Natural Gas: Demand Opportunities Abound...

But We All Must Help to Make it Happen

February 27, 2013 - AADE
JAMES ROLLER
DIRECTOR- CORPORATE DEVELOPMENT

James.roller@chk.com
405-935-8252 (o)
405-229-9683 (c)
@jamesroller
4 CORNERSTONES OF INCREASED GAS DEMAND

- Industrial
- Power Generation
- Transportation
- Exports

Increased and diversified demand will help balance the U.S. natural gas market and create sustainable, affordable prices that will encourage drilling, create jobs, grow our economy and still attract investment capital.
Great potential exists for new natural gas demand across all sectors

Source: 2011 Dept. of Energy Data

*Exports represents a hypothetical 6 Bcf/day market (3-10 Bcf potential for low – high) but would not occur until 2016 and beyond at the earliest

** Growth projections by EIA and SAFE
Rapidly increasing, domestic natural gas, natural gas liquids and oil production is a powerful lever for increasing American jobs.

An increased focus on natural gas liquids (NGL) extraction is providing a competitive advantage for the U.S. manufacturing base over global naptha-based (i.e. oil-based) competition in European and Asian markets.

Lower natural gas prices and increases in NGLs means low input costs and increased feedstock supply for industrial customers including:

- Petrochemicals, plastics, steel, aluminum, iron, industrial gases, fertilizer sectors and more.
DOMESTIC UNCONVENTIONAL RESOURCES ARE A KEY DRIVER FOR CURRENT AND FUTURE ECONOMIC GROWTH

- The American Chemistry Council projects that a 25% increase in the U.S. production of ethane, a key feedstock for petrochemical companies like Dow and DuPont, can create more than 400,000 American jobs alone as well as:
  - $4.4 billion in increased federal, state, and local tax revenue; $44 billion over 10 years
  - $32.8 billion increase in U.S. chemical gross products
  - $16.2 billion in U.S. capital investment
  - $132.4 billion in U.S. economic output

- America’s abundance of natural gas and NGLs is a competitive advantage to our global manufacturing companies and will be the key driver in an American industrial renaissance.
POWER: BIG OPPORTUNITY FOR FUEL SWITCHING

Increase utilization of natural gas in the power generation sector

- 300,000 MWs of coal generation capacity
  - 40,000 – 70,000 MWs likely retired by 2020 – that means 6-12 Bcf/d of incremental demand
  - What is “Fuel Switching”? 
    - Increased use of the installed capacity owned by investor-owned electric utilities (IOUs) or Co-Ops
    - Increased use of the installed capacity owned by merchant generators, through PPAs
    - Repower boilers at existing facilities
    - Collaborate with IOU’s and public utility commissioners (PUCs) to encourage new installation of highly efficient combined-cycle gas turbines (CCGTs)

Industry Goals

- Increase utilization of installed natural gas capacity, 180,000 MWs installed since 1995
- Provide long-term contracts for natural gas to allay concerns about price volatility with PUCs
- Engage in public policy considerations and discussion regarding benefits of retirement of inefficient coal-fired units and proposals for replacement with lower-cost, higher efficiency, lower emitting CCGTs
Next five years will see a significant shift in the composition of U.S. power generation due to anticipated imposition of stringent environmental regulations and other factors.

- Expect 40 – 70,000 MWs of U.S. coal-fired capacity to be retired by 2020 from EPA’s Mercury and Air Toxics Standards and CSAPR and simply old age.
- EPA rules combined with state RPS goals and the relatively inexpensive and quick process for building new natural gas-fired generation will drive sharp growth in natural gas and renewable capacity.

Estimate 75,000 MWs of new natural gas-fired capacity to be added by 2015 in the low-growth economic scenario and 90,000 MWs in the high-growth scenario.

- Low growth model – 39% coal, 25% natural gas, 20% nuclear, 10% renewable, 6% hydro
- High growth model – 36% coal, 30% natural gas, 20% nuclear, 11% renewable, 5% hydro
Exports are a great stabilizer but the overall impact on U.S. demand will be small; however, the ability to create sustainable markets is imperative.

**Cove Point**
Equity: Dominion
Regas Cap: BP, Shell, Statoil

**Lake Charles**
Equity: Energy Transfer
Regas Cap: BG

**Sabine Pass (Approved)**
Equity: Cheniere
Regas Cap: Cheniere, Chevron, Total
Off Takers: BG, GAIL, Korea Gas, Fenosa

**Jordan Cove (Approved)**
Equity: Ft Chicago Energy Partners

**Cameron**
Equity: Sempra
Regas Cap: Eni

**Freeport**
Equity: M. Smith, Zachry American Infrastructure, Dow, Osaka Gas
Regas Cap: ConocoPhillips, Dow, Mitsubishi, Macquarie

**Carib Energy**
Equity: EFG Industries, Argosy Transportation Group

Contemplated LNG export volumes are 6 bcf/day

Existing Onshore Regasification Terminal
Site approved for regasification
Approved LNG Export Project
NATURAL GAS IN TRANSPORTATION
FUELING THE FUTURE
TRANSPORTATION: THE AMERICAN DILEMMA
TRANSPORTATION: 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?
Current domestic and international challenges will likely keep upward pressure on the price of diesel in 2013 and beyond

- Refinery constraints in 2012 – 2015
- Diesel exports have increased by 28% since 2010
- Geopolitical issues, particularly associated with Iran
- 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?
NATURAL GAS VEHICLES ARE AN ANSWER TO RISING FUEL PRICES

Price of Oil vs. Natural Gas

- If NYMEX is $4.00/mcf
  - CNG will be $1.50/dge
  - LNG will be $2.00/dge
- If NYMEX is $8.00/mcf
  - CNG will be $2.00/dge
  - LNG will be $2.50/dge
- If NYMEX is $12.00/mcf
  - CNG will be $2.50/dge
  - LNG will be $3.00/dge

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

Source:
- Henry Hub CERA Reference Case (Feb 2010/032510 Briefing), IHS Global Insight WTI June '09, CERA, NYMEX (as of 1/30/12)
TRANSPORTATION: THE MARKET IS MOVING EVEN IF FEDERAL GOVERNMENT IS NOT

- New bi-fuel trucks and vans to be introduced by Ford, Chrysler (Dodge), and General Motors in 2013
- New natural gas HD truck engines by Cummins-Westport, Navistar, and Caterpillar
- New affordable home fueling appliances to provide potential lease opportunities by local gas utilities
- Retailers offering CNG; market is growing daily
- Investments being made in LNG fueling
- New CNG tank technology – 3M and CHK
- New fueling equipment – improvements and standardizations
DETOUR ROLLS OUT CNG IN 2012
OVER-THE-ROAD PLATFORM OFFERINGS

Cummins Westport ISL-G 8.9L

Volvo VNM

Kenworth T440
Kenworth T800SH

Freightliner M2

Peterbilt 384

Cummins Westport ISX-G 11.9L

Volvo VN Series

Kenworth T660

Freightliner Cascadia

Peterbilt

Westport HD GX 15L

Kenworth T800

Peterbilt 386

Peterbilt 388
## HD NATURAL GAS ENGINE AVAILABILITY

<table>
<thead>
<tr>
<th>Manufacturer</th>
<th>Engine</th>
<th>HP &amp; Torque</th>
<th>CNG or LNG</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>CNG or LNG</td>
<td>Available</td>
</tr>
<tr>
<td>Cummins Westport</td>
<td>ISX-G 11.9L</td>
<td>400 HP – 1400 #/ft</td>
<td>CNG or LNG</td>
<td>4Q 2013</td>
</tr>
<tr>
<td>Westport HD</td>
<td>GX 15L</td>
<td>475 HP – 1750 #/ft</td>
<td>LNG</td>
<td>Available</td>
</tr>
<tr>
<td>Navistar - ESI</td>
<td>Phoenix 7.6L</td>
<td>300 HP – 860 #/ft</td>
<td>CNG</td>
<td>Available</td>
</tr>
<tr>
<td>Navistar - ESI</td>
<td>Maxxforce 9.3L</td>
<td>375 HP – 1280 #/ft</td>
<td>CNG</td>
<td>3Q 2012</td>
</tr>
<tr>
<td>Navistar – CAP</td>
<td>Maxxforce 13L</td>
<td>430 HP – 1550 #/ft</td>
<td>CNG or LNG</td>
<td>TBD</td>
</tr>
<tr>
<td>Doosan Infracore</td>
<td>GK12 11L</td>
<td>290 HP – 905 #/ft</td>
<td>CNG</td>
<td>Available</td>
</tr>
</tbody>
</table>
EXAMPLES OF STRONG SYNERGIES AND NATIONAL PARTNERSHIPS IN WHICH INDUSTRY IS ENGAGED

- **JB Hunt**
  - Intermodal transport
  - Utilization of NG and increasing appetite for E&P business growth

- **CSX**
  - Ships JB Freight
  - Uses NG engines to reduce costs
  - Ships NGLs, steel, water, crude, sand, etc.

- **General Electric**
  - Manufactures engines for locomotives
  - Largest manufacturer at highly efficient CCGTs
  - Vested NG stakeholder – demand and supply

- **US Steel**
  - Steel for tubulars/pipelines
  - Uses natural gas for operations/fleet
  - Provides important political support by non-traditional E&P industry legislators

- **CHK**
  - Supply chain management
  - NG demand/supply efforts
TRANSPORTATION: INFRASTRUCTURE IS GROWING

Public CNG Fueling Coming to Stations Near You

No better way to encourage drilling operations than to save consumers 50% of transportation fuel bills
OKLAHOMA CNG INFRASTRUCTURE

CNG Fueling Locations within Oklahoma
Current as of Aug. 22, 2012

Compressed Natural Gas Station Location Index

<table>
<thead>
<tr>
<th>Location Name</th>
<th>Address</th>
<th>City</th>
<th>State</th>
<th>Zip Code</th>
</tr>
</thead>
<tbody>
<tr>
<td>...</td>
<td>...</td>
<td>...</td>
<td>...</td>
<td>...</td>
</tr>
</tbody>
</table>

Legend:
- CNG Station
- Highway
- Major Road
- County
- Township

Chesapeake Energy

CNG NOW!
DON’T WORRY... THERE IS AN APP FOR THAT!

- Free iPhone and Android Application
  - Locate and Plan your next trip
  - Get the latest News
  - Update Prices
  - Post to Facebook or Twitter
  - Post Pictures of the Station

Create your own profile at www.cngnow.com
A CALL TO ACTION

- We, as a nation, must embrace new demand opportunities for natural gas and we must support them.

- Advocate for increased utilization in all sectors:
  - Power, Industrial, Export, Transportation

- Drive a CNG vehicle, and advocate within company for greater usage of the fuel within all applications.

- Tell others about the exciting opportunities for greater use of natural gas.

- Work synergistically within industry to create solutions, improve markets, educate and engage public policy discussions, and improve the social license to operate.
Water Intensity of Transportation Fuels

- Compressed Natural Gas (CNG)
- Ethanol from Irrigated Corn Grain: 2,800 gallons
- Ethanol from Irrigated Corn Stover: 1,900 gallons
- Biodiesel from Irrigated Soybeans: 800 gallons
- Hydrogen via Electrolysis: 42 gallons
- Syn Diesel from Coal: 38.5 gallons
- Electric Vehicle (Electric from Nuclear)*: 35 gallons
- Oil Sands Gasoline: 33 gallons
- Syn Diesel from Natural Gas: 27.5 gallons
- Oil Shale Gasoline: 26 gallons
- Electric Vehicle (Electric from Coal)*: 23 gallons
- Gasoline: 10.5 gallons
- Electric Vehicle (Electric from Shale NG)*: 10 gallons
- Diesel: 8 gallons
- CNG using Electricity for Compression: 6.5 gallons
- Hydrogen from Natural Gas: 6 gallons
- CNG using NG Generator for Compression: 3 gallons

Average Consumption: Gallons of Water Per 100 Miles Driven

- Gasoline with 10% irrigated ethanol blend: ~ 200 gallons water consumed per 100 miles driven

Source: Adapted from King and Webber 2008a; *Adapted from King and Webber 2008b, combined with data from USDOE 2006

Non-irrigated biofuels not shown on plot above
PICKUP – BREAK EVEN ANALYSIS

- **Ford F-250**
  - 16 mpg – 24,000 miles per year
  - 1,500 GGE/year
  - Cost Premium: $9,000
  - Increased Resale: $4,500
  - Bi-Fuel CNG/Gasoline

- **At Fuel Differential of $1.50**
  - Simple payback in 4 years
  - Net Life Cycle Savings: $4,500
    - 100,000 mile turnover target

Increased resale assumption based upon recent auction prices achieved by Chesapeake Energy