International Shale Development: Prospects and Challenges

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Outline

- North America's shale revolution – a recap
- Exporting the North American shale gas experience
- The international playing field and key prospects
- Conclusions

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NORTH AMERICA'S SHALE REVOLUTION

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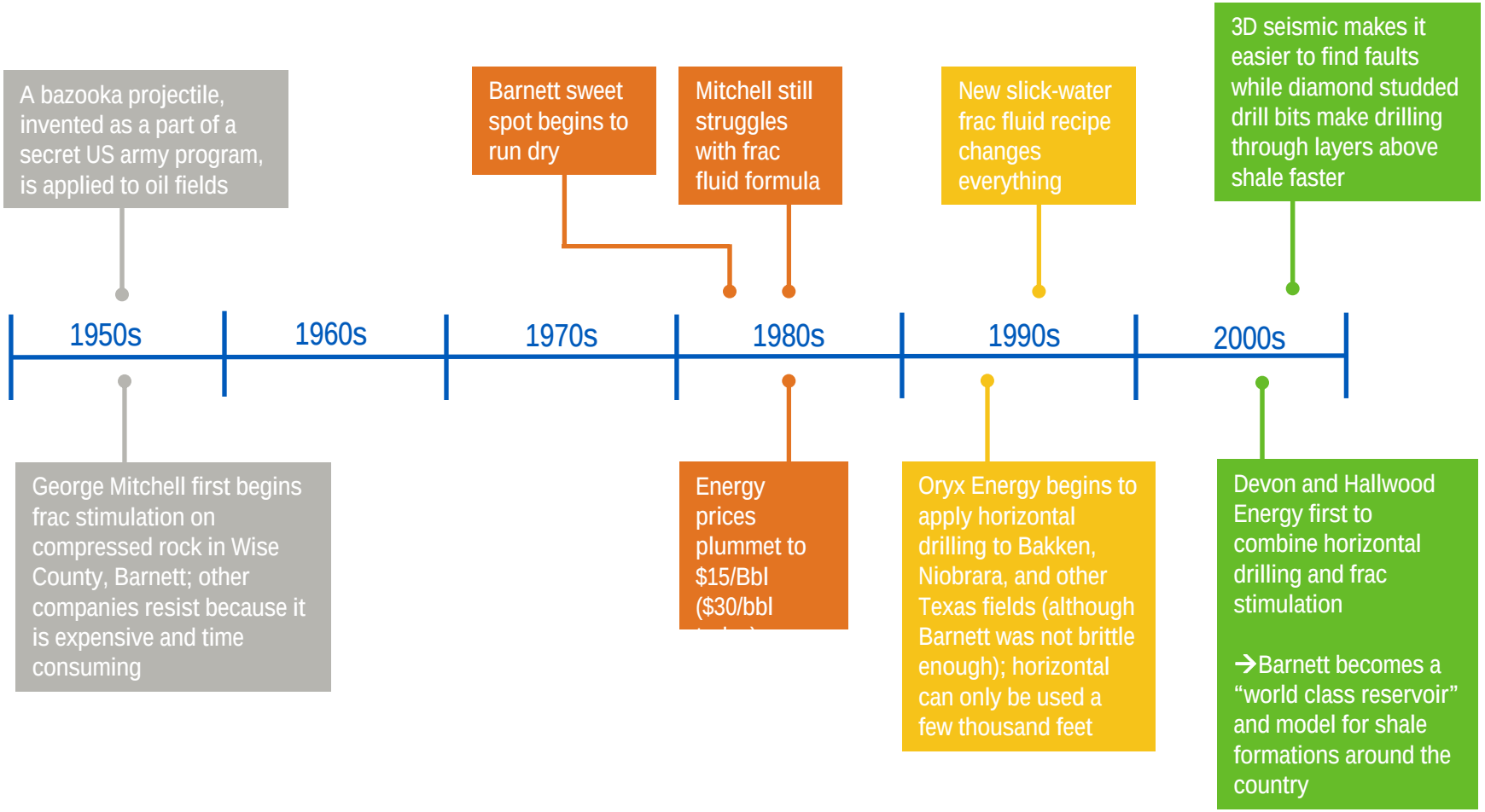
Unlocking Unconventional Resources in the U.S.



Companies today continue to experiment with technology through longer laterals, varying levels of proppant, well spacing, and multi pad drilling to optimize production

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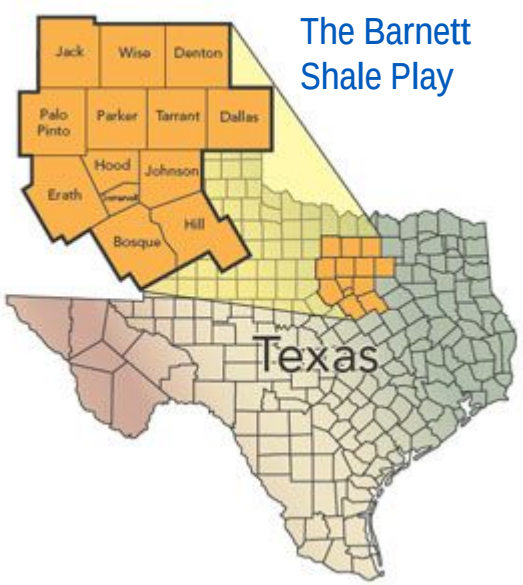
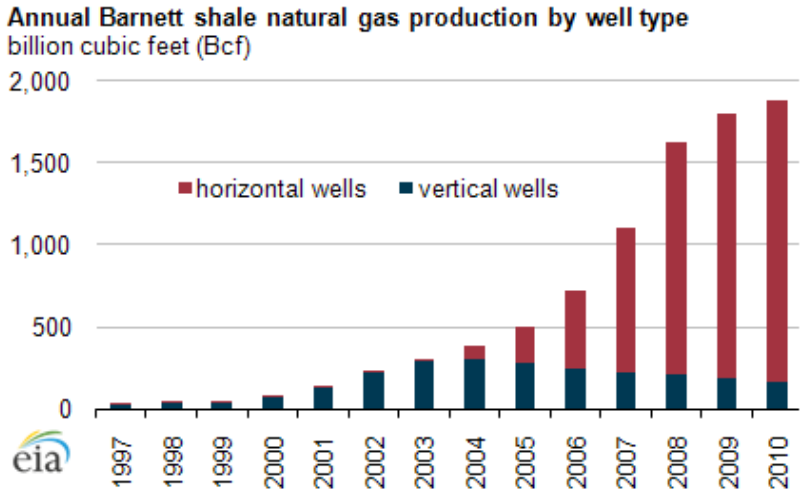
Barnett Shale Developed with Independents Taking the Lead

1980s:

- Oil majors generally focused abroad and were biased against domestic drilling
- Independents meanwhile experimented with new technologies in the U.S.
- Majors had talented geologists, but technology enabled all players to compete in land grabs
- Decades of perseverance and favourable price environments allowed Devon to “crack the code”



Source: Oil & Gas Journal



Source: US Energy Information Administration based on Drilling Info (formerly HPDI)

- Barnett slowly evolved from vertical to horizontal drilling; estimated Ultimate Recoverable (EUR) per well increased more than 6x over the past decade
- Key Barnett Players include large independents such as Devon, Chesapeake, Encana, EOG, XTO, Quicksilver, Range Resources

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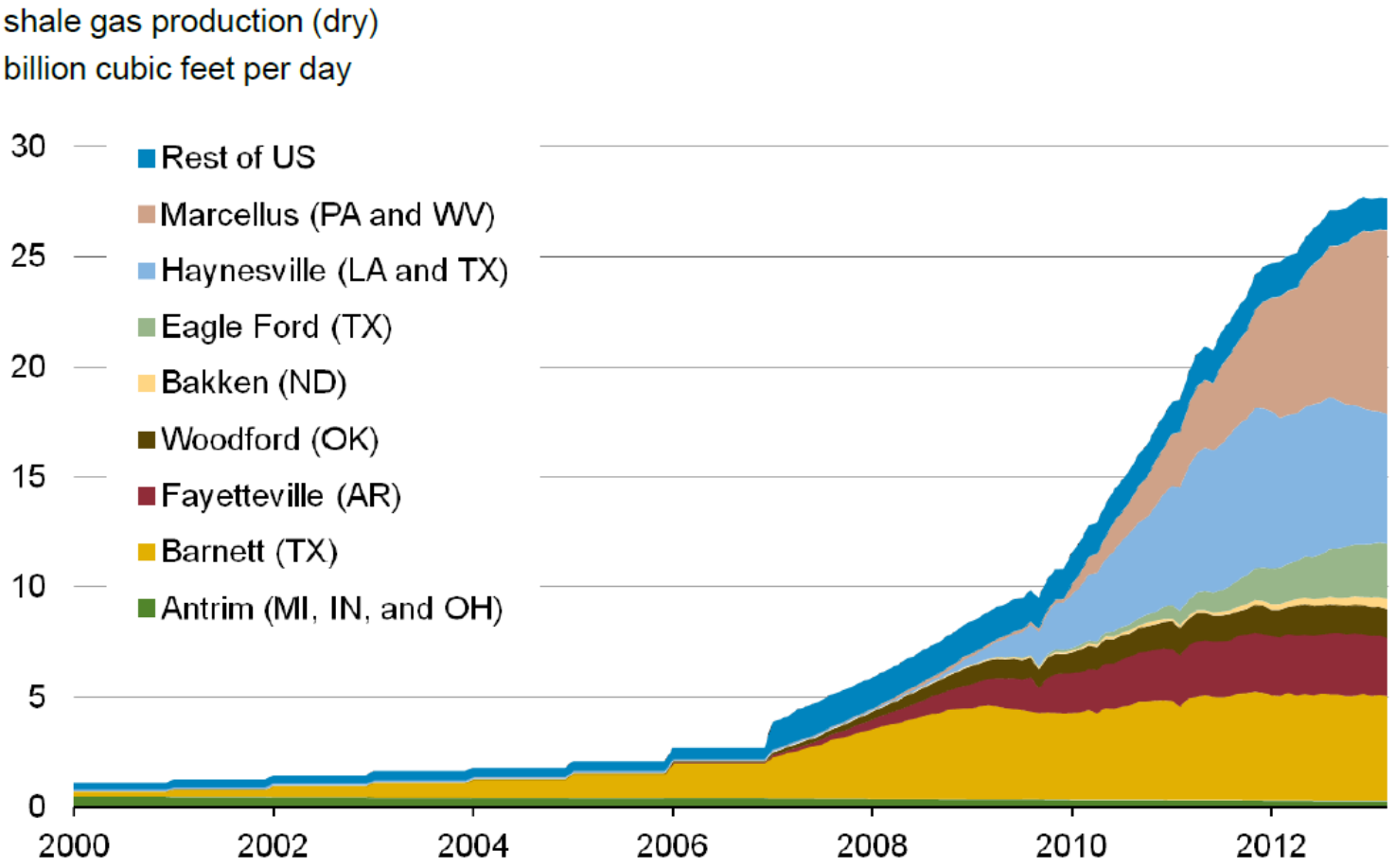
U.S. Shale Gas Production Takes Off Across a Number of Plays



Source: LCI Energy Insight gross withdrawal estimates as of March 2013 and converted to dry production estimates with EIA-calculated average gross-to-dry shrinkage factors by state and/or shale play

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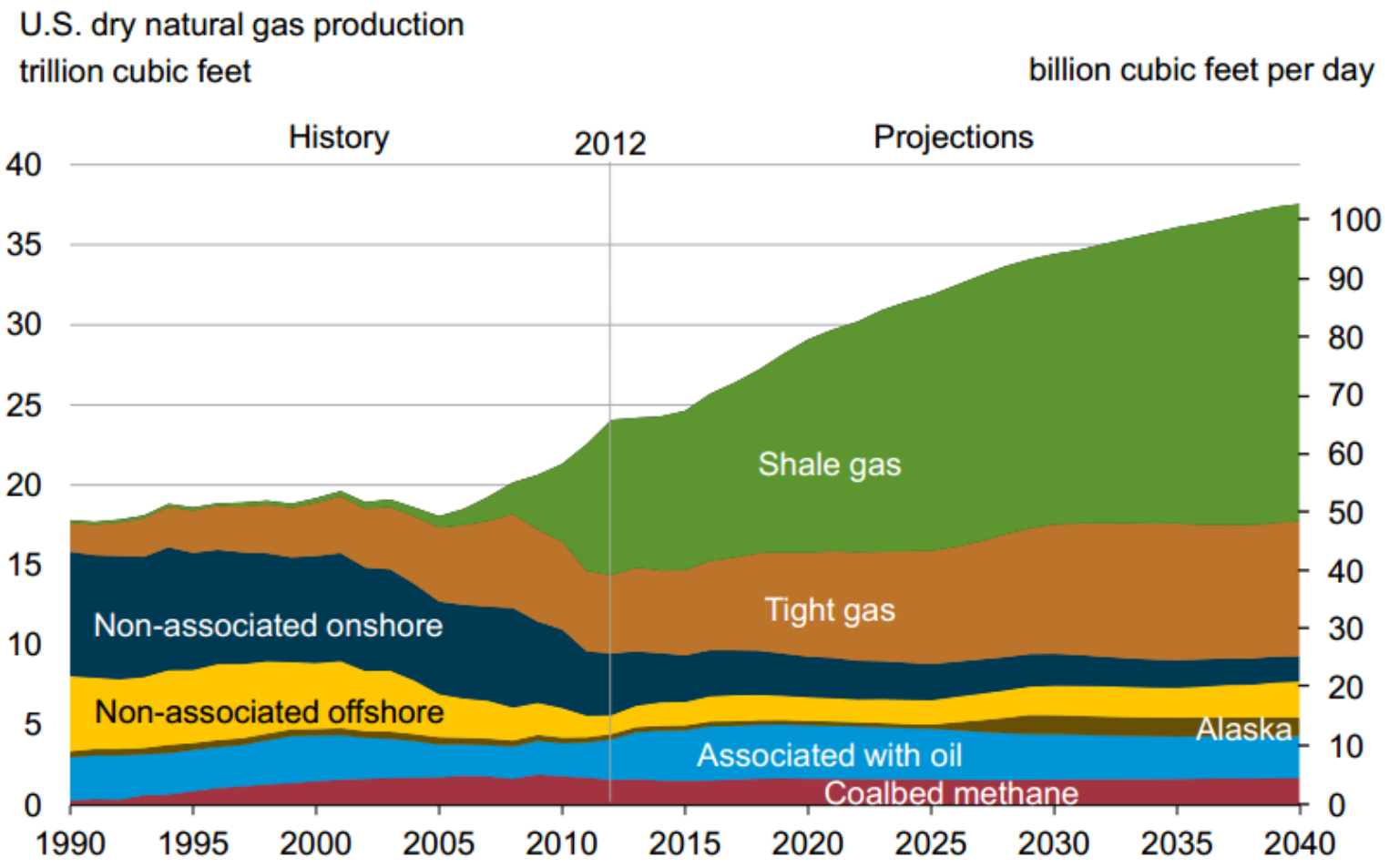
Shale Gas Will Account for Half of Natural Gas Output by 2040



Source: US Energy Information Administration, Annual Energy Outlook 2014 Early Release

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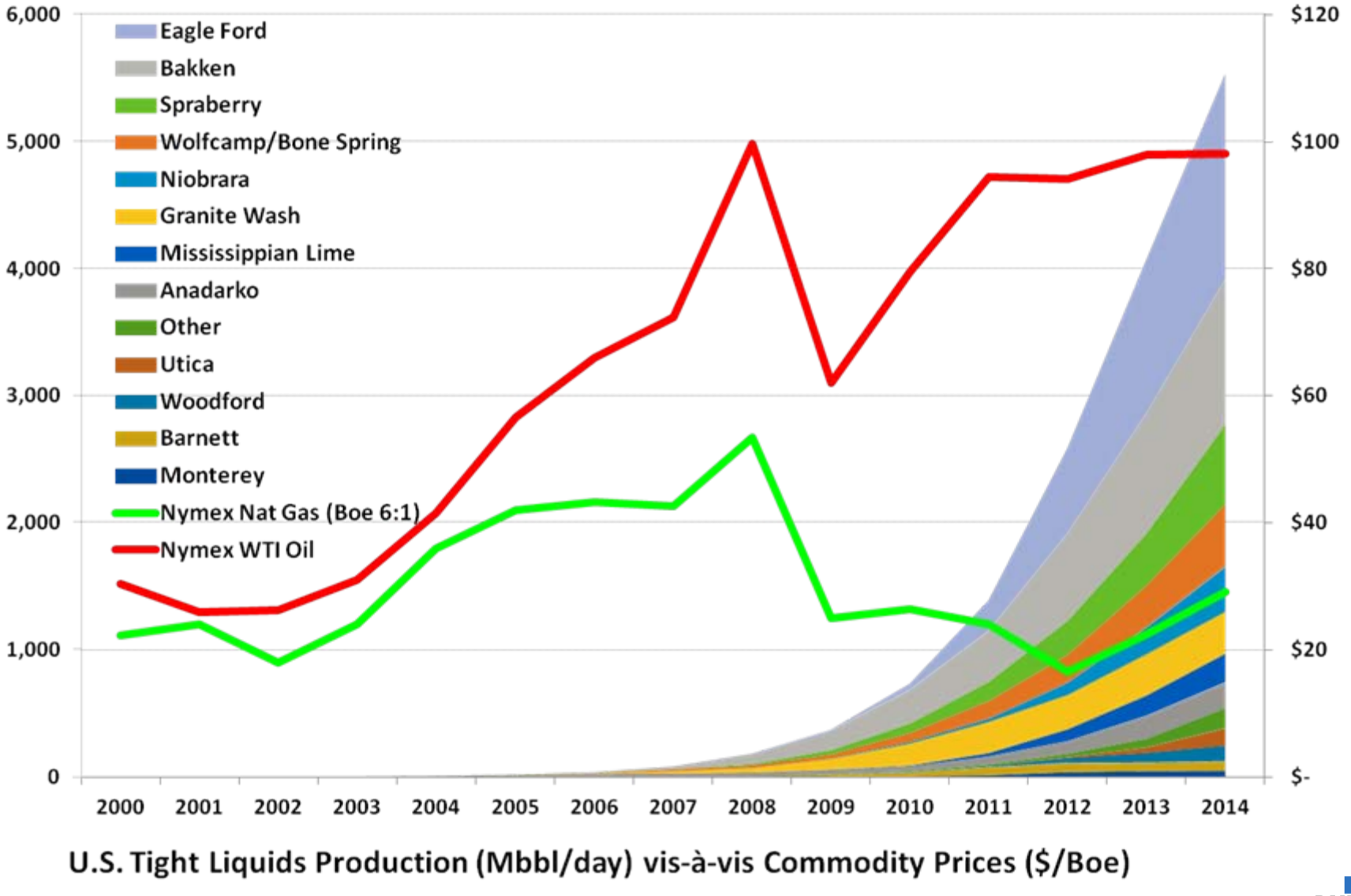
U.S. Tight Oil Production Takes Off as Oil Prices Rise



U.S. Tight Liquids Production (Mbbl/day) vis-à-vis Commodity Prices ($/Boe)

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Supply Revival and Economic Impact of the U.S. Oil and Gas Revolution is Substantial

	2012	2020
Jobs	2.1 million	3.3 million
Tax Revenue	$75B	$125B
GDP	$283B	$468B
Disposable Income	$1,200	$2,700
Capex	$121B	$189B

- Not just oil and gas: associated industries such as petrochemical and manufacturing have been booming
- As natural gas has replaced coal in electricity generation, US CO_2 emissions declined to their lowest levels in 20 years, the largest reduction of all countries

Source: IHS America's New Energy Future: The Unconventional Oil & Gas Revolution and the US Economy, Volume 3

EXPORTING THE NORTH AMERICAN SHALE GAS EXPERIENCE

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Above Ground and Subsurface Factors Must be in Place to Achieve Commercial Success

Prices & Market Fundamentals	• Motivated industry + government in the face of dwindling domestic supplies • A favorable price environment
Business Environment	• Open economy, free market dynamics • Private Equity and joint venture funding
Infrastructure	• Initial development in established oil and gas basins with pre-existing infrastructure and proximity of supply to demand • Ability to build/grow infrastructure
Land Access & Regulatory Terms	• Transparent regulations • Landowner incentives and mineral rights
Resource Base	• Sweet spot position • Technology advances such as geo-steering, LWD/MWD, imaging, simulation and modeling capabilities
Public Policy	• Favorable public opinion and minimal environmental footprint • Low political risk
Upstream OFS	• Existing and scalable service sector infrastructure + supplier base • Successful replication of best practices from analogs • Operational efficiencies, "factorization" • Rig Availability
Water Availability & Management	• Scale and access to resources

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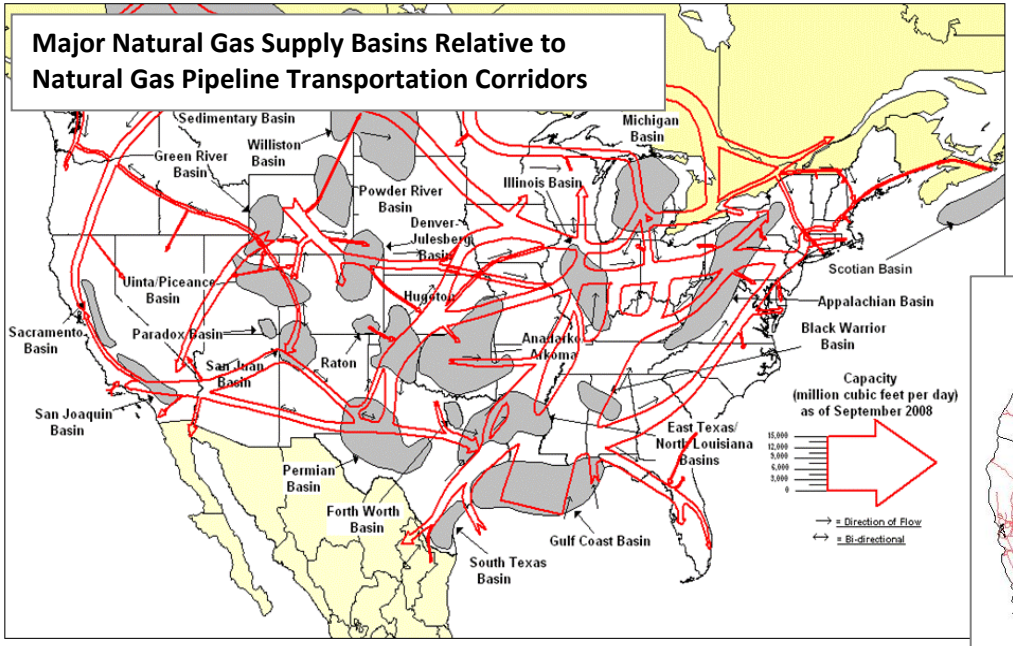
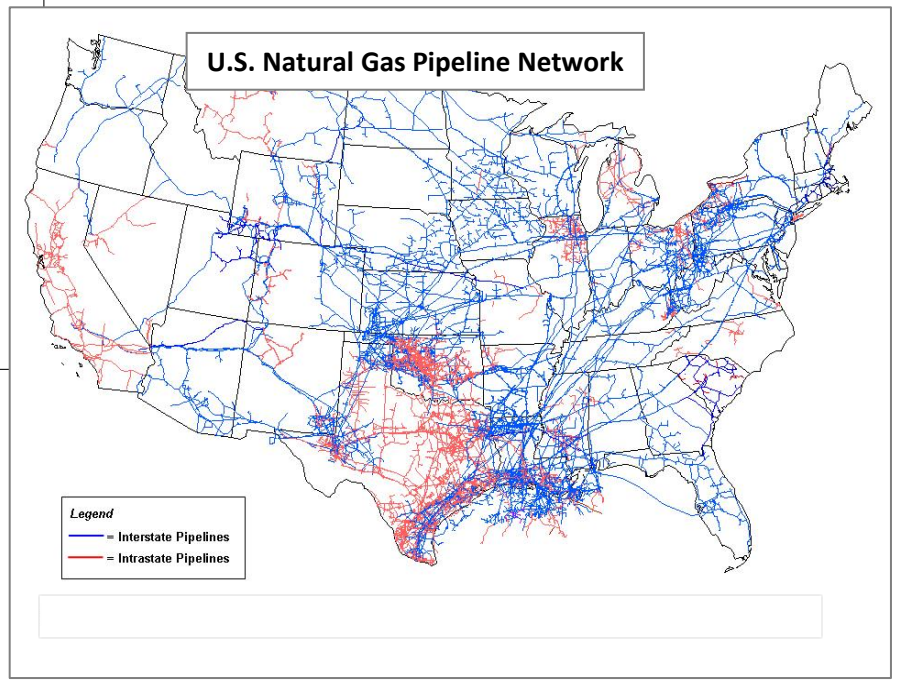
Mature Pipeline Infrastructure and Flexible Growth: A Key Enabler for the US Shale Revolution



Source: US Energy Information Administration



Source: US Energy Information Administration

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THE INTERNATIONAL PLAYING FIELD AND KEY PROSPECTS

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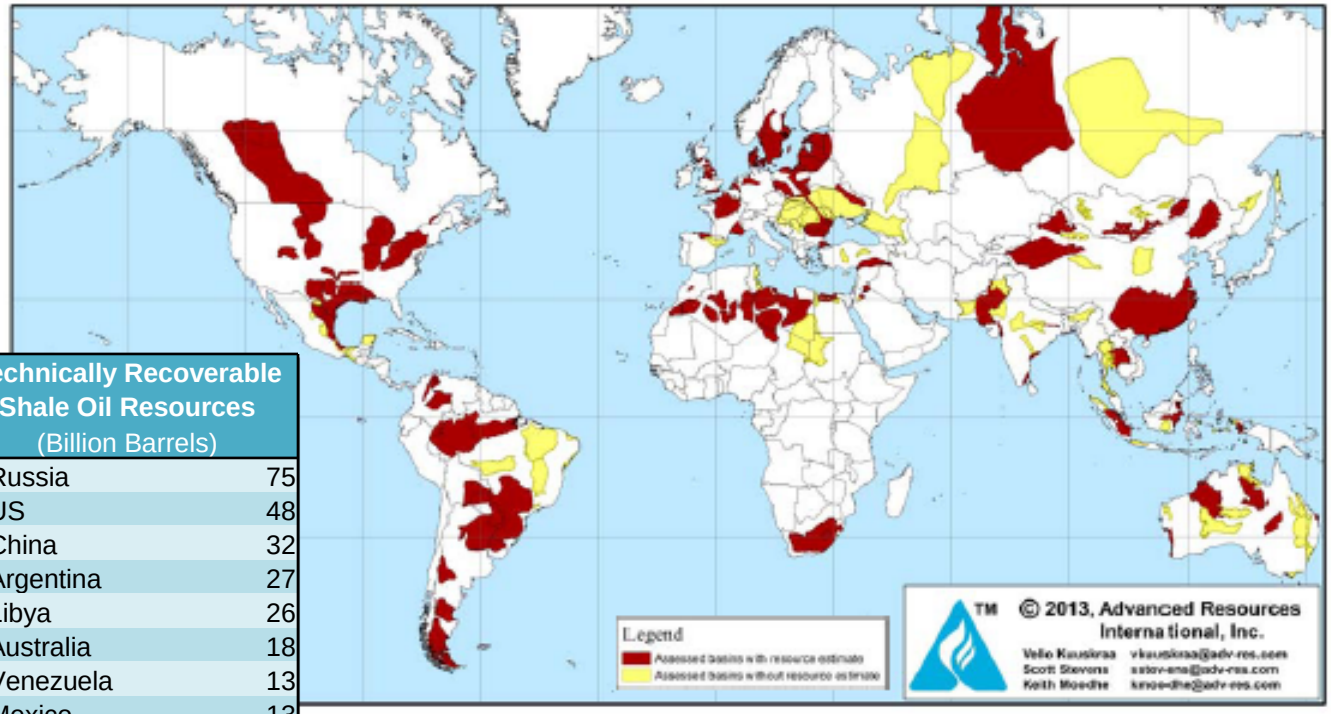
High Potential Global Resources

Assessed World Shale Gas and Shale Oil Resources (42 Countries, including U.S.)



Technically Recoverable Shale Gas Resources (Tcf)	
1. US	1,161
2. China	1,115
3. Argentina	802
4. Algeria	707
5. Canada	573
6. Mexico	545
7. Australia	437
8. South Africa	390
9. Russia	285
10. Brazil	245
11. Others	1,535
TOTAL	**7,795**

Technically Recoverable Shale Oil Resources (Billion Barrels)	
1. Russia	75
2. US	48
3. China	32
4. Argentina	27
5. Libya	26
6. Australia	18
7. Venezuela	13
8. Mexico	13
9. Pakistan	9
10. Canada	9
11. Others	65
TOTAL	**335**

Source: US Energy Information Administration and Advanced Resources International June 2013

Current global proved reserves amount to 6,839 TCF of wet gas and 1,624 Bn bbls of oil

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International Shale Market Growth and Challenges

Prices & Market Fundamentals	• Unpredictable state-controlled pricing regimes • Complex geopolitics that influence trade balances
Business Environment	• Competitive landscape: strong state-owned NOCs dominating the playing field vs. IOCs presence • Level of unconventional expertise and capital availability
Infrastructure	• Sufficient midstream capacity and proximity of supply to demand • Stranded hydrocarbons in isolated terrains (e.g. the Amazon) • Sufficient transportation to move oilfield equipment to/from sites
Land Access & Regulatory Terms	• Favorable or unfavorable fiscal terms • Bureaucracy transparency and response time • Maturity of development regulations
Resource Base	• Resources yet to be de-risked • Scale of resource potential
Public Policy	• Unpredictable security concerns and/or policy decisions • Public opposition strongly aligned against both frac stimulation and infrastructure that could compromise environmental conservation
Upstream OFS	• Local content requirements prompting labor and equipment shortage • Rig availability and supply chain sophistication
Water Availability & Management	• Water supply and weather constraints

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Qualitative Assessment of International Unconventional Space

Dimension	U.S.	Canada	Argentina	MENA	China	Australia	Mexico	Europe	Russia
Resource Base									
Infrastructure/ Logistics									
Public Policy, Land Access									
Development Cost									
Business Environment									
Upstream OFS									
Water Avail. and Management									
Overall Commerciality									

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CONCLUSIONS

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Key Takeaways

- Similar to North America, unlocking international unconventional energy has the potential to foster millions of jobs, encourage free enterprise growth, generate significant government revenue, and profoundly transform global economies and geopolitics as we know it today
- North American shale gas developments were uniquely driven by Independents through technological progress over time
- IOCs, NOCs, and Independents alike will apply key lessons learned to development of unconventional resources abroad
- The North American unconventional revolution has set the stage for global evolution, but significant production impact may not appear over a 3-5 year horizon

- International shale gas opportunities are mostly in early exploration; many current-day wildcards and challenges could play out over time in an entirely transformed landscape