The Emerging Geopolitics of the Globalizing Natural Gas Market and Ramifications for the North American Producer

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Coincidence of High Oil Prices with Financial Crises
Currency & Banking Crises Severest 1850s-70s, 1970s–
Many of the risks that were driving the so-called “terror premium” eased in 2008, removing a key psychological support to high prices. (Syrian-Israeli dialogue; Iranian elections; reduction in violence in Iraq; weakening of Al-Qaeda’s international coordination structure; improved emergency hurricane response in US)

Similarly, extreme co-movements in global financial markets remain a key threat to the smooth operation of global energy markets and will drive severe volatility in oil prices for the foreseeable future.

The first effect was a dollar flight-led bubble rally in oil as an asset class in late spring and summer.

Second effect is the bubble liquidation as financial players had to repatriate assets in August and September.

Lasting effect is the impact on oil demand from slowing global economy and U.S. consumer response.

Credit squeeze impacting operation of over-the-counter oil trading markets. Official paper markets still functioning because exchange guarantees counter party risk but market liquidity could emerge as a challenge for off exchange trading, limiting speculation.

Credit issues also impacted the amount of physical oil refiners would hold in advance over the autumn, creating contango in spot market. Speculators holding physical oil on the water and in storage.

Longer term, outlook is more bullish...

Uncertainty about climate policy and problems in global credit markets are dampening the investment response.

Moreover, NOC investment is also thwarted by civil unrest, government interference, corruption, inefficiency, and diversion of capital to social spending. As a result, many NOCs will have stagnant to declining production profiles.
US Oil Demand

- Demand is influenced by a number of factors.
  - Income, Price, Weather (heating load), Vehicle efficiency
  - Short run elasticities estimated as:
    - Price = -0.0508 ... Thus, a 1% increase in price would result in a decline in demand of 0.05%.
    - Income = 0.3518 ... Thus, a 1% decline in GDP would result in a decline in demand of 0.35%.
    - Fuel Efficiency = -0.7906 ... Thus, a 1% increase in efficiency would result in a decline in demand of 0.79%.
    - HDD = 0.1654 ... Thus, a 1% increase in HDD (colder weather) would result in an increase in demand of 0.17%.
      - Majority of adjustment occurs within a decade (lag coefficient = 0.4567)
  - The last four years and what we might expect for 2008-2010...
• Meet Budget Requirements
• New Attitudes that Financial Surpluses Might be Squandered or Mis-invested Anyway
• Ensure long term demand for oil
• Slow down shift to more fuel efficient cars, discourage massive investments in alternative energy
• Protect dollar asset holdings and promote a shallow and short recession
• Protect geopolitical influence through power in oil market, playing an important role in stabilizing global financial crisis
  – Saudi Arabia: 4th largest asset holder in the world at $575 billion
  – Largest current account surplus and trade surplus in the Middle East at $150 billion, ranking it in surplus terms in the top 5 worldwide
  – Saudi Arabia is among the top five largest creditors to the international financial system
• Reduce the influence of Russia, Iran and Venezuela
The Marginal Cost of Supply is Changing

Base marginal cost used to be $10 to 20, unconventional oil sands push to new highs last year but now deflation is changing the picture.

Source: Booz Allen/IEA - Assumed average vs. marginal costs; 10% return for conventional and 13% return for unconventional technologies; no subsidies for biofuels; no carbon offset costs; after severance and production taxes.
- Tar Sands cost outlook (Credit Suisse) $30 current mining operations; $80 for new projects to generate a 10% after tax return
- Company announcements of delays – Game of chicken?
- Exploration budgets haven’t really been cut. Stock buybacks have been cut.
- Majors committed to unconventional plays. Major spending cuts not likely. Long term average prices matter more than “today’s price,” ala the so-called ExxonMobil world view.
- Current market conditions seen as opportunity to pick up acreage from weaker financed players.
- Companies don’t believe in permanently low prices.
- Even if OPEC plays open up, unconventionals remain a key part of the strategy, maintain assets with lower geopolitical risk.
- IOC’s have cash and markets are recognizing their superior capital positions.
- What will ExxonMobil buy??
- Majors shopping for shale…
### Obama on energy policy

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<td>•Yes: reduce emissions 80% from 1990 levels by 2050</td>
<td>•Increase fuel economy beyond 35mpg</td>
<td>25% by 2025</td>
<td>•Supports limited offshore drilling (1Aug2008)</td>
<td>•Proposes creation of green energy jobs in the stimulus package</td>
<td>•Proposes $7,000 tax credit on the purchase of fuel-efficient cars</td>
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<td>•100% permit auction</td>
<td>•52 mpg by 2025</td>
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<td>•Prioritize the Construction of the Alaska Natural Gas Pipeline</td>
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<td>•Proposes that new vehicles sold in US are flex-fuel by the end of his first term: $4 billion in loans/tax credits to U.S. auto plants</td>
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<td>•Supports Low Carbon Fuel Standard</td>
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<td>•Supports extending tax credit for renewable energy production</td>
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New U.S. Efficiency Standards Will Reduce U.S. Oil Demand

- Fuel efficiency improvements have significant benefit, but are offset by growth in vehicle stocks and miles driven (income and “rebound” effects)
  - High prices are revealing a demand response as recent U.S. miles driven data are slightly lower
- Similar arguments hold in all countries, with potential for efficiency improvement varying across countries
- Policy is multi-pronged in its approach
  - A technological breakthrough, such as with plug-in hybrid vehicles, could push demand lower into the future. Once these alternatives are adopted, the market is forever changed
  - Biofuels can induce even further reductions in demand

**Notes:**
*CAFE phased in according to Senate bill by 2020
** Efficiency improvements accelerate in 2015
In both cases, new vehicles penetrate the stock at 6.5% per year
Globally, Demand for Natural Gas Has Been Growing Rapidly

- Natural gas use doubled from 1980-2005
  - Natural gas demand growth rate of 2.75% per annum
  - Comparatively, coal grew at 2% per annum and oil at 1% per annum
  - As a result, the share of natural gas in primary energy supply has been rising.
  - 2009 will see a setback in this trend, with estimates that US “demand destruction” could exceed 2 Bcf/d this winter. (Natural gas demand among steel and iron producers down 35% year on year. Industrial demand alone could be 1.3 Bcf/d lower this winter giving idling of plants by Dow, Dupont, and automakers, etc).
  - Longer term, environmental pressures could mean natural gas use could overtake oil. As gas’ share grows, it is becoming more “geopolitical.”

**1980**

Total Energy = 284 Quads

- Nuclear: 6%
- Renewables: 4%
- Petroleum: 46%
- Natural Gas: 19%
- Coal: 25%

**2005**

Total Energy = 455 Quads

- Nuclear: 6%
- Renewables: 8%
- Petroleum: 37%
- Natural Gas: 23%
- Coal: 26%

Source: EIA
**LNG will grow in share of global gas trade**

- North America will become an increasingly influential influence of a global market! What we do here will influence developments elsewhere.
  - Geopolitics and US energy policy will have a big impact on global gas market

- Key areas to watch
  - US gas shale likely to continue to limit opportunities for LNG imports to the US; majors will pick up prime properties from weakly financed players.
  - Impact of lifting of US access restrictions would dampen or delay demand for natural gas from Iran, Russia and other Middle East latent suppliers.
  - US carbon policies also likely to have large influence on global trends, creating extra demand for natural gas.

*Source: Papers and presentations available at [www.rice.edu/energy](http://www.rice.edu/energy)*
• Baker Institute model illustrates scenarios for a *world* market of expanding depth and geographical extent
• Transition to a world market could be rapid
  – An *expectation* of new market dynamics encourages moving away from bilateral trading
    • More *potential* trading partners lowers the risk of investing without complete long-term contract coverage
    • A decrease in average distances between suppliers and/or customers increases arbitrage opportunities
• Bilateral contracts can be fulfilled by *swap agreements* as increased market depth increases the number of profitable alternatives
  – Contracts can be viewed as financial arrangements that do not necessarily constrain physical trades
Key Trends in the global commoditization of natural gas

- An integrated global gas market is emerging in which events in any individual region or country will affect all regions.

- This market integration will have major ramifications for both large gas consumers and producers and increase the visibility of geopolitical influences on gas market fundamentals and pricing.

- Price impacts are being transmitted through contract for differences and shifting destinations for LNG.

- A Gas OPEC will be hard to organize over next decade or so because of fringe producers and higher substitutability of gas with other competing fuels.

- The fate of exploration and production policies in the US and Russia will have major bearing on the level of dependence key natural gas consumers will have on Middle East natural gas exports.
Developments in Shale Gas

- Very active area of exploration and development
  - NCI assessment indicates 275-840 tcf of technically recoverable shale gas
    - Differences driven primarily by producer reports for the Haynesville and Marcellus.
    - Even low end is higher than EIA’s 125 tcf (AEO2008) or the 131 tcf cited by PGC (2006)
    - Do not include Canada (Montney, Horn River) which might be as high as 71 tcf.
    - These are technically recoverable estimates. Costs may be an impediment.
      - Breakeven estimated at roughly $4-7/mcf in most plays. Favors Appalachian developments.
Developments in Shale Gas (cont.)

- Shale plays in Canada are also being developed.
- Most active areas are in the Horn River and Montney plays in BC and Alberta.
- Supply potential in BC, in particular, has pushed the idea of LNG exports targeting the Asian market
  - Asia is a premium market.
  - Competing projects include pipelines from Russia and the Caspian States, as well as LNG from other locales.
- BC is a basis disadvantaged market, but selling to Asia could provide much more value to developers.
- Utica Shale in Quebec has been compared to the Barnett in Texas, and price is even more favorable.
2009E Operating Cash Flow (Source: Morgan Stanley)

- XOM
- RDS
- BP
- CVX
- TOT
- ENI
- COP
- STO
- REP
- OXY

Legend:
- Dividends
- Capex
- Additional Operating Cash Flow
IOCs may have less cash available but share buy backs, not exploration, likely to be cut: Still shopping for attractive assets.

**Spending Capacity of IOCs (2005 – 2012)**

- **Capex**
- **FCF**

**Free Cash Flow of IOCs (2005 – 2012)**

- **FCF**
Many Independents now experiencing cash flow deficits.

**Operating Cash Flow Deficits**  (Source: Morgan Stanley)

- ECA: $10,000
- APA: $7,500
- DVN: $5,000
- CHK: $2,500
- EOG: $0
- HES: $0
- SWN: $0
- SD: $0
- HK: $0
- XCO: $0
- KWK: $0
- WLL: $0
- PVA: $0
- GMXR: $0
- GDP: $0
- PETD: $0

- Operating Cash Flow
- Funding Shortfall
Under base case, new U.S. Shale finds will constitute an increasing share of the market

- U.S. shale assessment has been expanded by 145 trillion cubic feet to total of 284 tcf
- Additional shale in Canada assessed at 71 tcf
- Shale forecast to be an increasing share of U.S. supply
- U.S. LNG import rates could flatten for a decade or more
- Green policies could influence this trend by buttressing demand and creating an earlier window for LNG flows to grow
Energy Security Policy vs. Climate Policy: “Two sides of the same coin?”

- There is tremendous uncertainty in the price of carbon in a tradable permit scheme. This tends to increase the “option value” of waiting to make future investments.
- Carbon prices in core scenarios range across models.
  - Generally prices increase with restrictions, and technology assumptions are crucial.
CO$_2$–intensity of fossil fuels

Energy (10$^8$ joules)

Source: EIA
Reduced emissions spells large upward growth in nat gas demand outlook in the United States.
• First mover advantage has dictated market dynamic until now, promoting supply growth
• Russia seeking coordination, flexing its muscle
• So far, Middle East suppliers are an important alternative supply to Russia but might that change over time?
• Latent supply in Iran, Iraq, and Saudi would kick in earlier if Russian problems create a window; Qatar has been first out of the gate.
• In the short run, there’s lots of alternative suppliers but over time, market concentration could look more like oil, with more potential for coordination.
• Russia is dependent on natural resource exports for its well being and growth. Energy policy has been core foreign policy vehicle for asserting itself on the international stage.

• Resurrection of a strong state with government control of the “commanding heights.” This especially true of energy sector.

• Russia wants to regain its status as a super power and reassert its influence in the FSU. Populist pressures at home, politicians play to public sentiment even if some threats aren’t realistic (shifting exports to China) or are counterproductive (cutoffs that damage Russia’s reputation as a reliable supplier).
Europe has responded to Russian saber-rattling with lower purchases.
• US policies toward the FSU conflict with Russian ambitions:
  – Promote pro-western democracies
  – Expand NATO and EU
  – Establish ties with Central Asian republics
  – Promote alternative pipeline routes for central Asian oil and gas resources
• Is Russia in a pincher movement over energy supply?
• Is a Gas OPEC possible?
• How is Europe responding? Russia taking a divide and rule tactic. European countries have varying levels of exposure to the Russian gas risk. European gas monopolies also block an effective EU response.
2006: Gazprom attempts natural gas swaps agreement with Algeria's Sonatrach

2007: Gazprom signs with ENI for share in pipeline from Libya to Southern Europe

2007: Negotiates multi-year swaps with Qatar to control price of gas in European pipelines
Natural gas supply to Europe—Extreme price impacts but market adjustments possible starting after a year.
Impacts. LNG impacts mean supply adjustments divided among many players, not just EU.
• Russia supplies military equipment and nuclear technology and protection against possible UN sanctions
• Russia gets an ally in Persian Gulf – Iran can exert pressure on Saudi Arabia
• Both get reduced US influence in Gulf
• End game: Iran can disrupt Persian Gulf oil flows
• According to the USGS, Iran holds the second largest natural gas resource potential in the world. According to the Oil and Gas Journal, Iran holds the second largest oil reserves (not including non-conventional oil). However, much of that resource may never reach major markets. If, for example, nuclear proliferation conflicts escalate, sanctions could effectively strand Iran’s resources. Ironically (or maybe not), Russia benefits from Iran’s geopolitical problems.

• A fugitive resource conflict exists in Qatar’s North field and Iran’s South Pars field. Iranian Deputy Oil Minister Hadi Nejad-Hosseini in April 2004:

Accused Qatar of overproducing gas at the fringes of the North Field and warned that if Qatar didn’t enter negotiations about slowing its production, Iran will find “other ways and means of resolving the issue.”

More recently, Iran has suggested joint development cooperation, including a possible joint border platform as part of three way talks between Russia, Iran and Qatar. Sharing of facilities and supply swaps have been mooted.
• High oil and gas prices
• Collusion with/influence on OPEC and future Gas-OPEC
  – Russia is trying to influence policies of other producers
  – Russia continues to try to assert control over Central Asian resources
• If oil prices continue to be low, will Russian be more willing to use military power to defend its interests or to sow geopolitical instability? Foreign adventures to unify domestic population? More desperate attempts to drive prices higher via export cutbacks or pressuring other suppliers or transit countries?
• Distribution of gas reserves is concentrated
• Gas exports are even more concentrated.
  – Russia has 28%
  – Top 7 have 79% of exports
  – But Canada, Norway and Netherlands with 30% of exports are not likely to join
    – Only significant Middle East exporter is Qatar with 2.6%
• But export concentration reflects underdevelopment of gas deposits in many countries.
• More widespread development can potentially create many sources of supply, thwarting cartelization. (the supply elasticity of non-members of a cartel is large in short - intermediate term)
• Little power at present
  – Attempts to prevent European liberalization
  – Algerian gas for Boston
• Too many members with competing interests to constrain capacity expansion in intermediate term.
• As in oil, world will become increasingly dependent on few sources of gas after 2030
• Russia and OPEC will have incentives to coordinate pricing of oil and gas
• Consuming nations can reduce market power of exporters by
  – Promoting competition among energy sources by
    • Liberalizing domestic energy sectors
    • Developing technologies that facilitate fuel switching
  – Improving energy efficiency