

25th world gas conference
“Gas: Sustaining Future Global Growth”

NATURAL GAS MARKETS IN NORTH AMERICA: WHAT'S NEXT?

Will cheap and abundant natural gas make North America more competitive and independent?

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Eurasia Group overview

- Founded in 1998, Eurasia Group has offices in New York, Washington DC, London, and Tokyo
- 50+ full-time country experts all trained as political scientists
- Global network of several hundred in-country experts
- Eurasia Group services corporations, financial institutions, and government organizations



What is political risk?

The probability that a political action (or non-action) alters the expected value of a given economic action or the expected outcome of a government policy

Levels of risk	Examples	
Global	<ul style="list-style-type: none"> ▪ War ▪ Migration 	<ul style="list-style-type: none"> ▪ Global economic rebalancing ▪ Resource nationalism
Country	<ul style="list-style-type: none"> ▪ Regime instability ▪ Economic and social turmoil ▪ Regional instability 	<ul style="list-style-type: none"> ▪ Policy change/instability ▪ Expropriations/rule of law ▪ Capital controls/credit defaults
Industry	<ul style="list-style-type: none"> ▪ Regulatory efficiency ▪ Key legislation ▪ Environment/social license 	<ul style="list-style-type: none"> ▪ National champions/protectionism ▪ Corruption
Firm	<ul style="list-style-type: none"> ▪ Regulatory compliance ▪ Regional/sub-state politics 	<ul style="list-style-type: none"> ▪ Breaches of contract ▪ Labor & stakeholder management
Project	<ul style="list-style-type: none"> ▪ Permitting/corruption ▪ Forced equity transfer 	<ul style="list-style-type: none"> ▪ Self-generated risks ▪ Stakeholder management

Eurasia Group political risk tools

Business need	Eurasia Group service
Management strategy	Comparative risk assessments and rankings Country/thematic analyst workshops and risk identification exercises M&A support Government and stakeholder relations strategy
Monitoring	Geopolitical/policy advisory service Unconventional gas focused advisory Analyst access/help desk
Market entry	Frontier and emerging market country risk/due diligence Political risk power maps

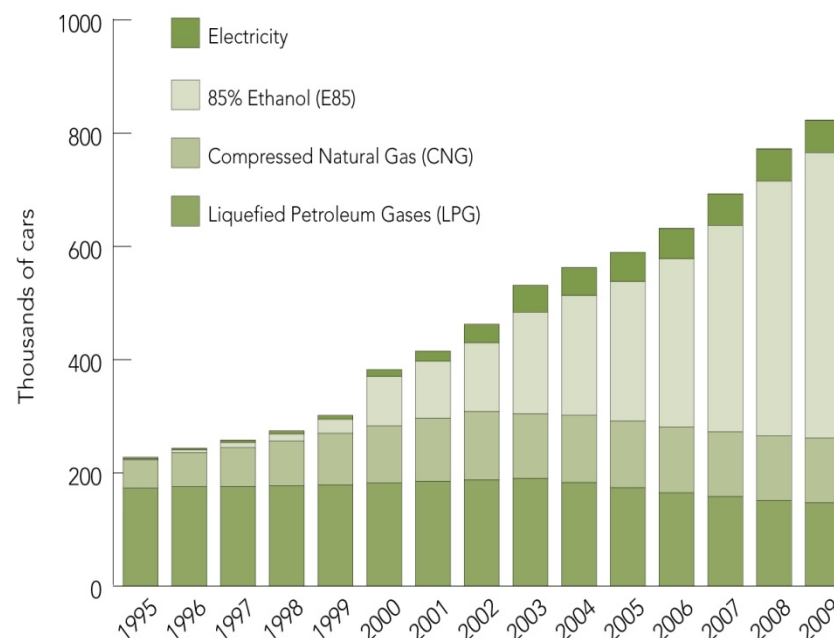
- The shale gas boom has profound implications far beyond the energy sector
- Resurgence of the industrial sector in the US and Canada is based on dramatically lower cost feedstock
- North America is becoming a petroleum exporter: LNG exports and exports of petrochemicals and other products that use gas either as a feedstock or fuel
- The US is steadily reducing its independence on imported oil and is now self-sufficient in natural gas which will have drastic consequences on the country's national energy security and geopolitics

NORTH AMERICA RENEWED INDUSTRIAL COMPETITIVENESS

Gas competitiveness in transportation

- Given the low price environment for natural gas, the switch to NGVs makes economic sense particularly in light and heavy-duty fleets and for long-haul trucking fleets
- MIT study: if these two vehicle classes were entirely converted to natural gas it could reduce oil demand by about 1.5 million bpd and increase gas demand by about 3 tcf/y in the US
- A number of companies such as UPS, Ryder, and Dillon have begun to convert their fleets
- However lack of available refueling infrastructure (which is expensive to build), and the \$40,000 price premium for natural gas trucks, will prevent full market penetration without assistance from subsidies

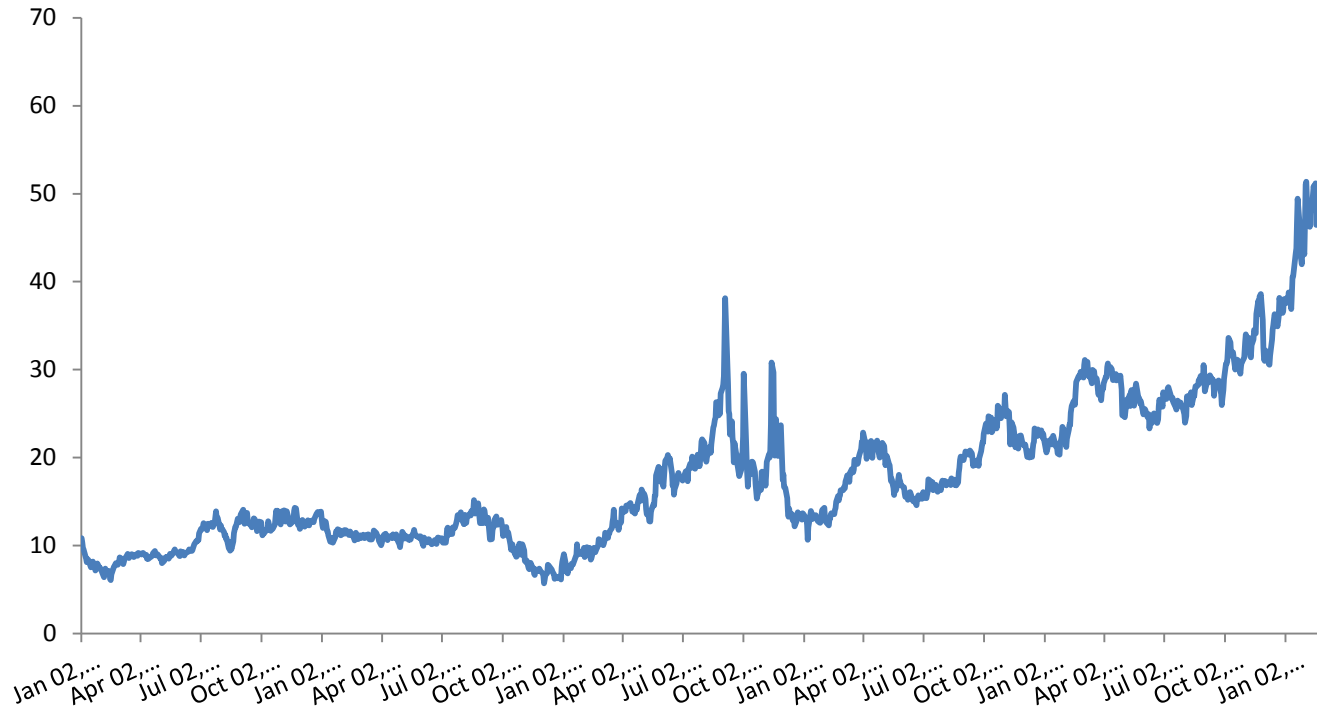
Alternative fueled vehicles in use



Source: EIA

Does the oil-gas price ratio create market incentives for NGV penetration and industrial renaissance?

Brent-Henry Hub price ratio, 2007-2012



Manufacturing and petrochemical growth

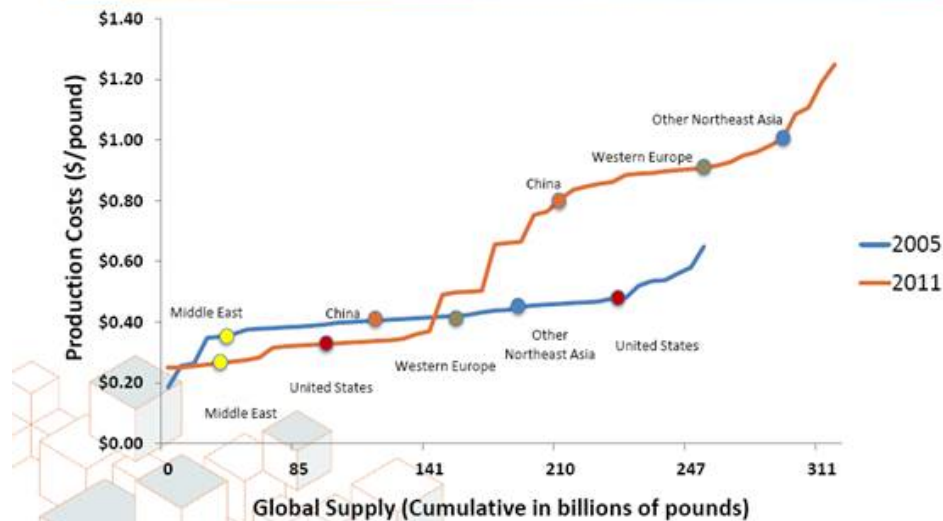
- Manufacturing resurgence is an emerging narrative in Washington debate over gas monetization
- Renaissance of the industrial sector in the US and Canada is based on the availability of dramatically lower cost feedstock than anywhere else in the world, with the possible exception of Qatar
- Industrial processes are being retooled to use natural gas instead of oil derivatives (eg, naphtha), due to gas's cost advantage which gives an edge to US producers over overseas producers
- Fuel substitution in the manufacturing sector would lower the overall cost of operation and improve competitiveness

US boom in petrochemical production

(from the American Chemistry Council)

- The petrochemical industry is a direct beneficiary of the boom in natural gas and NGLs/LPGs
- Chemical producers have plans to expand ethylene capacity in the US by more than 25% between now and 2017

Global Ethylene Supply Curve (Petrochemical Production Costs by Country/Region)



Petrochemical growth will be a Gulf Coast story

- The main area of interest for the petrochemical industry will continue to be the Gulf Coast where companies can rely on access to export markets. At least 15 projects are under construction or planned in the Gulf Coast region

Company	Project	Location	Capacity	Start date
Eastman Chemicals	Expansion of facility	Longview, Texas	Additional 37,000 tons/year	2012
Dow Chemical	Restart ethane cracker	St. Charles, Louisiana	390,000 tons/year	2012
Westlake Chemical	1st expansion ethane cracker	Lake Charles, Louisiana	108,863 tons/year	2H 2012
Westlake Chemical	2nd expansion ethane cracker	Lake Charles, Louisiana	Additional 113,399 tons/year	2013
Williams	Expansion ethane cracker	Geismar, Louisiana	Additional 272,158 tons/year	3Q 2013
INEOS	Expansion ethane capacity	Chocolate Bayou, Texas	115,000 tons/year	4Q 2013
Dow Chemical	Expand ethane capacity at existing cracker	Plaquemine, LA	n/a	2014
LyondellBasell	Expansion of ethane cracker	La Porte, Texas	386,000 tons/year	2014
Dow Chemical	Propelyne plant	Freeport, Texas	750,000 tons/year	2015
Formosa Plastics	Olefins cracker	Point Comfort, Texas	800,000 tons/year	2016
Formosa Plastics	Polyethylene plant	Point Comfort, Texas	300,000 tons/year	2016
Formosa Plastics	Propelyne plant		600,000 tons/year	2016
Chevron	Ethane cracker	Cedar Bayou, Texas	1.5 milion tons/year	2017
Chevron	Two polyethylene units	Sweeny, Texas	500,000 tons/year	2017
Dow Chemical	Ethane & propane cracker	Freeport, Texas	1.5 million tons/year	2017

GTL: Expensive way to monetize gas

- The gas to liquids (GTL) industry is in its infancy, but it may have significant room for growth, especially in North America, given abundant, cheap natural gas and high oil prices
- The one cause of concern is the economics of the industry which has high capital costs
- GTL production currently is tiny, just 182,700 bpd from three plants: two in Qatar and one in Malaysia
- The North American shale gas boom makes future GTL projects very attractive

Global GTL production

Country	Project name	Company	Status	Liquid capacity (bpd)
Existing				182,700
Qatar	Oryx GTL	Sasol, Qatar Petroleum	Operational	28,700
Qatar	Pearl GTL	Shell, State of Qatar	Operational	140,000
Malaysia	Bintulu	Shell, Mitsubishi, Petronas, Sarawak State.	Operational	14,000
Under construction, planned or under consideration				225,000
Nigeria	Escravos GTL (EGTL)	Sasol, NNPC, Chevron	Under construction	33,000
Uzbekistan		Uzbekneftegaz, Petronas, Sasol	Planned	48,000
Canada	British Columbia	Talisman, Sasol	Under consideration	48,000-96,000
US	Louisiana	Sasol	Under consideration	96,000

Source: Eurasia Group Research

NORTH AMERICA BECOMING A NET PETROLEUM EXPORTER

Washington cautious on LNG exports

- US LNG exports could total 6 bcf/day by 2020
- Obama is under pressure from the power & industrial sector and Democrats in Congress to keep supply in the US (and natural gas prices low)
- Department of Energy is reviewing eight pending applications (11.5 bcf/day total) and will review two reports on impacts of exports before making a decision
- Obama punting decision until after elections
- Renewed interest in Alaska LNG by ConocoPhillips, Exxon and BP to invest in a \$40 billion export facility in Port of Valdez

EIA Henry Hub price impact (\$/MMBTU, between 2015 and 2025)

<u>Export volumes</u>	<u>Reference case</u>	<u>High shale scenario</u>	<u>Low shale scenario</u>
No export	5.17	3.92	7.18
6 bcf/day export (slow)	5.69	4.29	8.16
6 bcf/day export (rapid)	5.83	4.43	8.41
12 bcf/day export (slow)	5.91	4.43	8.64
12 bcf/day export (rapid)	6.51	4.87	9.51

Canada LNG projects, consolidation expected

- Canada LNG exports likely to total 4 bcf/day by 2020
- Canadian projects have greater political support from both federal and provincial governments
 - Federal government keen on streamlining environmental and construction permit process
- Could be more competitive because of proximity to Asia, but higher greenfield costs and labor shortages will constrain development and lead to consolidation
- Canadian LNG exporters eager to secure oil-indexed price with Asian buyers
- The Apache-led project out of Kitimat appears keen on sticking to the its original timeline, with a final investment decision expected as early as first half of this year
- Horn River (estimated to hold at least 144 trillion cubic feet of recoverable gas) and the Montney (approximately 80 tcf) shale resources to supply LNG [?]

North America estimated project costs

Project	Location	Capacity charge	Pipeline	Shipping to Asia	Shipping to Europe
Cheniere	Gulf Coast, US	\$2.25-3.00	\$0.30	\$3.00	\$1.00
Kitimat LNG	BC, Canada	\$4.25-5.00e	\$0.75	\$0.85	N/A

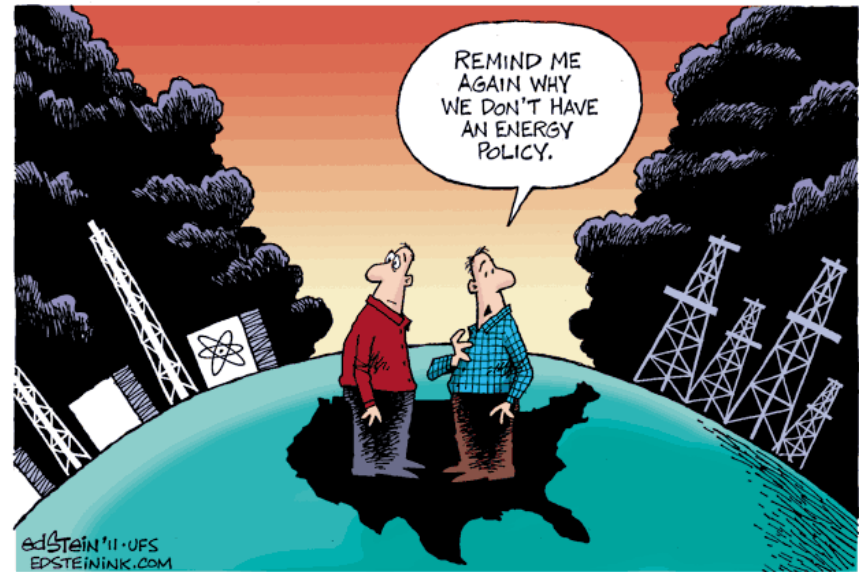
Source: Eurasia Group research, company filings

NORTH AMERICA GAS INDEPENDENCE: ECONOMY, TRADE BALANCE, GEOPOLITICS

Energy independence is no longer a joke

Closer than ever to Energy Independence
(since 1975)...

But no US national energy policy



Reduced vulnerability of North America and improved national energy security

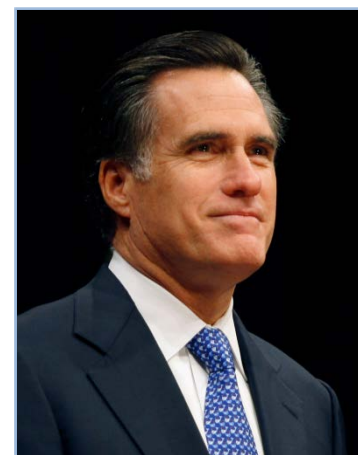
- The US has become a net petroleum exporting country and has edged out Russia as the world's largest producer of natural gas
- The reduced vulnerability of North America and improved national energy security had led to a decreased interest in Middle East (ME) oil and a renewed strategic interest in Asia, but may accentuate pressure for isolationism
- NA petroleum boom is challenge to OPEC and GECF, decrease the geopolitical power wielded by key petro-states
- North American natural gas exports could impact global gas pricing, eroding the appetite for oil-linked prices
- North America's new role as a petroleum exporter will play a central role in guaranteeing supply lines, protecting key consuming countries more than producer countries
- Fostering global shale resource potential in other parts of the world through the Global Shale Gas Initiative



NORTH AMERICA POLITICS MATTER: REGULATORY FRAMEWORK, OPPOSITION

US presidential election will affect energy policy in 2012

- The White House struggles to energize its environmental base while boosting economic growth and job creation
- Washington gridlock on energy policy expected until the elections: Obama administration will prefer to delay decisions whenever possible (Keystone XL, LNG exports)
- Republicans will go beyond pragmatic White House policy and position oil and gas as job creator with a more aggressive approach to expanding access in Eastern GOM, Atlantic, Alaska, federal lands, and Canadian oil sands
- Republicans will also bolster state role while curtailing EPA regulations for upstream oil & gas and the power sector



Unconventional oil and gas supply-side risks linger

- Though supply side risks are a lesser concern, the EPA will continue to intervene in cases of drinking water contamination
- The EPA will focus on wastewater and emissions (wastewater pretreatment, green completions), issuing guidance to state regulators
- Air emissions regulations finalized on 17 April will be watered down—White House pushed for two year delay in “green completions”
- Multi-year study on the impacts of fracking is unlikely to recommend blanket federal regulation

Washington policy timeline 2012-2014

Potential policy trigger	Date
EPA diesel guidance for Class II wells	2012
Air emissions guidelines for unconventional wells	April 2012
DOE induced seismicity study	April/May 2012
Presidential elections	Nov 2012
EPA hydraulic fracturing study preliminary results	Dec 2012
EPA wastewater pretreatment technology guidance	2014
EPA hydraulic fracturing study final results	2014
Congressional midterm elections	2014

Source: Eurasia Group research

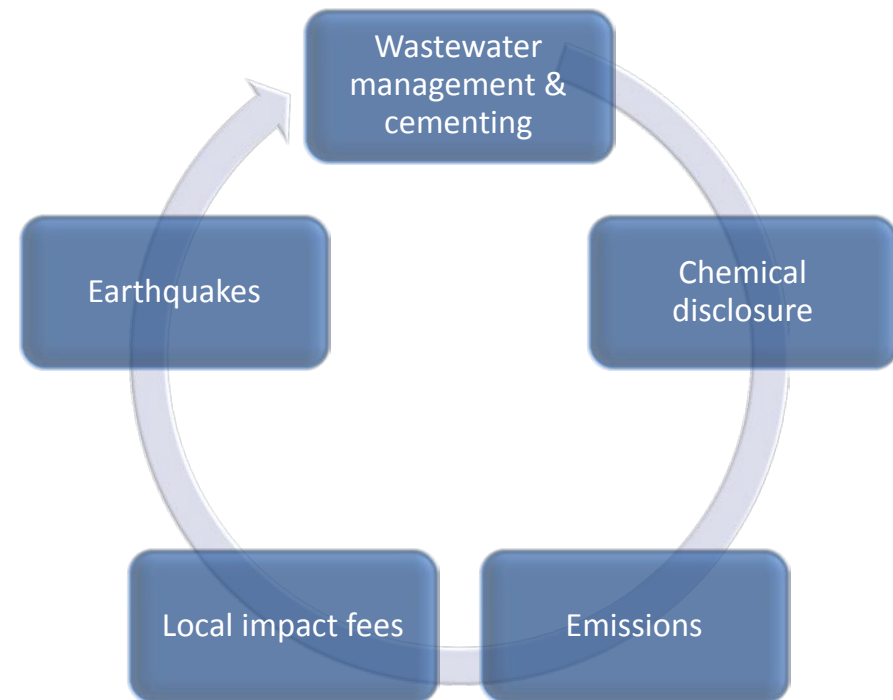
States to tighten regulations, adding costs

Wastewater

- Pennsylvania 's new wastewater treatment and cementing standards are likely to be implemented by other states
- Key for drillers will be onsite recycling and reducing water use
- States moving ahead on chemical disclosure

Seismic activity

- Tighter restrictions on underground injection are advancing, adding marginal costs
- Ohio's upcoming regulations could be strictest in the nation
- Existing technologies and sound operating procedures should mitigate risk
- In seismically active regions where opposition is already strong (California, NY) this could strengthen case against industry development



US resource nationalism: Prioritizing resources for domestic market

- The recent debate in the US regarding LNG exports has highlighted the growing politicization of the issue
- Two proposed bills from Democrats ban LNG exports
- While it is unlikely that these bills will pass Congress they underscore the political risks associated with US LNG export projects
- The increasingly heated opposition to exports from environmentalists, electric consumer groups, petrochemical, industrial, transportation sectors, and congressional Democrats is triggered by fear of an increase in Henry Hub prices, which would alter the economics of using gas as feedstock in the US chemical industry and discourage coal-to-gas switching

- The game-changing shale revolution is beginning to transform multiple industries and sectors in North America making them more competitive compared to overseas
- Thanks to the shale gas revolution which has spread to oil, the US is steadily reducing its independence on imported oil and is now self-sufficient in natural gas, becoming a net petroleum exporter
- But future growth is tied to natural gas production and politics could temper industrial renaissance by strengthening environmental regulations
- Resource nationalism does exist in North America

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