

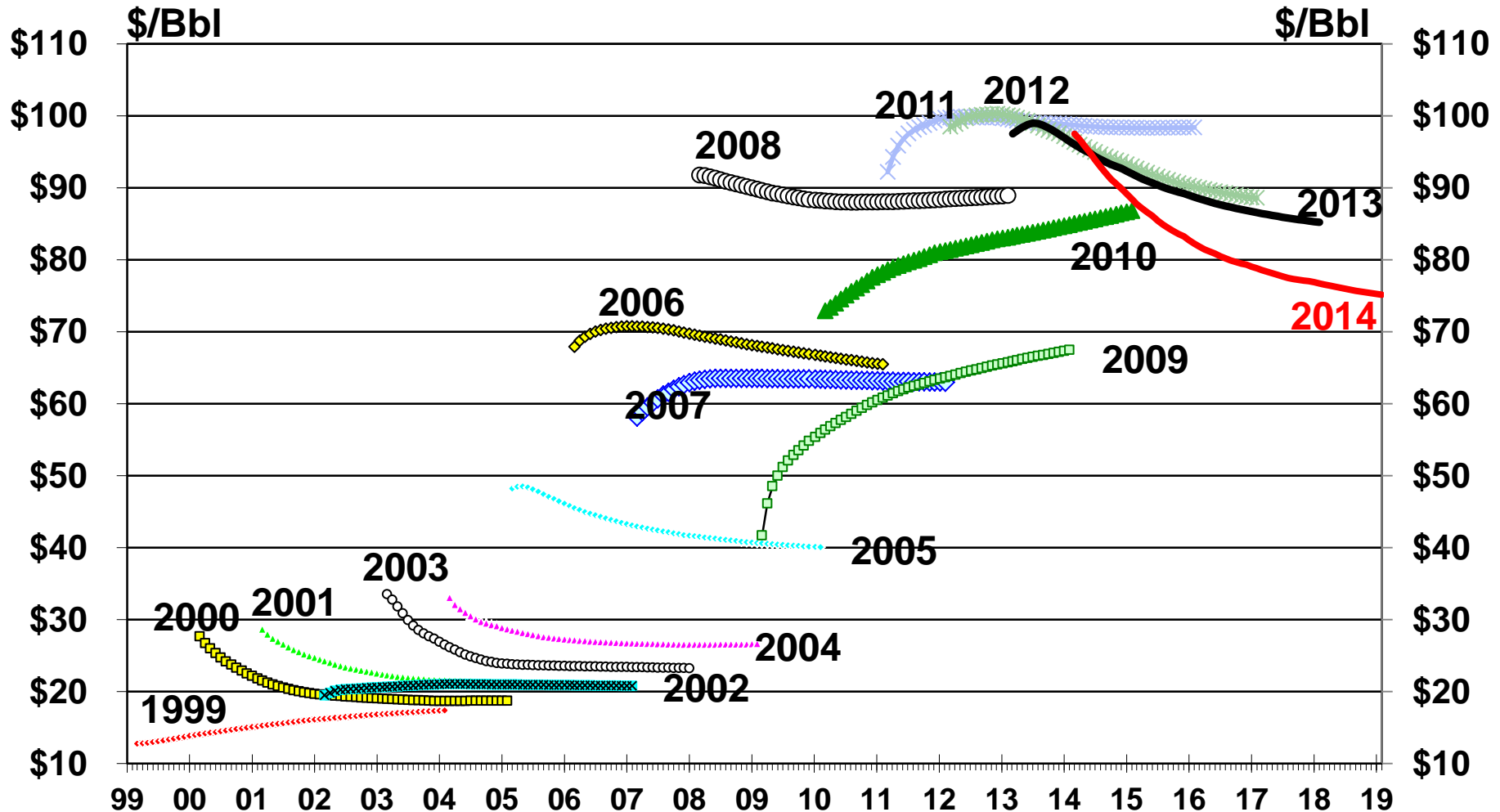
---

# **Liquids Supply Growth, Price, Cost and Resource Nationalism**

**Presentation to Saudi Aramco  
Management Development Seminar**

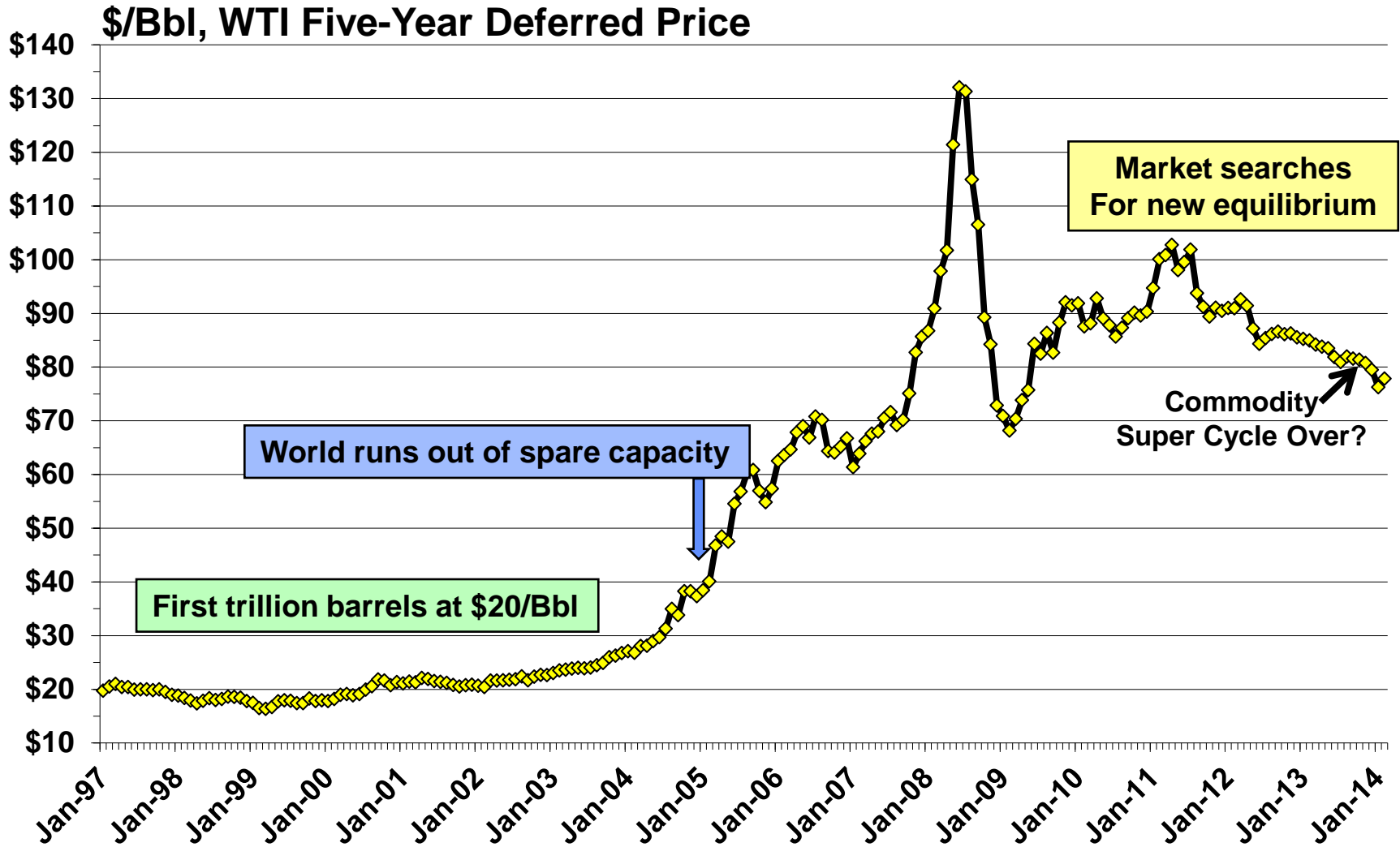
**Mark Schwartz  
PIRA Energy Group  
April 2014**

# WTI Futures Price Structure 1999-2014



\* End of January

# Five Year Out Deferred Price Comes Under Downward Pressure



# Long-Term GDP Growth Outlook

	<u>1995-2012</u>	<u>2013</u>	<u>2014</u>	<u>2014-2030</u>
U.S.	2.5%	1.6%	2.4%	2.3%
W. Europe	1.8%	0.2%	1.7%	1.6%
Japan	0.8%	1.9%	1.6%	1.3%
China	<b>9.7%</b>	7.5%	7.2%	<b>5.7%</b>
Other Asia	5.1%	4.2%	4.7%	4.5%
<u>ROW</u>	<u>3.7%</u>	<u>2.1%</u>	<u>3.0%</u>	<u>3.3%</u>
WORLD	3.6%	2.8%	3.5%	3.4%

**China Weight:**

**6%**

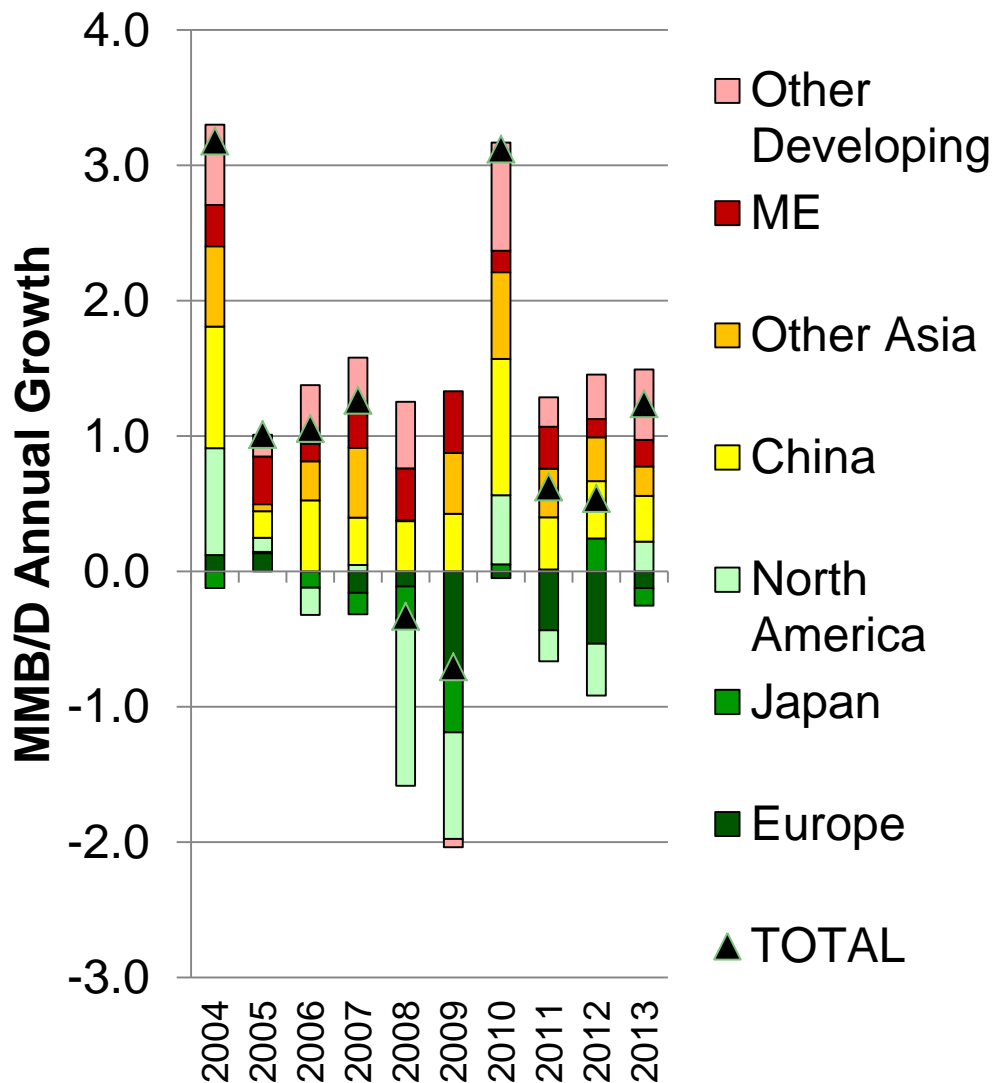
**23%**

**OECD Weight**

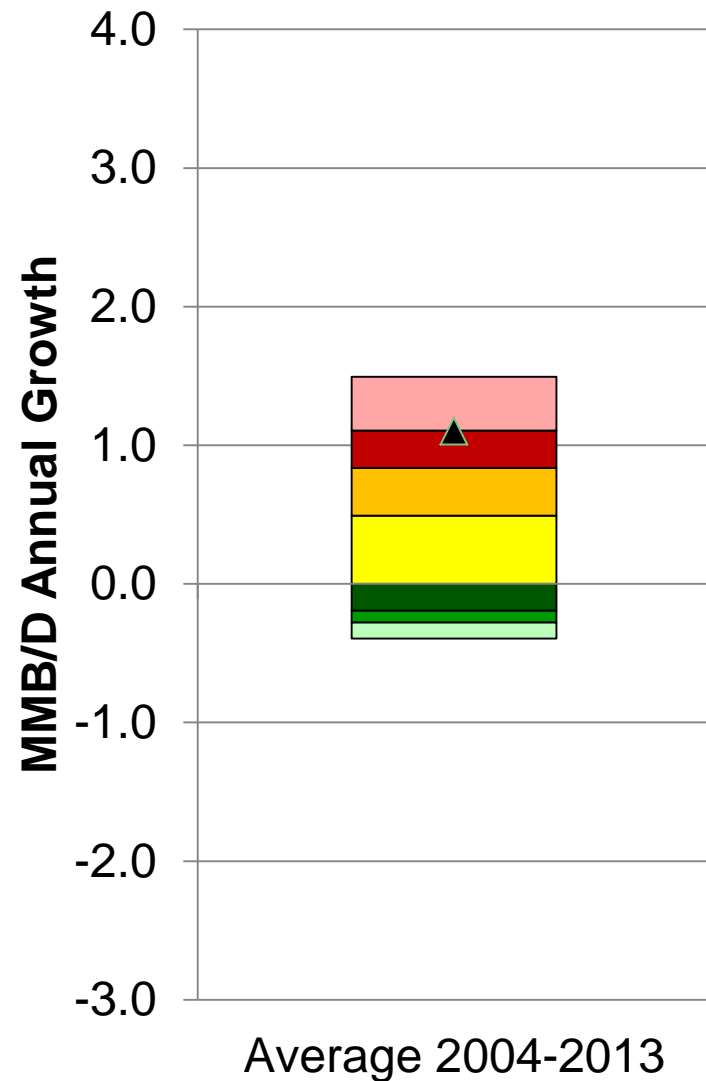
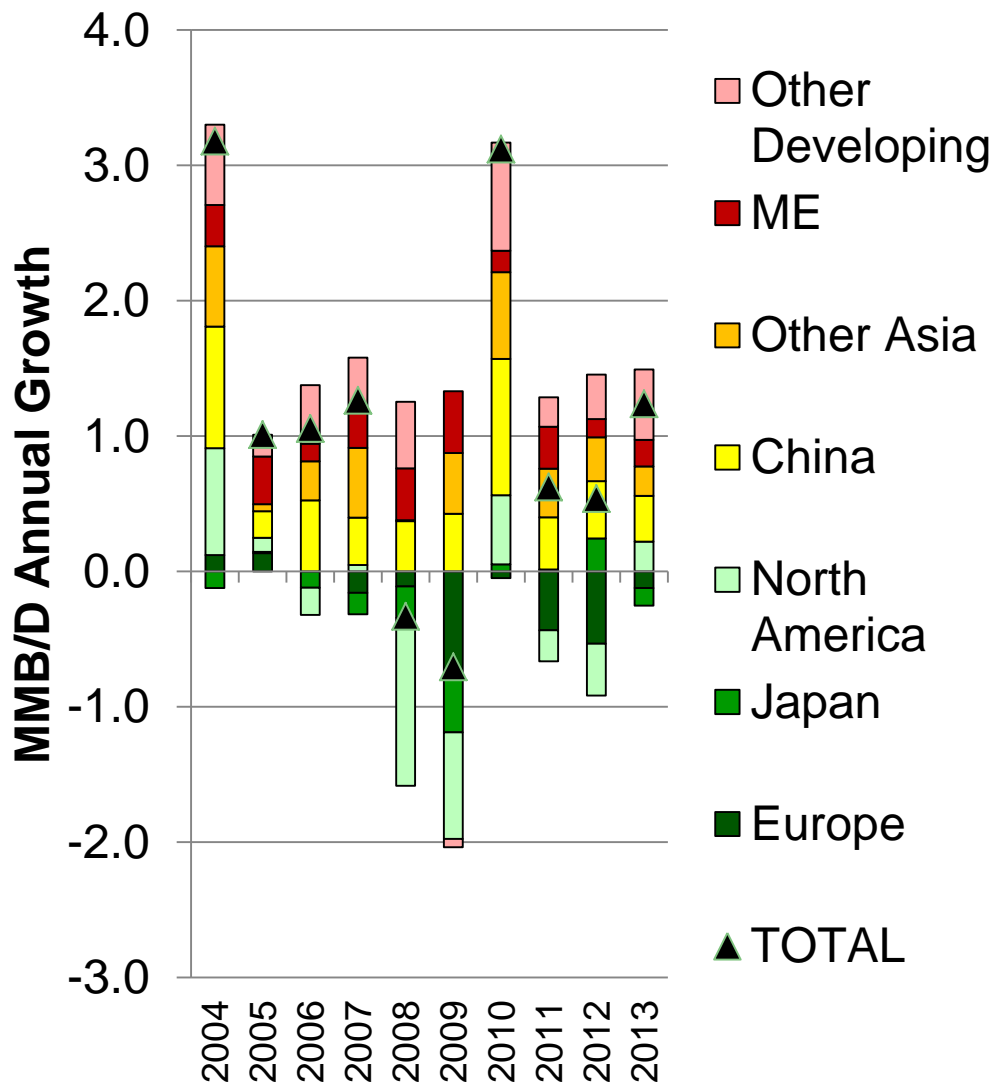
**60%**

**36%**

# Oil Demand Growth Averaged 1.1 MMB/D Despite Tripling of Crude Price, Great Recession



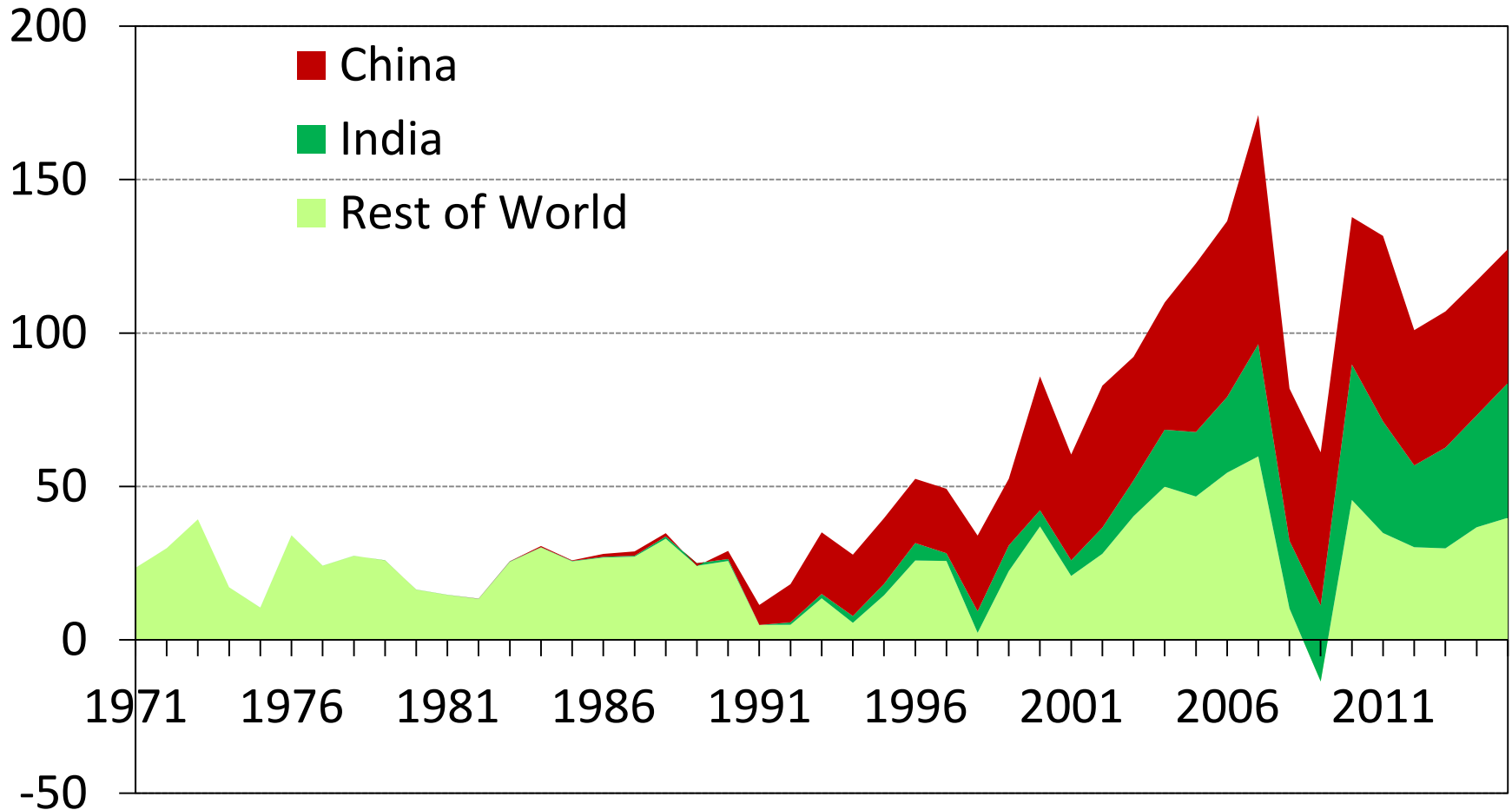
# Oil Demand Growth Averaged 1.1 MMB/D Despite Tripling of Crude Price, Great Recession



# Global Middle Class Growth Has Surged Since 1990

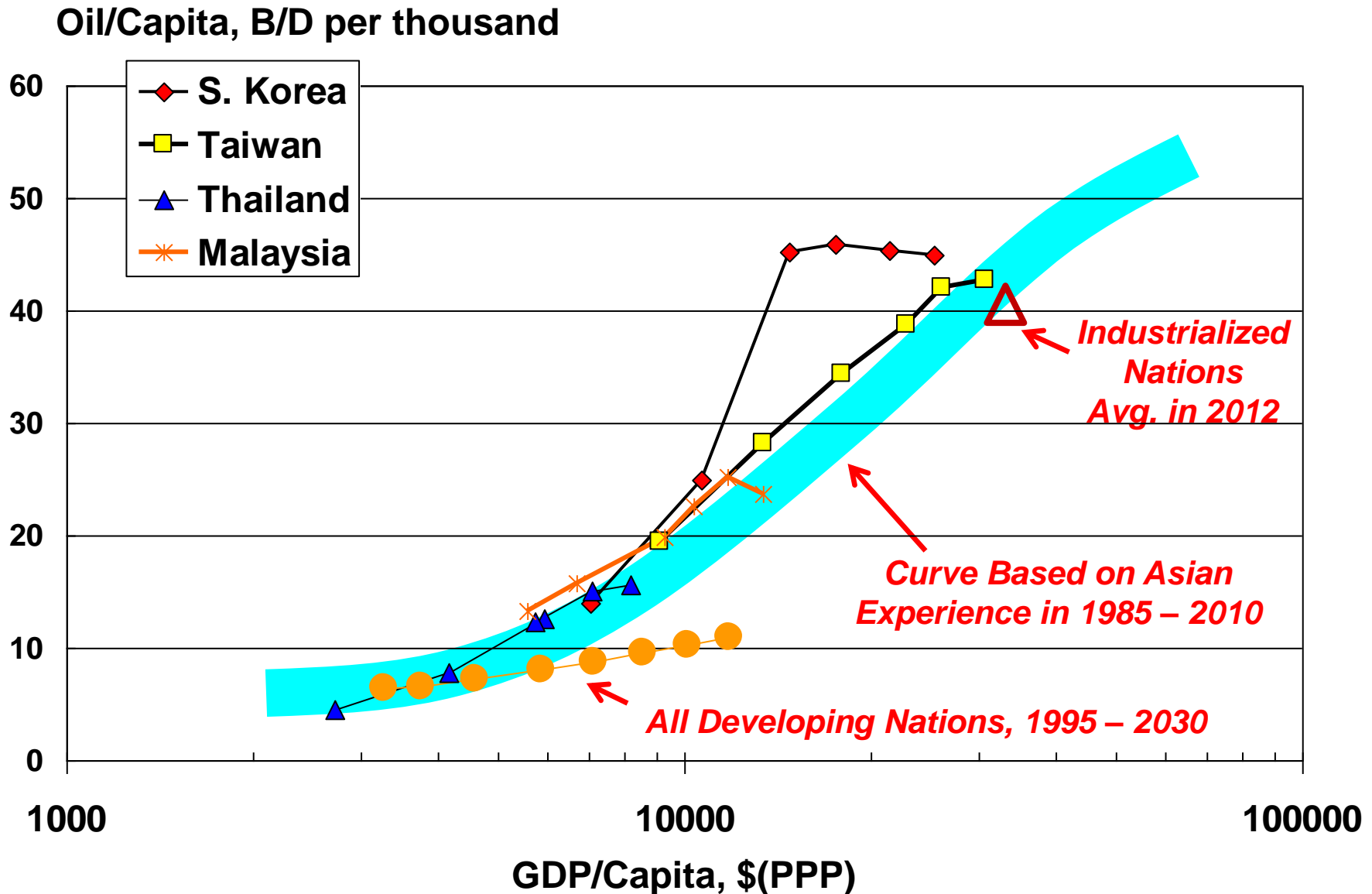
## Annual Growth in Middle Class+ Population (>\$6,000 GDP\* per Capita)

Millions



\* 1996 PPP \$

# PIRA's Long-term Oil Demand Per Capita Assumption for Emerging World is Conservative





# Long-Term Oil Demand Growth Supported By Strong, Resilient Core



MMB/D/YR

1.60

1.40

1.20

1.00

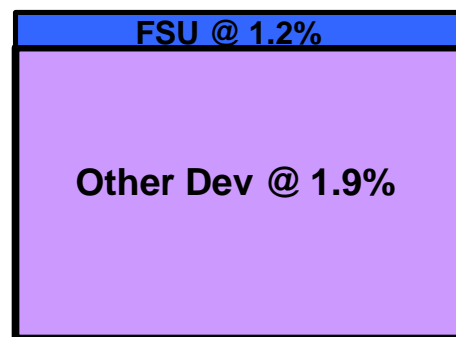
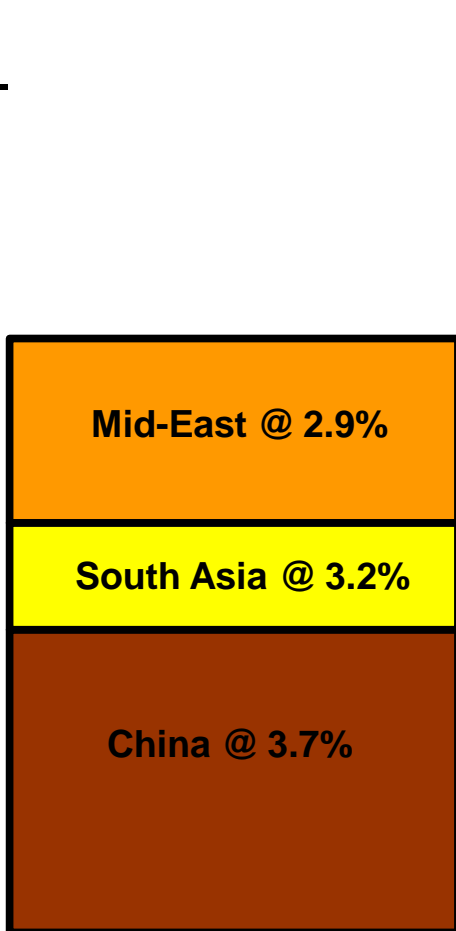
0.80

0.60

0.40

0.20

0.00



OECD @ -0.4%

Projected Annual Growth – 2013-2030

# How Will Demand be Supplied?

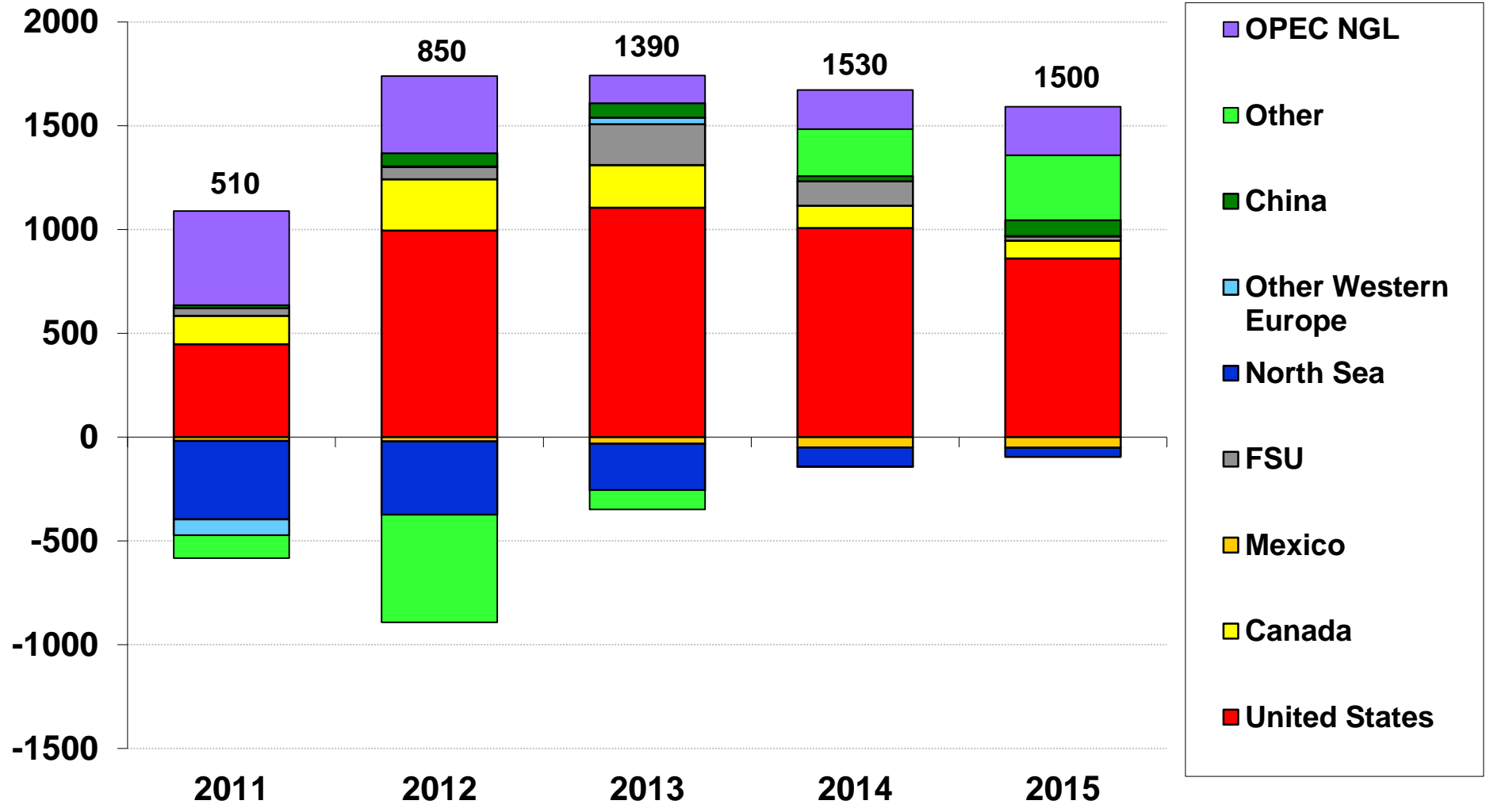
---

- **Non-OPEC**
  - » Conventional crude and condensate
    - Shale
    - Other
  - » NGL's
    - Non-OPEC
    - OPEC
  - » Non-Conventional
    - Oil sands
    - Biofuels
    - Other (GTL, CTL etc.)
- **OPEC crude**

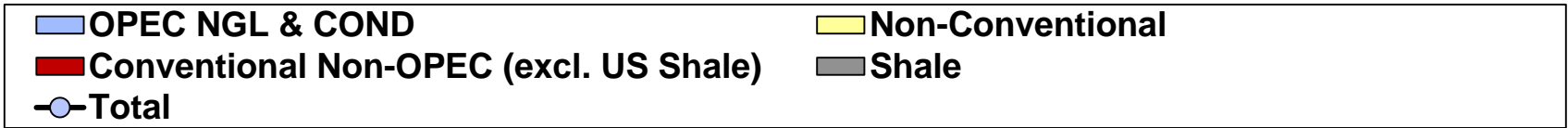
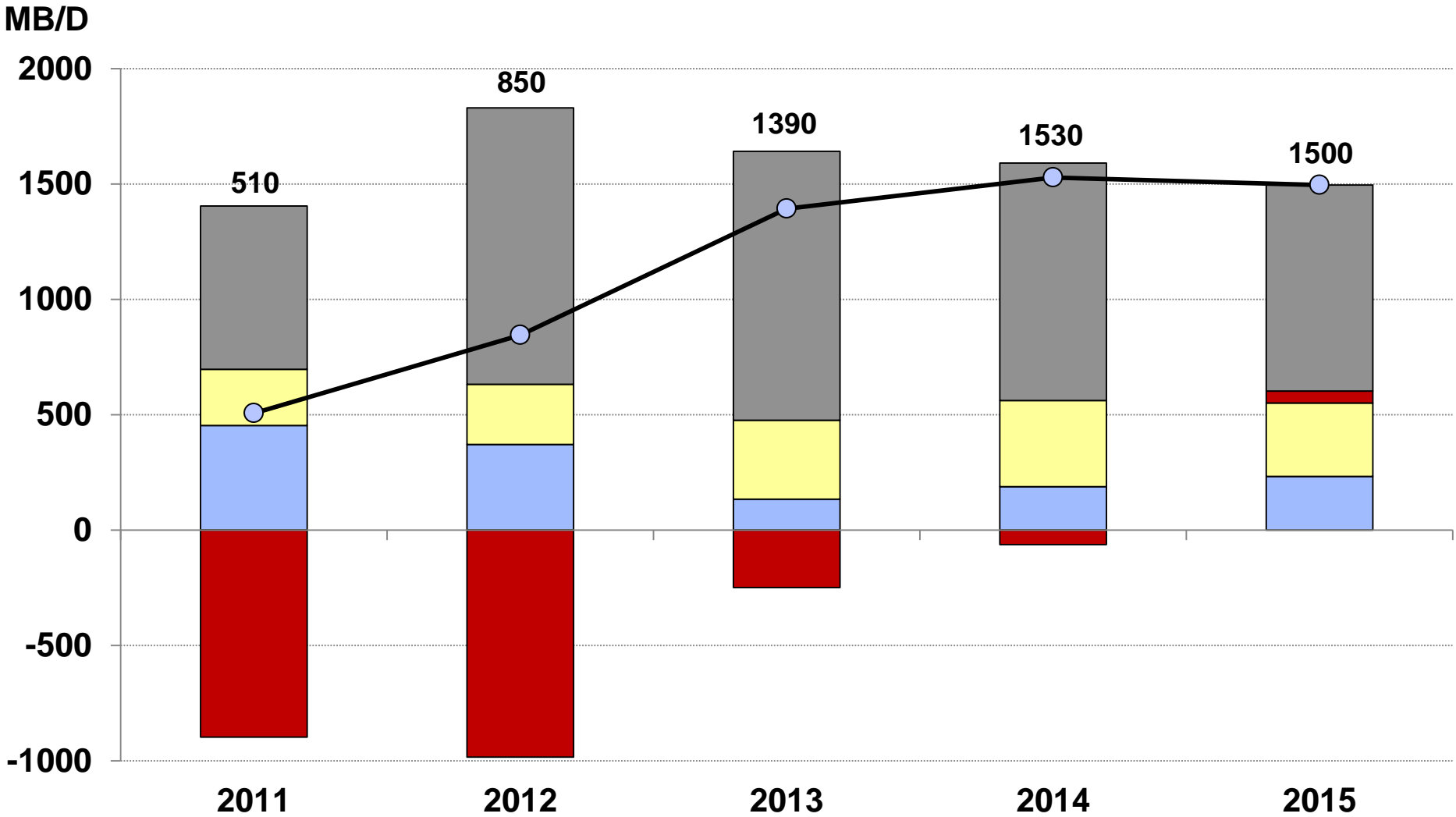
# Non-OPEC Supply Growth 2011-2015



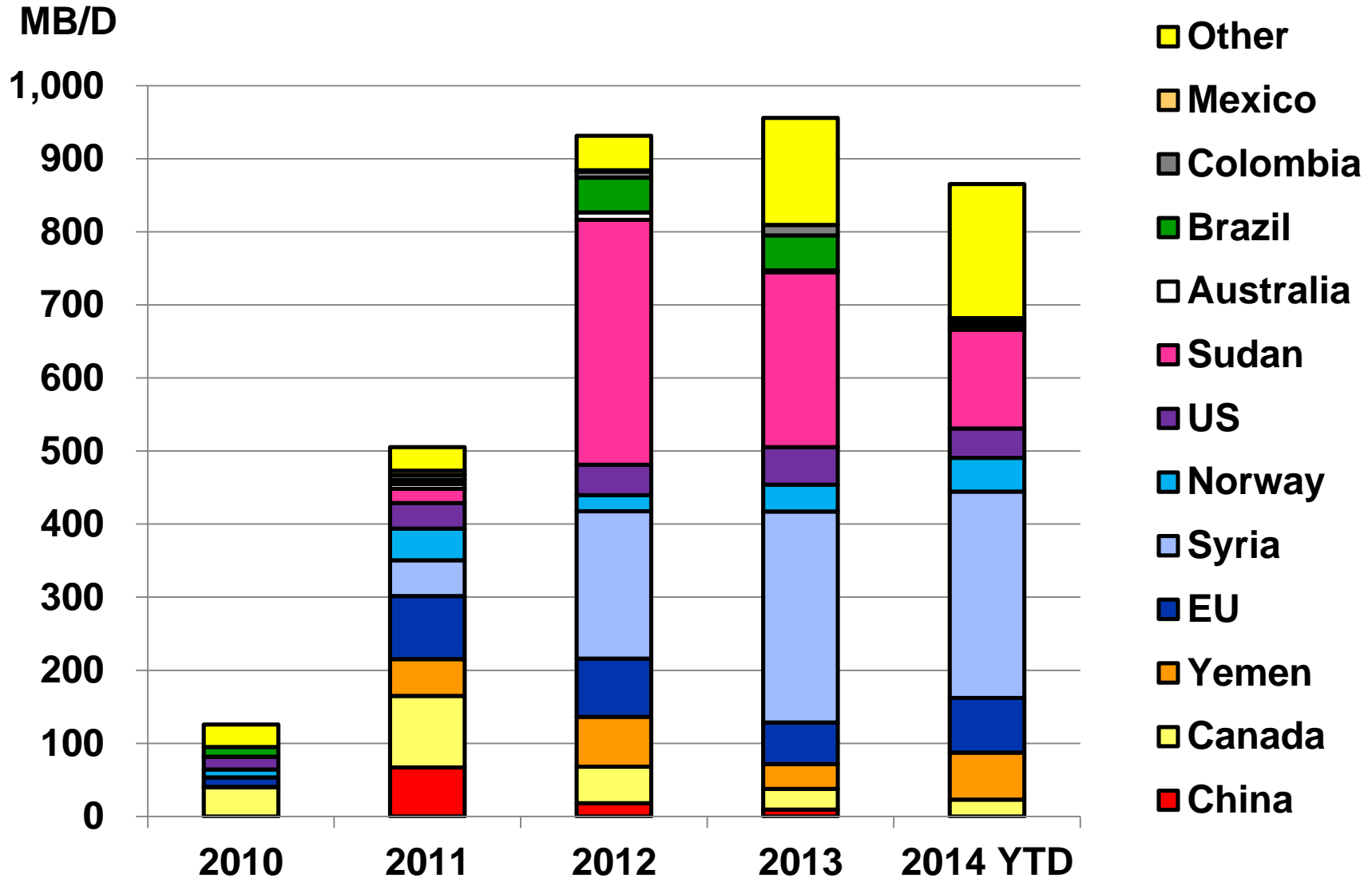
MB/D Year-on-Year Change



# Shale – Key Driver of the Growth in 2014 & 2015



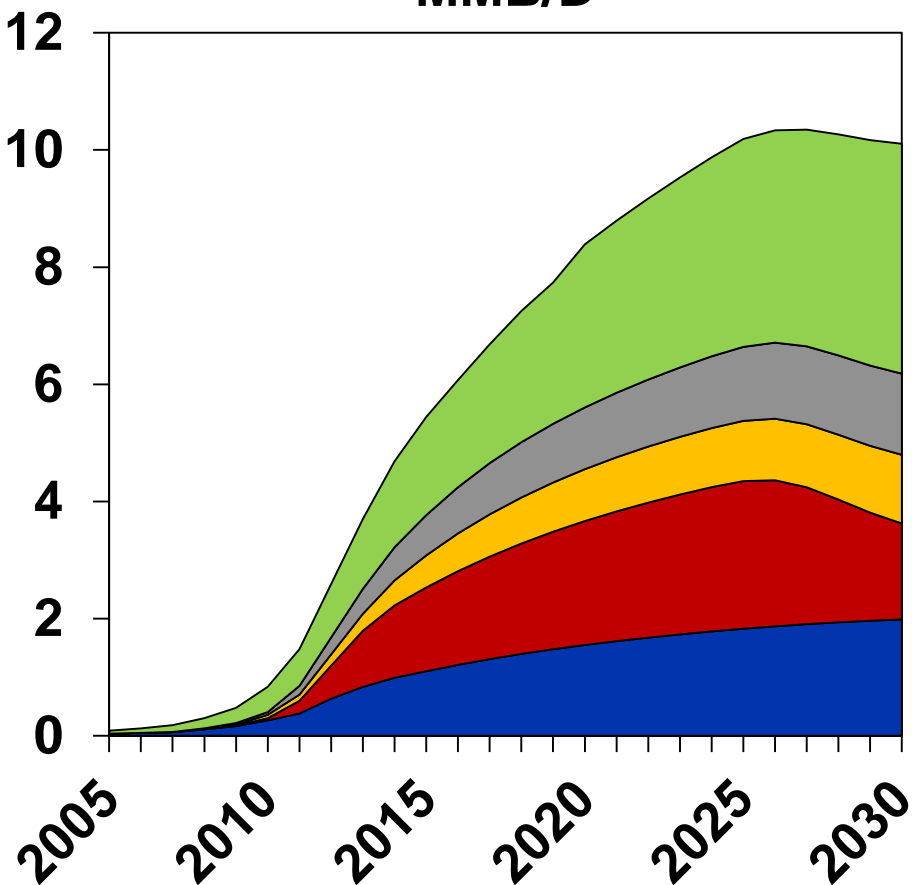
# Large Non-OPEC Oil Supply Disruptions Continue



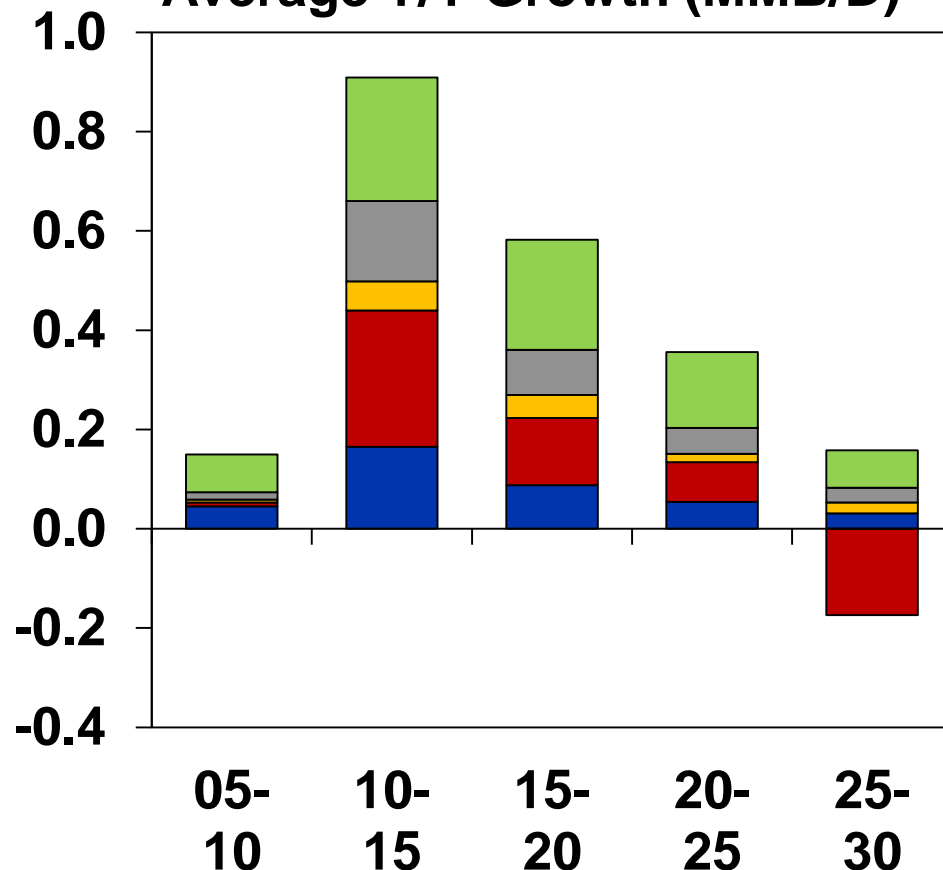
# U.S. Shale Liquids Growth Rate Will Slow But Absolute Potential Looks Stronger



MMB/D



Average Y/Y Growth (MMB/D)



- Bakken Crude & Condensate
- Eagle Ford Crude & Condensate
- Permian Shale Crude & Condensate

- Other\* Crude & Condensate
- U.S. Shale NGLs

# U.S. Shale Liquids Production

---

- **Major growth phase underway**
  - **Capital**
  - **Technology**
  - **Resource**
  - **Economic return**
- **Concentrated in several key basins – potentially more**
- **Conservative assumptions:**
  - **Technology / productivity**
  - **Acreage access**
  - **Rig growth**
- **Key obstacles**
  - **Environmental**
  - **PRICE !!!**

# Environmental Constraints

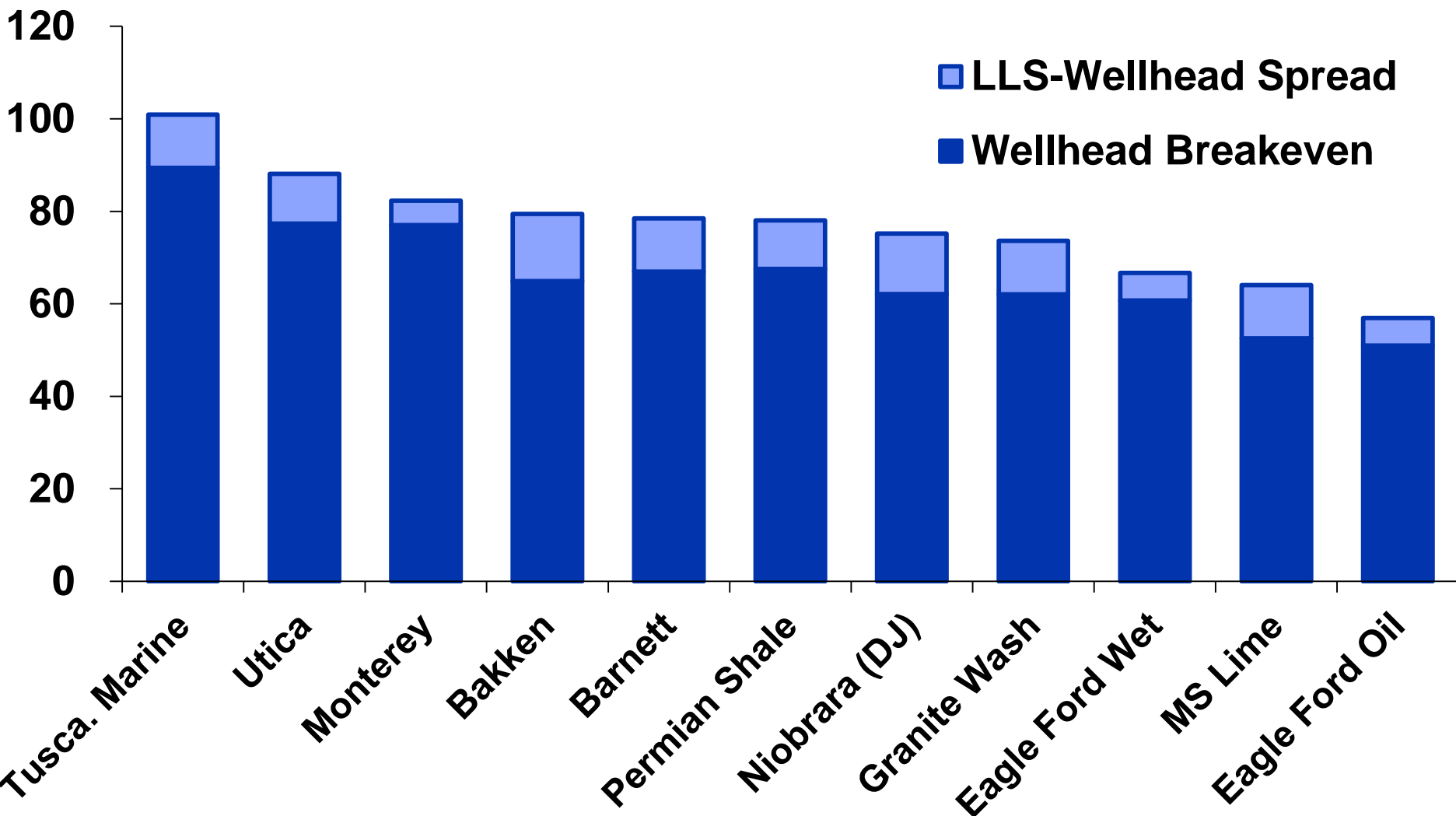
- **National consensus in U.S. that fracking benefits outweigh costs**
  - » Particularly with budget / employment priorities rising
- **Most shale regulated at state level by supportive states**
  - » Texas/Louisiana/North Dakota/Wyoming etc – moving forward
  - » Pennsylvania/Ohio – seeking compromise, tougher standards but need the jobs
  - » New York/California -- TBD
- **Obama administration recognizing political reality**
  - » Latest EPA “green completion” directive sensitive to industry concerns.
  - » Same with proposed rule on chemical disclosure.
- **Industry has incentives to “not kill golden goose” even if that means some rise in environmental costs**
- ***Wild cards: Water contamination, seismic event, methane, local pollution/congestion***



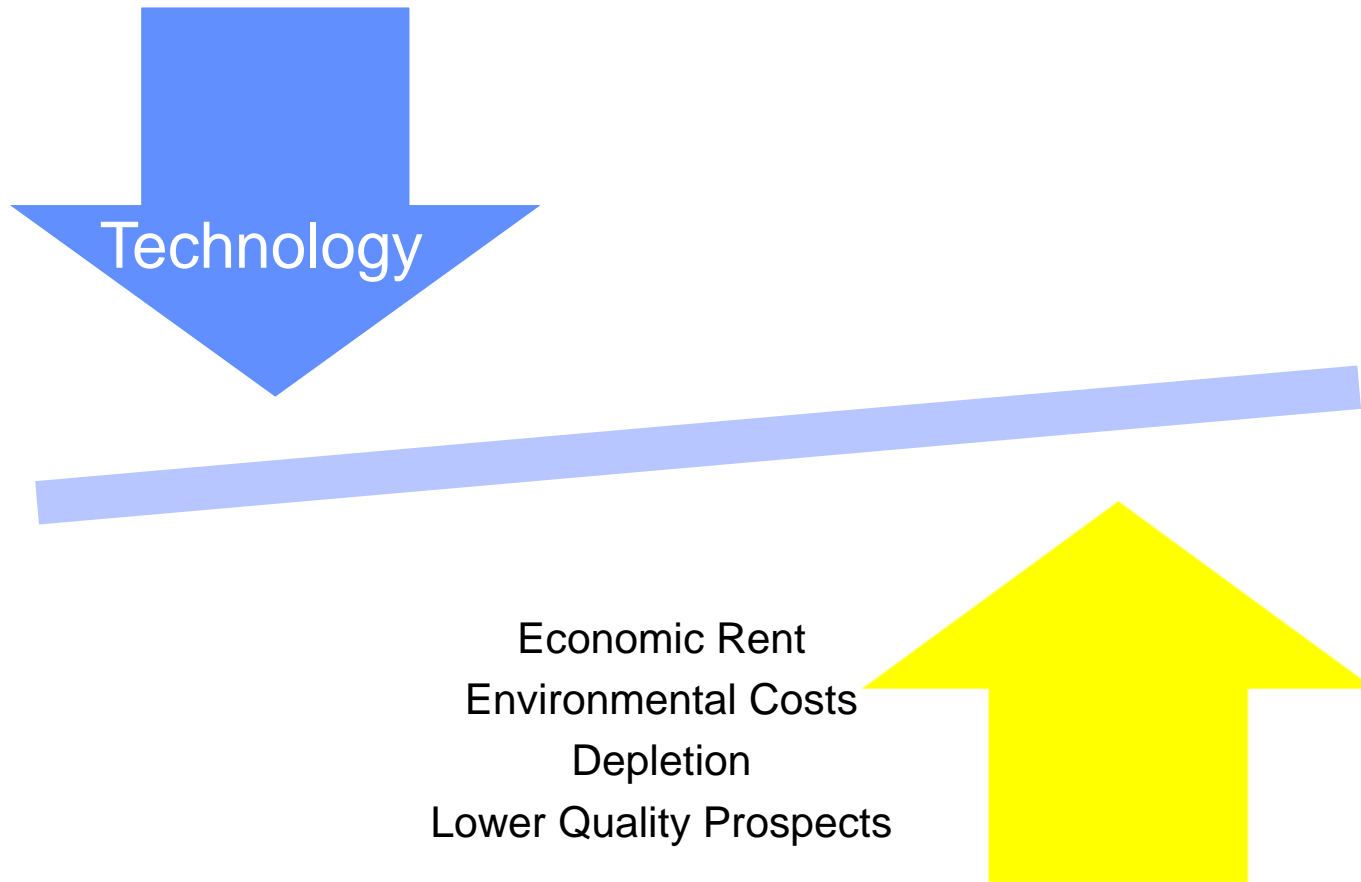
# Most U.S. Shale Plays Economic At Current Prices



Breakeven Single-Well Costs (\$/Bbl)



# Where Will Breakeven Costs Go?

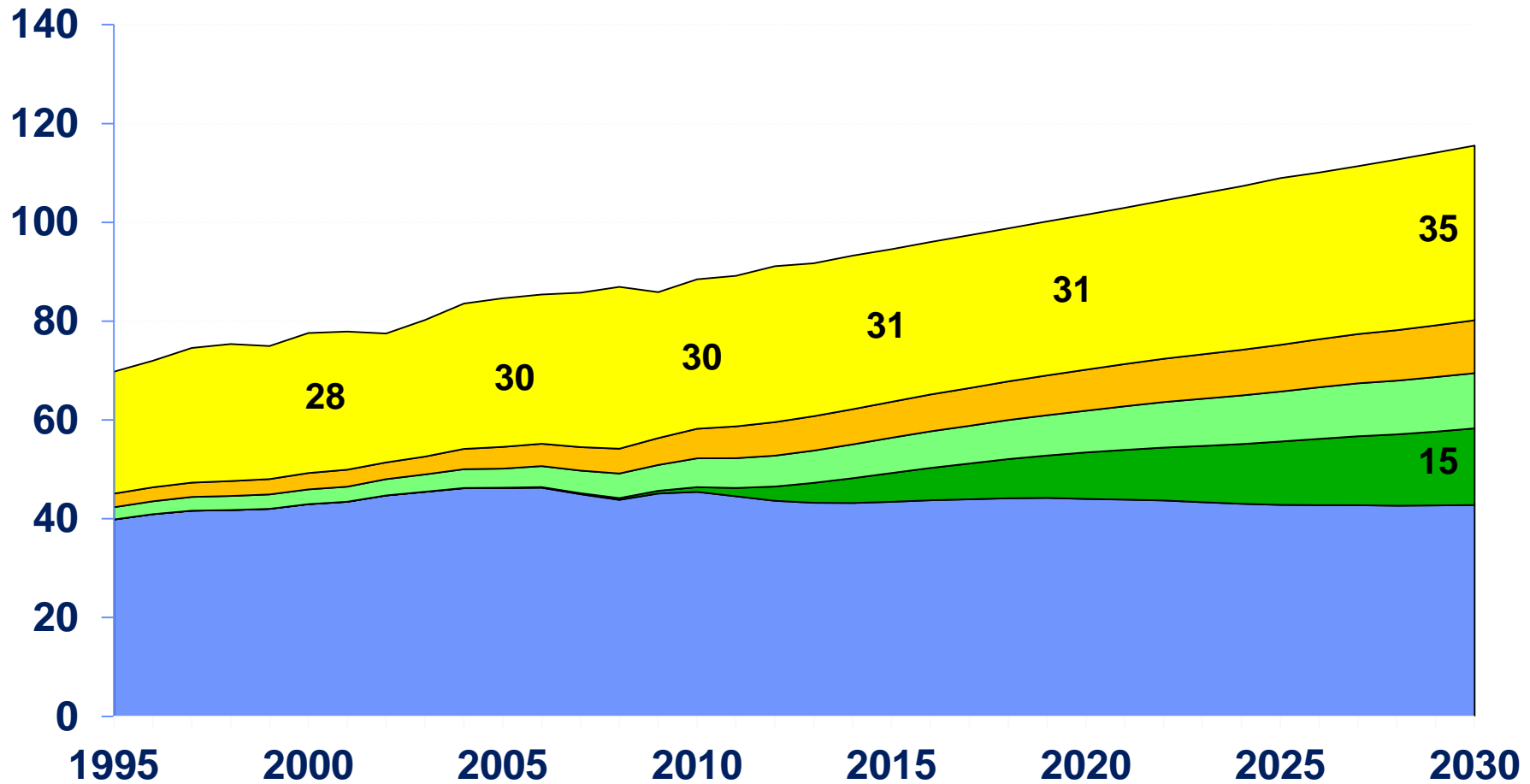


# Many Countries Lack Conditions for Successful Shale Oil Development



	U.S.	EU	Russia	China	Argentina	Mideast
<b>Geology</b>	✓					
<b>Clear Property Rights/Access</b>	✓		X	X	X	X
<b>Flexible Environ. Regime</b>	✓	X				
<b>Attractive Fiscal Regime</b>	✓		X	X	X	X
<b>Water Access</b>	✓			X		X
<b>Technology/Labor</b>	✓					
<b>Robust Service Providers</b>	✓					
<b>Room for Innovative Players</b>	✓					
<b>Capital</b>	✓					
<b>Takeaway Infrastructure</b>	✓					
<b>Limited Conventional Oil</b>	✓		X			X

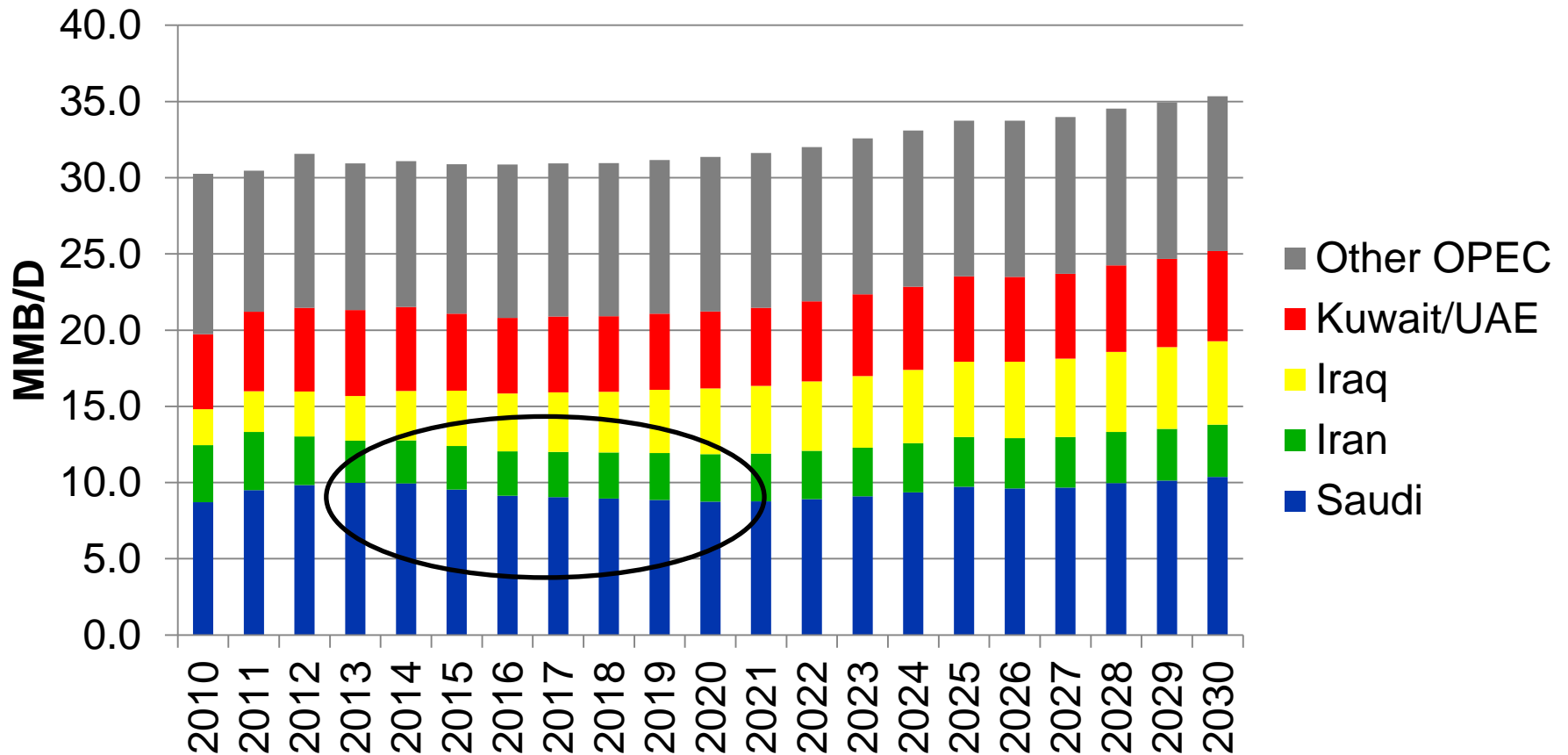
# OPEC Requirement Still Grows Longer Term But Flat for Next Several Years



# Potentially Difficult Period Ahead for OPEC, Saudi in Particular



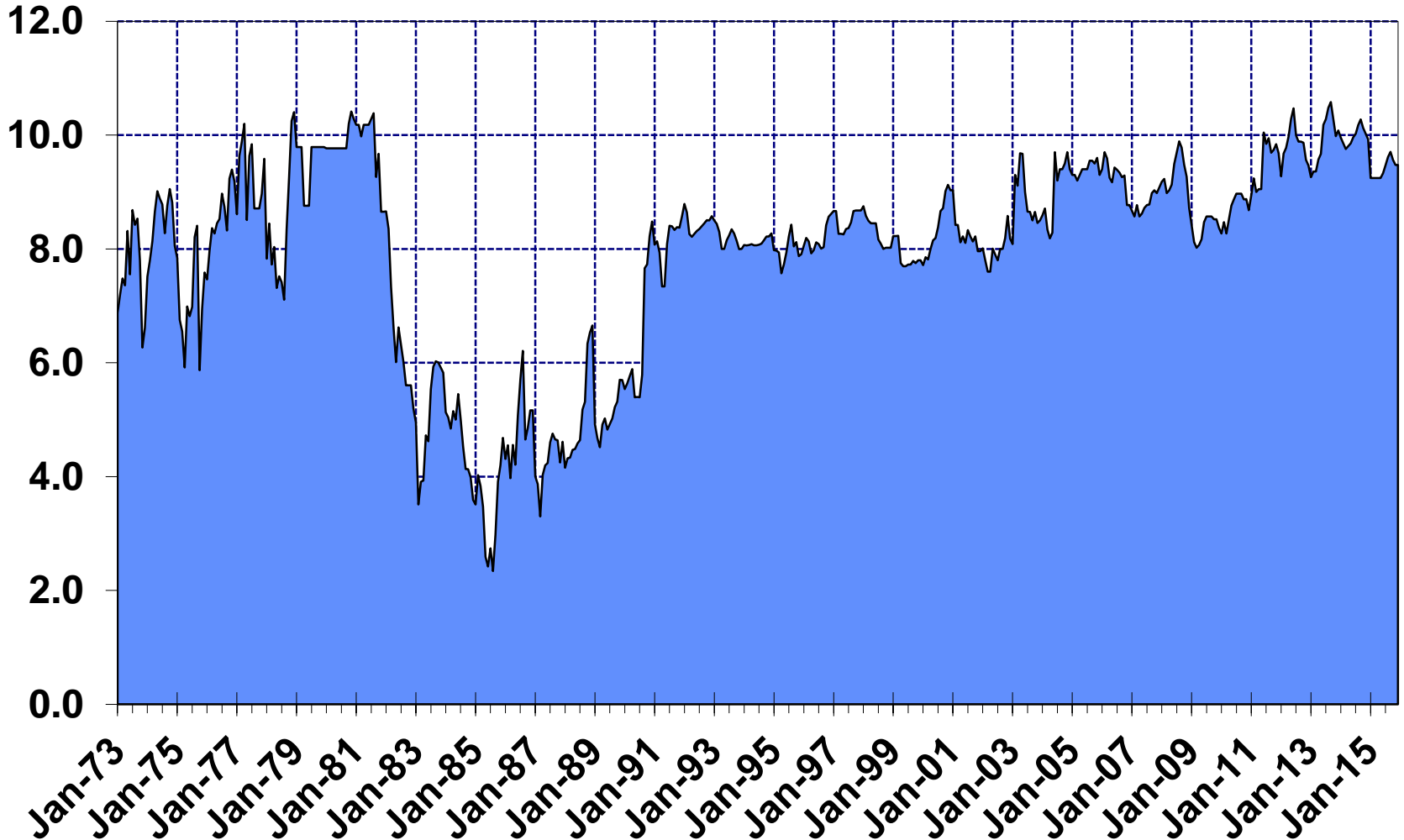
## OPEC Crude Production



# Saudi Arabia Crude Oil Production January 1973 - December 2015

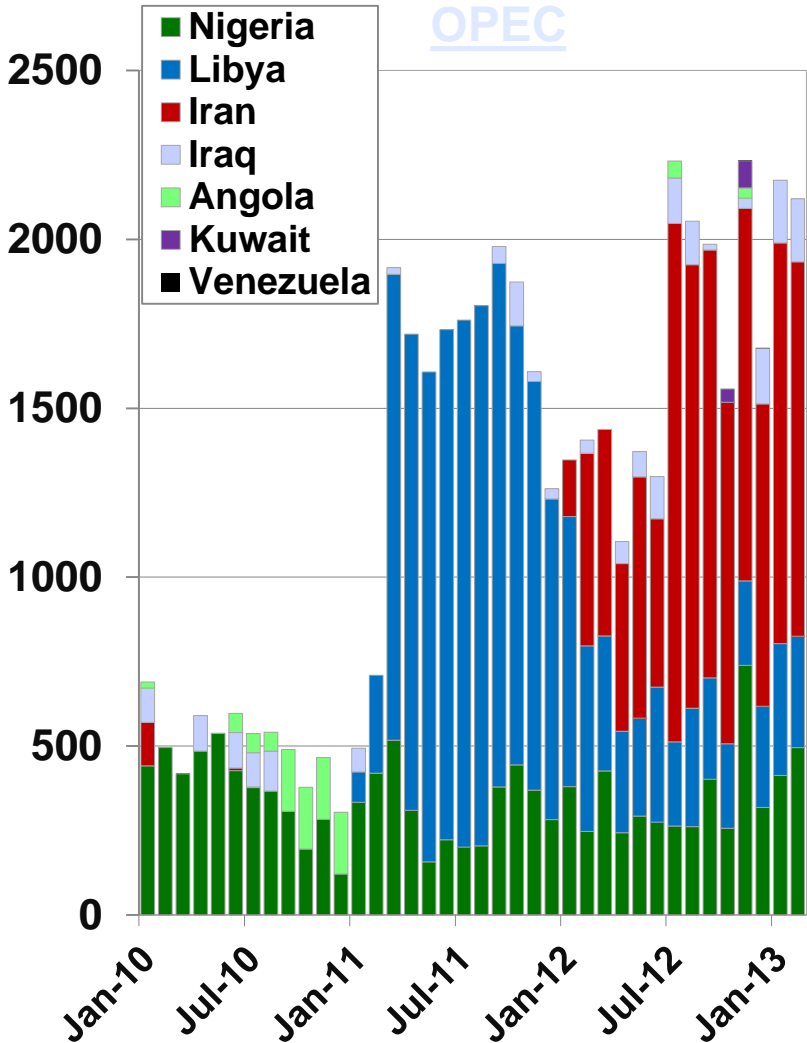
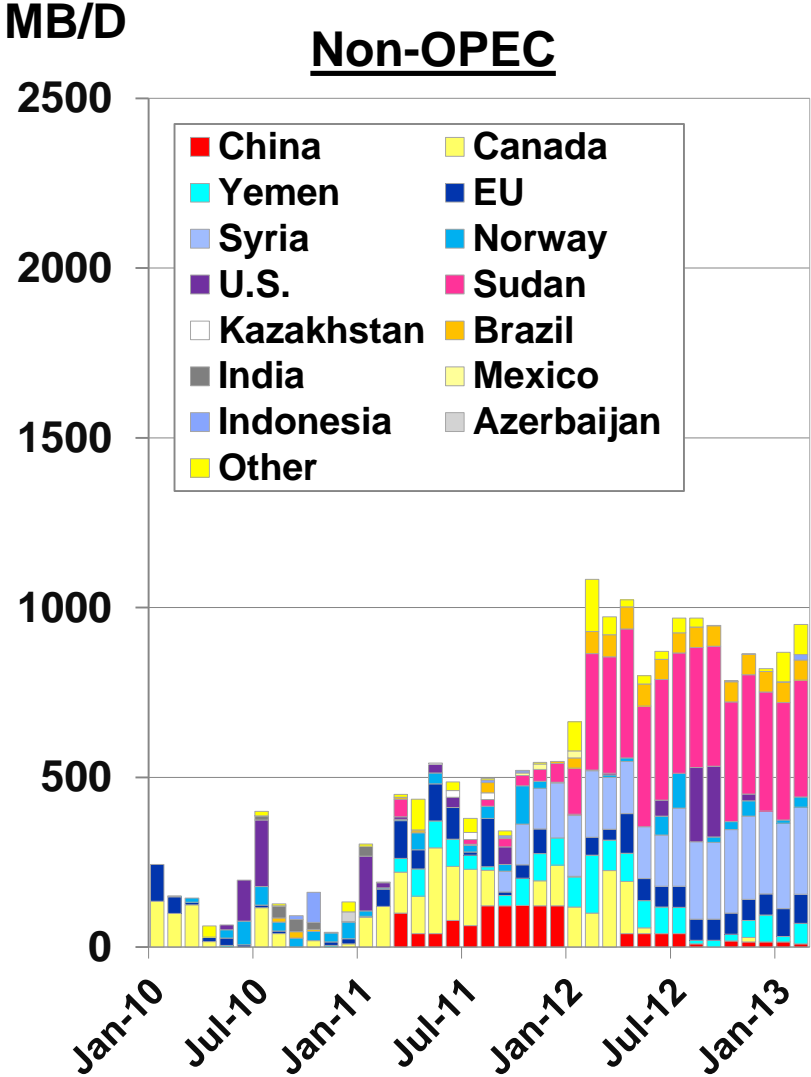


MMB/D



Includes Saudi Share of Neutral Zone

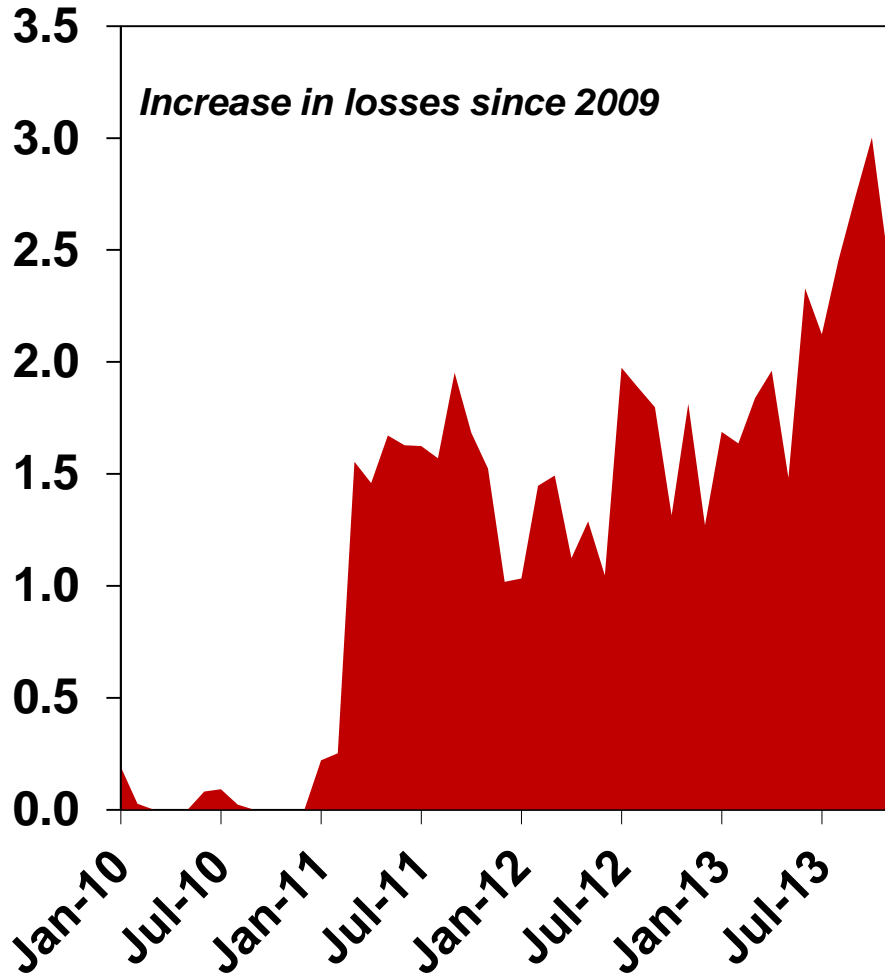
# Oil Supply Disruptions Continue at High Level



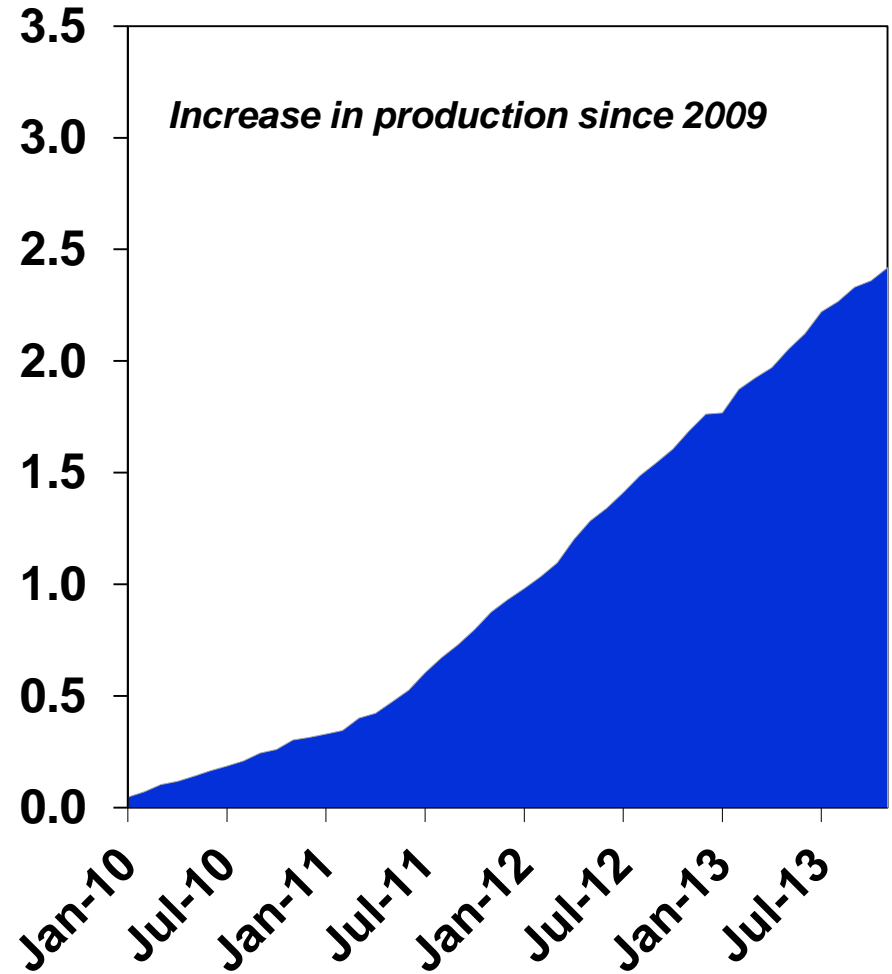
# Growth in Global Crude Disruptions Has Outpaced Growth in U.S. Shale Crude



## Growth in Global Crude Disruptions (MMB/D)



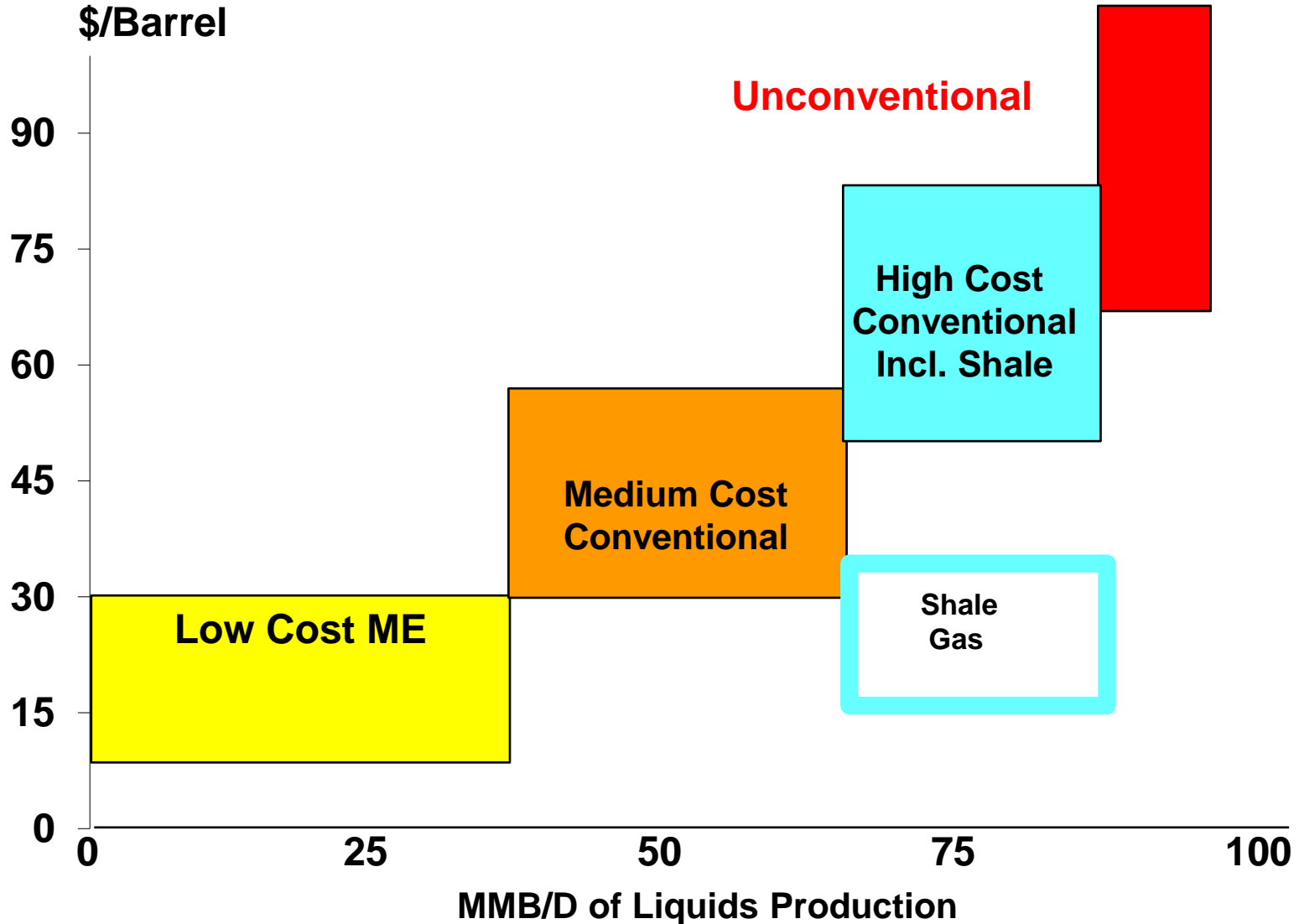
## Growth in U.S. Shale Crude Production (MMB/D)





# Cost of Shale Gas Fundamentally Lower

Oil Molecules Heavier, Higher Viscosity = Recovery Factor Lower



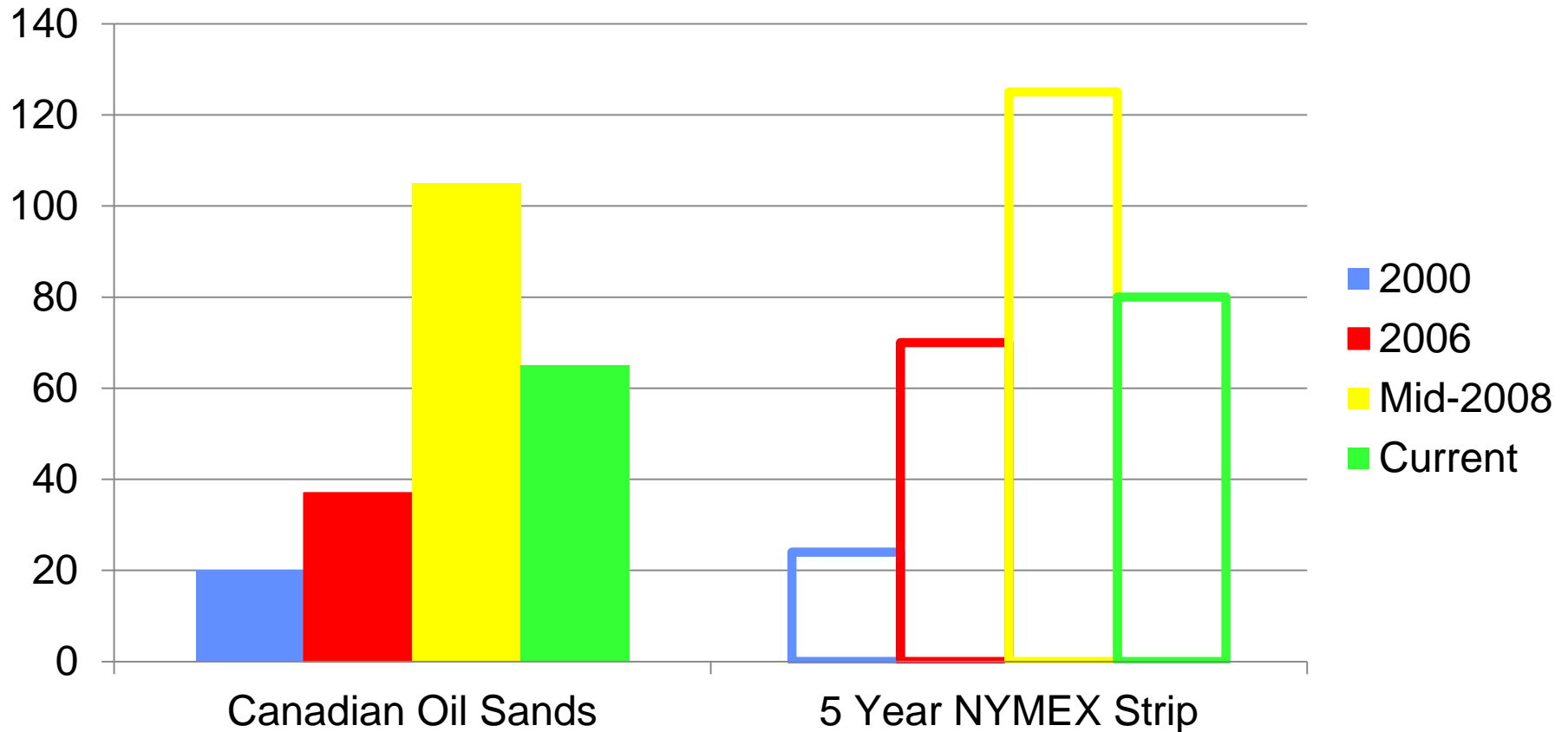
# Non-Conventional Liquids Costs

## A Moving Target



### Breakeven Price Estimates

\$/B, WTI Equivalent



# Does Marginal Production Cost Set Price?

- **Textbook economics says price should be set by marginal cost of supply**
- **However, this requires three critical assumptions:**
  - » Competitive market
  - » Sufficient volume of supply can be brought on to meet demand
  - » Cost is independent of price
- **None of these is consistently true in the oil market**
  - » Certainly not in short term, probably not for extended periods
- **Price required for demand destruction will often set market price**
- **Implies large “economic rents”**
  - » Who gets the rent????

# Components of Upstream Cost Sensitive to Price



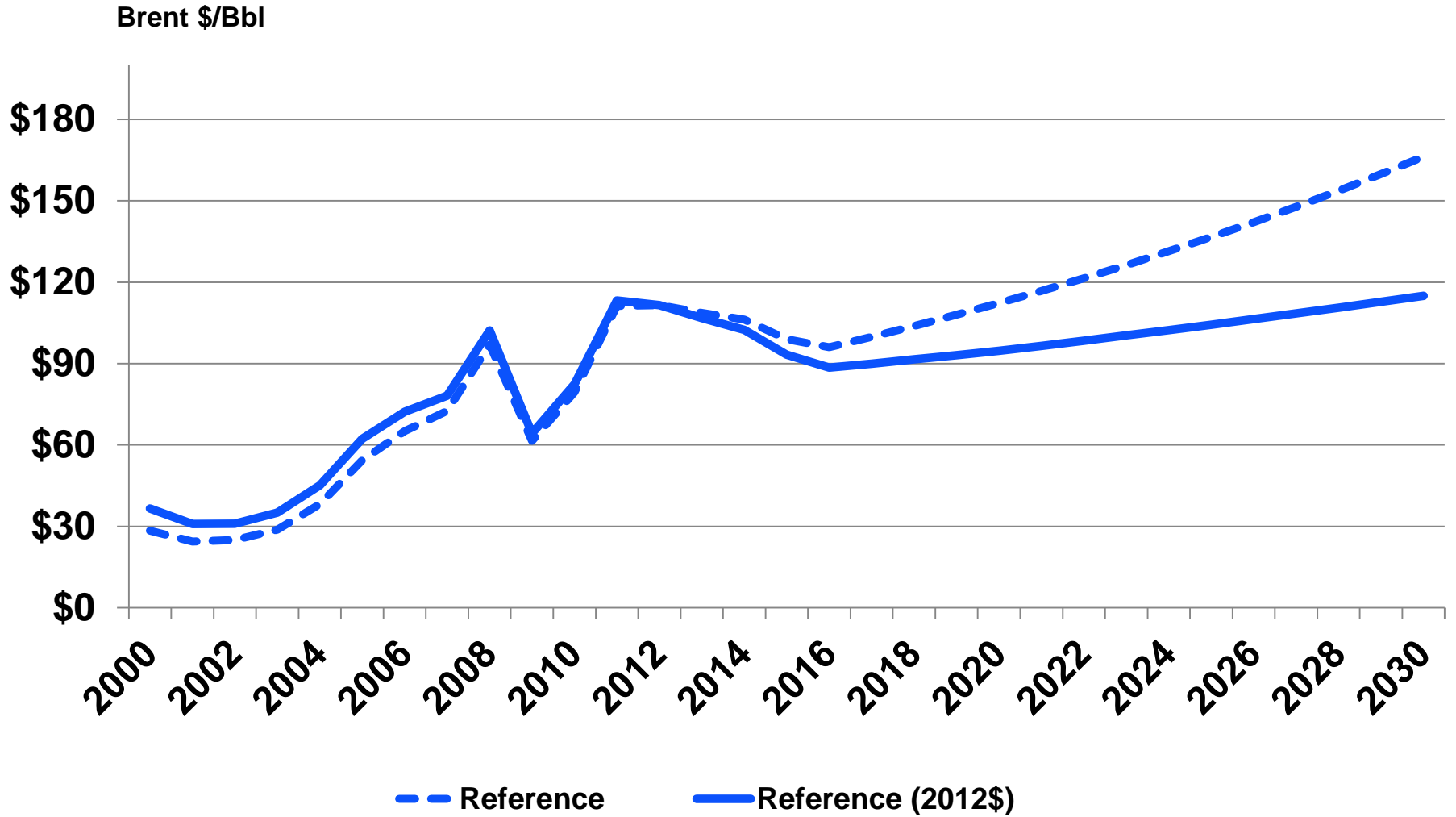
## Short term rents

- **Influenced by rate of increase in price – impact will eventually dissipate if activity levels off, but may take years**
  - » Steel prices, Pumps / compressors, Rigs
  - » Skilled labor

## Long term rents

- **Influenced by level of price – no dissipation**
  - » Land costs (including farmland)
  - » Royalties
  - » Petroleum Taxes
  - » Environmental Costs
  - » Alternative fuel inputs

# PIRA Crude Oil Price Outlook



# Key Oil Scenario Assumptions

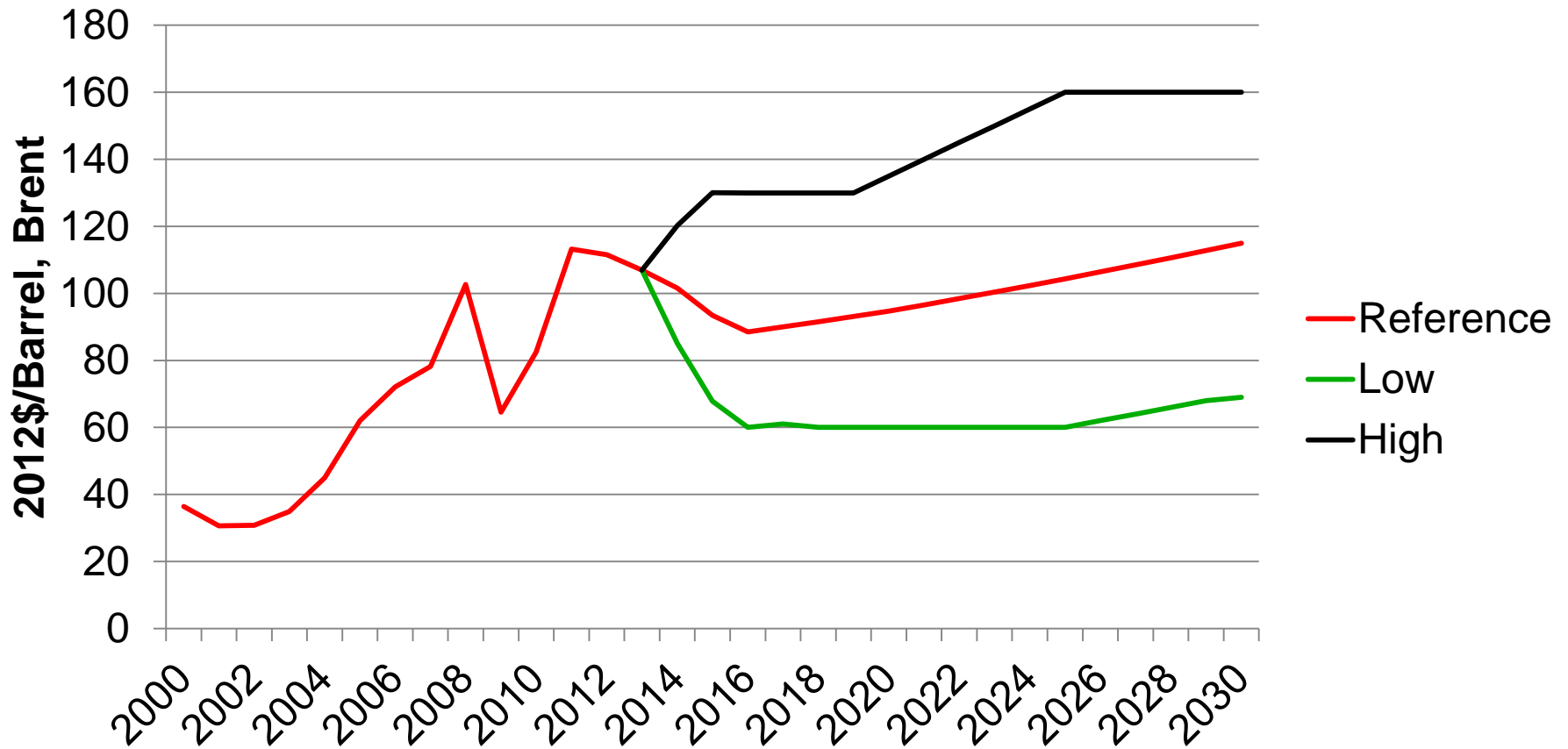
## ● Low Oil Price Scenario

- » Extended period of economic weakness
- » Global oil demand growth at under 1%/year
- » Rapid growth in shale liquids in U.S and initial growth globally
- » Technology continues to push down upstream F&D costs
- » Financial pressures cause host countries to ease access
- » Rapid Iraqi expansion

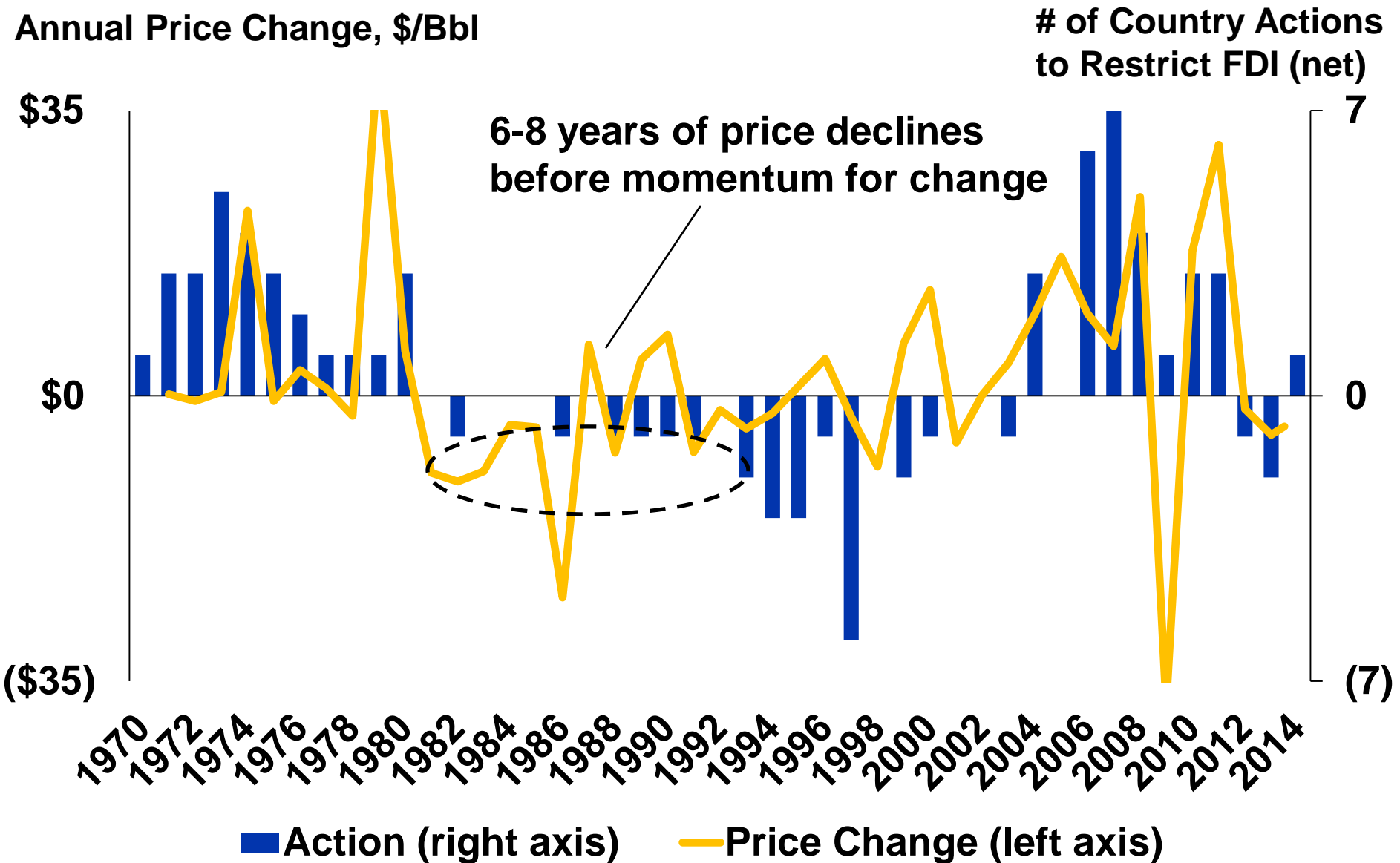
## ● High Oil Price Scenario

- » Historical trend growth for China
- » Environmental limits to shale liquids growth
- » Disruption losses remain high
- » OPEC capacity never climbs above 34 MMB/D
  - » No progress in Iraq
  - » Conflict with Iran
  - » Disruptions associated with protests / government changes

# High and Low WTI Scenario Cases



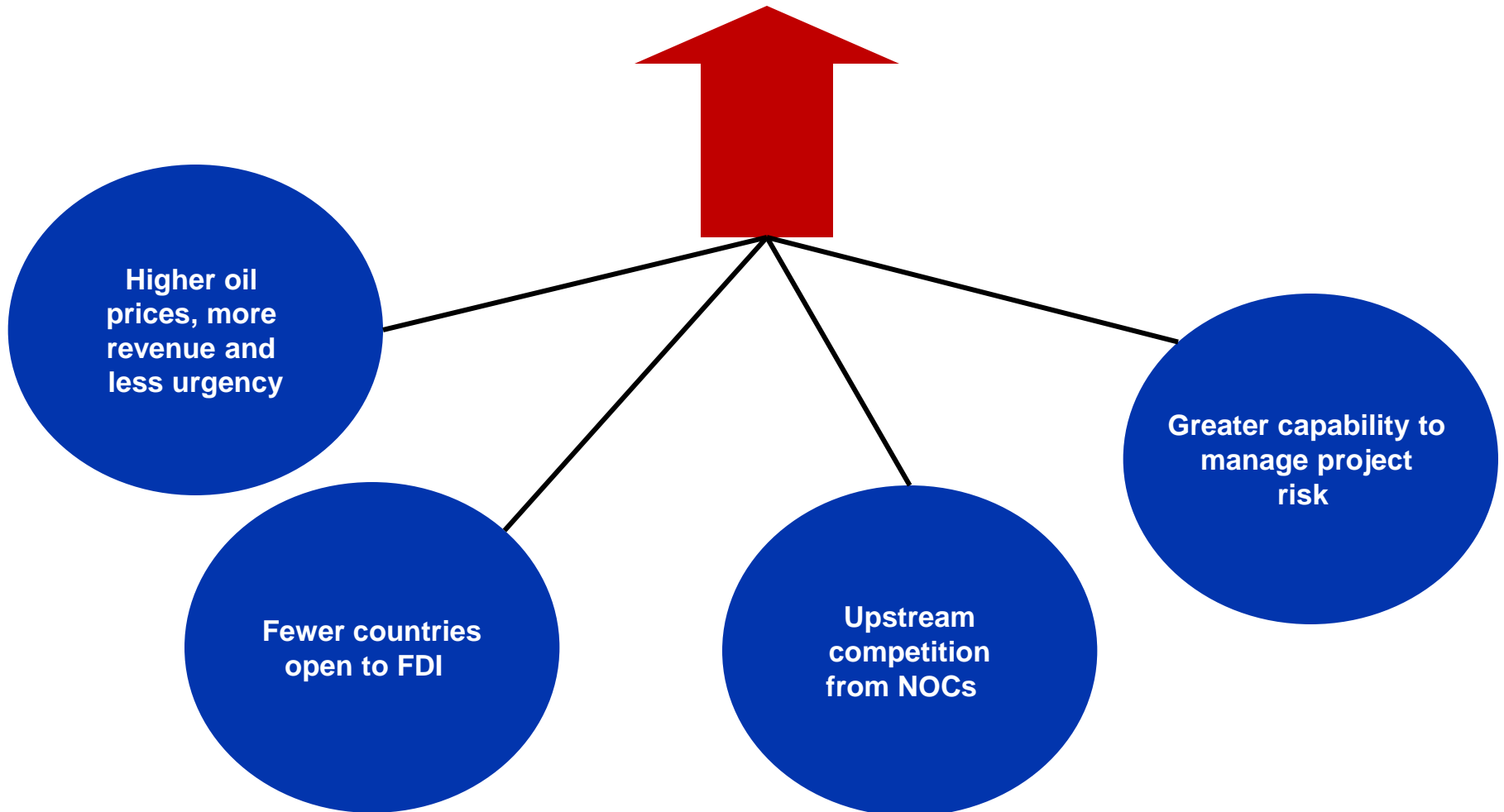
# Oil Price vs. Resource Control





# Factors Behind Greater Resource Control

## Increased Bargaining Power for Resource Owners



# Factors Slowing Momentum Towards Greater Resource Control



**More Resource Control  
(FDI Restriction)**

**Less Resource Control  
(FDI Attraction)**

- Higher oil prices, more revenue, less urgency
- Tighter competition, fewer countries open to FDI / Growth in state ideology
- Upstream competition from NOCs
- Belief that project risk has decreased



- Flat/declining oil prices, less revenue
- Growing production in areas open to FDI (e.g. North America)
- Domestic considerations: declining production, increased revenue requirements

# Why the Time Lag?

- **Revenue maximization by countries (especially if facing budget deficits)**
  - » Counter-productive to immediately cede revenue share to IOCs
- **Reluctance to expand capacity in a demand-constrained environment**
- **Momentum from projects already underway may allow for continued growth – for a while**
- **Dismissal of price fall as temporary and short-lived**
  - » Only after several years of reduced price does new reality take hold
- **In some cases, past investment reform has been triggered more by politics than economics**

# Cyclical Energy Investment Track Record: Holding Pattern As Prices Stabilize or Fall?



	1970s	1990s	2000s	2012-2014
OPEC	Control (12)	Access/Tax (8)↑	Control/Tax (6)	Control (1) Tax (3)
FSU		Access/Tax	Control/Tax	Tax
China		Access	Tax	
Brazil		Access	Control	Tax
UK	Tax	Tax	Tax	
Norway	Control	Access/Tax		Tax
US	Tax/Price	Tax	Tax	Tax
Canada	Control	Tax	Tax	

No opening for  
Libya, Qatar,  
Kuwait, Saudi

More non-OPEC  
constraints now

Mixed/holding  
pattern

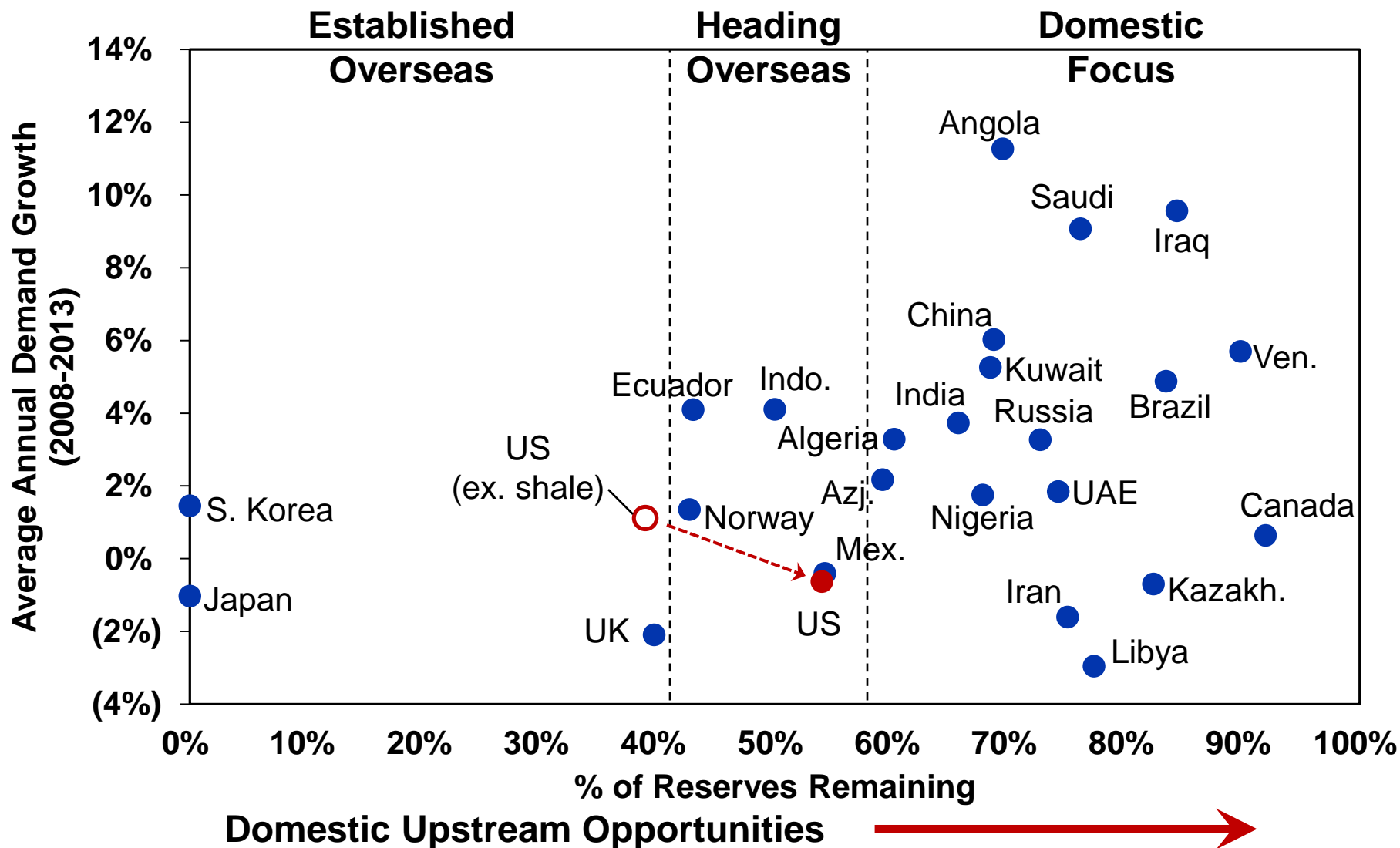
*The countries included above account for 90+% of global proven oil reserves. OPEC includes Saudi Arabia, Kuwait, UAE, Qatar, Iran, Iraq, Algeria, Angola, Libya, Nigeria, Ecuador, Venezuela, and Indonesia. FSU includes Russia and Kazakhstan.*

# Other Mechanisms Countries Use to Exert Control

---

- **Government veto authority on projects and transactions**
  - » Countries with less experienced NOCs (e.g. new African producers)
  - » Brazil/Nigeria proposed new NOCs to regulate development
- **Environmental policy making**
  - » Russia, Ecuador, Brazil
- **Administrative obstacles**
  - » Project deadlines/“use it or lose it” rules
  - » Auditing and tax assessments
  - » Access to infrastructure
- **Associated infrastructure development**
  - » Iraq: water, electricity, roads
  - » Social and health investments
- **Local partner/content requirements**

# Remaining Reserves\* Provides Useful First Indicator of Upstream Strategy



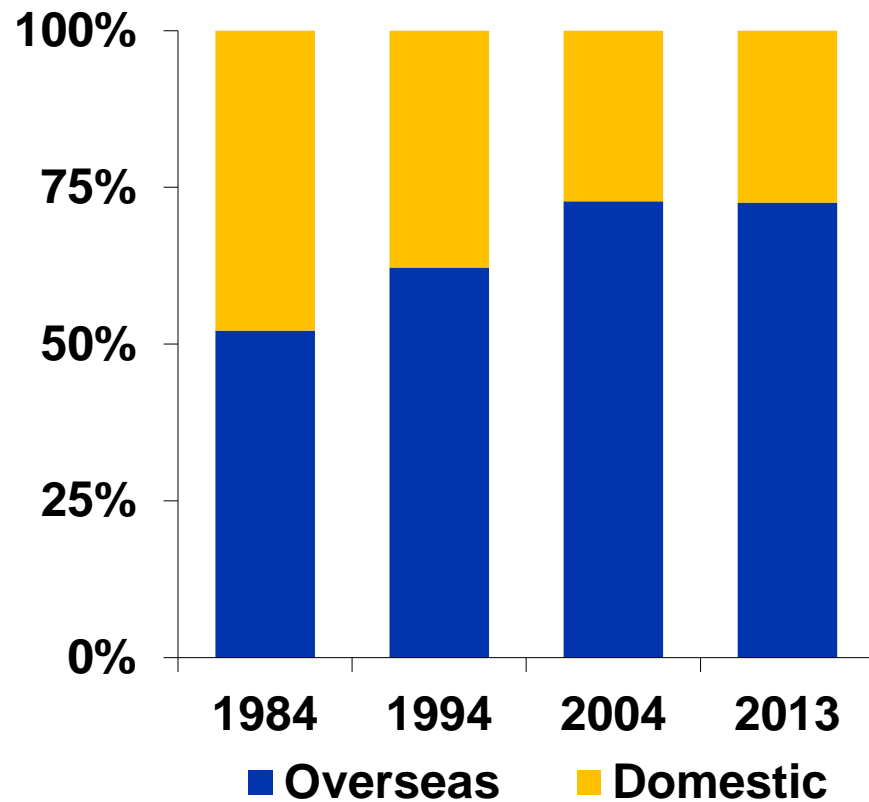
**Domestic Upstream Opportunities** →

\* Cumulative Production through 2013. Reserves include shale and oil sands.

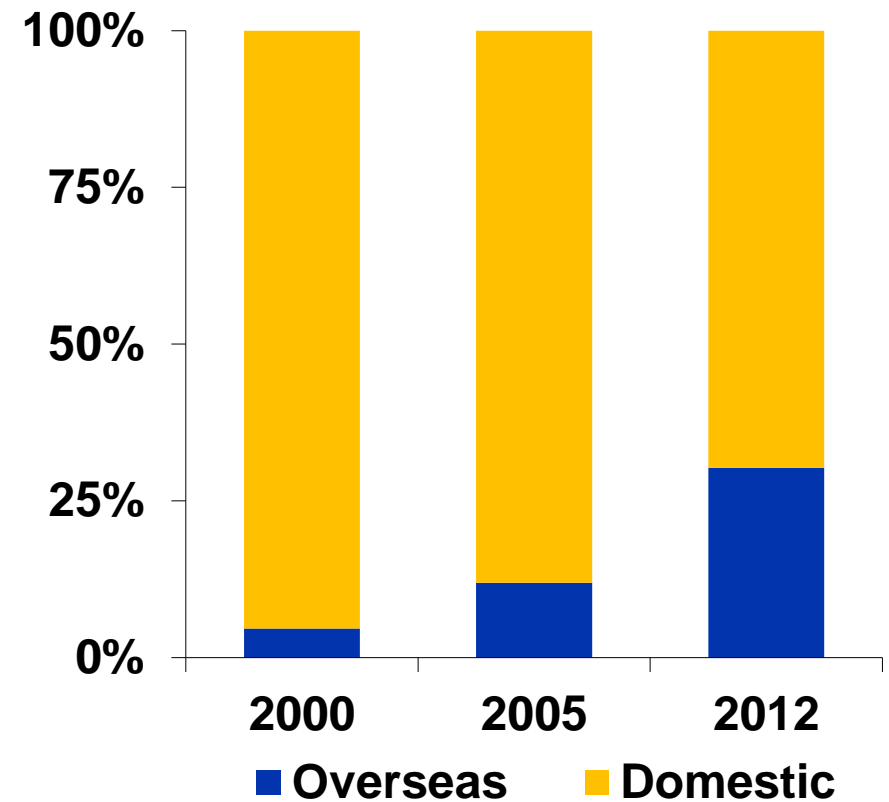
# Chinese Firms Are Following the U.S. Majors Overseas



### U.S. Majors Overseas vs. Domestic Oil Output



### Chinese Majors Overseas vs. Domestic Oil Output



*U.S. majors include production by ChevronTexaco, Exxon Mobil and Conoco Phillips. Chinese majors include production by CNPC, Sinopec and CNOOC. Overseas equity production for Chinese majors not yet available for 2013.*

# Recent Developments in China's Overseas Acquisitions



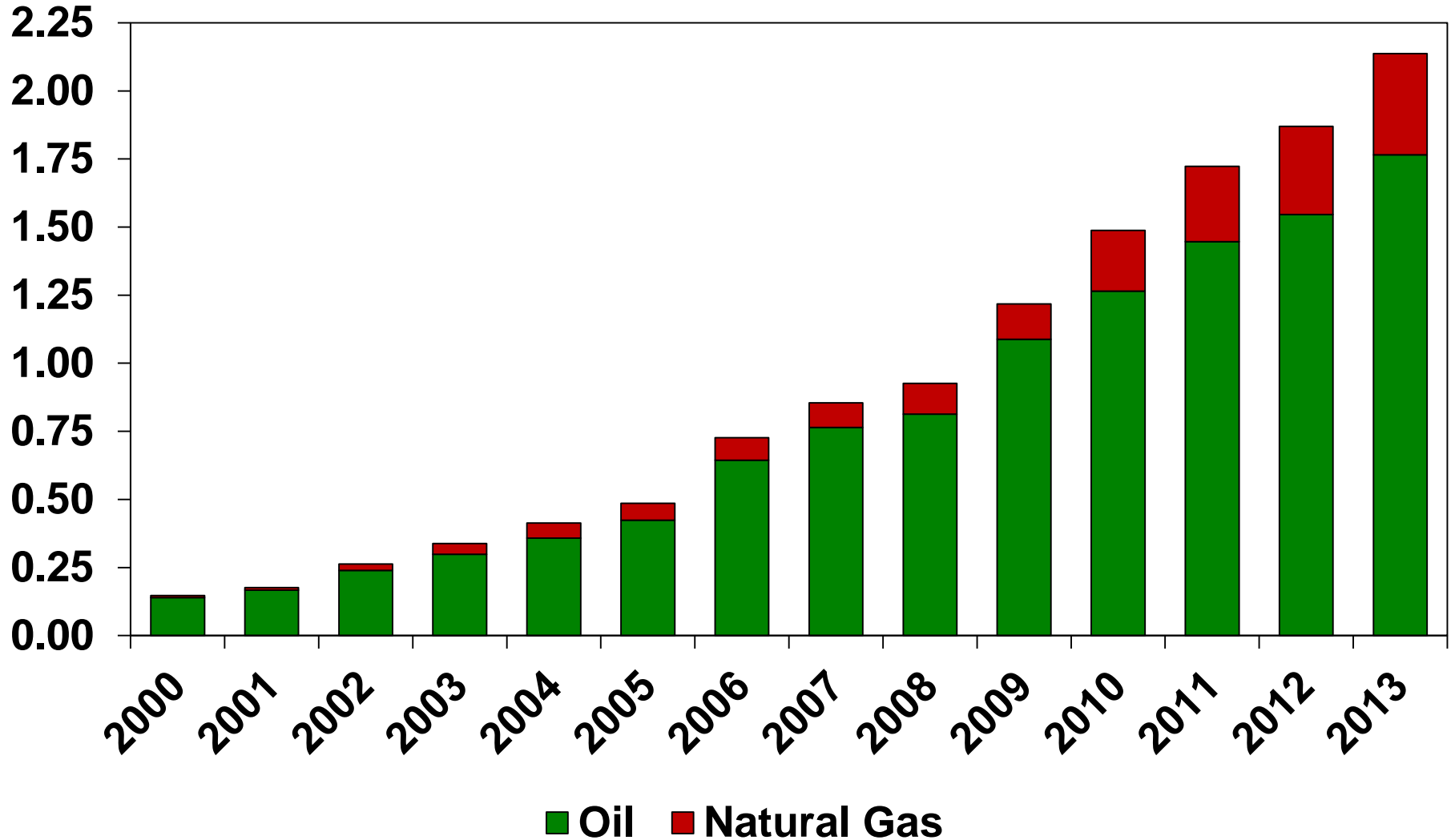
- **Rapid acquisition pace (nearly \$24B/yr avg 2009-2013)**
- **Emphasis on resource-rich, non-OPEC countries**
  - » Canada, Brazil, Australia, U.S., Kazakhstan, Mozambique
- **Prioritizing access to key growth sectors**
  - » North American non-conventional liquids (oil sands, shale)
  - » Large offshore projects (Brazilian pre-salt, Kazakhstan)
  - » Southern Iraq
  - » Australian, Russian LNG
- **Continued investment in offshore West Africa**
  - » Angola, Nigeria
- **Ongoing investment with oil/gas-linked gov't loans**
- **Often driven in part by desire to gain access to technology**



# China Overseas Production Continues to Grow



MMBOE/D



# Impact of Asian NOCs

- **Source of increased competition for IOCs**
- **Additional pressure on contract terms**
- **Increased expectations of host countries**
- **Establish infrastructure and foreign role in off-limit countries**

**But ....**

- **Net increase in capital and oil production**
- **Growing source of public backlash**
- **Still lag behind IOCs on technology advanced projects**
  - » Heavy oil, deep water, LNG, non-conventional gas, and shale liquids
  - » Project management skills

## Examples of IOC/NOC Partnerships

<b>Angola</b>	<b>BP, Sinopec and Sonangol JV on deepwater Block 18</b>
<b>Canada</b>	<b>TOT &amp; Sinopec JV on Northern Lights oil sands project; Sinopec acquires 9% in Syncrude with multiple IOCs; CNOOC teams with Encana on Cutback Ridge;</b>
<b>Iraq</b>	<b>BP, CNPC &amp; SOMO SC on Rumaila; TOT, CNPC, PNB on Halfaya</b>
<b>Nigeria</b>	<b>TOT, NNPC, SAPETRO, CNOOC, PBR JV on deepwater AKPO</b>
<b>Australia</b>	<b>Woodside, CVX, Shell, BHP, Japan Australia LNG, BP and CNOOC JV in NWS LNG Venture</b>
<b>Indonesia</b>	<b>BP, MI Berau, Nippon, CNOOC, KG Berau, and LNG Japan PSC on Tangguh LNG</b>
<b>U.S.</b>	<b>CNOOC work with Chesapeake in Eagle Ford and Niobrara; CHK, Sinopec JV in Mississippi Lime</b>
<b>Brazil</b>	<b>PBR with TOT, Shell, CNOOC, CNPC on Libra</b>
<b>Russia</b>	<b>Eni, XOM, STO, Rosneft in Arctic; Gazprom, Shell in Bazhenov</b>
<b>Venezuela</b>	<b>PDV, REP, OVL, PNB, IOC, OIL JV on Carabobo 1 project; PDV, ENI on Junin 5 project</b>

# Project Risks from Resource Control Policies: Private Sector Perspective

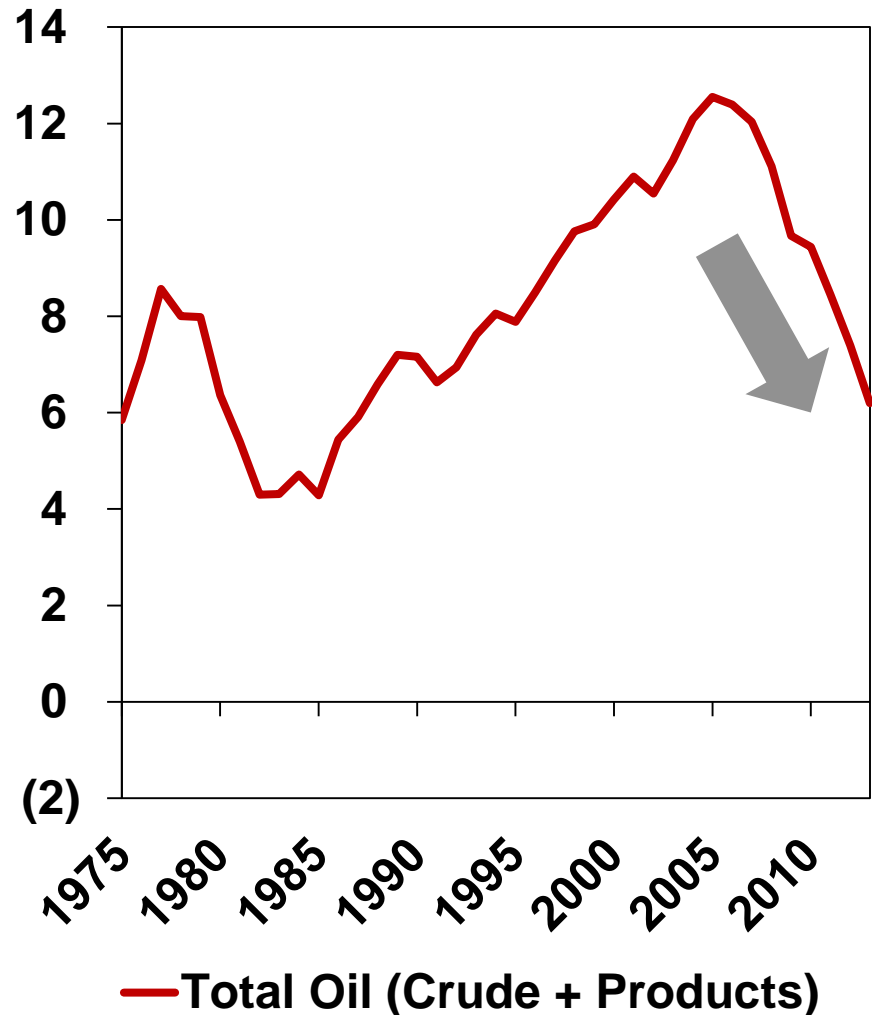
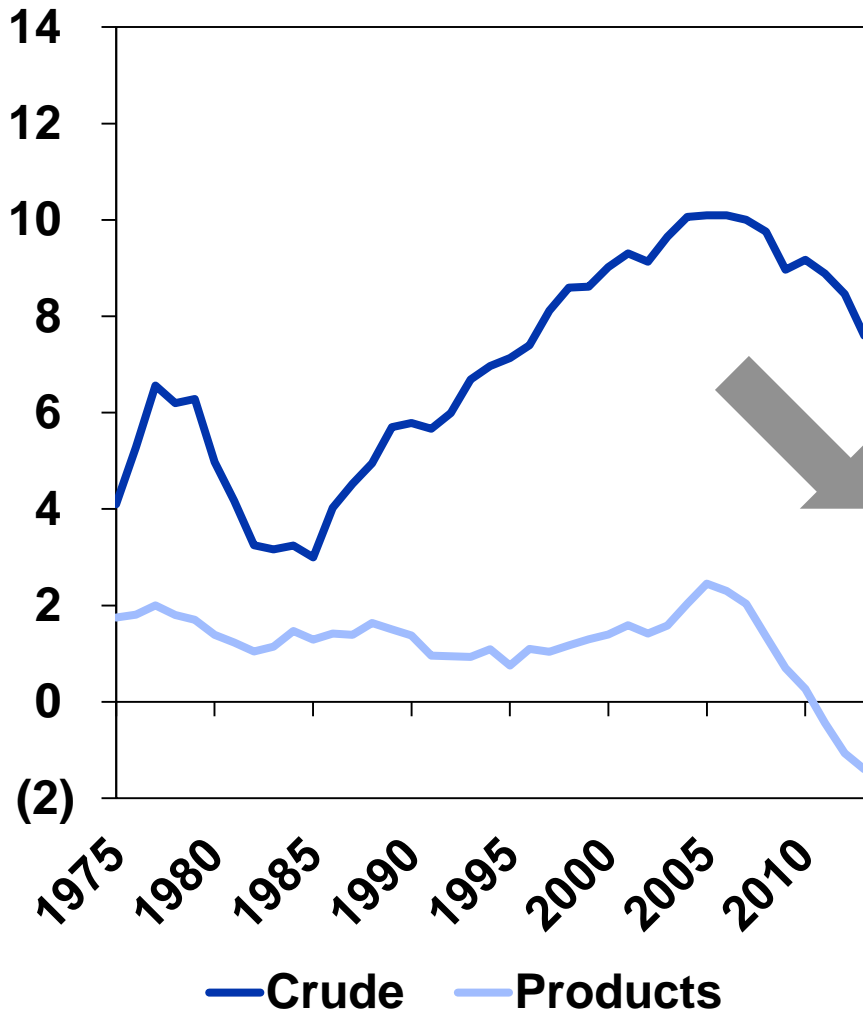


- **Risk of nationalization**
- **Risk of delays**
- **Risk of higher costs**
  - » Royalties, taxes, bonuses
  - » Employment, local content, social program pressure
  - » Carrying NOC partner share
- **Risk of less operational control**
  - » Lower production volumes
  - » Diverting supply to lower-value domestic or foreign market
- **Risks of reduced access to infrastructure**

# After Years of Growing Import Dependence, U.S. Net Oil Imports in Decline Since 2005



## U.S. Net Imports (MMB/D)



# U.S. Policy Issues

- **U.S. energy policy already increasingly driven by budget and employment concerns**
- **Supply security becoming a declining concern**
  - » Ukraine crisis leading to arguments for supporting allies through energy policy
- **Reduced priority for environmental issues**
- **Could impact policies regarding:**
  - » Biofuels
  - » Fuel efficiency
  - » Renewables
  - » Crude/Product/Nat gas exports

# PIRA Now Assumes the U.S. Will Permit Some Crude Exports Post-2017



- **Price impact of export restrictions**
  - » Increasing congestion in the U.S. (particularly the Gulf Coast) could create price disconnects large enough to affect U.S. shale production growth
  - » Industry will argue export restrictions cost production and jobs
- **Offshore imports (non-Canadian) will continue to decline**
  - » Decreasing crude imports and increasing product exports will weaken the national security argument for restricting crude exports
  - » Policymakers will likely adjust to the new reality of growing U.S. production
- **Allies could pressure the U.S. to lift restrictions**
  - » Particularly countries disadvantaged by competition from U.S. refineries with lower-priced crude
- **Precedents for policy change: LNG exports, biofuel revisions**

# The Future of Resource Control

---

- **Potentially at an inflection for resource control policies**
- **Price direction over next few years will likely determine whether countries resume restrictive actions**
  - » If prices begin to rise, likely to see an uptick in actions to restrict FDI or assert more control over resources
  - » If prices remain steady or decline for a few years, likely to see pause, and could eventually see openings
- **China likely to continue expanding overseas production, targeting major growth areas**
  - » Could face restrictions in other countries as overseas holdings expand