PECO CNG PROGRAM

Clean Cities Presentation

March 20th, 2012

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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

U.S. Average Fuel Prices

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

*NREL US Average Fuel Prices
CNG Fuel Comparison

Alternative Fuel Prices versus Gasoline

*Clean Cities Alternative Fuel Report January 2012
CNG Fuel Comparison

*Clean Cities Alternative Fuel Report January 2012*
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
  - Availability
  - Size for tank
- Size of Fleet
  - Public Station
  - Dedicated Station
- Range
  - Short
  - Long
  - Sta. access
- Total Ownership Cost
  - Acquisition
  - Maintenance
  - Fuel cost
- Location
  - Depot
  - Main
  - Night/Fast
- Industry
  - Standards
  - Requirements
  - Green Goals
- Financing
  - Grants
  - Loans
  - Tax Incentive

BENEFITS

- CNG FUEL
  - Lower fleet fuel costs
  - More predictable fleet fuel costs
  - Less GHG emissions
  - Cleaner burning, less maintenance
  - Domestic fuel
- ANOTHER ALTERNATIVE FUEL
  - Easier conversion
  - Available vehicles and fueling stations
  - No fueling behavior changes
  - Less range issues
- NO FUEL CHANGE
  - No additional capital required
  - No additional mechanic training
  - No fueling behavior changes
  - Predictable maintenance
  - Available vehicles and fueling stations

DECISION POINT

- CONVERT FLEET TO AN ALTERNATIVE FUEL
- MAINTAIN TRADITIONAL FUEL
Refuse Haulers – Customer Case
CNG Vehicles

One Truck
- Annual fuel use
  - 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
- Slow fill station construction cost $500,000
- 30 CNG trucks
  - Incremental cost of CNG trucks = $900,000
  - Annual fuel cost savings = $603,000
  - Simple payback 2.32 years

- Fast fill station construction cost $1,500,000
- 30 CNG trucks
  - Incremental cost of CNG trucks = $900,000
  - Annual fuel cost savings = $603,000
  - Simple payback 3.98 years

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
  - 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
- Slow fill station construction cost $500,000
- 50 CNG step vans
  - Incremental cost of CNG vans = $1,000,000
  - Annual fuel cost savings = $417,400
  - Simple payback 3.59 years

- Fast fill station construction cost $1,200,000
- 50 CNG step vans
  - Incremental cost of CNG vans = $1,000,000
  - Annual fuel cost savings = $417,400
  - Simple payback 5.27 years

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
  - 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
  - Incremental cost of CNG buses = $2,325,000
  - Annual fuel cost savings = $399,525
  - **Simple payback 7.32**

- Fast fill station construction cost $1,200,000
- 75 CNG school buses
  - Incremental cost of CNG buses = $2,325,000
  - Annual fuel cost savings = $399,525
  - **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
  - 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
- **Slow fill** station construction cost $1,000,000
- 50 transit buses
  - Incremental cost of CNG buses = $2,500,000
  - Annual fuel cost savings = $1,062,000
  - **Simple payback 3.30 years**

- **Fast fill** station construction cost $2,000,000
- 50 transit buses
  - Incremental cost of CNG buses = $2,500,000
  - Annual fuel cost savings = $1,062,000
  - **Simple payback 4.24 years**

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
  - 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
  - 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
  - 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)
### EXISTING

<table>
<thead>
<tr>
<th>CNG Fueling Stations</th>
<th>Annual Consumption</th>
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<tbody>
<tr>
<td>13 Active CNG fueling stations</td>
<td>21,068 Mcf annually</td>
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<tr>
<td>Lower Merion School District - Private Station</td>
<td>12,000 Mcf</td>
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<tr>
<td>Printing Company - Private Station</td>
<td>5,700 Mcf</td>
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<tr>
<td>PECO Facilities (5) - Public Stations</td>
<td>1,643 Mcf</td>
</tr>
<tr>
<td>West Chester University - Private Station</td>
<td>1,200 Mcf</td>
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<tr>
<td>Other (5) - Private stations</td>
<td>525 Mcf</td>
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### IN PROGRESS

<table>
<thead>
<tr>
<th>CNG Stations</th>
<th>Annual Consumption</th>
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<tbody>
<tr>
<td>5 New CNG stations</td>
<td>337,900 Mcf annually</td>
</tr>
<tr>
<td>Clean Energy, Philadelphia Airport - Private Station</td>
<td>104,000 Mcf / target install 5/12</td>
</tr>
<tr>
<td>Lehigh Gas (2), KOP &amp; Concordville - Private Station</td>
<td>36,600 Mcf / target install 5/12</td>
</tr>
<tr>
<td>Clean Energy, Fairless Hills - Private Station</td>
<td>104,000 Mcf / target install 7/12</td>
</tr>
<tr>
<td>Waste Management, Bristol - Private Station</td>
<td>93,300 Mcf / target install 10/12</td>
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### FUTURE

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<thead>
<tr>
<th>CNG Stations</th>
<th>Annual Consumption</th>
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<tbody>
<tr>
<td>Estimate of Total Target Market*</td>
<td>3,504,000 Mcf</td>
</tr>
<tr>
<td>Refuse - Private Station</td>
<td>1,934,000 Mcf annual estimate</td>
</tr>
<tr>
<td>Service/Delivery - Private Station</td>
<td>155,000 Mcf annual estimate</td>
</tr>
<tr>
<td>Schools - Private Station</td>
<td>1,272,000 Mcf annual estimate</td>
</tr>
<tr>
<td>Other, suburban transit buses - Private Station</td>
<td>143,000 Mcf annual estimate</td>
</tr>
</tbody>
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*All target fleets convert to CNG
PECO Territory CNG Stations
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 3rd 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

*Please refer to Clean Cities or PECO for updates on grants
Questions?

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