Opportunities in CNG

July, 2016
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<tr>
<th>Where we started</th>
<th>Where we’re going</th>
<th>What we’ve learned</th>
<th>How we help</th>
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<tr>
<td>AMP began by building a renewable CNG plant to supply long-haul trucks with cheap and clean natural gas</td>
<td>AMP is building a network of CNG stations across major US highway corridors</td>
<td>AMP has millions of miles of experience operating CNG that we share with you</td>
<td>AMP works with Fleets and Truck Stops to realize savings and to enhance revenues</td>
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Where we started

AMP began by building a renewable CNG plant to supply long-haul trucks with cheap and clean natural gas
Running 20,000+ miles a day on CNG delivering milk through the Midwest

Fleet of 42 long-range CNG trucks—one of the largest CNG fleets in the US

Built two CNG fueling stations for trucks—fueling 200K+ DGE’s a month

On-farm anaerobic digester provides 1.5M DGE of gas a year to station.

Project can source gas from local utility when renewable is not available.

First agriculture-based CNG projects to be registered with the US EPA’s Renewable Fuel Standard.
ampCNG’s project at Fair Oaks Farm is in partnership with one of the largest dairy farms nationwide. We transform manure from 15,000 cows into 1.5 million DGEs of bio-CNG per year.

Source: Fortune Magazine February 1, 2016
CNG is much cleaner than burning diesel. CNG reduces 20+% CO2, 35+% NOx, and 67+% particulate-matter as compared with diesel.

amCNG Renewable Natural Gas from our Fair Oaks plant offers 100% lower GHG emissions vs diesel.

ampCNG can provide RNG at any of our 19 ultra high performance heavy duty CNG stations.

With Cummins Near Zero engine, and RCNG, trucks are CLEANER THAN ELECTRIC.
Our projects
Where we’re going

AMP builds CNG stations on key highway corridors across the United States
Fuel is the #1 Cost for Commercial Carriers.

Switching to CNG dramatically reduces fuel costs (for many fleets by as much as 20 cents per mile).

Reducing fuel costs allows for dramatic reductions to the cost of logistics (20 cents per mile represents up to a 15% reduction in total cost).
Price comparisons

Why use CNG?

- **DIESEL**: $2.71*  
  *Based on EIA projection for 2017 ($2.71) July 2016

- **LNG**: $2.50

- **CNG**: $2.00
ampCNG is building a national network of Heavy Duty public access, ultra fast-fill CNG fueling stations to fuel the future of trucking in the US.
What have we learned?

*With 43 million miles running a 42-truck CNG fleet since Sept 2011 – CNG is not just for pioneers anymore!*
How does CNG work?

Natural gas has been powering commercial truck fleets since the early 1900’s.
How does CNG work?

Engine

Cummins Westport ISX12G ENGINE

- 4 cycle, spark ignited, in-line 6 cylinder, turbocharged, CAC
- Displacement – 11.9 liter (726.2 cu in)
- **Peak rating**: 400 HP, 1450 lb-ft of torque
- EPA/CARB certified at or below EPA10 emission levels
- Dedicated natural gas engine
  - Will operate on CNG or LNG
  - Capable of using up to 100% Biomethane
- Three Way Catalyst after-treatment
- Engine braking
- Manual/Automatic Transmission capable
How it works

Heavy duty CNG engines now run cleaner than electric vehicles

**Cummins Westport ISLG NZ ENGINE**
- Meets the 0.02 g/bhp-hr optional Near Zero NOx Emissions standards for 2023 today – better than EVs
- 4 cycle, spark ignited, in-line 6 cylinder, turbocharged, CAC
- Displacement – 8.9 liter (726.2 cu in)
- **Peak rating**: 250-320 horsepower, 660-1,000 lb-ft torque
- Dedicated natural gas engine (up to 100% Biomethane)

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- EPA/CARB certified at or below EPA10 emission levels
- Dedicated natural gas engine (up to 100% Biomethane)
- Near Zero capability expected 2018

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<tr>
<th>NMHC</th>
<th>NOx</th>
<th>CO</th>
<th>PM</th>
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<tbody>
<tr>
<td>FTP</td>
<td>EURO</td>
<td>FTP</td>
<td>EURO</td>
</tr>
<tr>
<td>STD</td>
<td>0.14</td>
<td>0.14</td>
<td>0.02</td>
</tr>
<tr>
<td>CRT</td>
<td>0.01</td>
<td>0.000</td>
<td>0.004</td>
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FTP EURO FTP EURO FTP EURO
STD 0.14 0.14 0.02 15.5 0.01 0.01
CRT 0.01 0.000 0.004 1.5 0.001 0.000
How does CNG work?
Cylinder packages

Modern CNG tank configurations:
• Multiple Tanks (BOC & Rail)
• High Pressure (3,600 psi)
• Fully Protected
• Extended Range
How does CNG work?

Fast-fill station
### CNG trucking has come a long way

**In 5 years**

<table>
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<tr>
<th>From 2011 prior generation ISL G 8.9L engine:</th>
<th>To the newest generation ISX G 11.9L engine</th>
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<tbody>
<tr>
<td>• Engine not suited to load</td>
<td>• Engine well suited to max loads</td>
</tr>
<tr>
<td>• Incorrect rear end ratio</td>
<td>• Maintenance costs better than diesel</td>
</tr>
<tr>
<td>• Steep learning curve</td>
<td>• Significantly improved MPG vs.</td>
</tr>
<tr>
<td>– Learning to drive CNG trucks (psi vs. full/empty, fueling safety)</td>
<td>prior generation (6.2 mpg)</td>
</tr>
<tr>
<td>– Maintaining CNG Trucks</td>
<td>• Excellent reliability</td>
</tr>
<tr>
<td>• High maintenance costs</td>
<td>• Positive perceptions</td>
</tr>
<tr>
<td>• Negative perceptions</td>
<td></td>
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“We tried CNG, but it just didn’t work for us” - Fleet manager

“When will I get my CNG rig back?!” - Driver with CNG tractor in the shop
Case Studies

RDF fleet with 42.5M miles

2011: fleet 8.9L ISL G
- 16M miles
- 5.4 mile/DGE

2013: 11.9L ISX G
- 26.5M miles
- 6.22 miles/DGE

Outcomes:
- Learned to run CNG
- Learned to maintain CNG
- Developed close industry partnerships
- OEMs demonstrated excellent support
- Proved viability of infrastructure
- Proved Concept
How we help

AMP CNG works with Fleets and Truck Stops to realize savings and to enhance revenues using cheap, clean American fuel
Environmental Impact

CNG Environmental Benefits

- 20-25% CO2 Reduction
- 32-73% NOx Reduction
- 69-83% Hydrocarbon Reduction
- 50-90% Noise Reduction
- 67-94% Particulate-Matter Reduction
- Increases Driver Safety
- Reduces Smog Production in US Cities
- Avoidance of Damaging and Costly Oil Spills
- Domestic Product Travels via Pipeline Rather than by Vehicle

R-CNG

- Produced from Waste Product (manure, compost, etc.)
- Renewably Sourced by Catching Biomethane
- Closed-loop System (Renewable Dairy Fuels)
American Fuel

• In 2014, 27% of petroleum consumed in the United States was imported from foreign countries.
• 35% of 2014 US petroleum imports were from OPEC.
• 99.7% of natural gas burned in the US comes from North America.

- The EIA estimates that natural gas prices will remain stable until at least 2035.
- At current consumption rates, the US has an estimated 90+ year supply of natural gas.
- 31 states currently produce natural gas.

Shale Gas Employment Contribution
(number of workers)

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<th>2010</th>
<th>2015</th>
<th>2035</th>
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<tr>
<td>Direct</td>
<td>148,143</td>
<td>197,999</td>
<td>360,335</td>
</tr>
<tr>
<td>Indirect</td>
<td>193,710</td>
<td>283,190</td>
<td>547,107</td>
</tr>
<tr>
<td>Induced</td>
<td>259,494</td>
<td>388,495</td>
<td>752,648</td>
</tr>
<tr>
<td>Total</td>
<td>601,348</td>
<td>869,684</td>
<td>1,660,090</td>
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http://www.eia.gov/naturalgas/crudeoilreserves/
http://www.eia.gov/tools/faqs/faq.cfm?id=727&t=6
http://www.eia.gov/tools/faqs/faq.cfm?id=32&t=6
What About Fracking?

Net Benefits of Natural Gas Benefits Positive

- Displacement of Coal in Electricity Generation - From 2007-2014 the US reduced annual emissions of CO2 by 556 million metric tons
- US personal expenditures on energy dropped 16 percent in 2015 – good for households and economy.
- Low energy costs have kept billions of dollars out of the petrostates.

Water Contamination/ Fugitive Emissions

- Landmark June 2015 EPA study found that while fracking activities had led to a small number of water contamination incidents, they “have not led to widespread, systemic impacts to drinking water resources in the United States.”
- Fugitive emissions need further study
Payback period per state for CNG

Assumes: VETC of $0.50/GGE (in place for 2016); $45,000 premium for CNG vs. diesel Class-8 truck, 125,000 miles/year per truck, diesel fuel economy 7mpg, CNG fuel economy 6.3mi/DGE, average diesel price by state per AAA survey

Source: afdc.energy.gov, AAA, state governments, amp analysis
Case studies

Fueling options: How we work with you

- **Target CNG opportunity** – focus on best locations and vehicles

- **High performance public stations reduce costs** for our partners

- **We provide the capital** (including maintenance bay upgrades if needed)

- **Flexible, open-book fee structure for fuel**

- **Unparalleled know-how** from our 43M miles operating experience
  - Spec trucks and stations, train operators, know the economics, design maintenance upgrades, etc.
Our fueling partners, among the largest CNG fleets

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