The U.S. Shale Gas Revolution & Its Impact on Vladimir Putin & Jared Polis

Presentation to:
Opportunity Coalition

By:
John Harpole

Mercator Energy

August 14, 2014

Vladimir Putin

Approximate net worth: $70 billion

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Jared Polis

Approximate net worth: over $200 million

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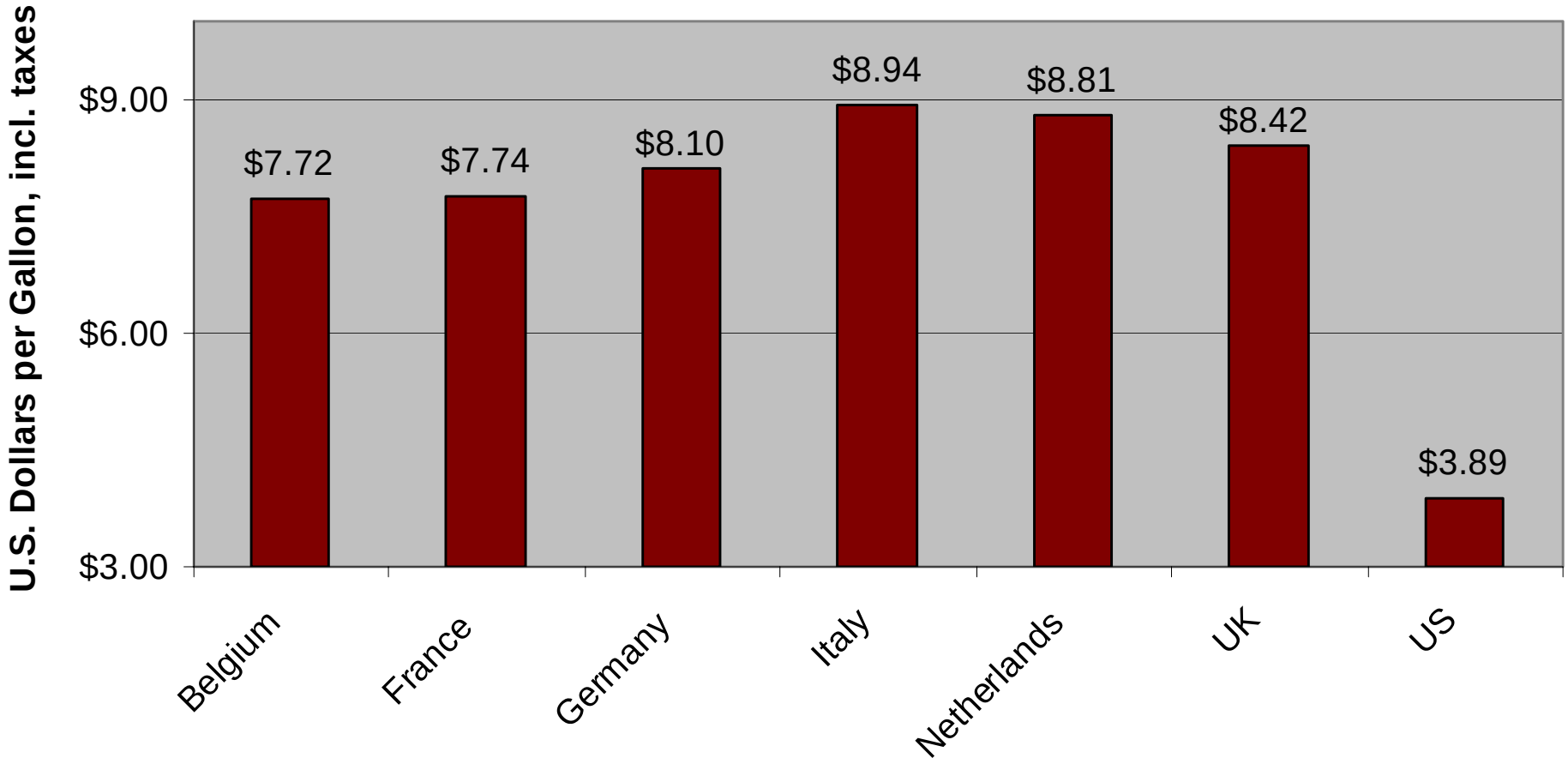
Retail Premium Gasoline Prices*



Source: U.S. Energy Information Administration,

Price as of 7/28/2014

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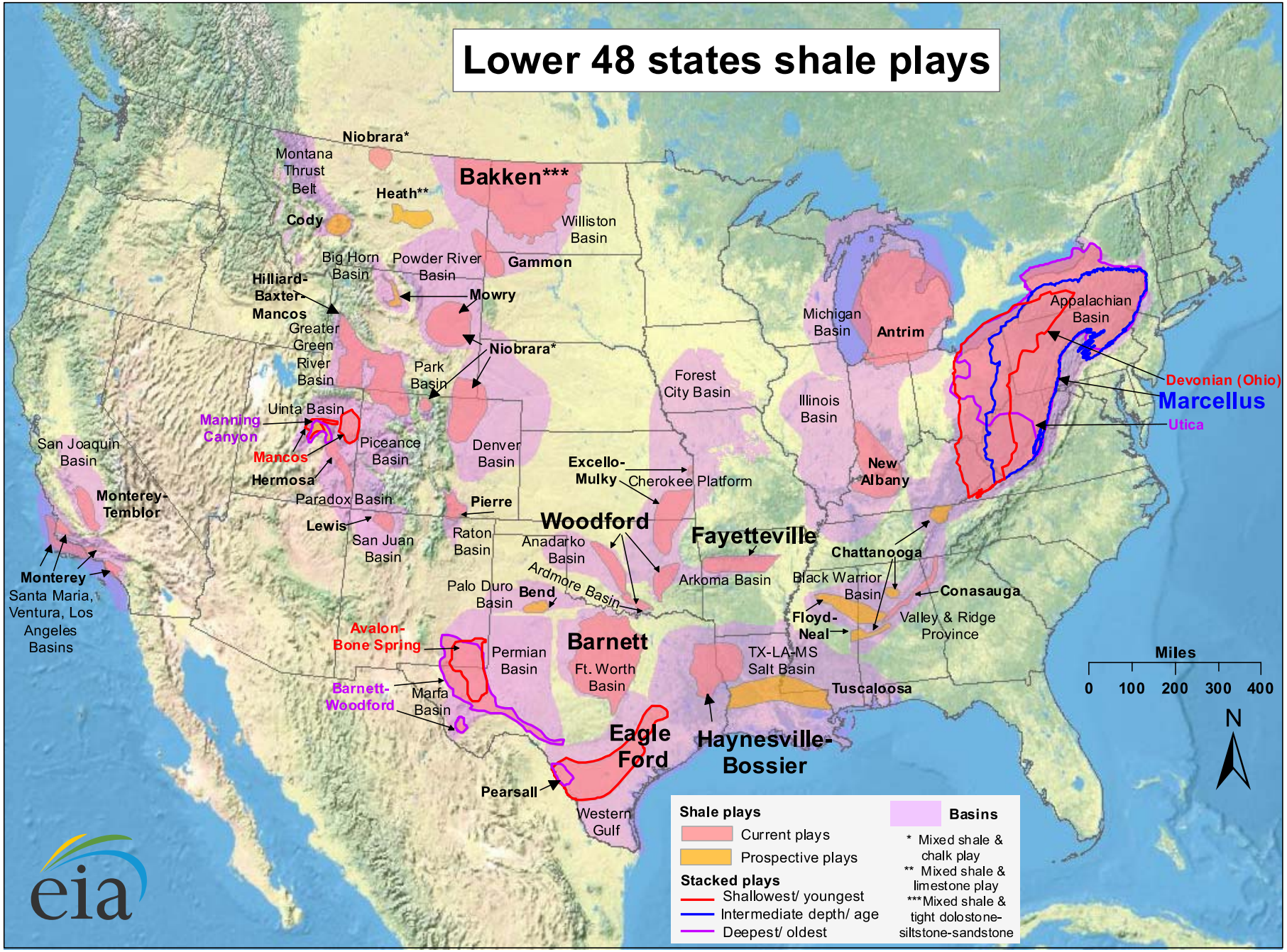
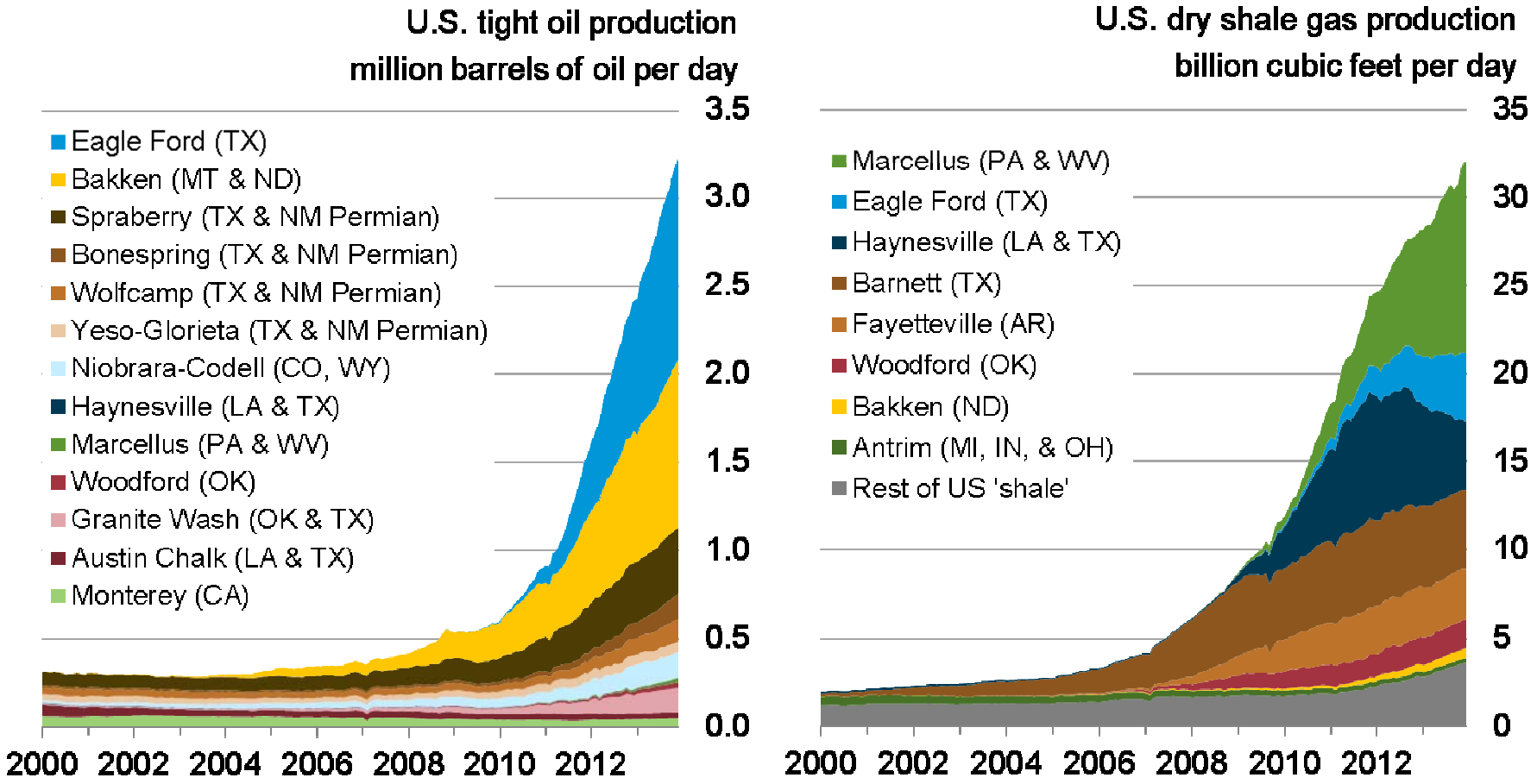


Source: Energy Information Administration based on data from various published studies.
Updated: May 9, 2011

The U.S. has experienced a rapid increase in natural gas and oil production from shale and other tight resources



Sources: EIA derived from state administrative data collected by DrillingInfo Inc. Data are through December 2013 and represent EIA's official tight oil & shale gas estimates, but are not survey data. State abbreviations indicate primary state(s).

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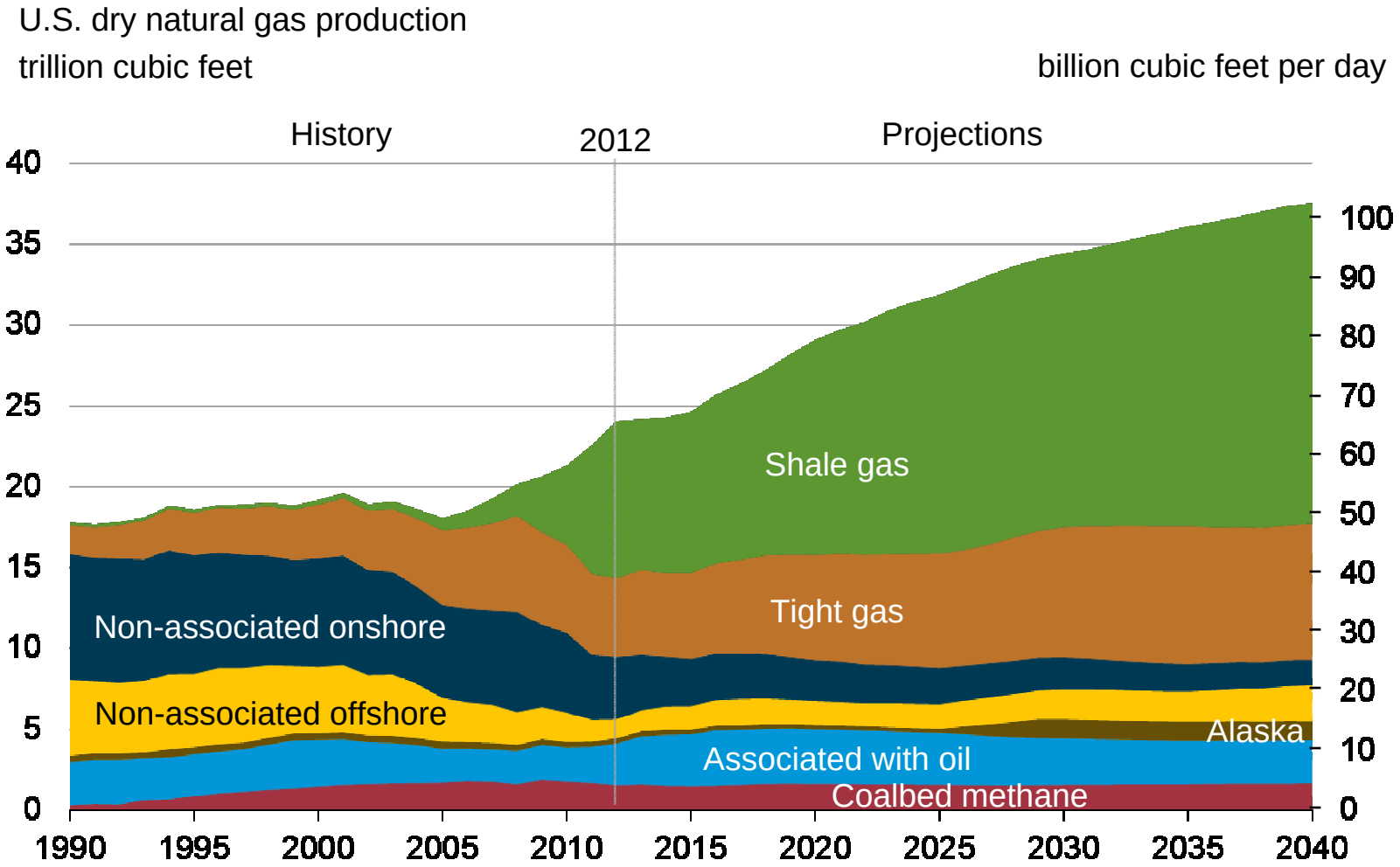
Source: *Outlook for U.S. shale oil and gas,* Presentation to Argus Americas Crude Summit, 01/22/2014, Adam Sieminski, EIA Administrator

U.S. shale gas leads growth in total gas production through 2040 to reach half of U.S. output



Source: EIA, Annual Energy Outlook 2014 Early Release

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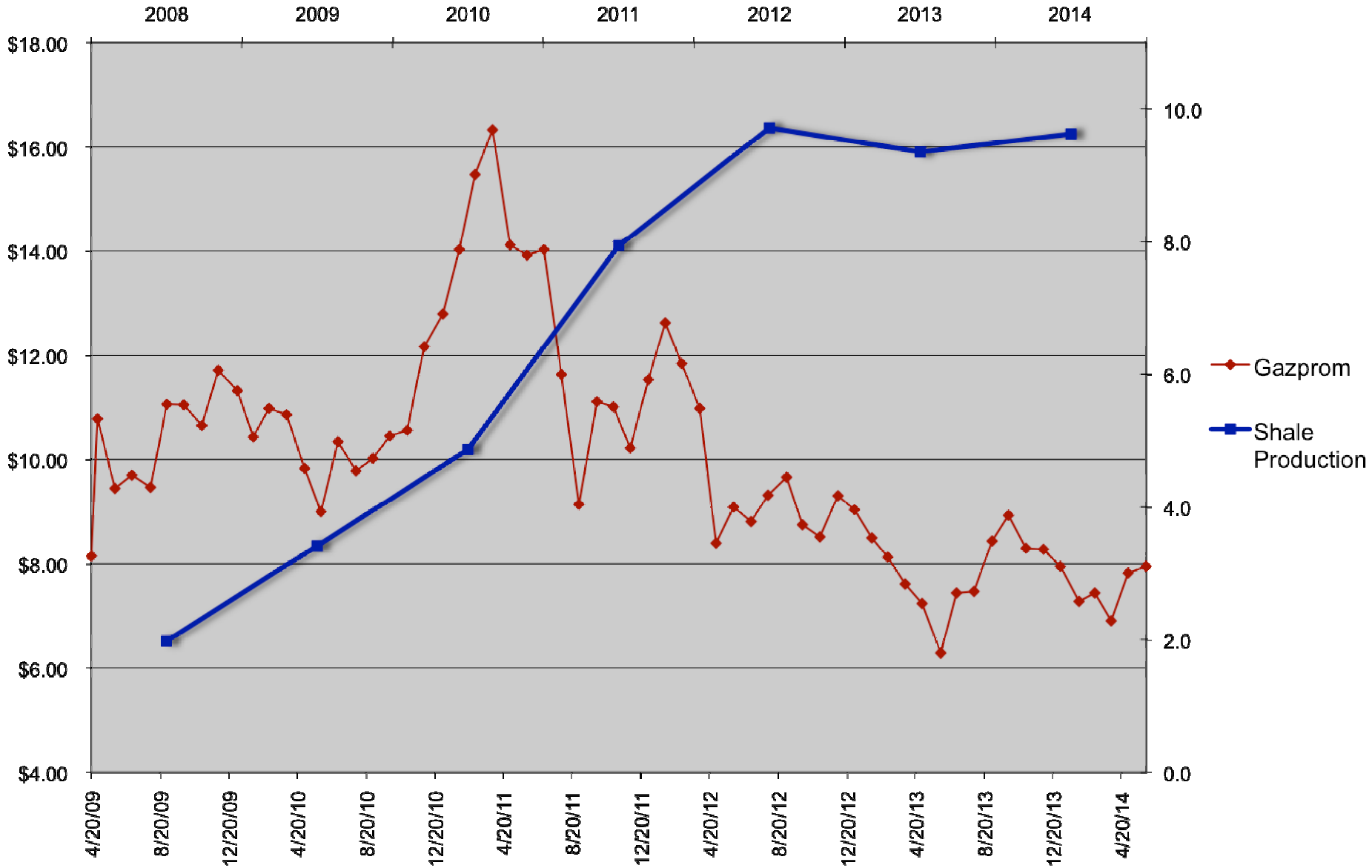
Source: *Outlook for U.S. shale oil and gas,* Presentation to Argus Americas Crude Summit, 01/22/2014, Adam Sieminski, EIA Administrator

Gazprom Share Price vs. US Shale Gas Production



The Four "R's" of Natural Gas & Energy Security:

Russia — Rockies Gas

Rig Count — Renewables

Presentation to:
Club 20's Spring Meeting
Grand Junction, CO

April 4, 2009

By:
John A. Harpole

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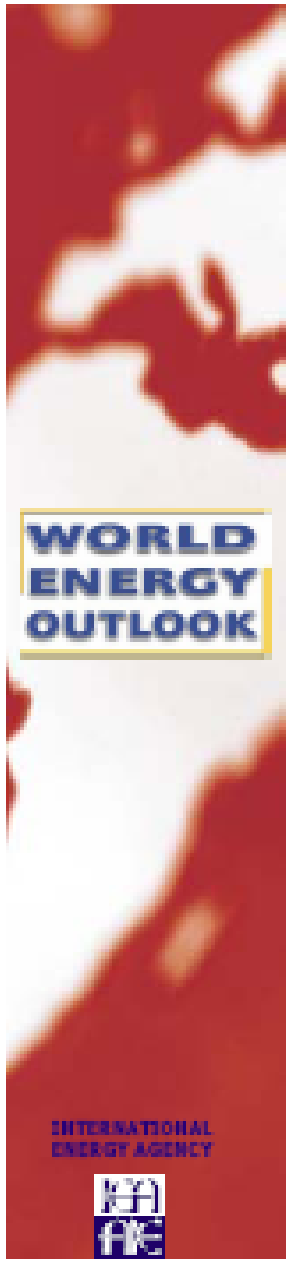
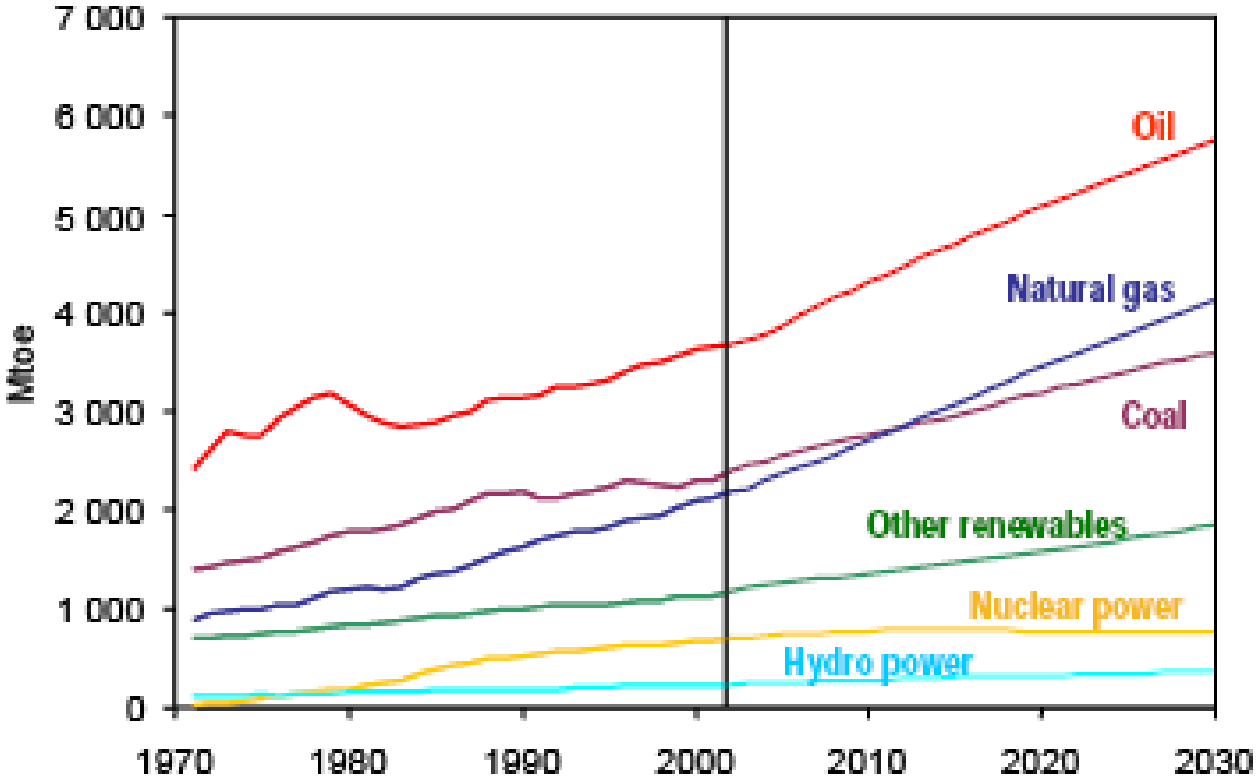


World Primary Energy Demand



Fossil fuels account for almost 90% of the growth in energy demand between now and 2030

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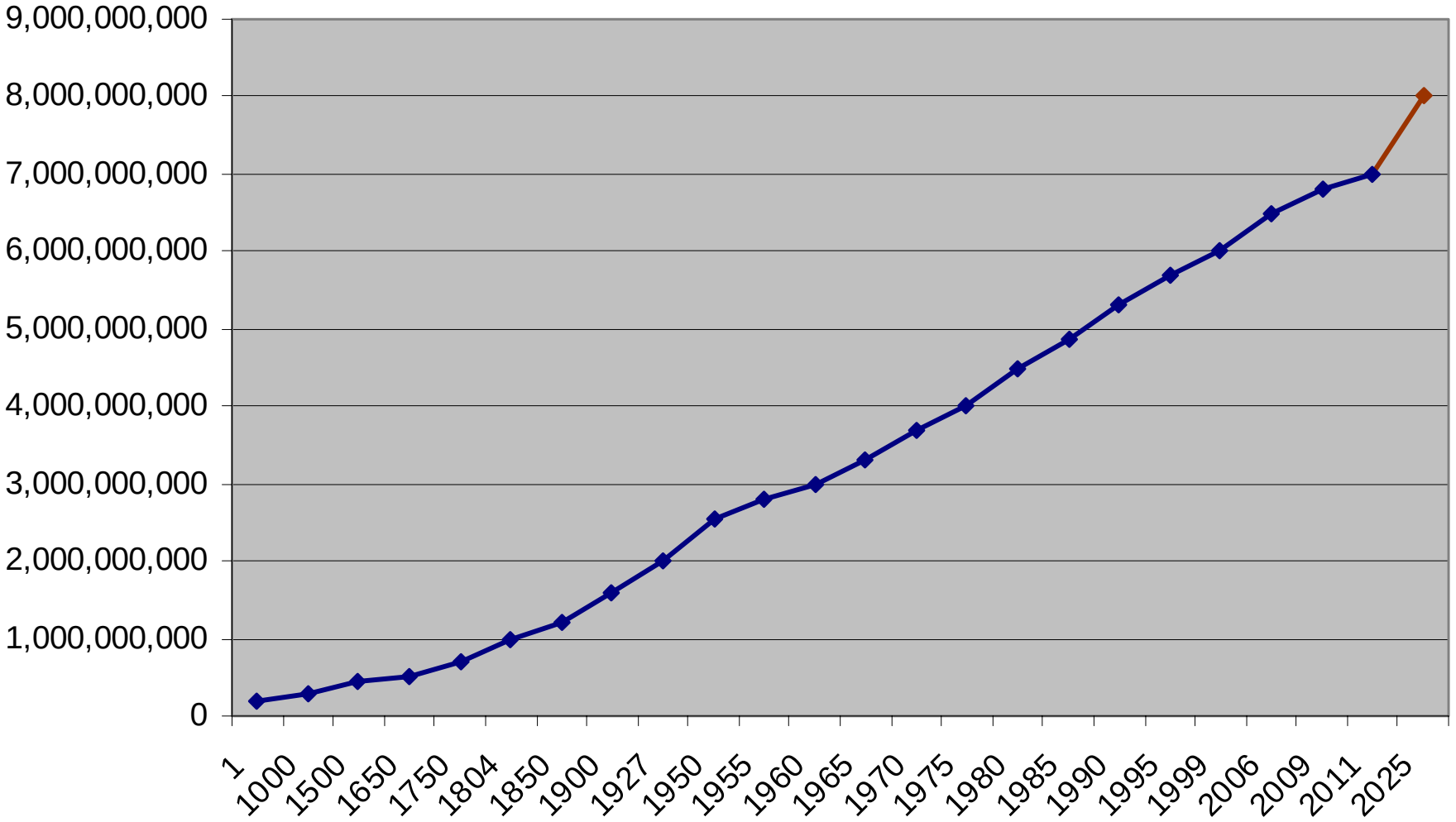
World Population Growth



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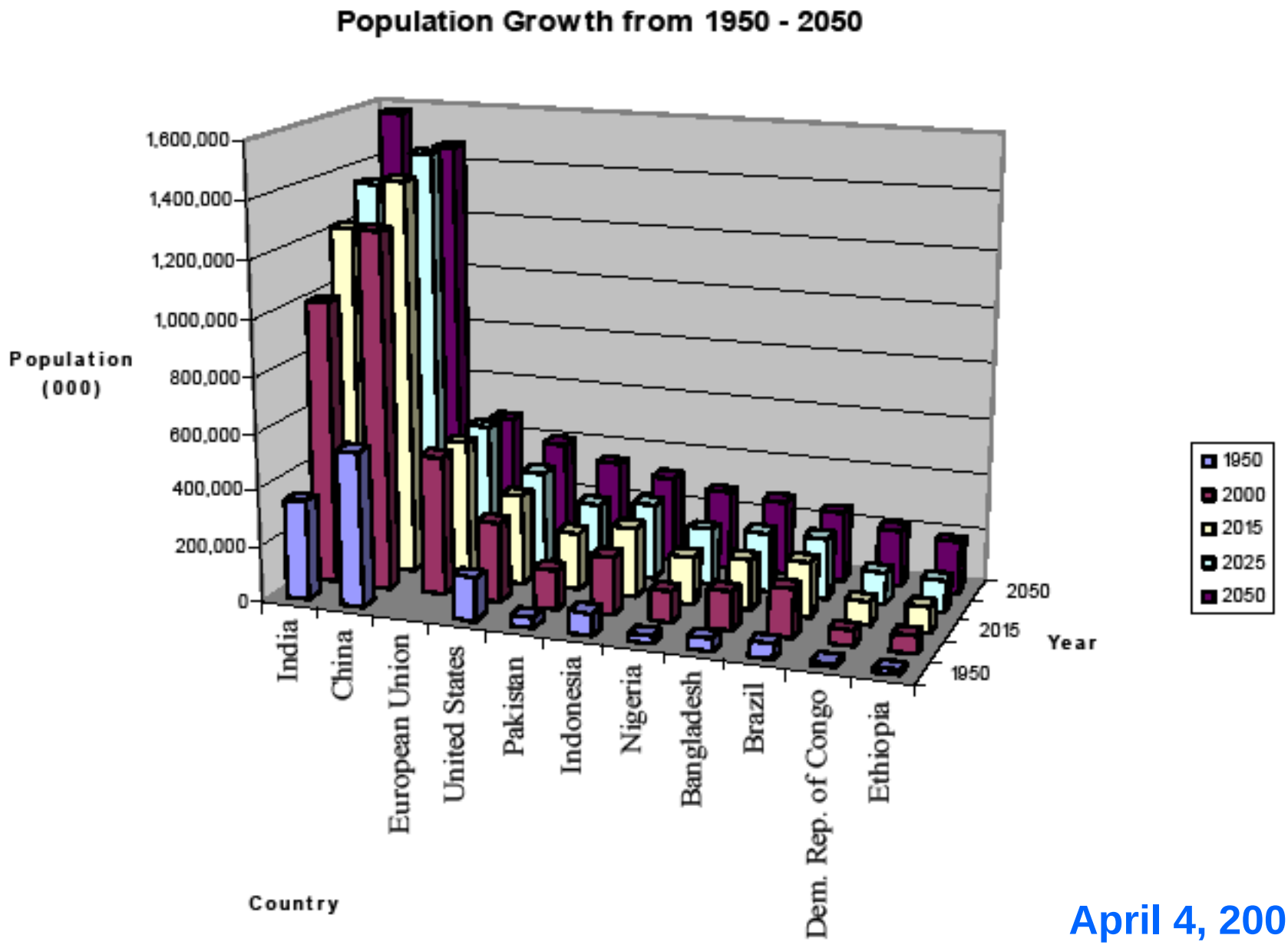
Source: About.com; http://geography.about.com/od/obtainpopulationdata/a/worldpopulation.htm


Population Growth from 1950 - 2050
Population (000)
1,600,000
1,400,000
1,200,000
1,000,000
800,000
600,000
400,000
200,000
0
India
China
European Union
United States
Pakistan
Indonesia
Nigeria
Bangladesh
Brazil
Dem. Rep. of Congo
Ethiopia
Country
2050
2015
1950
Year
1950
2000
2015
2025
2050

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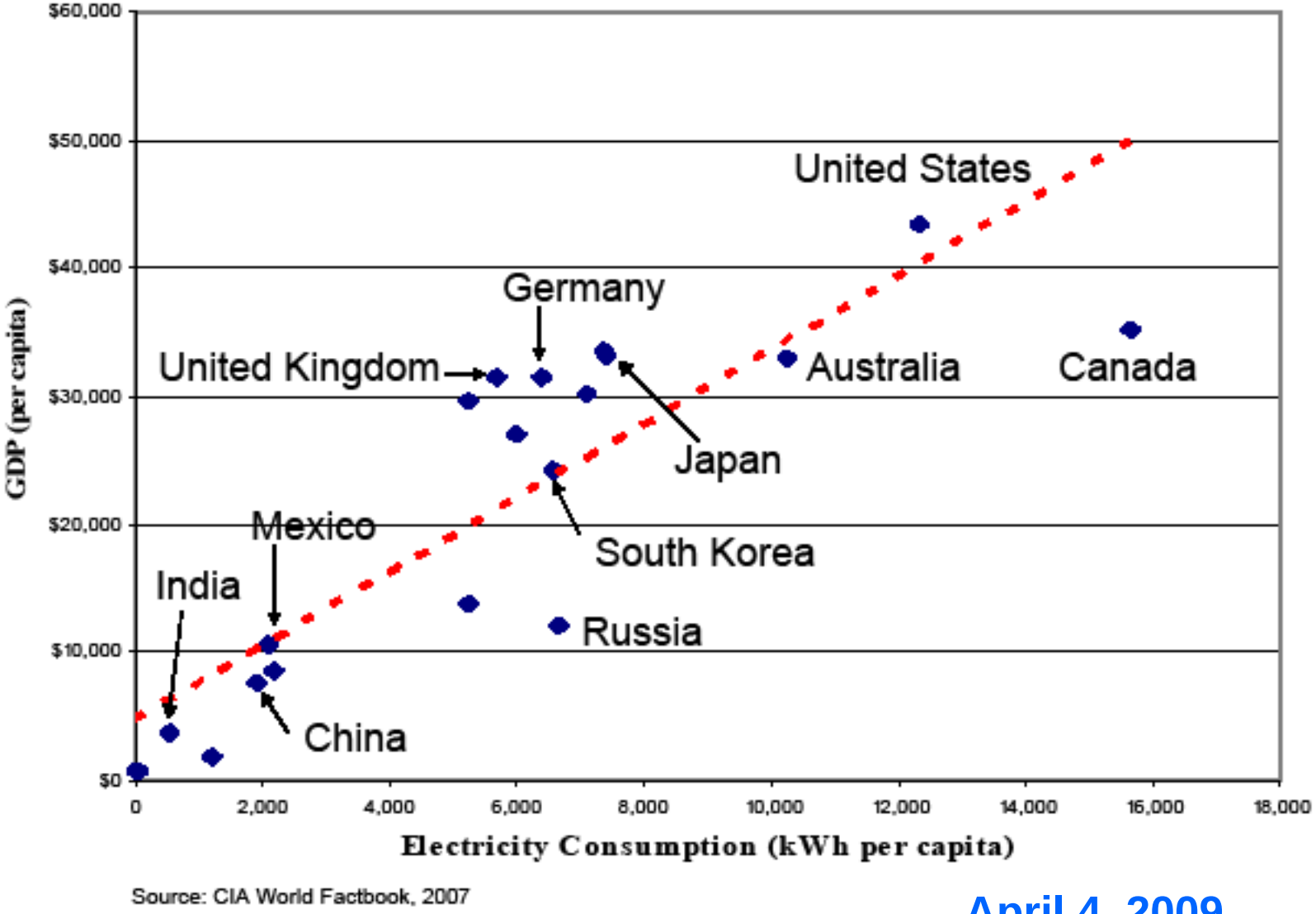
Quality of life is strongly correlated with electricity consumption



Source: CIA World Factbook, 2007

Is Natural Gas Misunderstood?

Nancy Pelosi appeared on *Meet the Press

BROKAW: …If we work our way off carbon-based fuels, in the meantime, this is not going to happen overnight.

PELOSI: No, it isn't, but you could – again, you could reduce the price at the pump immediately with (inaudible). You can have a transition with natural gas. That is cheap, abundant and clean compared to fossil fuels.

***

PELOSI: I'm – I'm investing in something I believe in. I believe in natural gas as a clean, cheap alternative to fossil fuels.

***

PELOSI: Well, that's not – that is the marketplace. The fact is, the supply of natural gas is so big, and you do need a transition if you're going to go from fossil fuels, as you say, you can't do it overnight, but you must transition.

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*From the transcript of her appearance during the Democratic National Convention, 2008

Who Owns and Controls the World's Reserves of Natural Gas?

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World Natural Gas Reserves by Country as of January 1, 2005

Country	Reserves (Trillion Cubic Feet)	Percent of World Total
World	6,040	100.0
Top 20 Countries	5,391	89.3
Russia*	1,680	27.8
Iran*	940	15.6
Qatar	910	15.1
Saudi Arabia	235	3.9
United Arab Emirates	212	3.5
United States	189	3.1
Nigeria	176	2.9
Algeria*	161	2.7
Venezuela*	151	2.5
Iraq	110	1.8
Indonesia	90	1.5
Malaysia	29	0.5
Norway	75	1.2
Turkmenistan	74	1.2
Uzbekistan	71	1.2
Kazakhstan	66	1.1
Netherlands	65	1.1
Canada	62	1.0
Egypt	57	0.9
Ukraine	40	0.7
Rest of World	649	10.7

Source: "Worldwide Look at Reserves and Production," Oil & Gas Journal, Vol. 102, No. 47 (December 20, 2004) pp. 22-23

* These 4 countries account for 48.6% of world natural gas reserves.

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Part I: Russia and Natural Gas

Let’s discuss your cost of natural gas.

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Russia's Energy Muscle

- Energy Used Over 55 times Against Former Soviet Nations Since 1990

Source: *Europe Doubles Down on Russian Gas to Feed its Energy Appetite,* by Andrew Haney, Ricardo Bracho, Nick Wolfe and Max Faith

Russia's Neo-Imperialism

- Regain Political and Economic Control Over ALL Former Soviet States, including the Baltic States that are NATO members

Source: *Europe Doubles Down on Russian Gas to Feed its Energy Appetite,* by Andrew Haney, Ricardo Bracho, Nick Wolfe and Max Faith

Russia's Neo-Imperialism

- Purchases Of Energy Assets from Former Soviet States
- Use Of Energy Supply Disruptions To Influence Policy And Punish

Source: *Europe Doubles Down on Russian Gas to Feed its Energy Appetite,* by Andrew Haney, Ricardo Bracho, Nick Wolfe and Max Faith

Energy Security?

- By the year 2020, Gazprom will supply nearly 70% of the European Union's natural gas.
- Would you pursue a conflict with a country that you depend on for the majority of your energy needs?

Gazprom's Current Near-Monopoly Supply Position

% of Supply from Gazprom/Russia	
Slovakia	100%
Macedonia	100%
Finland	99%
Bulgaria	97%
Serbia & Montenegro	87%
Lithuania	84%
Hungary	80%
Czech Republic	79%
Greece	76%

Source: "Domestic Consumption" EIA International Energy Annual, 2007; "Exports 2006 and 2007" Gazexport as cited by Energy Intelligence, March 2008

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Gazprom's Current Near-Monopoly Supply Position (cont'd)

% of Supply from Gazprom/Russia	
Austria	74%
Slovenia	64%
Poland	62%
Ukraine	66%
Turkey	60%
Germany	40%
Croatia	37%
Italy	30%
France	25%

Source: "Domestic Consumption" EIA International Energy Annual, 2007; "Exports 2006 and 2007" Gazexport as cited by Energy Intelligence, March 2008

10/21/2008 in Tehran, Iran
Russia, Iran and Qatar form natural gas cartel

Qatar's Deputy Premier and Minister of Energy and Industry, Abdullah bin Hamad Al-Attiya

Iranian Oil Minister, Gholam Hossein Nozari

Alexei Miller, Chief of Russia's state gas monopoly - Gazprom

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Russia and LNG

- Sakhalin Energy's Chief Executive Officer Ian Craig said: "Sakhalin has now firmly established its position on the global energy map. When the Sakhalin II project is fully on stream, it will supply around 5% of the world's LNG and make a significant contribution to strengthening global energy security." (February 18, 2009)
- Sakhalin, formerly owned by Shell Exploration, was "nationalized" by Gazprom. Gazprom currently owns 51% of the project.

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Kovykta Gas Field

- Reserves amount to 2 trillion cubic meters of natural gas
- More than 600 million barrels of gas condensate
- 3 BCF gas/day

History of Kovykta

- **1987** – Kovykta Discovered
- License to develop held by Russia Petroleum (Majority of RP owned by TNK-BP)
- **June 2006** - Top TNK-BP Engineer Enver Ziganshin murdered
- **June 2007** - TNK-BP offered to sell stake for $700-$900 million to Gazprom, but deal never materialized
- **June 2010** - Russia Petroleum filed for bankruptcy
- TNK-BP attempted to sell field to state owned Rosneft but failed
- **March 2011**- Gazprom bought Russia Petroleum's assets, including Kovykta, for $711 million

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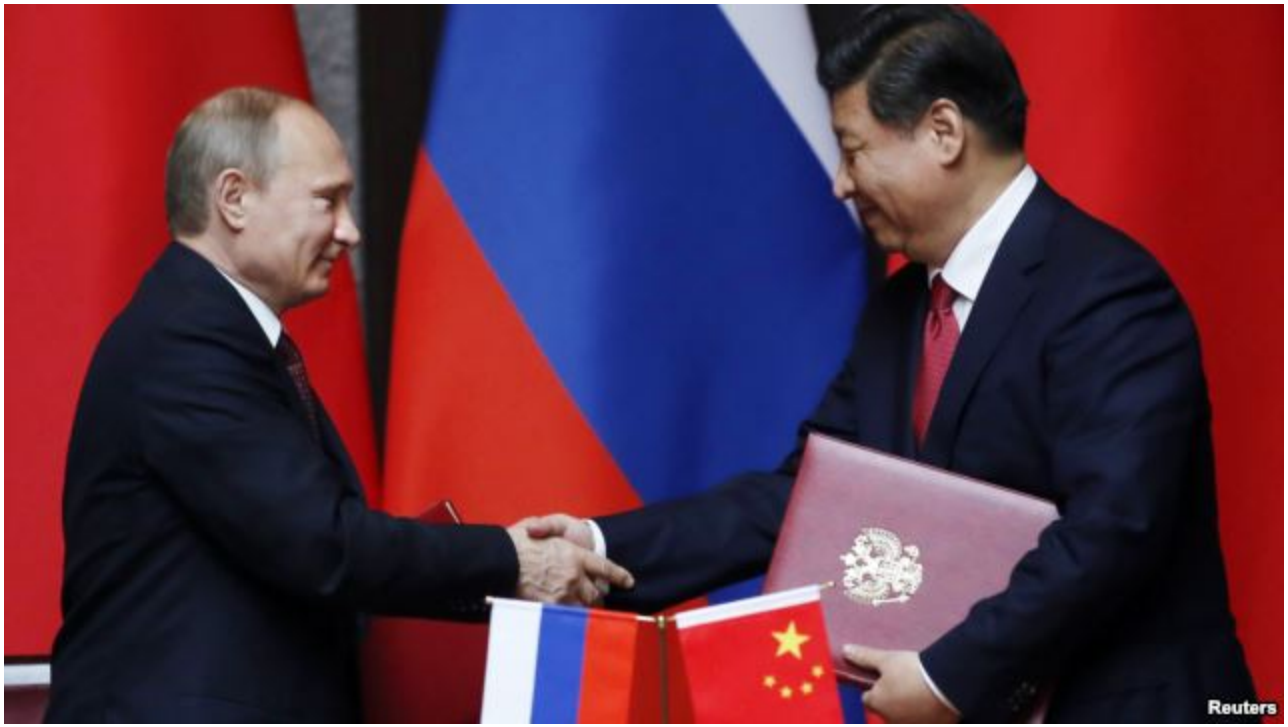
Kovykta Today

May 2014 -

The Washington Post

China, Russia sign $400 billion gas deal



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Kovykta Gas Field

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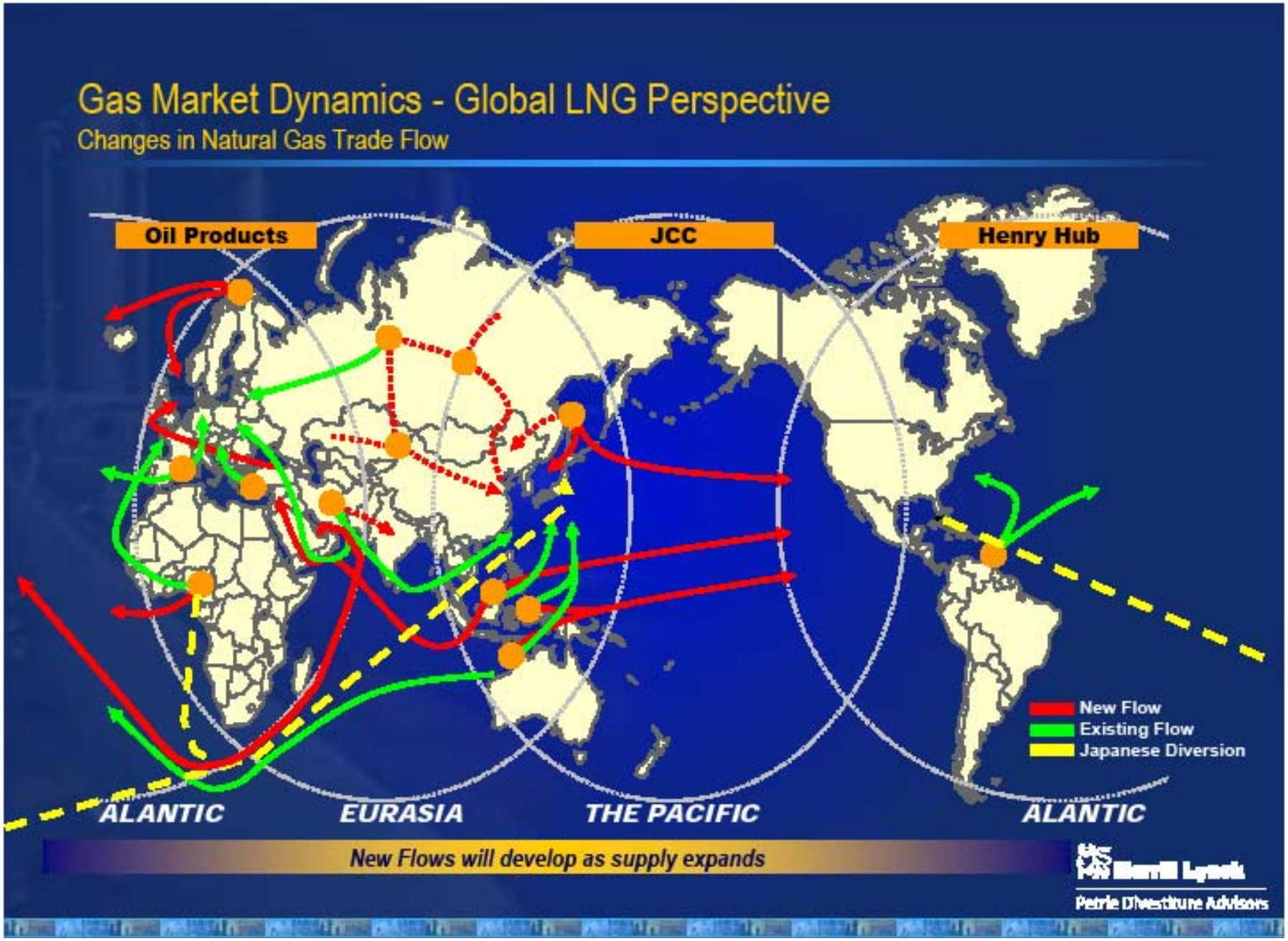
Gas Market Dynamics - Global LNG Perspective
Changes in Natural Gas Trade Flow
Oil Products
JCC
Henry Hub
New Flow
Existing Flow
Japanese Diversion
ALANTIC
EURASIA
THE PACIFIC
ALANTIC
New Flows will develop as supply expands
Merrill Lynch
Petrie Divestiture Advisors

An example of “energy policy-making” circa 2003.

“If North America natural gas markets are to function with the flexibility exhibited by oil, unlimited access to vast world reserves of gas is required. Markets need to be able to effectively adjust to unexpected shortfalls in domestic supply. Access to world natural gas supplies will require a major expansion of LNG terminal import capacity. Without the flexibility such facilities will impart, imbalances in supply and demand must inevitably engender price volatility.”

Testimony of Chairman Alan Greenspan, *Natural gas supply and demand issues*, before the Committee of Energy and Commerce, U.S. House of Representatives, June 10, 2003.

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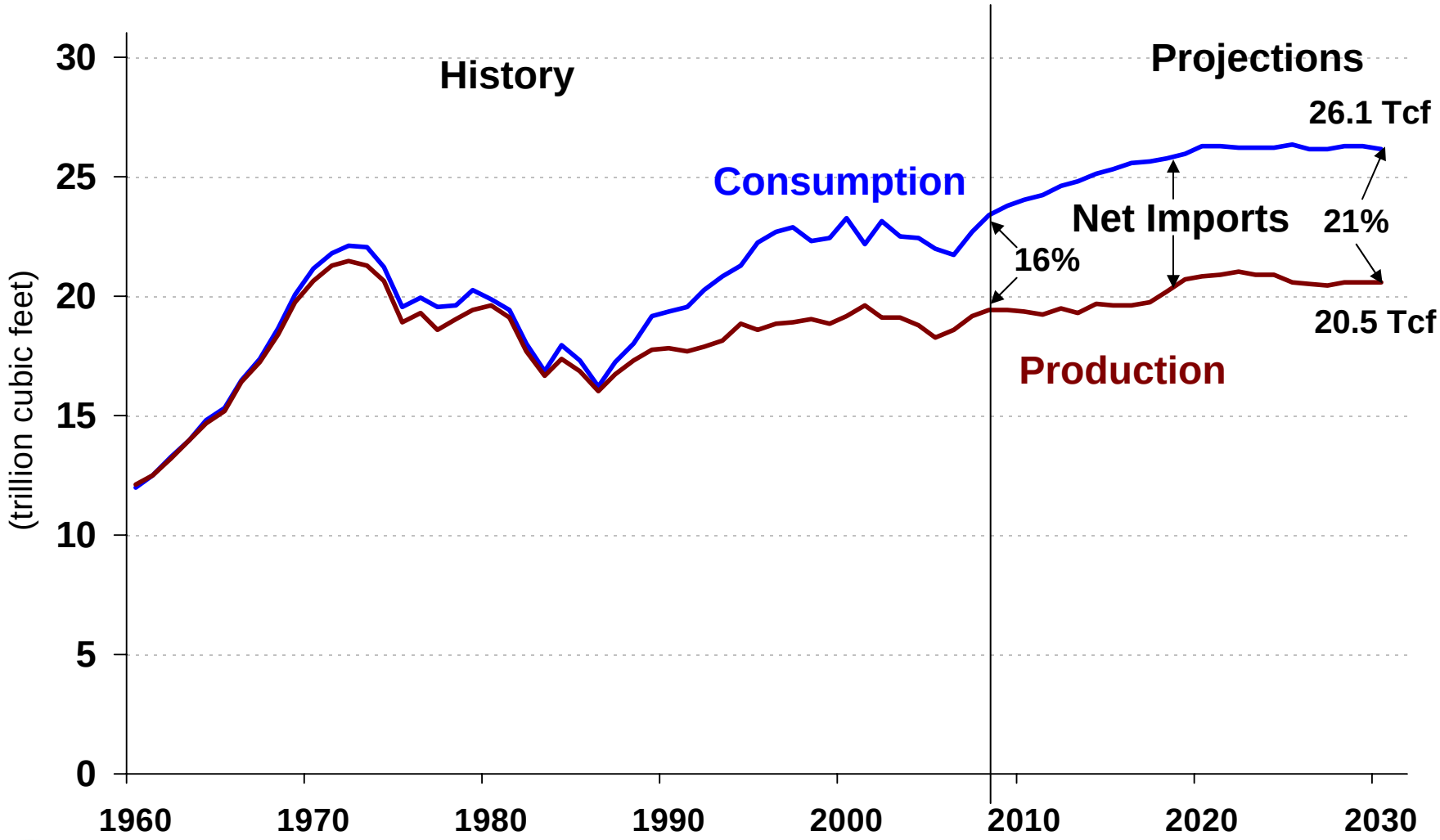
2008 Conventional Wisdom



Source: Annual Energy Outlook 2007

Natural Gas Projections from EIA and Six Others: March 28, 2007

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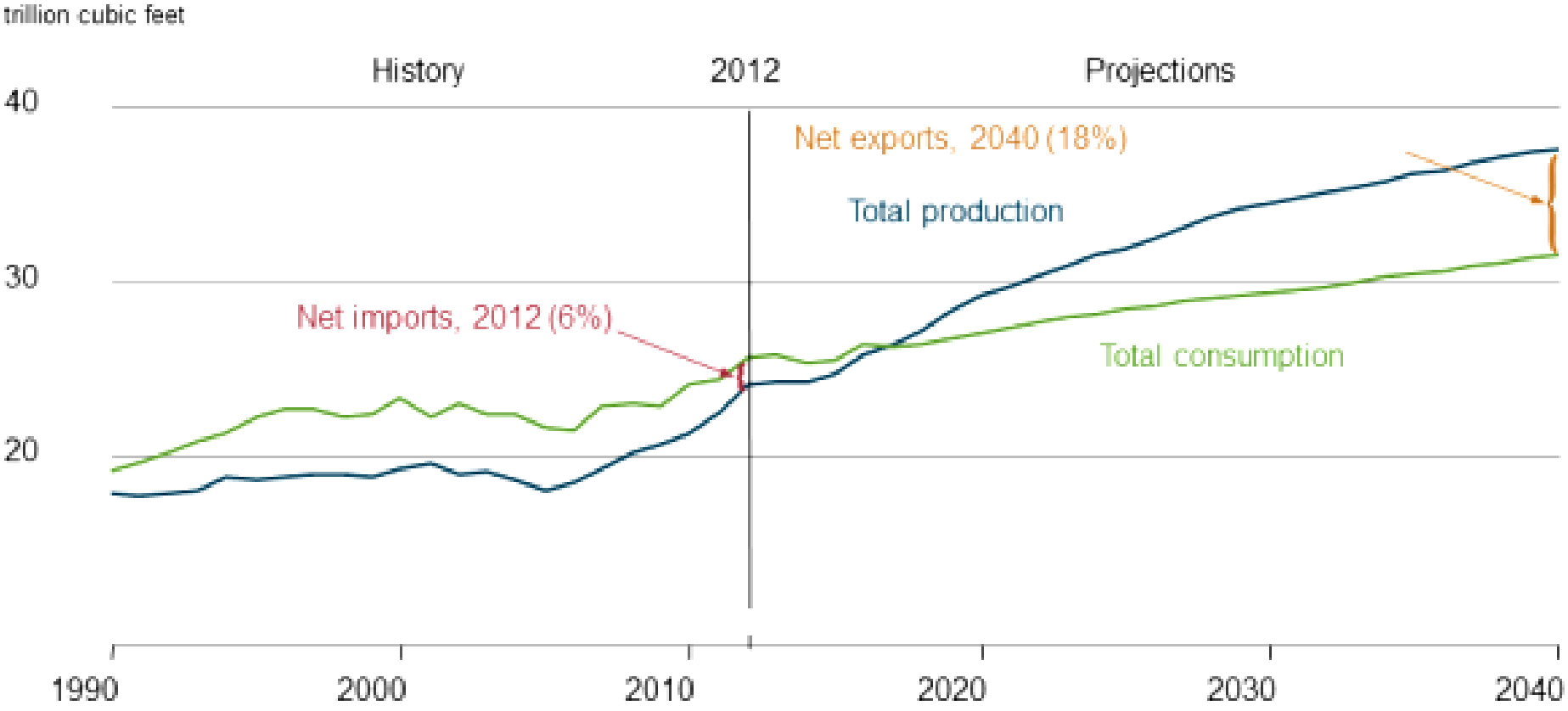
Figure MT-42. Total natural gas production, consumption, and imports in the Reference case, 1990-2040



Technology Break-through on Shale Gas

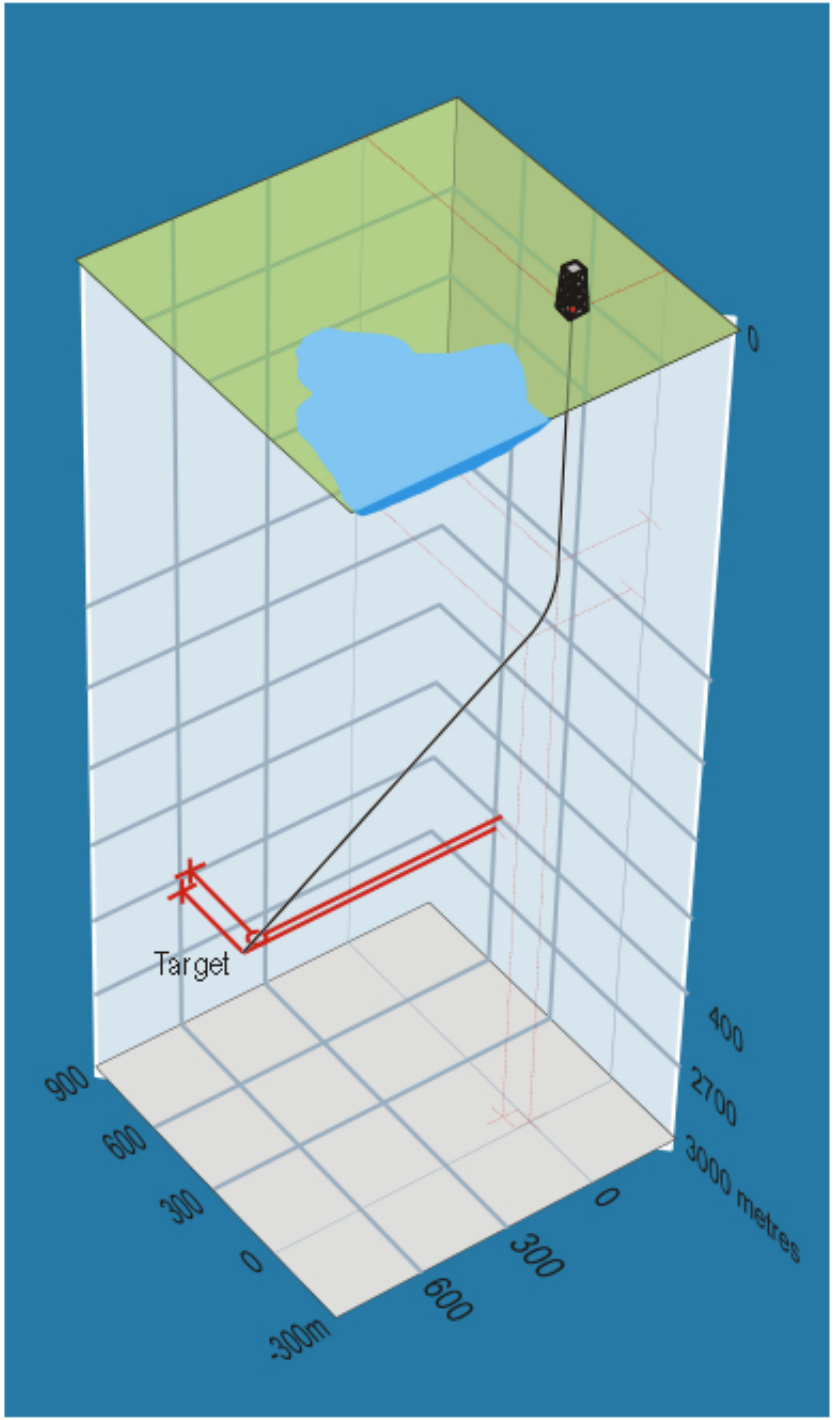


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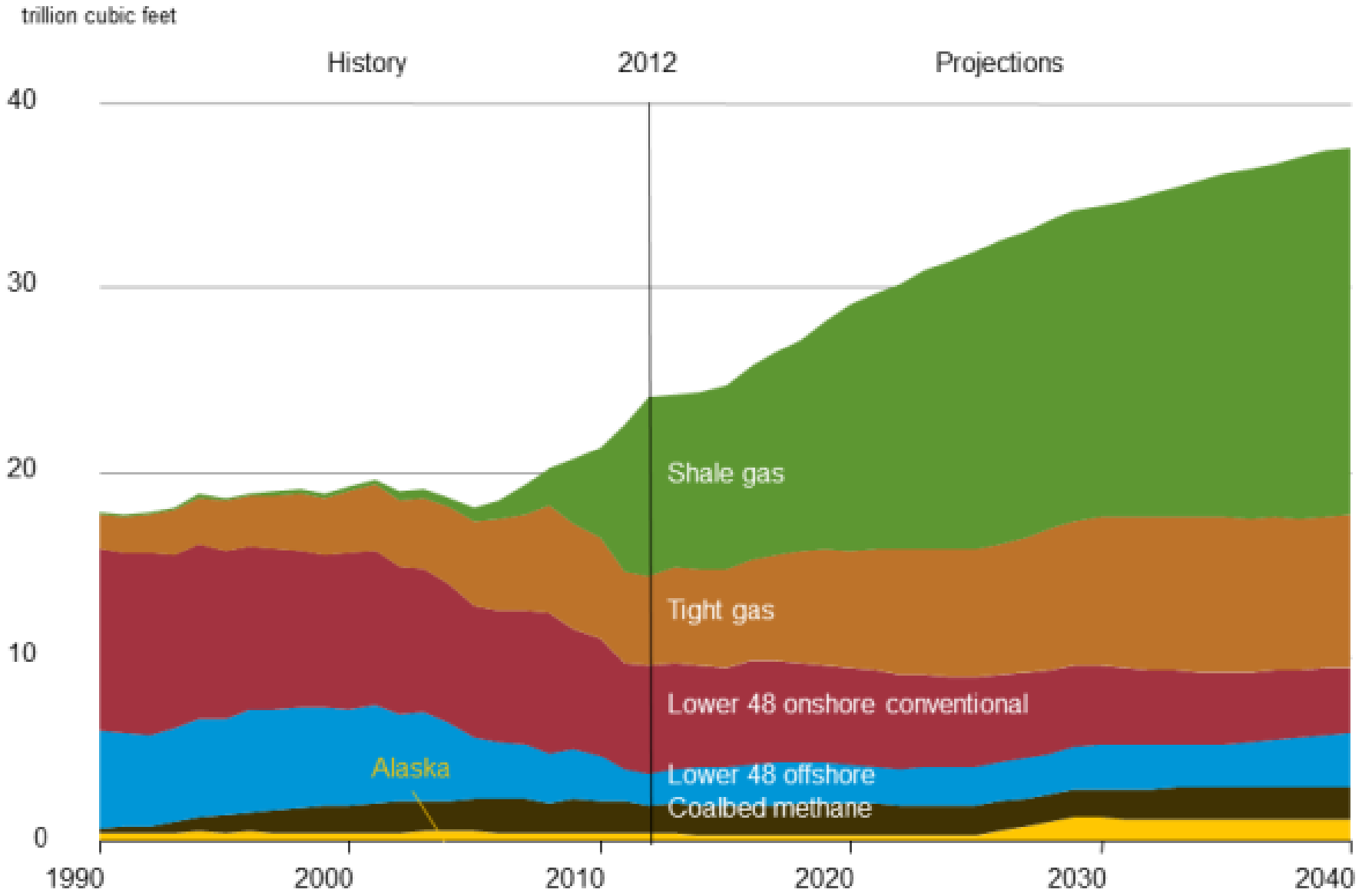
Figure MT-44. U.S. natural gas production by source in the Reference case, 1990-2040



Forecasts for Shale Gas Resource?

- 2008 - **347 TCF** - Energy Information Administration (EIA)
- 2008 - **840 TCF** - Navigant for Clean Skies Foundation
- 2009 - **616 TCF** - Potential Gas Committee (PGC)
- 2011 - **827 TCF** - Energy Information Administration (EIA)
- 2013 – **1,073 TCF** - Potential Gas Committee (PGC)

Source: Various resource estimates

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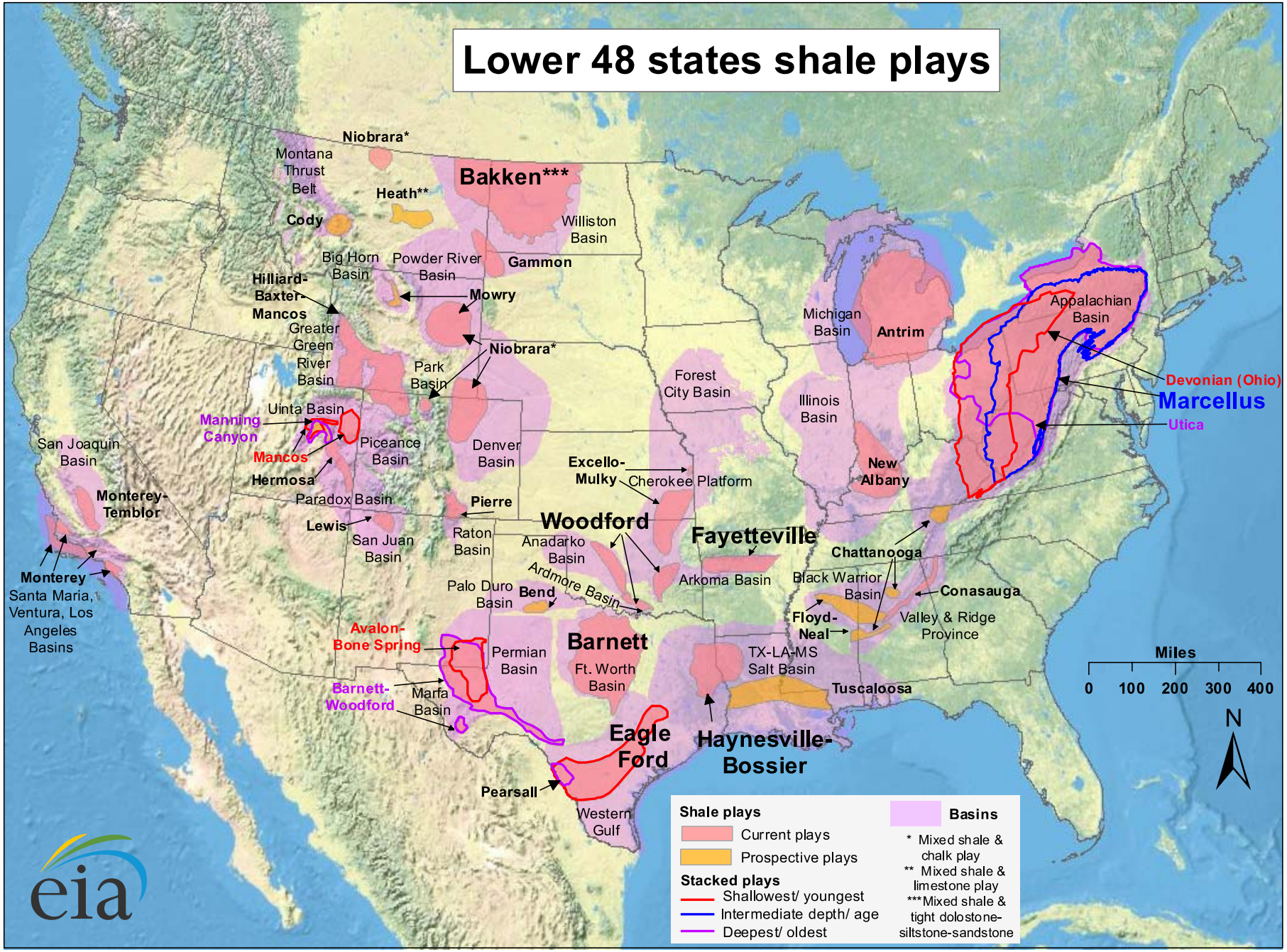
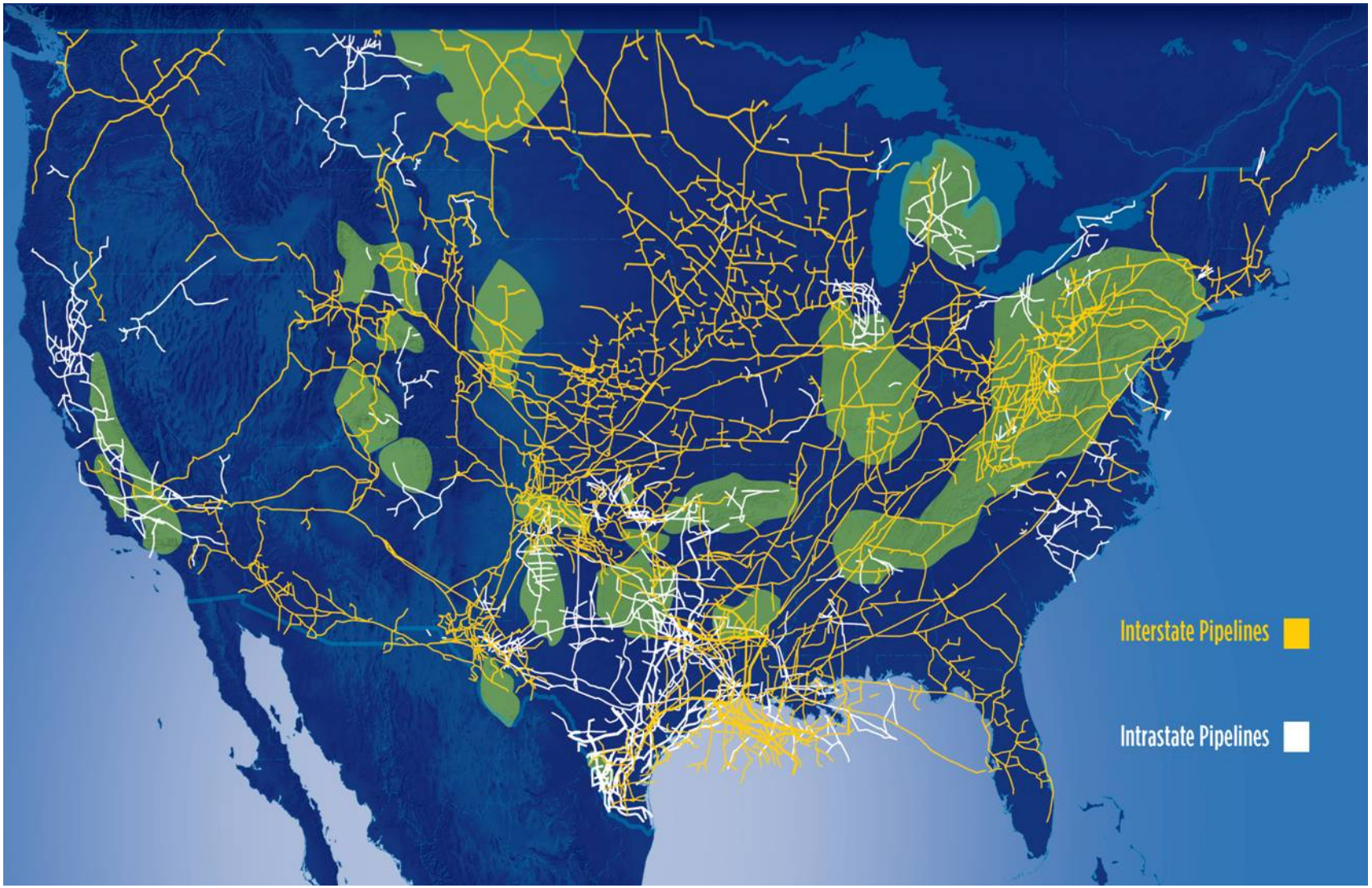


Source: Energy Information Administration based on data from various published studies.
Updated: May 9, 2011

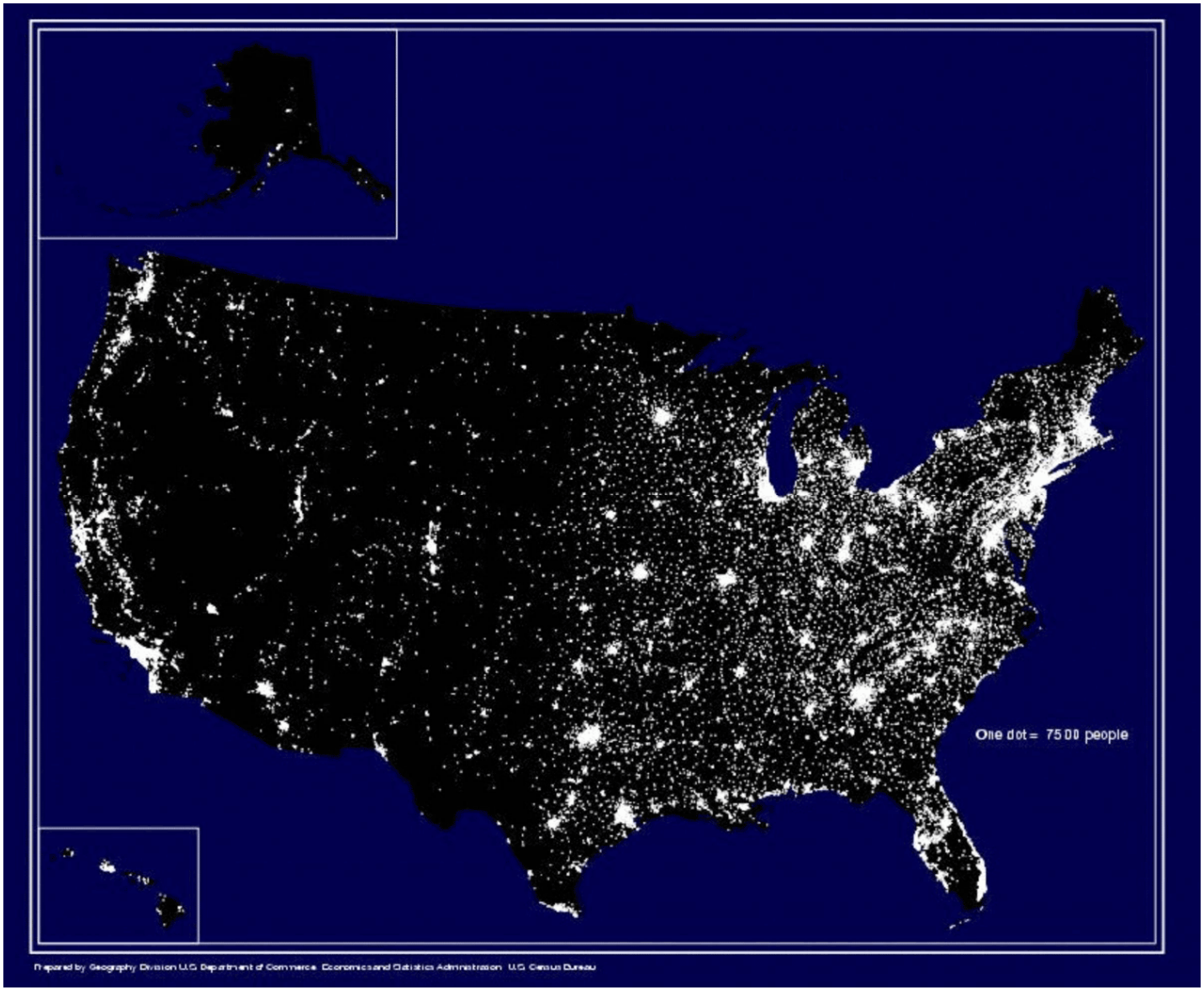
U.S. Natural Gas Shale Basins Align with Pipeline Grid



Sources: EIA, US Natural Gas Pipeline Nework

North American Natural Gas Supply Assessment, prepared for American Clean Skies Foundation, July 4, 2008.

US Population Distribution 2000



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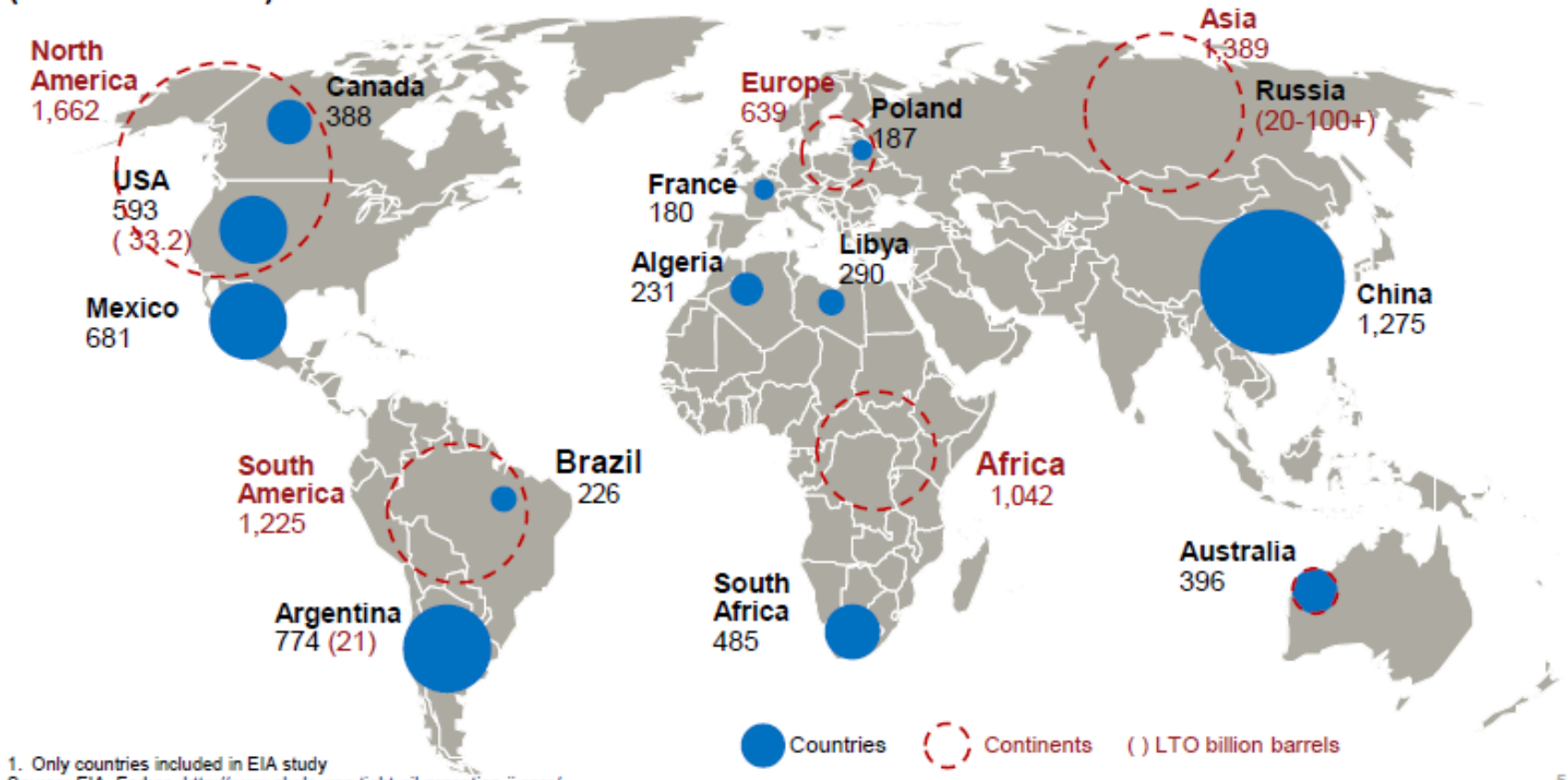
ATKearney

Resource potential in North America is massive – with the Rockies accounting for a significant fraction

Major global shale gas and LTO opportunities[1]

Technically recoverable shale gas (trillion cubic feet) and LTO (Billion barrels) resources



1. Only countries included in EIA study
Source: EIA, Forbes, http://www.shale-gas-tight-oil-argentina-ii.com/

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World Gas Reserves 2003 vs. 2013

2003 Rank	Country	Proved Reserves, Trillion Cubic Feet (2003)	Proved Reserves Trillion Cubic, Feet (2013)	2013 Rank
1	Qatar	910.1	890	3
2	Iran	970.8	1187	2
3	United Arab Emirates	213.9	215.025	7
4	Saudi Arabia	238.4	287.844	5
5	Russia	1694.4	1688	1
6	Algeria	160.4	159.05	10
7	Turkmenistan	102.4	265	6
14	**United States**	**186.9**	**308.436**	**4**
15	Canada	56.6	68.166	18

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Shale Revolution?

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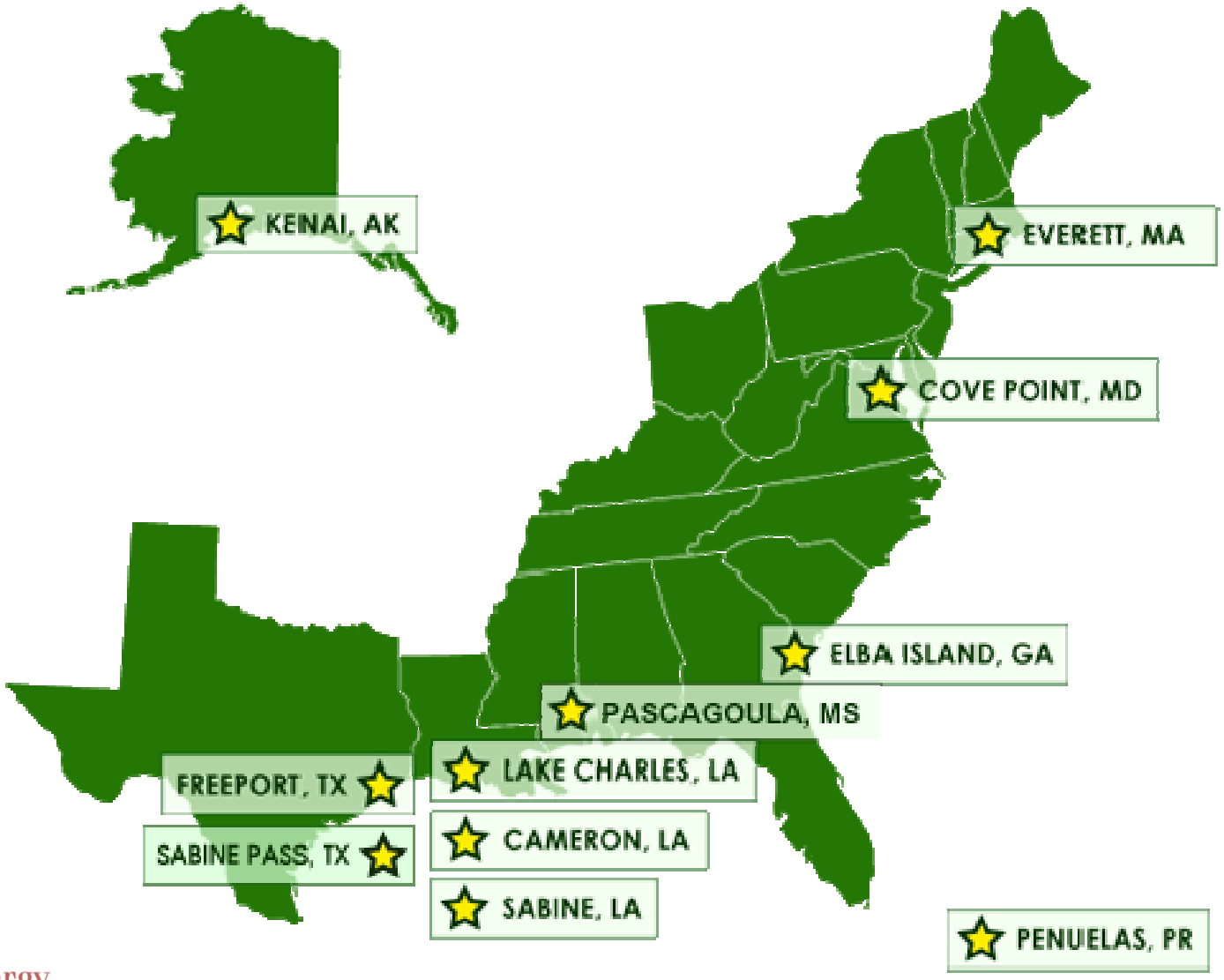
Existing LNG Export Facilities



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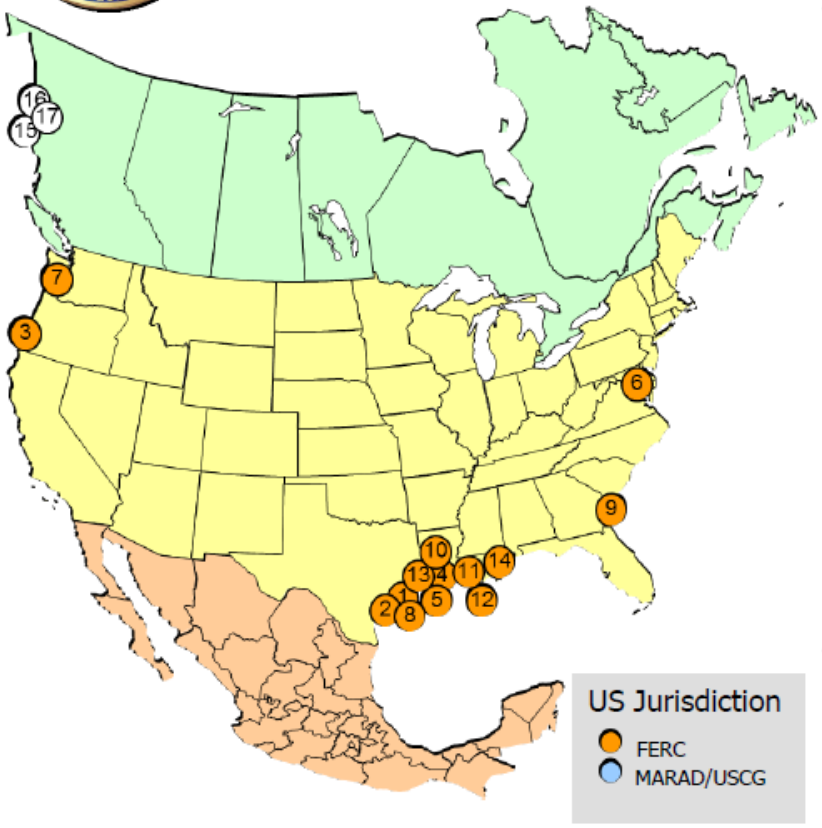
Proposed LNG Export Facilities

North American LNG Export Terminals
Proposed



Export Terminal

PROPOSED TO FERC

1. **Freeport, TX:** 1.8 Bcfd (Freeport LNG Dev/Freeport LNG Expansion/FLNG Liquefaction) (CP12-509)
2. **Corpus Christi, TX:** 2.1 Bcfd (Cheniere – Corpus Christi LNG) (CP12-507)
3. **Coos Bay, OR:** 0.9 Bcfd (Jordan Cove Energy Project) (CP13-483)
4. **Lake Charles, LA:** 2.2 Bcfd (Southern Union - Trunkline LNG) (CP14-120)
5. **Hackberry, LA:** 1.7 Bcfd (Sempra – Cameron LNG) (CP13-25)
6. **Cove Point, MD:** 0.82 Bcfd (Dominion – Cove Point LNG) (CP13-113)
7. **Astoria, OR:** 1.25 Bcfd (Oregon LNG) (CP09-6)
8. **Lavaca Bay, TX:** 1.38 Bcfd (Excelerate Liquefaction) (CP14-71 & 72)
9. **Elba Island, GA:** 0.35 Bcfd (Southern LNG Company) (CP14-103)
10. **Sabine Pass, LA:** 1.40 Bcfd (Sabine Pass Liquefaction) (CP13-552)
11. **Lake Charles, LA:** 1.07 Bcfd (Magnolia LNG) (CP14-347)
12. **Plaquemines Parish, LA:** 1.07 Bcfd (CE FLNG) (PF13-11)
13. **Sabine Pass, TX:** 2.1 Bcfd (ExxonMobil – Golden Pass) (PF13-14)
14. **Pascagoula, MS:** 1.5 Bcfd (Gulf LNG Liquefaction) (PF13-4)

PROPOSED CANADIAN SITES IDENTIFIED BY PROJECT SPONSORS

15. **Kitimat, BC:** 1.28 Bcfd (Apache Canada Ltd.)
16. **Douglas Island, BC:** 0.23 Bcfd (BC LNG Export Cooperative)
17. **Kitimat, BC:** 3.23 Bcfd (LNG Canada)

As of May 21, 2014

** Filed Certificate Application*

Office of Energy Projects

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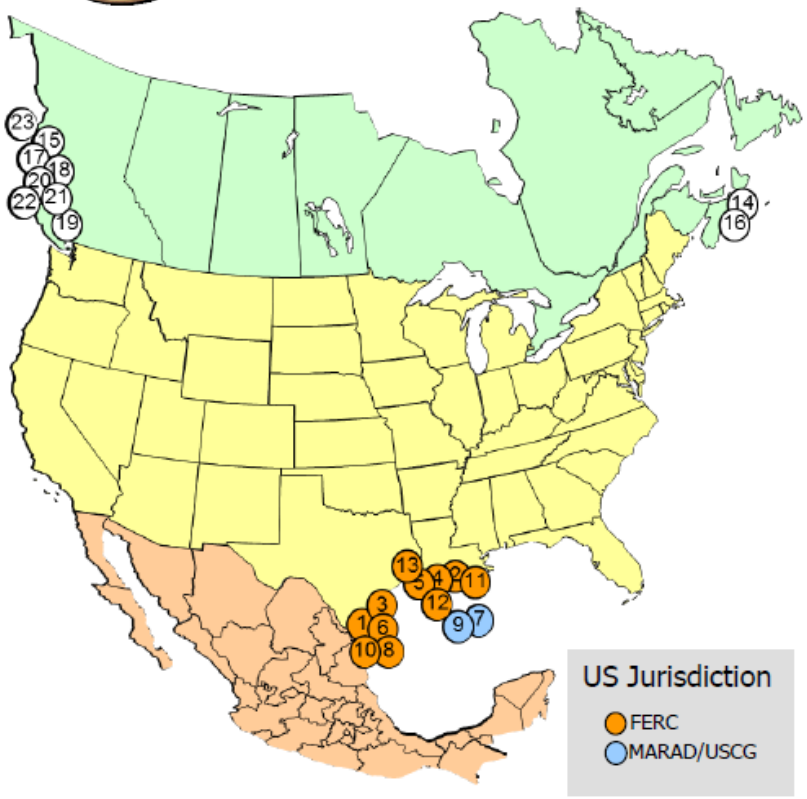
Potential LNG Export Facilities

North American LNG Export Terminals
Potential



Export Terminal

POTENTIAL U.S. SITES IDENTIFIED BY PROJECT SPONSORS

1. **Brownsville, TX:** 2.8 Bcfd (Gulf Coast LNG Export)
2. **Cameron Parish, LA:** 0.16 Bcfd (Waller LNG Services)
3. **Ingleside, TX:** 1.09 Bcfd (Pangea LNG (North America))
4. **Cameron Parish, LA:** 0.20 Bcfd (Gasfin Development)
5. **Cameron Parish, LA:** 0.67 Bcfd (Venture Global)
6. **Brownsville, TX:** 3.2 Bcfd (Eos LNG & Barca LNG)
7. **Gulf of Mexico:** 3.22 Bcfd (Main Pass - Freeport-McMoRan)
8. **Brownsville, TX:** 0.94 Bcfd (Annova LNG)
9. **Gulf of Mexico:** 1.8 Bcfd (Delfin LNG)
10. **Brownsville, TX:** 0.27 Bcfd (Texas LNG)
11. **Plaquemines Parish, LA:** 0.28 Bcfd (Louisiana LNG)
12. **Cameron Parish, LA:** 0.54 Bcfd (SCT&E LNG)
13. **Port Arthur, TX:** 0.2 Bcfd (WesPac/Gulfgate Terminal)

POTENTIAL CANADIAN SITES IDENTIFIED BY PROJECT SPONSORS

14. **Goldboro, NS:** 1.4 Bcfd (Pieridae Energy Canada)
15. **Prince Rupert Island, BC:** 2.91 Bcfd (BG Group)
16. **Melford, NS:** 1.8 Bcfd (H-Energy)
17. **Prince Rupert Island, BC:** 2.74 Bcfd (Pacific Northwest LNG)
18. **Prince Rupert Island, BC:** 4.0 Bcfd (ExxonMobil – Imperial)
19. **Squamish, BC:** 0.29 Bcfd (Woodfibre LNG Export)
20. **Kitimat/Prince Rupert, BC:** 0.32 Bcfd (Triton LNG)
21. **Prince Rupert, BC:** 3.12 Bcfd (Aurora LNG)
22. **Kitsault, BC:** 2.7 Bcfd (Kitsault Energy)
23. **Stewart, BC:** 4.1 Bcfd (Canada Stewart Energy Group)

As of May 21, 2014

Office of Energy Projects

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A Global Picture

Global demand for natural gas is expected to increase between 18 Bcf/day and 38 Bcf/day by 2025. ICF International expects worldwide liquefaction capacity outside the U.S. to expand by nearly 50 Bcf/day by 2025. Current U.S. export projects at the DOE account for deliveries of approximately 35 Bcf/day of LNG. According to ICF, “With projections of world demand for LNG ranging from 50-65 Bcf/day by 2025, global LNG supply may exceed demand.”

Energy Security for the U.S.

In 2013 the U.S. consumed 26 TCF of natural gas. According to the Potential Gas Committee, the Energy Information Administration and MIT, the most recent range of technically recoverable U.S. reserves (using current technology) is from 2,200 to 3,500 TCF.

Linking the Super Powers

Source: *Europe Doubles Down on Russian Gas to Feed its Energy Appetite,* by Andrew Haney, Ricardo Bracho, Nick Wolfe and Max Faith

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Nord Stream Pipeline

- ECONOMIC ASPECTS
- POLITICAL ISSUES
- EVIRONMENTAL CONCERNS
- SOCIAL IMPLICATIONS

Source: *Europe Doubles Down on Russian Gas to Feed its Energy Appetite,* by Andrew Haney, Ricardo Bracho, Nick Wolfe and Max Faith

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South Stream Pipeline

	Russia (UGSS expansion)	Offshore part	European part (onshore)	Total
Length, km	2500	925	1730	4300
Capacity, bcm (at the entry point in Bulgaria)	63	63		63
CAPEX, bln. Euro	9,1	10,0	6,1	25,2

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Putin Takes Over Crimea

KyivPost
INDEPENDENCE. COMMUNITY. TRUST

Russian armed forces seize Crimea as Putin threatens wider military invasion of Ukraine

The New York Times

Putin Reclaims Crimea for Russia and Bitterly Denounces the West

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$35.4 Billion Demanded in Letter to EU

Bloomberg

Putin Calls on Europe to Aid Ukraine or Face Gas Supply Risk

FOX NEWS

Putin warns Europe about Ukraine gas debt

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Gas Shutoff in Europe

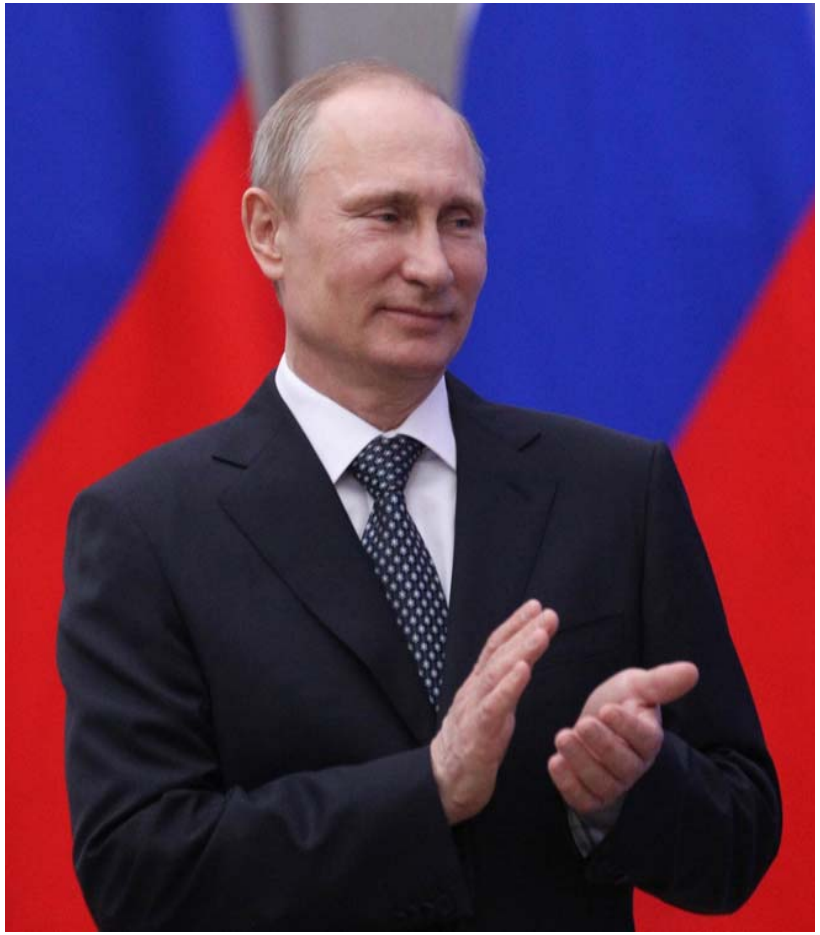
BBC

Ukraine crisis: Russia halts gas supplies to Kiev

The Washington Post

Russia's Gazprom cuts gas to Ukraine in a new phase of the nations' conflict

Economic Terrorism?



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Top ten countries with technically recoverable shale resources

Shale oil		
rank	country	billion barrels
1	Russia	75
2	United States	58
3	China	32
4	Argentina	27
5	Libya	26
6	Venezuela	13
7	Mexico	13
8	Pakistan	9
9	Canada	9
10	Indonesia	8
	World total	**345**

Shale gas		
rank	country	trillion cubic feet
1	China	1,115
2	Argentina	802
3	Algeria	707
4	United States	665
5	Canada	573
6	Mexico	545
7	Australia	437
8	South Africa	390
9	Russia	285
10	Brazil	245
	World total	**7,299**

Note: ARI estimates U.S. shale oil resources at 48 billion barrels and U.S. shale gas resources at 1,161 trillion cubic feet.
Source: United States: EIA and USGS; Other basins: ARI.

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Source: *Outlook for U.S. shale oil and gas,* Presentation to Argus Americas Crude Summit, 01/22/2014, Adam Sieminski, EIA Administrator

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