



An Exelon Company

# **PECO CNG PROGRAM**

## **Clean Cities Presentation**

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PECO Energy Co.**

# What is a CNG?

- ✓ NGV (Natural Gas Vehicle) is the overarching term for both CNG and LNG
  - CNG – Compressed Natural Gas powered vehicles
  - LNG (Liquefied Natural Gas) is also used in vehicles, but NOT directly marketed to customers by PECO
  
- ✓ CNG - Fuel compressed up to 3600 PSI to allow for storage on-vehicle
  - Allows for 60 times greater energy density
  - Tank(s) can be similar size to gasoline tank, and/or sized to provide similar vehicle range
  
- ✓ Vehicle operates the same way it is currently used
  - No power difference
  - Similar range can be obtained if tanks are sized correctly
  - Available in most models and vehicle sizes, from Honda Civic to 18-Wheelers

# Current Vehicles



\*Courtesy of NGVA

# CNG Implementation

## ✓ Station

- Built to compress pipeline gas (2-99 PSI) up to 3600 PSI

## ✓ Multiple CNG fueling options can be provided to customers depending on their needs:

- On-site customer station construction
- Private/Public station construction
- Public retail stations

## ✓ Fueling methods

- Fast fill: Similar to current liquid fuel process
- Slow fill: Vehicle fills when not operating over several hours

# CNG Implementation

## ✓ Vehicle modified to run on Natural Gas

- Can be purchased directly from fleet dealers

## ✓ Different CNG Vehicle Types

- Dedicated CNG: Runs on only CNG all of the time
- Bi-Fuel: Can run on CNG or Gasoline, can switch while vehicle is running full speed
- Dual Fuel: Runs on a mixture of Diesel and CNG at all times

## ✓ Maintenance Facilities Upgrades

- Methane Detectors
- Train staff on CNG maintenance and safety

# CNG Benefits

*Clean burning, Domestic fuel, at a reduced price*

## ✓ Cleaner Burning

- Greenhouse gases 22% less than diesel vehicles; 29% less than gasoline vehicles\*
- Greater than 90% reduction CO & particulates\*\*

## ✓ Domestic

- Greater than 90% of our natural gas is produced within the US, with much here in PA

## ✓ Reduced Price

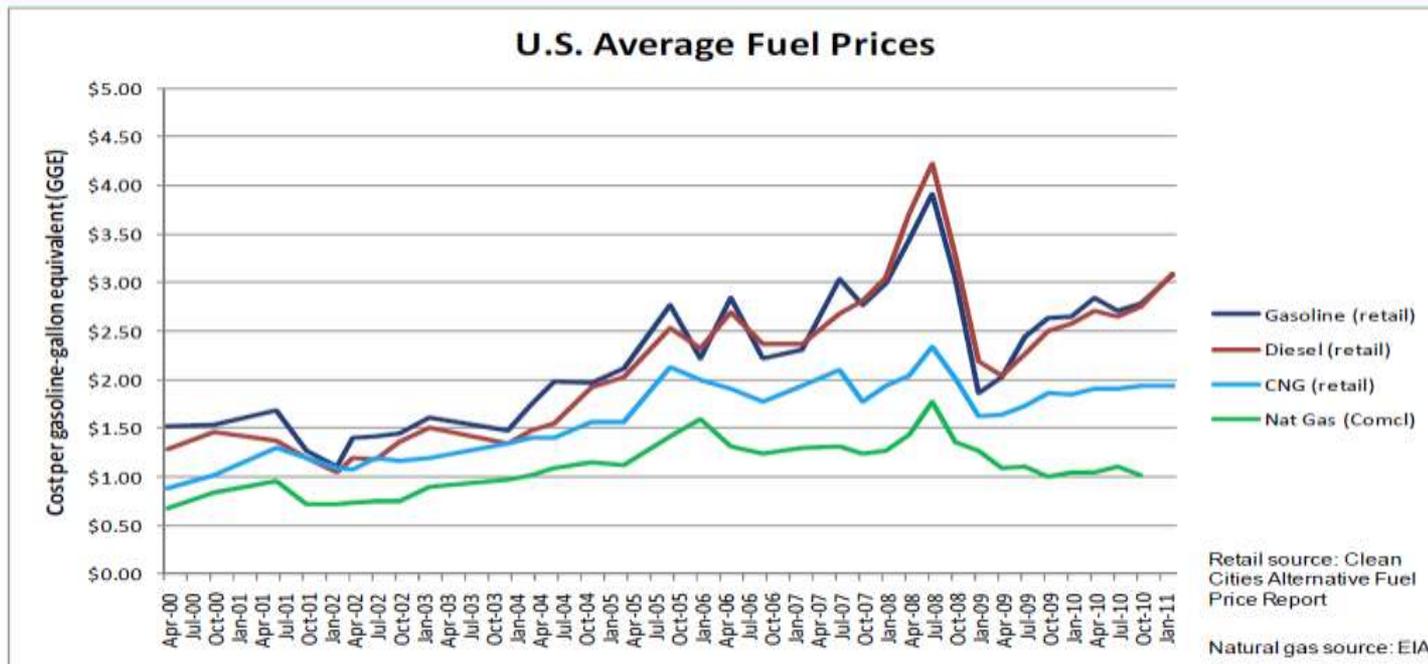
- Around a \$2.00 price differential (\$4.00 gasoline to \$2.00 CNG)

\*Wells-to-wheels numbers for developed for CARB reported via NGVA; common methane gas – bio-methane can be 90% or greater depending on source

\*\*NREL Light Duty Emissions Test

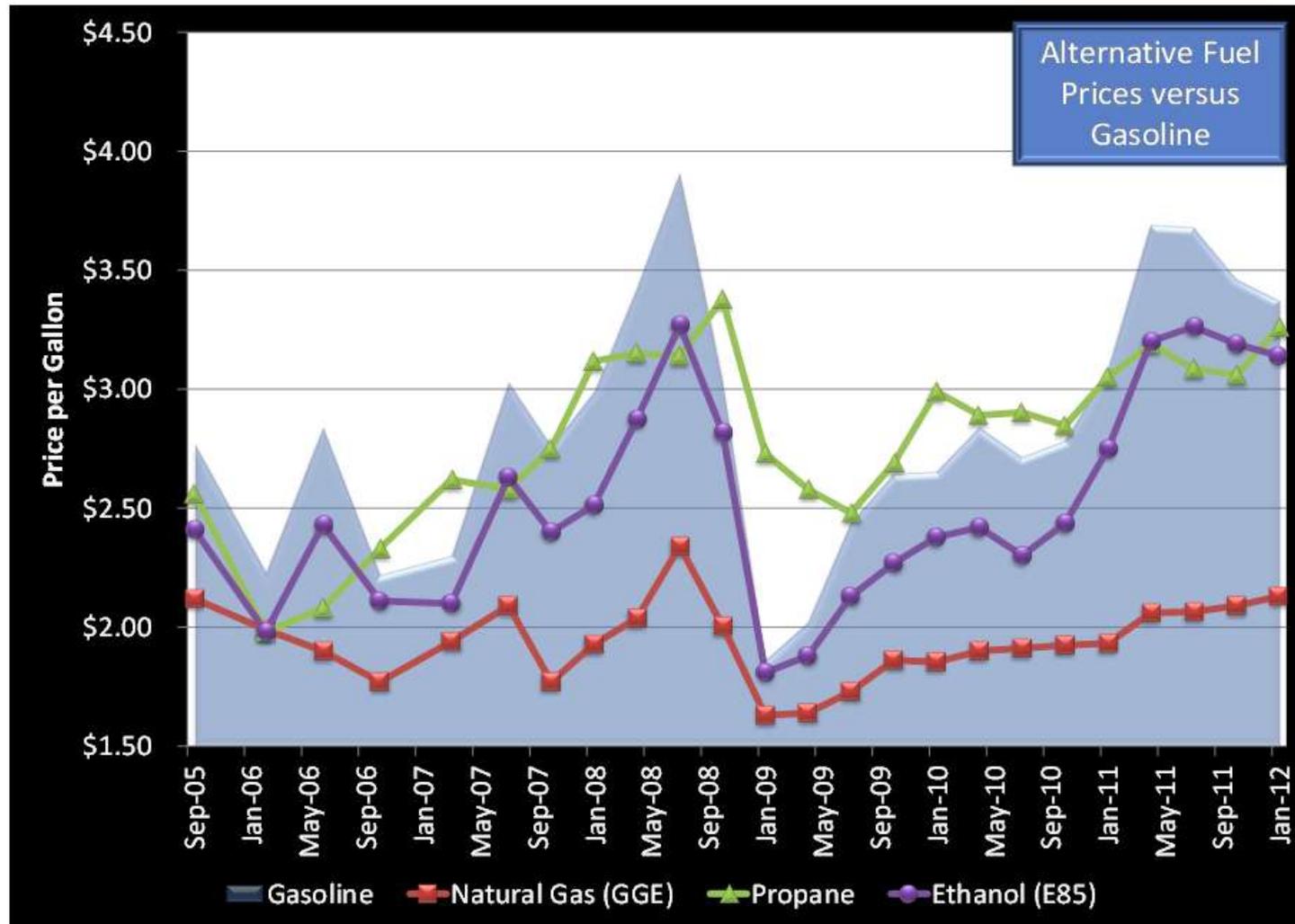
# CNG Fuel Comparison

## Primary Driver: Fuel Cost Savings & Predictability

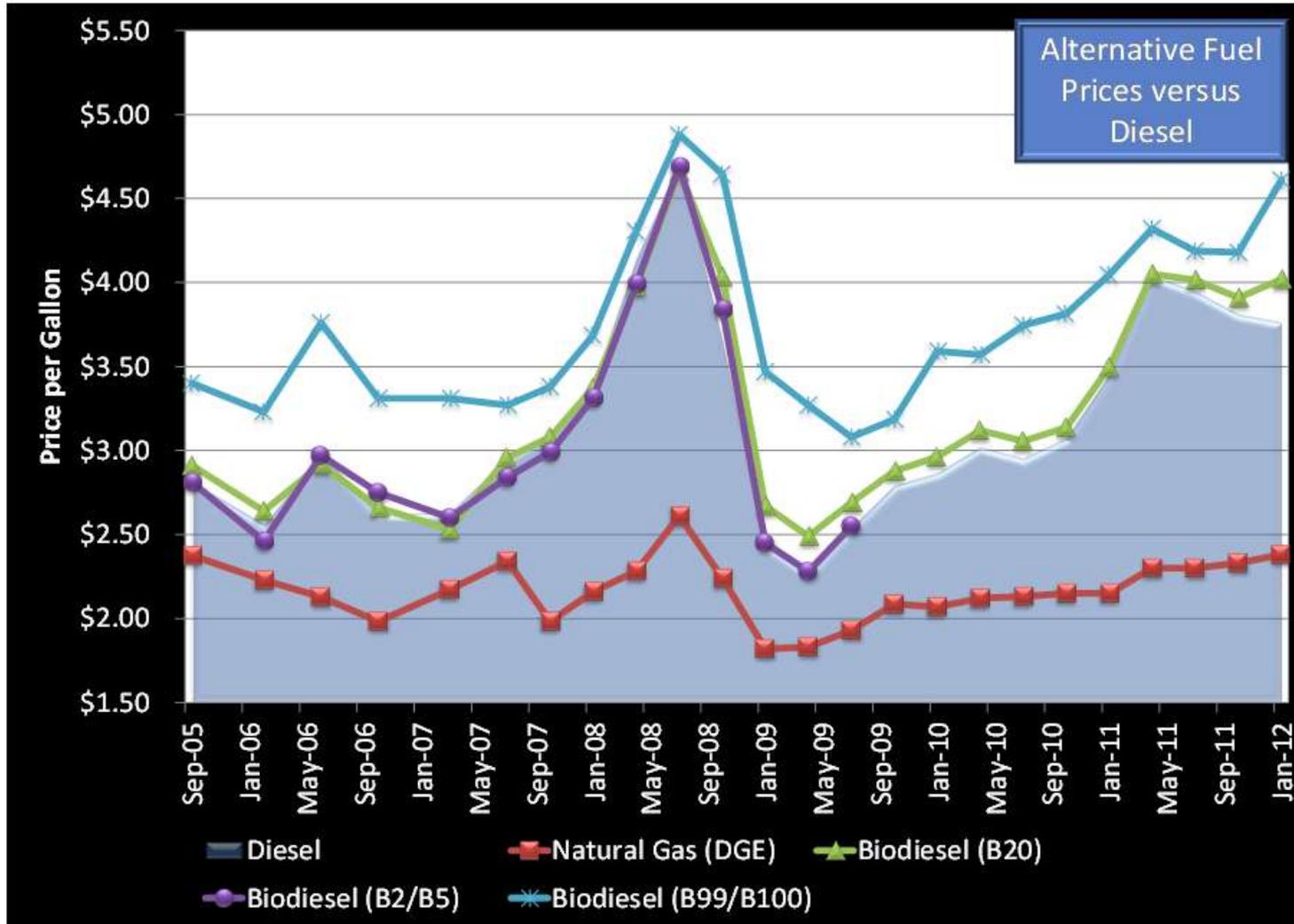


- Retail CNG is much less volatile than diesel and gasoline
  - Commercial natural gas is even less volatile

# CNG Fuel Comparison



# CNG Fuel Comparison



# CNG Fleet Characteristics

- ✓ Large Fleet operating from a Common Depot
- ✓ Regular Routes with short to medium length, centralized to a local area
- ✓ High fuel use associated with large or heavy vehicles
- ✓ High fuel use due to high mileage and/or long operating hours
- ✓ Available CNG vehicle models in the market
- ✓ Green initiatives in industry, and/or reduced noise requirements
- ✓ Proven industry successes with CNG nationally

# CNG Conversion Decision Process

## DRIVERS

Type of Vehicles	<ul style="list-style-type: none"> <li>- Availability</li> <li>- Size for tank</li> </ul>
Size of Fleet	<ul style="list-style-type: none"> <li>- Public Station</li> <li>- Dedicated Station</li> </ul>
Range	<ul style="list-style-type: none"> <li>- Short</li> <li>- Long</li> <li>- Sta. access</li> </ul>
Total Ownership Cost	<ul style="list-style-type: none"> <li>- Acquisition</li> <li>- Maintenance</li> <li>- Fuel cost</li> </ul>
Location	<ul style="list-style-type: none"> <li>- Depot</li> <li>- Main</li> <li>- Night/Fast</li> </ul>
Industry	<ul style="list-style-type: none"> <li>- Standards</li> <li>- Requirements</li> <li>- Green Goals</li> </ul>
Financing	<ul style="list-style-type: none"> <li>- Grants</li> <li>- Loans</li> <li>- Tax Incentive</li> </ul>

## DECISION POINT



## BENEFITS

<p><b>CNG FUEL</b></p> <ul style="list-style-type: none"> <li>- Lower fleet fuel costs</li> <li>- More predictable fleet fuel costs</li> <li>- Less GHG emissions</li> <li>- Cleaner burning, less maintenance</li> <li>- Domestic fuel</li> </ul>
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<p><b>ANOTHER ALTERNATIVE FUEL</b></p> <ul style="list-style-type: none"> <li>- Easier conversion</li> <li>- Available vehicles and fueling stations</li> <li>- No fueling behavior changes</li> <li>- Less range issues</li> </ul>
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<p><b>NO FUEL CHANGE</b></p> <ul style="list-style-type: none"> <li>- No additional capital required</li> <li>- No additional mechanic training</li> <li>- No fueling behavior changes</li> <li>- Predictable maintenance</li> <li>- Available vehicles and fueling stations</li> </ul>
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## Refuse Haulers – Customer Case

### CNG Vehicles

#### One Truck

- Annual fuel use
  - o 10,000 dge per year (1,340 Mcf)
    - Diesel \$4.00 gal = \$40,000
    - CNG \$1.99 dge = \$19,900
- Annual fuel cost savings = \$20,100
- Incremental cost of CNG truck \$30,000
- **Simple payback 1.49 years** (12 year truck life)



#### Fleet with station construction

- |   |   |
|---|---|
| <ul style="list-style-type: none"> <li>- <u>Slow fill</u> station construction cost \$500,000</li> <li>- 30 CNG trucks           <ul style="list-style-type: none"> <li>o Incremental cost of CNG trucks = \$900,000</li> <li>o Annual fuel cost savings = \$603,000</li> <li>o <b>Simple payback 2.32 years</b></li> </ul> </li> </ul> | <ul style="list-style-type: none"> <li>- <u>Fast fill</u> station construction cost \$1,500,000</li> <li>- 30 CNG trucks           <ul style="list-style-type: none"> <li>o Incremental cost of CNG trucks = \$900,000</li> <li>o Annual fuel cost savings = \$603,000</li> <li>o <b>Simple payback 3.98 years</b></li> </ul> </li> </ul> |
|---|---|

Due to high annual fuel use, the business case for refuse companies converting to CNG is strong.

- Most customer costs built into CNG price (electric, operations, maintenance); based on WM retail cost
- annual fuel usage estimate from NGVA, will vary
- cost differential will shift as diesel and CNG prices fluctuate
- incremental vehicle costs from NGVA, will vary depending on specifications
- station construction costs are estimates
- estimated life of refuse trucks, 12 years according to NREL
- No federal or state incentives included, none currently available

## Service/Delivery Companies – Customer Case

### CNG Vehicles

#### One Step Van

- Annual fuel use
  - o 4,153 dge per year (557 Mcf)
    - Diesel \$4.00 gal = \$16,612
    - CNG \$1.99 dge = \$8,264
- Annual fuel cost savings = \$8,348
- Incremental cost of CNG van \$20,000
- **Simple payback 2.40 years** (10 year van life)



#### Fleet with station construction

- |  |  |
|--|--|
| <ul style="list-style-type: none"> <li>- <u>Slow fill</u> station construction cost \$500,000</li> <li>- 50 CNG step vans           <ul style="list-style-type: none"> <li>o Incremental cost of CNG vans = \$1,000,000</li> <li>o Annual fuel cost savings = \$417,400</li> <li>o <b>Simple payback 3.59 years</b></li> </ul> </li> </ul> | <ul style="list-style-type: none"> <li>- <u>Fast fill</u> station construction cost \$1,200,000</li> <li>- 50 CNG step vans           <ul style="list-style-type: none"> <li>o Incremental cost of CNG vans = \$1,000,000</li> <li>o Annual fuel cost savings = \$417,400</li> <li>o <b>Simple payback 5.27 years</b></li> </ul> </li> </ul> |
|--|--|

Due to annual fuel use and savings, an acceptable pay back period is achieved.

- Most customer costs built into CNG price (electric, operations, maintenance); based on WM retail cost
- annual fuel usage estimate from NGVA, will vary
- cost differential will shift as diesel and CNG prices fluctuate
- incremental vehicle costs from NGVA, will vary depending on specifications
- station construction costs are estimates
- estimated life of a step van, 10 years according to NGVA
- No federal or state incentives included, none currently available

## School Districts – Customer Case

### CNG Vehicles

#### One School Bus

- Annual fuel use
  - o 2,650 dge per year (355 Mcf)
    - Diesel \$4.00 gal = \$10,600
    - CNG \$1.99 dge = \$5,273
- Annual fuel cost savings = \$5,327
- Incremental cost of CNG bus \$31,000
- **Simple payback 5.82** (15 year bus life)



#### Fleet with station construction

- Slow fill station construction cost \$600,000
- 75 CNG school buses
  - o Incremental cost of CNG buses = \$2,325,000
  - o Annual fuel cost savings = \$399,525
  - o **Simple payback 7.32**
- Fast fill station construction cost \$1,200,000
- 75 CNG school buses
  - o Incremental cost of CNG buses = \$2,325,000
  - o Annual fuel cost savings = \$399,525
  - o **Simple payback 8.82 years**

Due to low annual fuel use from low mileage, grants are required for the business case to work

- Most customer costs built into CNG price (electric, operations, maintenance); based on WM retail cost
- annual fuel usage estimate from NGVA, will vary
- cost differential will shift as diesel and CNG prices fluctuate
- incremental vehicle costs from NGVA, will vary depending on specifications
- station construction costs are estimates
- estimated life of a school bus, 15 years according to NREL
- No federal or state incentives included, none currently available

## Transit Systems – Customer Case

### CNG Vehicles

#### Bus

- Annual fuel use
  - o 10,672 dge per year (1,430 Mcf)
    - Diesel \$4.00 gal = \$42,688
    - CNG \$1.99 dge = \$19,900
- Annual fuel cost savings = \$21,237
- Incremental cost of CNG transit bus \$50,000
- **Simple payback 2.35 years** (15 year transit bus life)



#### Fleet with station construction

- |   |   |
|---|---|
| <ul style="list-style-type: none"> <li>- <u>Slow fill</u> station construction cost \$1,000,000</li> <li>- 50 transit buses           <ul style="list-style-type: none"> <li>o Incremental cost of CNG buses = \$2,500,000</li> <li>o Annual fuel cost savings = \$1,062,000</li> <li>o <b>Simple payback 3.30 years</b></li> </ul> </li> </ul> | <ul style="list-style-type: none"> <li>- <u>Fast fill</u> station construction cost \$2,000,000</li> <li>- 50 transit buses           <ul style="list-style-type: none"> <li>o Incremental cost of CNG buses = \$2,500,000</li> <li>o Annual fuel cost savings = \$1,062,000</li> <li>o <b>Simple payback 4.24 years</b></li> </ul> </li> </ul> |
|---|---|

Due to high annual fuel use of transit buses, the business case for converting to CNG is strong.

- Most customer costs built into CNG price (electric, operations, maintenance); based on WM retail cost
- annual fuel usage estimate from NGVA, will vary
- cost differential will shift as diesel and CNG prices fluctuate
- incremental vehicle costs from NGVA, will vary depending on specifications
- station construction costs are estimates
- estimated life of a transit bus, 15 years according to NREL
- No federal or state incentives included, none currently available

# Customer Case – other vehicles

## One F-350 Pickup Truck

- Annual fuel use @20,000 miles per year
  - o 1,200 gge per year (144 Mcf)
    - Gasoline \$3.50 gal = \$4,200
    - CNG \$1.80 gge = \$2,160
- Annual fuel cost savings = \$2,040
- Incremental cost of CNG truck \$12,000
- Simple payback 5.88** ( 8 year truck life)



## One Taxi

- Annual fuel use @60,000 miles per year
  - o 3,400 gge per year (400 Mcf)
    - Gasoline \$3.50 gal = \$11,872
    - CNG \$1.80 gge = \$6,105
- Annual fuel cost savings = \$5,767
- Incremental cost of Taxi \$ 6,000
- Simple payback 1.04** ( 3-4 year taxi life)



## One Shuttle Van

- Annual fuel use @80,000 miles per year
  - o 5,000 gge per year (600 Mcf)
    - Gasoline \$3.50 gal = \$17,500
    - CNG \$1.80 gge = \$9,000
- Annual fuel cost savings = \$8,500
- Incremental cost of CNG van \$15,000
- Simple payback 1.76** ( 4 year van life)



# Growth of CNG in PECO Region

## EXISTING

**21,068 Mcf annually**

13 Active CNG fueling stations

Lower Merion School District  
 - Private Station – 12,000 Mcf

Printing Company  
 - Private Station – 5,700 Mcf

PECO Facilities (5)  
 - Public Stations – 1,643 Mcf

West Chester University  
 - Private Station – 1,200 Mcf

Other (5)  
 - Private stations – 525 Mcf

## IN PROGRESS

**337,900 Mcf annually**

5 New CNG stations

Clean Energy, Philadelphia Airport  
 - 104,000 Mcf / target install 5/12

Lehigh Gas (2), KOP & Concordville  
 - 36,600 Mcf / target install 5/12

Clean Energy, Fairless Hills  
 - 104,000 Mcf / target install 7/12

Waste Management, Bristol  
 - 93,300 Mcf / target install 10/12

## FUTURE

**3,504,000 Mcf**

Estimate of Total Target Market\*

Refuse  
 - 1,934,000 Mcf annual estimate

Service\Delivery  
 - 155,000 Mcf annual estimate

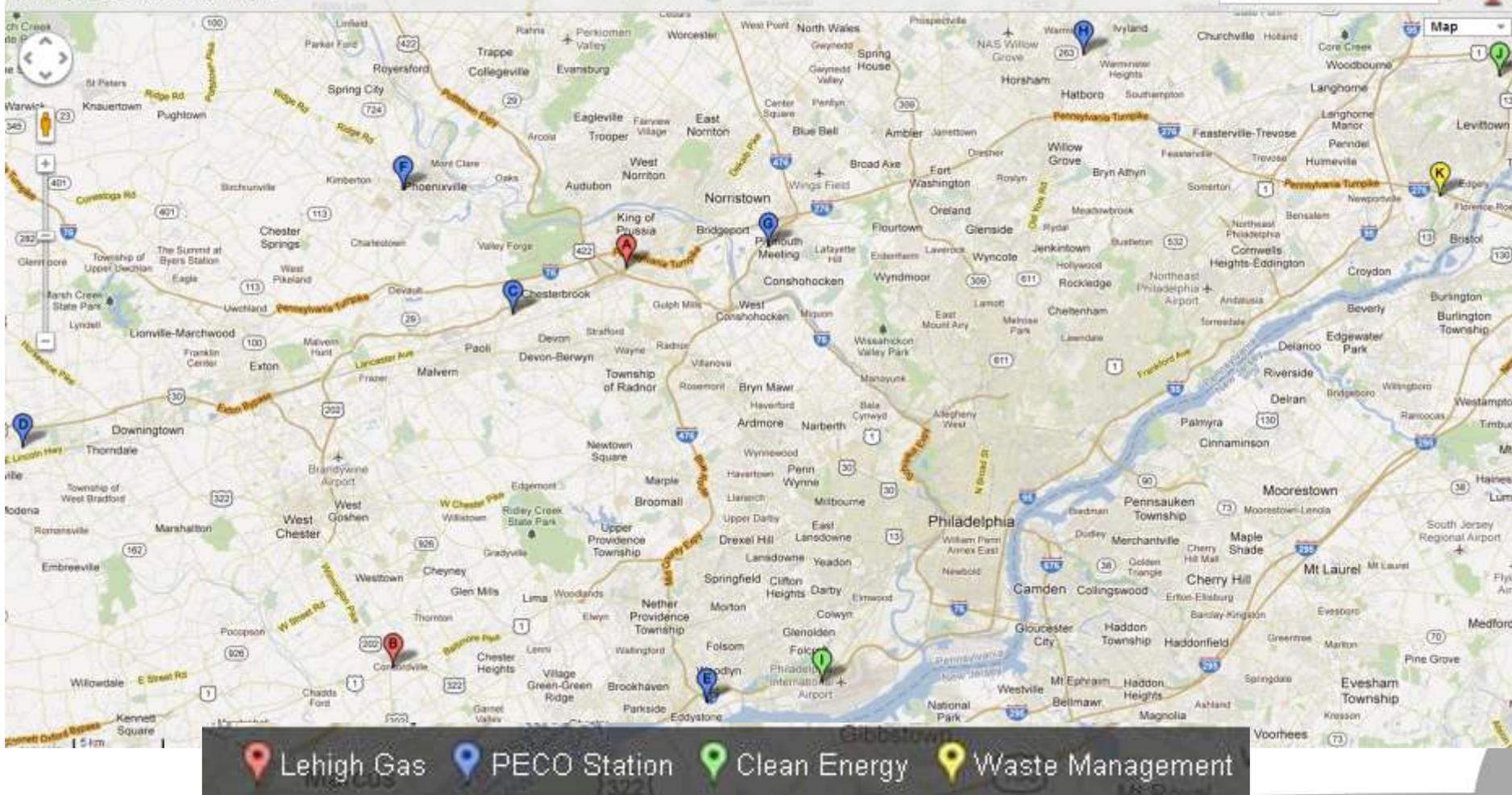
Schools  
 - 1,272,000 Mcf annual estimate

Other, suburban transit buses  
 - 143,000 Mcf annual estimate

\*All target fleets convert to CNG

# PECO Territory CNG Stations

February PECO CNG Station Map 2



# CNG Team Assistance

- ✓ Provide Background information to customers on CNG
  - Introduction, resource links, and case studies
- ✓ Provide gas availability at location(s)
- ✓ Introduce options for both Station and Vehicle conversion
- ✓ Provide contacts for 3<sup>rd</sup> party companies to quote stations and vehicle
- ✓ Introduce to other parties who use CNG
  - PECO or other current CNG customers
- ✓ Help connect to grant writing and distributing through Clean Cities

# CNG Proposed Incentives

## ✓ PECO

- Station commitments can negate cost for service lines

## ✓ Non-PECO Incentives\*:

- PA Marcellus Shale (approved and passed):
  - \$20 million over 3 years
  - 50% funding up to \$25k per vehicle
  - 50% for transportation services
- PA Alternative Fuel Incentive Grant - AFIG (approved and passed)
- Federal NatGas Act (not passed):
  - All Fuel incentives and vehicle incentives expired Dec. 31st, 2011
  - Several versions have been put forward
- President Obama Budget (not passed):
  - Extend alt fuel tax credit for all fuel sales
  - Provide Vehicle incentives



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## Questions?

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