehicle, refueled 5 days each week

$10\text{gge} \times 4\text{ vehicles} \times 5\text{ days/week} \times 52\text{ weeks/year} = 10,400\text{ GGEs}$

Current Gasoline price: \$3.75/gallon

Current cost of CNG for FuelMaker user: \$1.00/GGE

Savings per GGE:  $\$3.75 - \$1.00 = \$2.75$  Savings per GGE

**$\$2.75 \times 10,400\text{gge/year} = \$28,600$  savings per year!**



# Fast-Fill CNG Stations

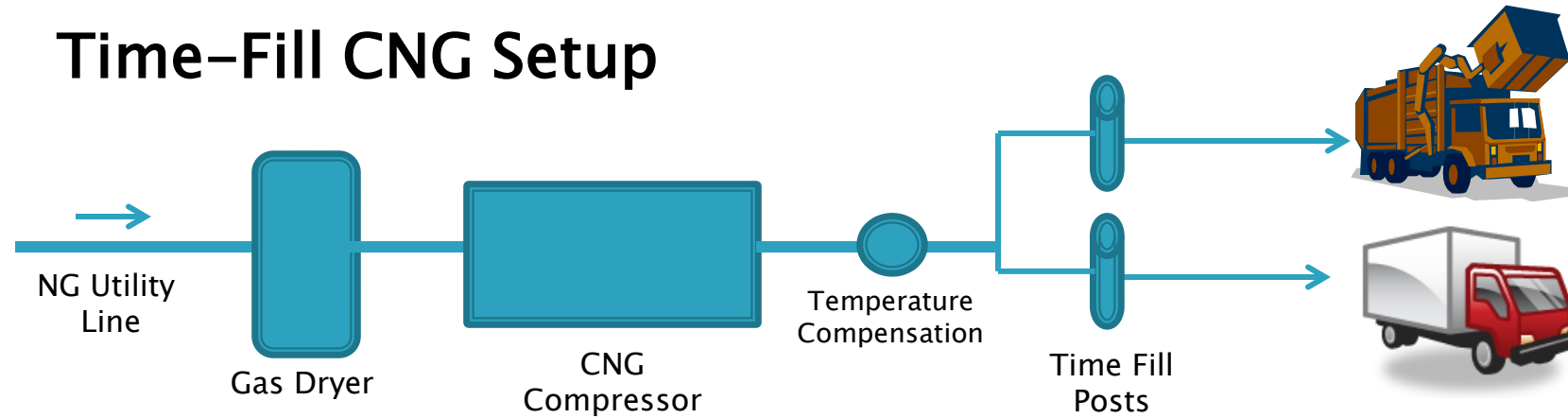
Same refueling experience as a traditional gasoline station



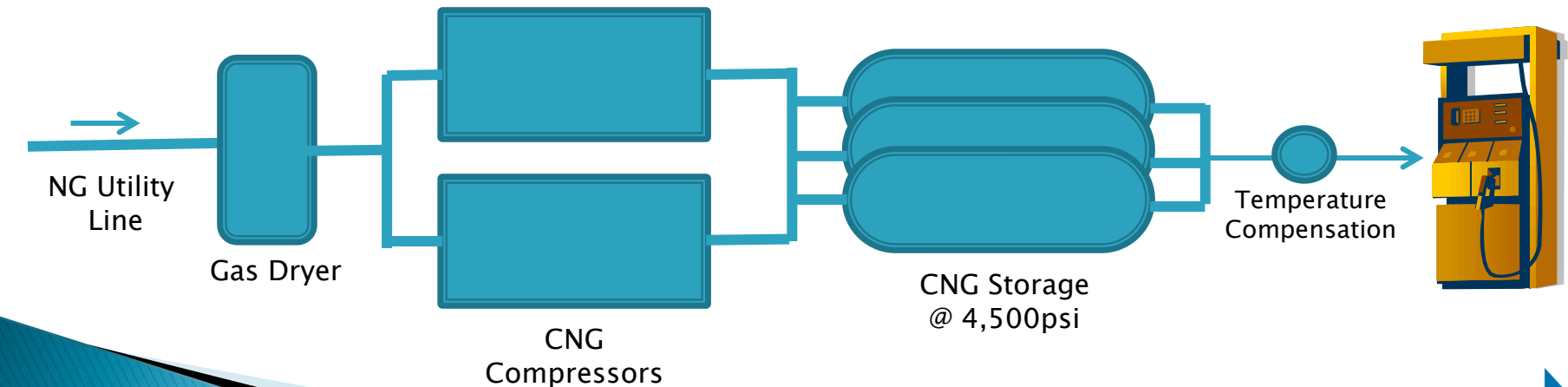
- Gas pre-compressed to 4,500 psi in storage tubes or spheres
- Inlet pressure can vary. We like to see at least MP lines normally operating at 40–60 psi or greater
- Equipment & compression cost go up with lower inlet pressures
- Temperature Compensated fill

# CNG Station Layout

## Time-Fill CNG Setup



## Fast-Fill CNG Setup





# Federal Tax Credits

- ▶ Current Federal Credits
  - 30% reimbursement of infrastructure up to \$30,000.
  - \$0.50 per GGE tax credit
  - No tax credits for vehicles at this time
  - Set to expire on Dec 31, 2013



# State Tax Credits

## ▶ Ohio

- Currently no tax credits exist in Ohio for CNG. A number of parties are working with state policymakers with the goal of developing monetary incentives to promote CNG

## ▶ West Virginia

- 50% reimbursement for incremental vehicle costs up to \$25,000
- 50% reimbursement for CNG infrastructure up to \$312,500
- Credit caps phase down over time, expiring in year 2022

# Savings & Payback for CNG

- ▶ Without tax credits... Gasoline/Diesel @ \$4.00 & CNG @ \$2.10
  - Refuse Truck: 2–3 year ROI. Net \$60,000+ savings over 7 years
  - Transit Bus: 2–3 year ROI. Net \$100,000+ savings over 12 years
  - Semi Truck: 2–3 year ROI. Net \$100,000+ savings over 10 years
  - Light duty (15k+ miles): 7–8 year ROI. Net \$4,000+ savings over 10 years
  - Light duty (30k+ miles): 3 year ROI. Net \$12,000+ savings over 6 years
  - School Bus: 8–12 year ROI. Slight savings over 12 years



# CNG Safety Video



Link: <http://www.youtube.com/watch?v=CcayDbdVXHE>



# Thank You!

## Questions?

### Contact Information

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