NATURAL GAS VEHICLES:
AN OVERVIEW OF MARKET GROWTH AND OPPORTUNITY IN THE TRUCKING, FUELING, AND TECHNOLOGY SECTORS

RESOURCES FOR THE FUTURE - OCTOBER 10, 2012
Founded in 1989 with a $50,000 investment by our co-founder and CEO – Aubrey McClendon

- Leader in production
  - Largest gross producer of U.S. natural gas (#2 on net basis)
  - Top 15 producer of U.S. liquids
- Leader in drilling
  - #1 driller in the world of horizontal wells and horizontal shale wells
  - Most active driller in the U.S.
    - 100 operated drilling rigs (#2 most active operates 60, #3 operates 56)
- Leader in identifying and capturing world-class unconventional natural gas and liquids resources
  - In past 5 years, discovered 5 of America’s best unconventional plays
- Leader in technological innovations in unconventional reservoirs
  - #1 inventory of shale core rock data and built industry’s only proprietary core analysis facility
- Leader in vertical integration into midstream and oilfield service operations
- **America’s Champion of Natural Gas**
CHK’S 10 KEY PLAYS

Low-risk, U.S. onshore asset base; not exposed to economic, geopolitical or technological risks internationally or in the Gulf of Mexico

Once our asset sales are complete we will exclusively focus on 10 leading plays in which we have a #1 or #2 position.
THE BIG 4 U.S. NATURAL GAS SHALE PLAYS: WORLD CLASS DISCOVERIES

- WORLD GAS FIELDS BY RECOVERABLE RESERVES
THE “JUST IN TIME” INVENTORY APPROACH TO NATURAL GAS SUPPLIES

BASIN ECONOMICS - GAS PRICE REQUIRED FOR 10% RATE OF RETURN

- The basin economics will help large energy consumers have confidence in a low-priced transportation fuel for years to come.
- These fields are largely “held by production” which means the subsequent wells are bolstered by a pre-existing infrastructure and gathering system.
- These economics and basin realities will enable supplies to quickly respond to price signals.

Gas produced from oil and liquids-rich plays is ~17% of the total of the gas stack. These plays account for ~35% of the gas growth going forward.

Source: Tudor Pickering - May '12
Our ability to drill subsequent wells from one padsite allows new natural gas supplies to come online and achieve scale much quicker.
NATURAL GAS UTILIZATION SUMMARY

- Macroeconomic Factors are Affecting Energy Prices in the U.S.
  - Greater global consumptions of crude oil
  - Emerging economies vying for limited resources

- Recoverable Domestic Supplies of Natural Gas are at All-Time Highs
  - Shale gas has significantly increased U.S. supply
  - Productive capacity of shale places continued downward pressure on natural gas prices

- Chesapeake has Achieved Significant Fuel Savings from CNG Vehicles
  - Lower fuel costs
  - Surprising resale value for used CNG vehicles

- Auto Manufacturers are Providing More Options
  - Big 3 OEMs are developing production vehicles running on CNG
  - Heavy-duty and vocational truck manufacturers are increasing market share

- Infrastructure Development is Keeping Pace
  - Fuel marketers are joining the game for both light- and heavy-duty refueling
  - Pricing economics are attractive for retailers and consumers alike
  - Innovation continues on fuel delivery options
AMERICA ON THE BOTTLE

- U.S. consumes 23% of the world’s oil, 19 mm bbls/day, of which 11 mm bbls/day is imported
- By 2020, the IEA predicts world oil consumption will increase 60%
  - This does not take production decreases into account
  - This means we will need 4 more Saudi Arabias... where will they be?
- To keep pace with demand and depletion, the world must add 64 million barrels of production per day by 2020:
  - This growth will require $350 billion per year in drilling capex on new projects
  - Yet, OPEC only spent $390 billion in total on new projects from period 2000-2007; where will required funding come from with rising OPEC social costs?
  - The U.S. is exporting $1 mm per minute to import oil, that’s $500 billion per year and $5 trillion per decade – can we afford that drag on our economy?

Let’s get off the foreign oil bottle in the next 10 years!
HOW WILL AMERICA DEAL WITH $5/GALLON GASOLINE OR DIESEL?

- Current domestic and international challenges will likely keep upward pressure on the price of diesel in 2012 and beyond
  - Refinery constraints in 2012 – 2015
  - Diesel exports have increased by 28% since 2010
  - Geopolitical issues, particularly associated with Iran
    - Israel vs. Iran – Strait of Hormuz
    - Action – both economic and military conflict – likely to occur in 2012
    - Saudi Arabia and other countries – developing petroleum-based manufacturing economies
  - Exports vs. internal consumption?
    - Global oil consumption growing at a steady pace, especially in Mideast, China, India and all of SE Asia

- 10 year curve for oil = ~$100 per bbl
- 10 year curve for U.S. natural gas = $25 per bbl equivalent
- How can Americans resist a $75 per bbl ($1.80/gallon) discount on fuel costs?
FUEL PRICE DIFFERENTIAL FORECAST

NATURAL GAS VEHICLES ARE AN ANSWER TO RISING FUEL PRICES

Price of Oil vs. Natural Gas

* (Energy Feedstock Ratio: CNG 8:1, LNG 7:1)

- If NYMEX is $4.00/mcf
  - CNG will be $1.50/dge ($0.50)
  - LNG will be $2.00/dge ($0.57)
- If NYMEX is $8.00/mcf
  - CNG will be $2.00/dge ($1.00)
  - LNG will be $2.50/dge ($1.14)
- If NYMEX is $12.00/mcf
  - CNG will be $2.50/dge ($1.50)
  - LNG will be $3.00/dge ($1.71)

This is why AT&T, UPS, Verizon, Waste Management, etc. are switching to natural gas – they can save millions on fuel costs

Source: Bloomberg (as of 3/9/12)
GASOLINE AND DIESEL PRICING

FACT: Changes in the price of Natural Gas have a much smaller effect on pump prices compared to changes in the price of Crude Oil on gasoline and diesel prices.
CNG SALES PROFITABILITY IS THE KEY DRIVER FOR INFRASTRUCTURE DEVELOPMENT

On July 24, 2012 the NYMEX spot price for natural gas closed at $3.02/MMBtu. These low commodity prices are a boon for CNG retail profit margins.

Pump price of $1.99/gge

<table>
<thead>
<tr>
<th>INPUT</th>
<th>COST</th>
</tr>
</thead>
<tbody>
<tr>
<td>Natural Gas (divide by 8.0)</td>
<td>$0.38</td>
</tr>
<tr>
<td>Transport Costs &amp; Fees</td>
<td>$0.25</td>
</tr>
<tr>
<td>Electricity Costs per GGE</td>
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<tr>
<td>Maintenance per GGE</td>
<td>$0.26</td>
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<tr>
<td>Federal and State Taxes</td>
<td>$0.25</td>
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<tr>
<td>Fuel Card Fees per GGE</td>
<td>$0.03</td>
</tr>
<tr>
<td>Retailer Profit Margin</td>
<td>$0.70</td>
</tr>
<tr>
<td>CNG at the Pump</td>
<td>$1.99</td>
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Pump price of $2.45/gge

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</table>
WHERE IN THE WORLD?

**10. UKRAINE**
- Natural gas vehicles: 200,000
- Refuelling stations: 285
  (December 2006)

**7. CHINA**
- Natural gas vehicles: 450,000
- Refuelling stations: 1,350
  (December 2008)

**14. USA**
- Natural gas vehicles: 112,000
- Refuelling stations: 1,000
  (December 2010)

**4. BRAZIL**
- Natural gas vehicles: 1,664,847
- Refuelling stations: 1,725
  (December 2010)

**6. ITALY**
- Natural gas vehicles: 730,000
- Refuelling stations: 790
  (December 2010)

**2. IRAN**
- Natural gas vehicles: 1,954,925
- Refuelling stations: 1,574
  (December 2010)

**1. PAKISTAN**
- Natural gas vehicles: 2,740,000
- Refuelling stations: 3,285
  (December 2010)

**9. THAILAND**
- Natural gas vehicles: 218,459
- Refuelling stations: 426
  (November 2010)

**8. COLUMBIA**
- Natural gas vehicles: 340,000
- Refuelling stations: 614
  (December 2010)

**3. ARGENTINA**
- Natural gas vehicles: 1,954,925
- Refuelling stations: 1,878
  (December 2010)

Source: http://kangw.org/tools-resources/statistics.html
NATIONAL FLEETS WITH NGVS
NATURAL GAS TRANSPORTATION SUPPLY CHAIN SYNERGIES:
IMPRESSIVE WEB OF OPPORTUNITIES FOR ALL STAKEHOLDERS

Technological Innovation

Infrastructure Buy-In

End User Utilization

Robust Market For State Fleet Vehicles

Technology
Retailers
Fleets
States
Oklahoma is an Example of Collaborative Infrastructure Growth

- Current as of August 22, 2012
ADDITIONAL STRATEGIC GROWTH MARKETS
HD-CNG VS. LNG

- **Clean Energy and Pilot-Flying J**
  - 19 locations completed
  - Willing to add L/CNG to locations with fuel commitment
  - Seeking liquefaction sources

- **Shell and TravelCenters of America**
  - At least 100 TA locations
  - Agreement allows for LNG and CNG
  - Motivated by requests from existing customers

THE FOUNDATION FOR NATURAL GAS TRUCKING AT TRAVEL STOPS IS BEING BUILT TODAY; HOWEVER, MORE IS NEEDED FOR EXPEDITED ADOPTION

1st Mover:
- CHK, Clean Energy, and Pilot Flying J
- ~ 100 LNG Travel Stop Stations (above)

2nd Mover:
- Shell and TravelCenters of America/Petro
- ~ 100-200 LNG/CNG Travel Stop Stations
## HD NATURAL GAS ENGINE AVAILABILITY

<table>
<thead>
<tr>
<th>Manufacturer</th>
<th>Engine</th>
<th>HP &amp; Torque</th>
<th>Fuel Source</th>
<th>Availability</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cummins Westport</td>
<td>ISL-G 8.9L</td>
<td>320 HP – 1000 #/ft</td>
<td>Natural Gas</td>
<td>Available</td>
</tr>
<tr>
<td>Cummins Westport</td>
<td>ISX-G 11.9L</td>
<td>400 HP – 1400 #/ft</td>
<td>Natural Gas</td>
<td>1Q 2013</td>
</tr>
<tr>
<td>Cummins</td>
<td>ISX 15L</td>
<td>TBD</td>
<td>Natural Gas</td>
<td>2014</td>
</tr>
<tr>
<td>Westport HD</td>
<td>HD15L</td>
<td>550 HP – 1850 #/ft</td>
<td>NG/Diesel</td>
<td>1Q 2013</td>
</tr>
<tr>
<td>Navistar</td>
<td>Phoenix 7.6L</td>
<td>300 HP – 860 #/ft</td>
<td>Natural Gas</td>
<td>Available</td>
</tr>
<tr>
<td>Navistar</td>
<td>Maxxforce 13L</td>
<td>430 HP – 1550 #/ft</td>
<td>NG/Diesel</td>
<td>4Q 2013</td>
</tr>
<tr>
<td>Volvo-Westport HD</td>
<td>13L</td>
<td>TBD</td>
<td>NG/Diesel</td>
<td>2014</td>
</tr>
</tbody>
</table>
OVER-THE-ROAD PLATFORM OFFERINGS

- **Cummins Westport ISL-G 8.9L**
  - Volvo VNM
  - Kenworth T440
  - Freightliner M2
  - Peterbilt 384
  - International Transtar, Workstar

- **Cummins Westport ISX-G 11.9L**
  - Volvo VN Series
  - Kenworth T660
  - Freightliner Cascadia
  - Peterbilt
  - International Prostar+, Workstar

- **Westport HD GX 15L**
  - Kenworth T800
  - Peterbilt 386
  - Peterbilt 388
DUAL-FUEL TECHNOLOGY

What is Dual-Fuel?

- Non-invasive technology is applied to an existing diesel engine
- Runs on diesel and natural gas, simultaneously
- Small pilot injection of diesel ignites gas mixture under high pressure
- Diesel-to-gas substitution of up to 70%; averaging 40-65%
- Engine can still run on 100% diesel
- Can utilize CNG or LNG
- Diesel performance and efficiency
- Typically requires emission controls

- 50+ OUL certifications for CAT and Detroit Diesel engine families
- Partnership formed with Univ. of Houston to certify “Intermediate Age” engines with same system

OUL is >435,000 miles / 22,000 hour / 10+ yrs

- 2004 to 2009 Cummins ISX15
- Only for OUL engines
- Now aiming for Detroit Diesel, Mack and Cat engines that are IUL
CNG IN A BOX™

- Partnership between GE & Peake Fuel Solutions
- Up to 7.5 GGE/min at 39 PSIG
- Modular design allows for increased performance through additional compressors
- “Plug and play” solution
3M PRESSURE VESSELS

- **Significant Performance improvements:**
  - *Burst Pressure:* +8%
  - *Burst after impact:* +30%
  - *Fatigue Life:* +50%

- **Leading to:**
  - *Lighter weight designs*
  - *Longer life*
  - *Design flexibility*
MARKET FORECAST AND MARKET REALITY

- Worldwide market for light duty NGVs will grow steadily over the next 7 years, reaching 3.2 million vehicles sold in 2019.
- Result in a cumulative total of 25.4 million light duty NGVs on the road by 2019.
- The largest regional market for NGVs by the end of this decade will be Asia Pacific, thanks largely to Pakistan, which had 2.7 million NGVs on the road at the end of 2012, as well as strong growth in countries like Thailand, India, and China.
- Sales of NGVs will also grow at a healthy pace in North America, with a compound annual growth rate of 10.2% from 2012 to 2019.

Source: Pike Research, 2012

- U.S. DOE can certify an accurate count of 1,066 CNG stations and 54 existing LNG stations.
- Stations planned now include 96 CNG stations and 98 LNG stations.
- Since June 2012, an addition of 19 existing CNG and 1 existing LNG stations.
- Since 2009, an increase of 38.1% in existing CNG stations and 50% in LNG stations.
- Since mid-2010, stations under construction have shown an increase of 231% for CNG stations and 9,700% for LNG stations.

Source: US DOE – Alternative Fuels Data Center, 7/18/12
The new reality on natural gas prices is that we have long-term value creation with an affordable, predictable, domestic fuel. OEMs will release engines to cover all applications. Infrastructure is growing and the key to development exists with the current market.

- Sustainable scale will come through large retailers like Pilot Flying J, Love’s Travel Stops, and Travel Centers of America.

Federal government should encourage growth and ensure GSA and GAO assets are shipped on domestics fuels.

- States will lead in development.
THANK YOU FOR YOUR TIME

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APPENDIX
GLOBAL NATURAL GAS VEHICLE
MARKET PERSPECTIVE

- Lack of domestic oil reserves or insufficient refining capacity to meet transportation demands with petroleum fuels only.
- Domestically available and cost advantageous natural gas resources.
- Favorable natural gas fuel price differentials compared to petroleum fuels.
- Well-established gas transmission and distribution networks coincident with major transport routes.
- Urban air quality concerns.
- Lack of stringent emissions standards, resulting in a low adoption of advanced vehicle emissions controls.
- Regulations and policies for either GHG mitigation or energy security purposes that either mandate alternative fuels or incentivize their use.

The IEA estimates that in 2006 there were 800 million Light Duty Vehicles.

The global NGV market growth trend represents a compounded annual growth rate of 23.2% over the period of 2003 to 2010.

IEA forecast that the LDV fleet could reach 2 billion vehicles by 2050.

**very diverse economic, environmental, and regulatory factors have supported the deployment of NGVs in different regions**

<table>
<thead>
<tr>
<th>Region</th>
<th>MD/HD NG Buses</th>
<th>MD/HD NG Trucks</th>
<th>Total HD NGVs</th>
</tr>
</thead>
<tbody>
<tr>
<td>Africa</td>
<td>1,237</td>
<td>713</td>
<td>1,950</td>
</tr>
<tr>
<td>Asia-Pacific</td>
<td>237,274</td>
<td>88,275</td>
<td>325,549</td>
</tr>
<tr>
<td>Europe</td>
<td>12,717</td>
<td>5,572</td>
<td>18,289</td>
</tr>
<tr>
<td>Middle East</td>
<td>5,364</td>
<td>0</td>
<td>5,364</td>
</tr>
<tr>
<td>North America</td>
<td>11,240</td>
<td>2,500</td>
<td>13,740</td>
</tr>
<tr>
<td>Latin America</td>
<td>13,820</td>
<td>9,660</td>
<td>23,480</td>
</tr>
<tr>
<td>Russia &amp; C.I.S</td>
<td>131,231</td>
<td>102,026</td>
<td>233,257</td>
</tr>
</tbody>
</table>

Source: National Petroleum Council, 2012
NATURAL GAS IS A CLEAN ALTERNATIVE TO EXISTING TRANSPORTATION FUELS

Fossil Fuel Emission Levels
Pounds per Billion Btu of Energy Input

<table>
<thead>
<tr>
<th>Pollutant</th>
<th>Natural Gas</th>
<th>Oil</th>
<th>Coal</th>
<th>The Natural Gas Advantage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Carbon Dioxide</td>
<td>117,000</td>
<td>164,000</td>
<td>208,000</td>
<td>44%</td>
</tr>
<tr>
<td>Carbon Monoxide</td>
<td>40</td>
<td>33</td>
<td>208</td>
<td>81%</td>
</tr>
<tr>
<td>Nitrogen Oxides</td>
<td>92</td>
<td>448</td>
<td>457</td>
<td>80%</td>
</tr>
<tr>
<td>Sulfur Dioxide</td>
<td>1</td>
<td>1,122</td>
<td>2,591</td>
<td>99.9%</td>
</tr>
<tr>
<td>Particulate Matter</td>
<td>7</td>
<td>84</td>
<td>2,744</td>
<td>99.7%</td>
</tr>
<tr>
<td>Mercury</td>
<td>0.000</td>
<td>0.007</td>
<td>0.016</td>
<td>100%</td>
</tr>
</tbody>
</table>
Water Used for Transportation Fuels

Compressed Natural Gas (CNG)
Source: Adapted from King and Webber 2008a;
*Adapted from King and Webber 2008b, combined with data from USDOE 2006
ARE OUR OPERATIONS REGULATED?

- Our operations are regulated by federal, state and local agencies from start to finish and are specific to local terrain and climate
CNG AND LNG BASICS

NATURAL GAS TRANSPORTATION FUEL

COMPRESSED NATURAL GAS
• Natural Gas that is compressed, typically to 3,600 PSI, for dispensing and storage
• Gas is distributed through natural gas pipeline (the same infrastructure that delivers to homes and businesses currently) to the fuel location
• Gas is compressed at fuel location into CNG for dispensing into the truck
• Dispensing is similar to gasoline or diesel fuel
• The CNG is stored on the vehicle in one or more cylinders

LIQUEFIED NATURAL GAS
• Natural Gas that is cryogenically cooled to 260°F for dispensing and storage
• Gas is processed at LNG production and transported by special truck to the fuel location
• LNG is stored at fuel location in cryogenic tanks and dispensed directly into the truck
• Dispensing requires special safety equipment
• The LNG is stored on the vehicle in cryogenic tanks
FUEL SUPPLY CHAIN COMPARISON

DIESEL

PROCESSING → PIPELINE → RACK → TRANSPORT → DISPENSE → CONSUME

LNG

PROCESSING → PIPELINE → PRODUCTION → TRANSPORT → DISPENSE → CONSUME

CNG

PROCESSING → PIPELINE → DISPENSE → CONSUME
Natural gas is priced on the New York Mercantile Exchange (NYMEX) in $/Million cubic feet (Mcf).

CNG is priced as a Gasoline Gallon Equivalent (GGE), which is the volume of natural gas necessary to equate to the energy content in British Thermal Units (BTU) of a gallon of gasoline.

One Mcf of natural gas contains approximately 1,000,000 BTU, and one GGE of CNG contains approximately 125,000 BTU, an 8:1 ratio.

Therefore, the commodity component of the pump price of CNG can be calculated by dividing the NYMEX price by 8.

NYMEX Price of $3.00 ÷ 8 = CNG commodity price of $0.38