



# Energy: A Private Equity Perspective

## Agenda

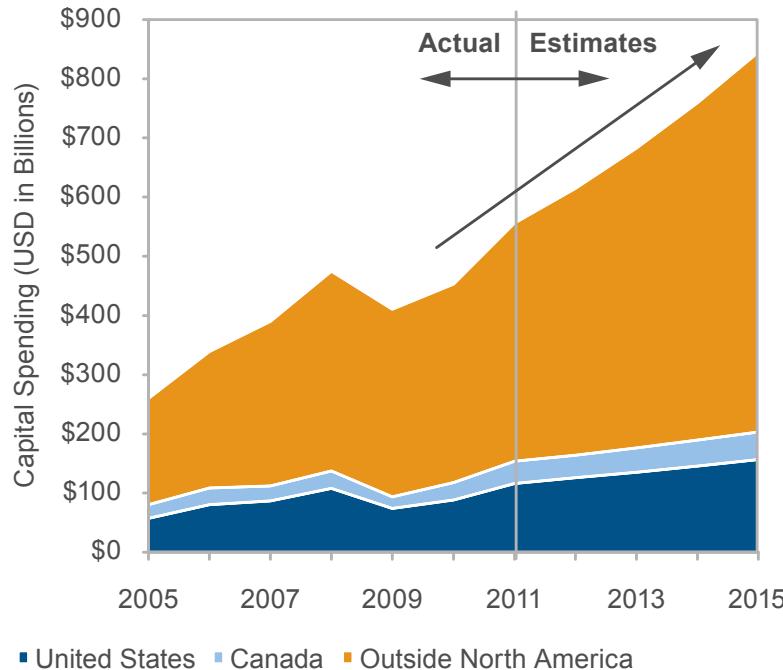
• Energy Industry Overview.....	1
• Private Equity Opportunity Set.....	6
• Upstream.....	10
• Midstream.....	17
• Power.....	24
• Fundraising	
• Energy Landscape	



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# Energy Industry Overview

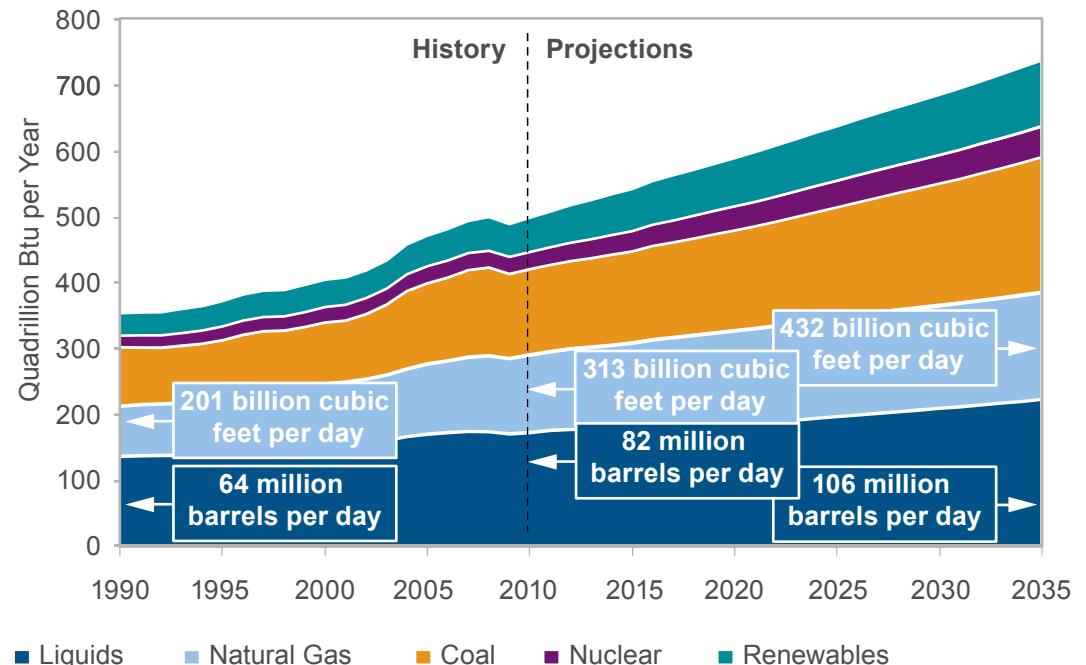
## E&P Spending Forecast



Source: Barclays Research

## World Marketed Energy Use

By Fuel Type

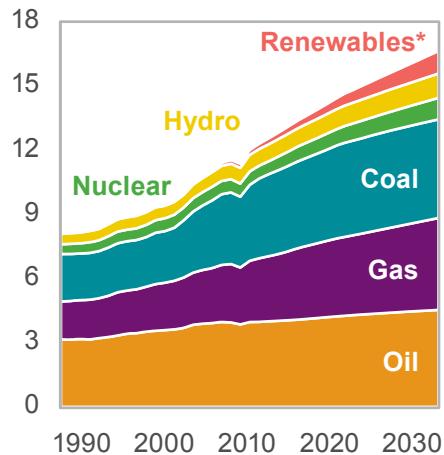
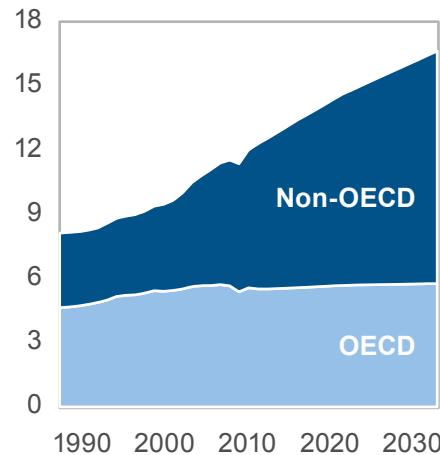


Sources: The Energy Information Administration -International Energy Outlook 2010 and International Energy Agency -World Energy Outlook 2009

- Large investment in energy supply sources needed to meet projected global demand growth of nearly 1% per year over next 20+ years
  - The IEA estimates global cumulative investment of \$37 trillion is needed to replace existing and build new energy supply infrastructure to meet projected demand over the 2012-2035 period
  - In 2012 alone, global exploration and production spending is expected to exceed \$600 billion

**Non-OECD Economies Drive Energy Consumption Growth**

Billion Toe

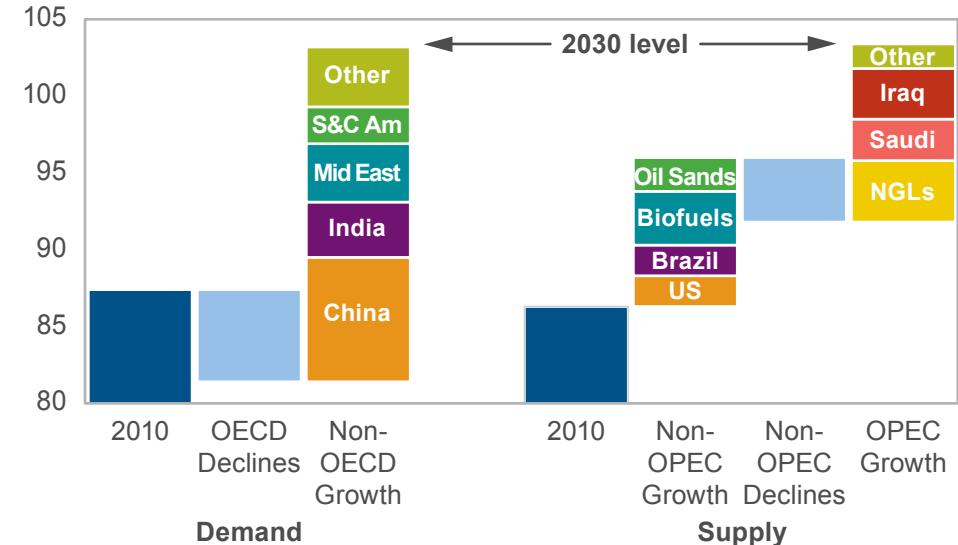


\* Includes biofuels

Source (all data): BP Energy Outlook 2012

**Liquids Demand Growth From Non-OECD Countries**

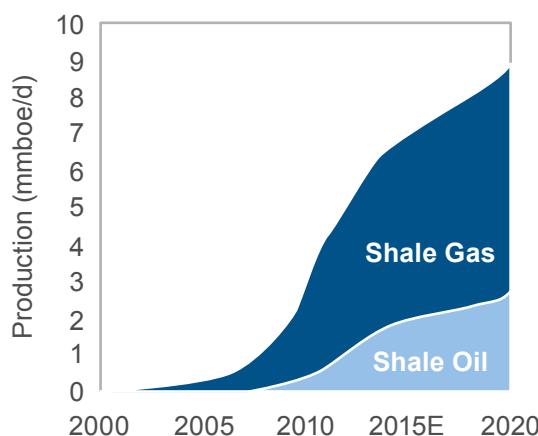
Millions of Barrels per Day



- Overall projected demand growth driven by non-OECD, particularly China
  - Long-term trend driven by population growth, urbanization, industrialization and wealth creation
- Demand growth will create investment opportunities internationally
- OECD demand expected to remain flat as energy efficiency improves, especially in the transport sector
  - Despite measured consumption growth domestically, investment opportunities will be driven by resource discoveries and infrastructure build out, particularly from mid-continent North America

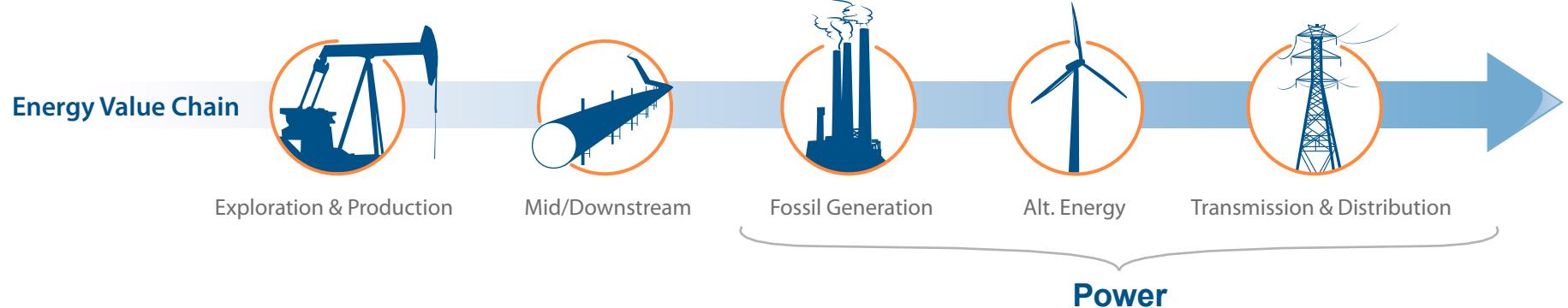
Country	Top 10 Non-OPEC Oil Producers									
	5 Year CAGR		4 Year CAGR		3 Year CAGR		2 Year CAGR		1 Year CAGR	
	2006-2011	Rank	2007-2011	Rank	2008-2011	Rank	2009-2011	Rank	2010-2011	Rank
Russia	1.1%	6	0.9%	6	1.5%	6	1.5%	6	0.8%	4
<b>U.S.</b>	<b>2.9%</b>	<b>2</b>	<b>4.5%</b>	<b>1</b>	<b>5.8%</b>	<b>1</b>	<b>5.0%</b>	<b>2</b>	<b>3.9%</b>	<b>2</b>
China	2.2%	4	2.3%	4	2.6%	5	3.4%	3	-0.1%	5
Canada	2.2%	5	1.5%	5	3.1%	4	5.1%	1	5.1%	1
Mexico	-4.4%	8	-4.1%	8	-2.4%	8	-0.7%	7	-0.6%	6
Brazil	4.5%	1	4.2%	2	3.3%	3	2.5%	5	-1.0%	7
Norway	-6.3%	9	-5.9%	9	-6.6%	9	-7.6%	9	-6.0%	9
Kazakhstan	3.4%	3	3.2%	3	4.7%	2	3.2%	4	1.8%	3
UK (Offshore)	-7.5%	10	-9.3%	10	-10.3%	10	-12.7%	10	-17.8%	10
Indonesia	-2.0%	7	-1.1%	7	-2.2%	7	-2.5%	8	-3.4%	8

Source: U.S. Energy Information Administration (July 2012)

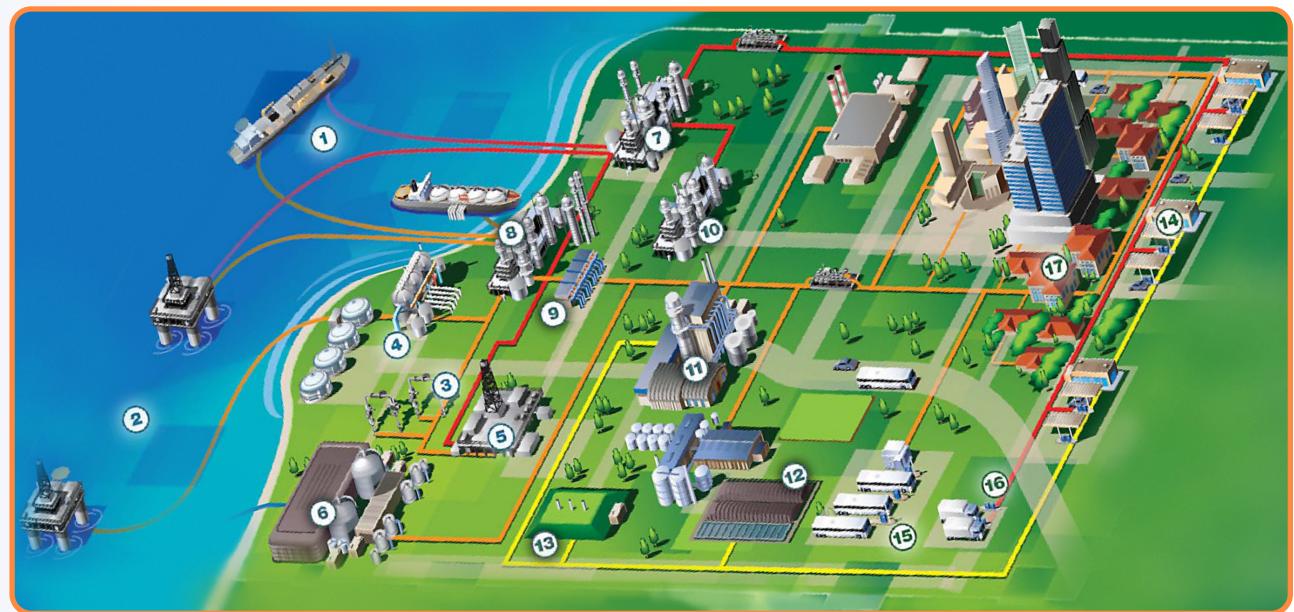


Source: PFC Energy and U.S. EIA

- Natural gas projected to be the fastest-growing fossil fuel – U.S. is central to this supply growth
- The U.S. has long been viewed as the largest energy importer with declining domestic production. It has reversed the trend across all energy areas, most importantly, in liquids
- By utilizing new production as well as discovery technologies, the U.S. has become the fastest growing non-OPEC oil producer in the world
- Assuming current production growth is sustainable, North America could be energy independent in 10 years
- In the short to medium term, the U.S. will continue to attract private equity investment, primarily in upstream and midstream, to capitalize on the shift to cheaper, domestic energy sources, particularly natural gas



- ① Floating Production, Storage and Offloading (FPSO)
- ② Offshore Production Platforms
- ③ Wellhead
- ④ Above & Underground Storage
- ⑤ Conventional & Unconventional Production
- ⑥ Nuclear Power
- ⑦ Oil Refinery
- ⑧ LNG/Gas Processing Plant
- ⑨ Compressor Station
- ⑩ Petrochemical Plant
- ⑪ Traditional Power Plant - Coal, Gas
- ⑫ Biofuel/Digester Gas Plant
- ⑬ Landfill
- ⑭ Retail Consumer Fueling
- ⑮ CNG Fueling Station
- ⑯ Commercial Fueling
- ⑰ Residential Gas Heating Stovetops

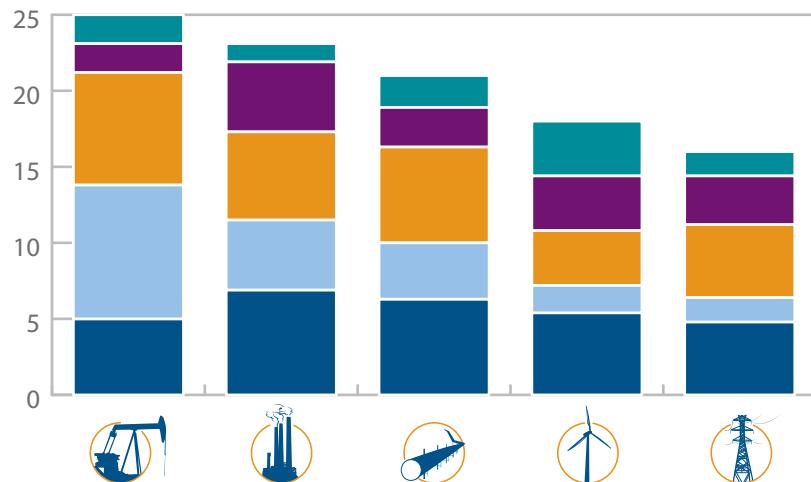




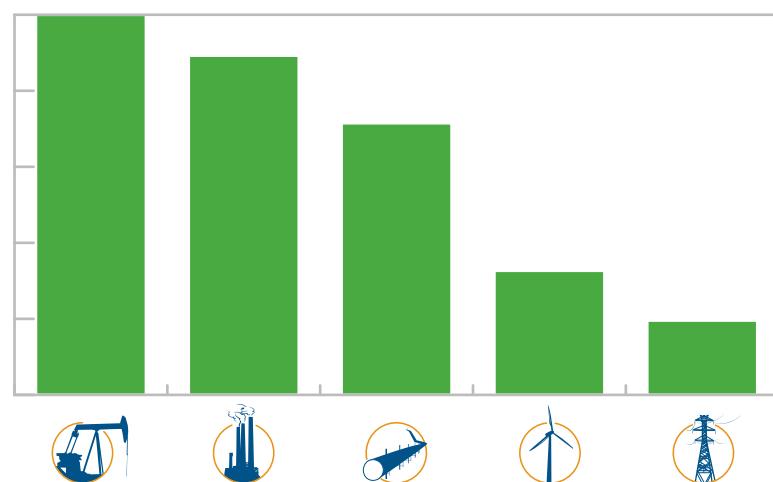
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## Private Equity Opportunity Set

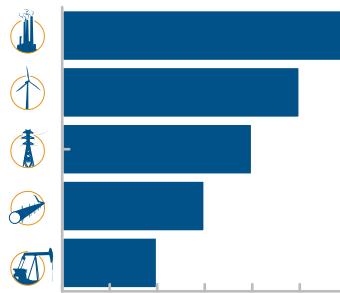
## Target PE Returns



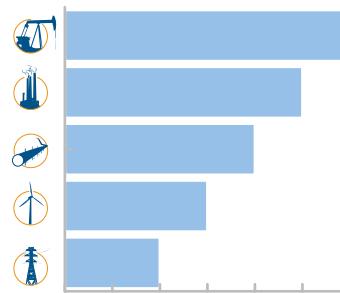
## Investable PE Opportunity



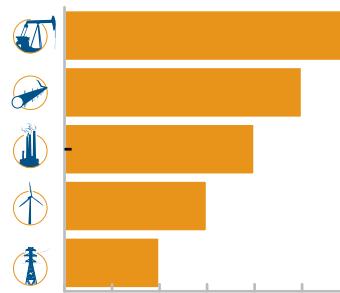
## Leverage



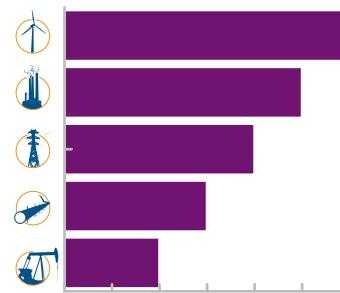
## Commodity



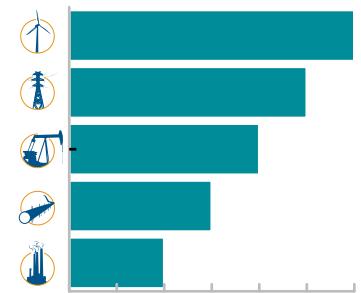
## Management



## Regulations



## Technology



## Energy Value Chain



Exploration & Production

Mid/Downstream

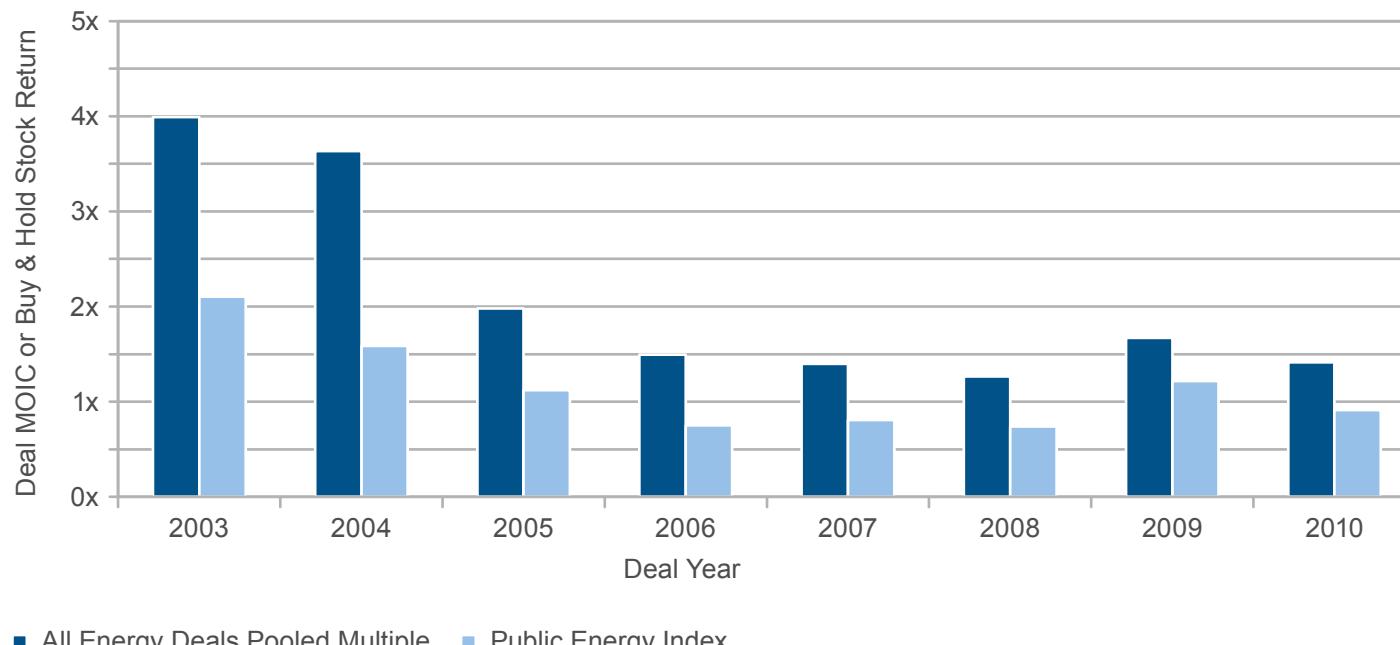
Fossil Generation

Alt. Energy

Transmission & Distribution

- Upstream, midstream and power investment opportunities are better suited to generate private equity-like returns

## Private Energy Deals vs Public Energy Equity

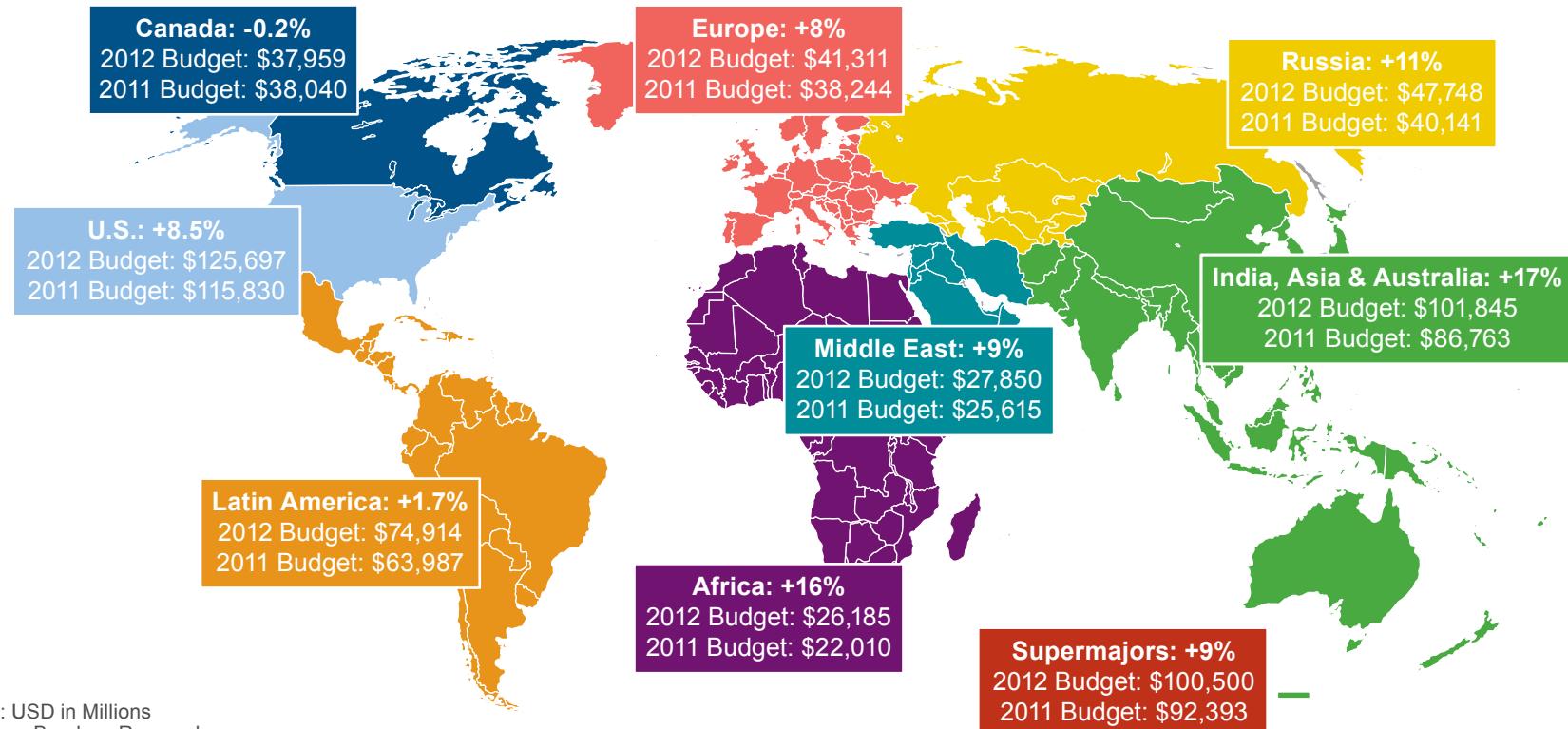


■ All Energy Deals Pooled Multiple ■ Public Energy Index

Source: Hamilton Lane; 396 sample deals; includes TXU (July 2012)

- Over the past decade, private equity energy deals, whether in focused or generalist funds, have never underperformed the public comparables
- Historically, the outperformance has usually been by significant multiples

## Global 2012 Exploration & Production Spending Outlook



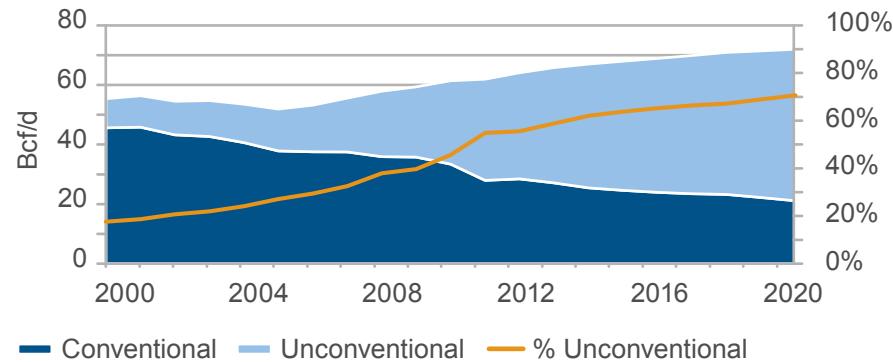
- North America has historically attracted the most private equity activity
- As demand markets continue to grow and new resources are discovered globally, private equity will likely pursue more opportunities outside North America in the medium to long run
- Recent private equity activity outside the U.S. has largely focused on offshore drilling, particularly in Brazil, West Africa and certain regions in Asia
  - Few private equity firms have the global reach, network and resources to complete such deals
  - Much of this activity has been driven by the large private equity firms with global resources such as Blackstone, Apollo and First Reserve



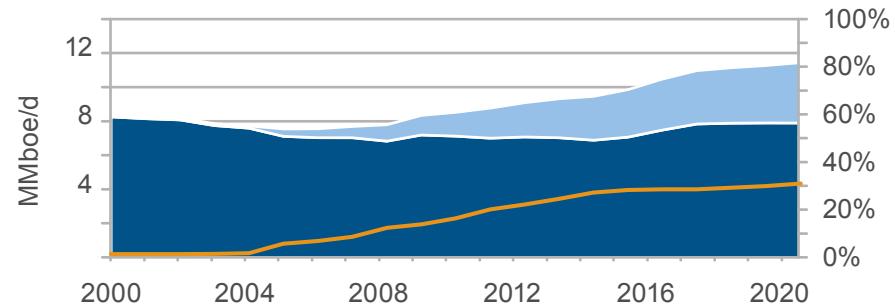
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Upstream

### U.S. Gas Production by Type



### U.S. Liquids Production by Type



— Conventional — Unconventional — % Unconventional

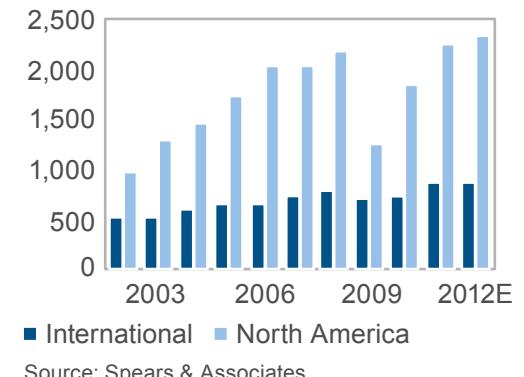
Source: PFC Energy

Onshore			
Strategy/ Investment Type	Sub Strategy	Target Geography	“Expected Returns (multiple of cost)”
Oil & Gas Upstream	Onshore Lease & Drill	Primarily North America, to a lesser extent Europe, LATAM and Asia	3.0x, 2-4 years
	Onshore Acquire & Exploit		2.0x-2.5x, 5-10 years

### Unconventional drilling, high oil price drive onshore activity

- Advancements in drilling technology provide access to unconventional resources
  - Activity primarily focused on early capture of new supply (i.e. lease and drill)
- U.S. has the lowest energy cost of any industrialized country
- High oil prices, low natural gas prices in near term
  - Focus on liquids rich plays
  - Drilling for dry gas has declined as prices have dropped
- Reduction in commodity pricing impairs ability to economically drill

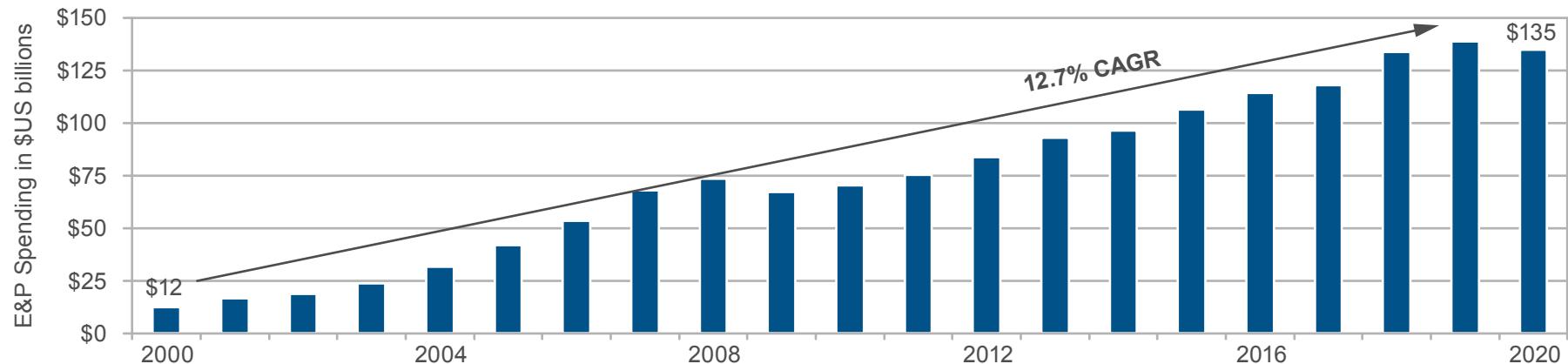
### International vs. North American Land Rigs



■ International ■ North America

Source: Spears & Associates

### Deepwater Capex Spending

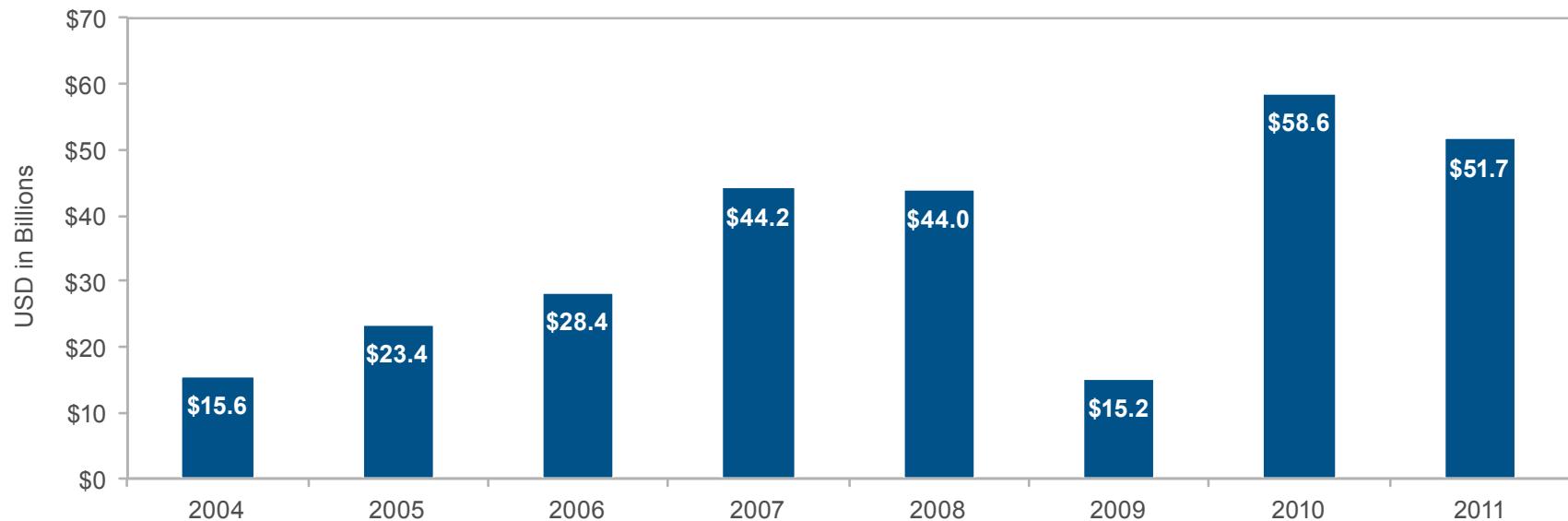


Source: PFC

Offshore			
Strategy/Investment Type	Sub Strategy	Target Geography	"Expected Returns (multiple of cost)"
Oil & Gas Upstream	Offshore Drilling	North America, Europe, Asia, LATAM, Africa	3.0x, 2-4 years

### Resource discoveries, technology drive offshore activity

- Focus on deepwater through improved platform drilling technology
- Activity primarily in Mid-Atlantic basin (Brazil to West Africa), Gulf of Mexico and pockets of Asia
- Joint ventures with large and local exploration and production and services companies
  - Heavy CAPEX spending
  - High exposure to commodity price impacts
  - Implementation risk strongest potential impact on returns

**North American Transaction Volumes - E&P**


Apollo Global Management, IHS Herold and RBC

**Robust current environment for upstream exits**

- Asset sales driven by:
  - Portfolio re-balancing has accelerated as majors and independents move to focus on capital intensive unconventional drilling (shale plays) and deep water off shore development
  - Debt repayment as companies consolidate and optimize their portfolios
  - Acquisition and divestiture asset transaction values reached record levels in last two years

Key risks	Mitigation tools
<ul style="list-style-type: none"> <li>• Commodity price exposure</li> <li>• Operational and implementation</li> <li>• Geopolitical (int'l offshore drilling)</li> <li>• Portfolio company talent retention</li> </ul>	<ul style="list-style-type: none"> <li>• Hedging program</li> <li>• Back experienced management teams</li> <li>• Partner/JV with international strategics</li> <li>• Regional/basin diversification</li> <li>• Invest project capital in tranches over time</li> <li>• Fund structure preferred to operating company structure</li> </ul>

- Difficult to generate private equity-like returns in upstream as commodity prices have generally fallen recently, and as a result most investors are acquiring streams of production that generate infrastructure-like returns
  - However, the best private equity managers are able to identify emerging resource plays, develop them and sell to majors, which continue to be active acquirers of assets
- Key attributes of successful investors in upstream/resources:
  - Flexibility of strategy to adapt to changing commodity prices
  - Identifying and retaining talented management teams
  - Regional diversification and deep knowledge of local resource markets

Fund Manager	Fundraising	Competitive Matrix							Comments	
		Manager Type		Geographic Focus		Investment Type				
		Energy Specific	Generalist	North America Only	Global	Onshore Lease & Drill	Onshore Acquire & Exploit	Offshore Drilling	Merits	Concerns
Apollo Natural Resources	2015		X						<ul style="list-style-type: none"> <li>Differentiated focus on distressed/complex carve outs</li> <li>Strong historical performance, capital preservation</li> <li>Backing of Apollo organization</li> </ul>	<ul style="list-style-type: none"> <li>Relatively new leadership in Greg Beard</li> <li>Limited realized track record</li> </ul>
ArcLight Capital Partners	2014	X							<ul style="list-style-type: none"> <li>Recognized player in power and midstream</li> <li>Back management teams to build assets</li> </ul>	<ul style="list-style-type: none"> <li>Mixed returns</li> </ul>
Avista Capital Partners	TBD	X							<ul style="list-style-type: none"> <li>Continue to grow franchise and brand name within energy</li> <li>Investment team supported by operating professionals</li> </ul>	<ul style="list-style-type: none"> <li>Returns have been mixed</li> <li>Also focus on healthcare, consumer, industrial and communications</li> </ul>
Blackstone Energy Partners	2015		X						<ul style="list-style-type: none"> <li>Global focus, broader Blackstone support</li> <li>Strong historical performance, capital preservation</li> </ul>	<ul style="list-style-type: none"> <li>Limited realized track record</li> </ul>
Denham Capital Management	2015	X							<ul style="list-style-type: none"> <li>Global focus, opportunistic strategy</li> <li>Experienced team</li> </ul>	<ul style="list-style-type: none"> <li>Mixed returns</li> </ul>
EIG Global Energy Partners	2013	X							<ul style="list-style-type: none"> <li>Invests across the capital structure</li> <li>Income stream/j-curve mitigation</li> </ul>	<ul style="list-style-type: none"> <li>First lien securities offer conservative risk/reward</li> <li>Negative press around investments with Chesapeake</li> </ul>
EnCap Energy Capital Funds	In Market	X							<ul style="list-style-type: none"> <li>Strong historical performance, low write-off ratio</li> <li>Strong team in upstream E&amp;P</li> <li>Consistently back repeat management teams</li> </ul>	<ul style="list-style-type: none"> <li>Capital deployment strategy has potential to impact net IRRs early in life of fund</li> </ul>
EnerVest	In Market	X							<ul style="list-style-type: none"> <li>Strong historical performance, capital preservation</li> <li>Experienced team</li> </ul>	<ul style="list-style-type: none"> <li>Challenges surrounding operating company model</li> </ul>
First Reserve Corp.	In Market	X							<ul style="list-style-type: none"> <li>Recognized player in global energy industry</li> <li>Exposure to global deals, services focus</li> </ul>	<ul style="list-style-type: none"> <li>Recent performance challenged</li> <li>Significant team turnover</li> </ul>
Kayne Anderson Capital Adv.	In Market	X							<ul style="list-style-type: none"> <li>Longstanding history in upstream</li> <li>Team has strong reputation in their target sub-sector</li> </ul>	<ul style="list-style-type: none"> <li>Organization continues to build out various investment products</li> </ul>
KKR Associates	In Market		X						<ul style="list-style-type: none"> <li>Access to global KKR resources and deal flow</li> </ul>	<ul style="list-style-type: none"> <li>Energy exposure only through main fund portfolio</li> </ul>
Lime Rock Partners	In Market	X							<ul style="list-style-type: none"> <li>Access to the broader Lime Rock Partners platform</li> </ul>	<ul style="list-style-type: none"> <li>Limited realized track record</li> <li>Performance has been consistent, but not compelling</li> </ul>

Source: General Partners and Hamilton Lane Database

# Upstream: Private Equity Landscape (cont'd)

Competitive Matrix											
Fund Manager	Fundraising	Manager Type		Geographic Focus		Investment Type			Comments		
		Energy Specific	Generalist	North America Only	Global	Onshore Lease & Drill	Onshore Acquire & Exploit	Offshore Drilling			
	Next Fund								Merits	Concerns	
Merit Energy Partners	2014	X		North America Only	Global	Onshore Lease & Drill	Onshore Acquire & Exploit	Offshore Drilling	<ul style="list-style-type: none"> <li>• Significant operating and technical expertise</li> <li>• Strong historical performance across funds</li> <li>• Experienced and well-tenured senior management</li> </ul>	<ul style="list-style-type: none"> <li>• Challenges surrounding operating company model</li> </ul>	
Natural Gas Partners	2015	X			North America Only	Onshore Lease & Drill	Onshore Acquire & Exploit	Offshore Drilling	<ul style="list-style-type: none"> <li>• Recognized player in developed upstream sector</li> <li>• Experienced team</li> </ul>	<ul style="list-style-type: none"> <li>• Performance decline in recent funds</li> <li>• Sector-focus has shifted</li> </ul>	
Pine Brook Partners	In Market		X		North America Only	Onshore Lease & Drill	Onshore Acquire & Exploit	Offshore Drilling	<ul style="list-style-type: none"> <li>• Led by longstanding former Warburg Pincus energy partner</li> </ul>	<ul style="list-style-type: none"> <li>• Also focus on financial services</li> <li>• Key man risk</li> </ul>	
Quantum Energy	2015	X			North America Only	Onshore Lease & Drill	Onshore Acquire & Exploit	Offshore Drilling	<ul style="list-style-type: none"> <li>• Strong performance in mature funds</li> <li>• Experienced team</li> </ul>	<ul style="list-style-type: none"> <li>• Concentrated portfolio construction</li> <li>• Management team turnover</li> </ul>	
Quintana Energy Partners	2014	X			North America Only	Onshore Lease & Drill	Onshore Acquire & Exploit	Offshore Drilling	<ul style="list-style-type: none"> <li>• Experienced and tenured team, led by former U.S. Secretary of Commerce</li> </ul>	<ul style="list-style-type: none"> <li>• Potential conflicts of interest when last reviewed given a senior partner's board position at a publicly-traded upstream company</li> </ul>	
Riverstone Holdings	In Market	X			North America Only	Onshore Lease & Drill	Onshore Acquire & Exploit	Offshore Drilling	<ul style="list-style-type: none"> <li>• Experienced team with significant network</li> <li>• Strong historical performance</li> </ul>	<ul style="list-style-type: none"> <li>• Fund size increase</li> <li>• Departure from Carlyle</li> </ul>	
Sheridan Production Partners	2014	X		North America Only	Global	Onshore Lease & Drill	Onshore Acquire & Exploit	Offshore Drilling	<ul style="list-style-type: none"> <li>• Consistent upstream focus</li> <li>• Warburg Pincus partnership</li> </ul>	<ul style="list-style-type: none"> <li>• Challenges surrounding operating company model</li> <li>• Limited realized track record</li> </ul>	
TPG Capital	TBD		X		North America Only	Onshore Lease & Drill	Onshore Acquire & Exploit	Offshore Drilling	<ul style="list-style-type: none"> <li>• Global focus, broader TPG support</li> </ul>	<ul style="list-style-type: none"> <li>• Public listing potential</li> <li>• Mixed returns in recent funds</li> </ul>	
Warburg Pincus	In Market		X		North America Only	Onshore Lease & Drill	Onshore Acquire & Exploit	Offshore Drilling	<ul style="list-style-type: none"> <li>• Longstanding generalist investor in energy</li> </ul>	<ul style="list-style-type: none"> <li>• One, diversified fund investment model</li> </ul>	
White Deer Management	In Market	X		North America Only	Global	Onshore Lease & Drill	Onshore Acquire & Exploit	Offshore Drilling	<ul style="list-style-type: none"> <li>• Experienced team led by former First Reserve partner</li> <li>• Current portfolio well positioned in oilfield and midstream services</li> </ul>	<ul style="list-style-type: none"> <li>• Returns have been mixed</li> </ul>	
Yorktown Partners	2014	X		North America Only	Global	Onshore Lease & Drill	Onshore Acquire & Exploit	Offshore Drilling	<ul style="list-style-type: none"> <li>• Longstanding name in upstream and midstream</li> </ul>	<ul style="list-style-type: none"> <li>• Small team with limited resources</li> </ul>	

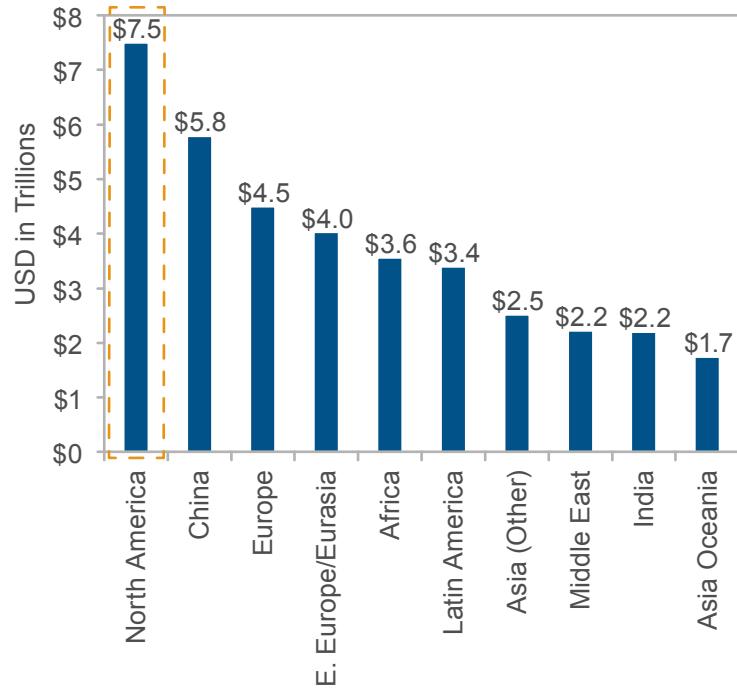


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**Midstream**

## Projected Cumulative Investment in Energy-Supply Infrastructure

By region (2011-2035)



Midstream			
Strategy/ Investment Type	Sub Strategy	Target Geography	Expected Returns (multiple of cost)
Oil & Gas Midstream	Develop	Global	2.5x, 2-5 years
	Buy & Enhance		2.0x, 2-5 years
	Services		2.0x, 2-5 years

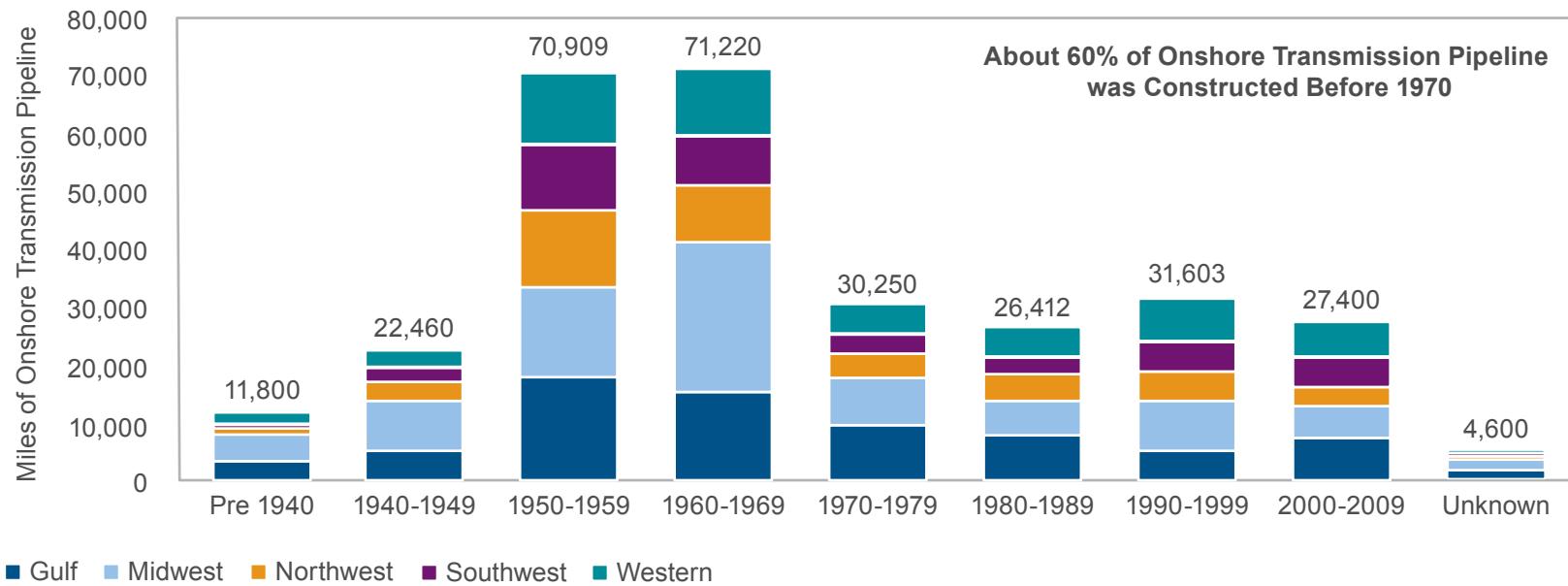
IEA World Energy Outlook

### Production driving significant midstream investment opportunity

- Growth in production requires improved and new infrastructure
- Midstream infrastructure required to connect supply and demand across crude oil, dry gas and natural gas liquid (NGL)
- As conventional gas production is displaced by shale production in new shale basins, additional infrastructure will need to be built to store, transport, and process gas to market
- Demand from petrochemical industry for NGLs will require substantial infrastructure build

## Onshore Gas Transmission Pipeline

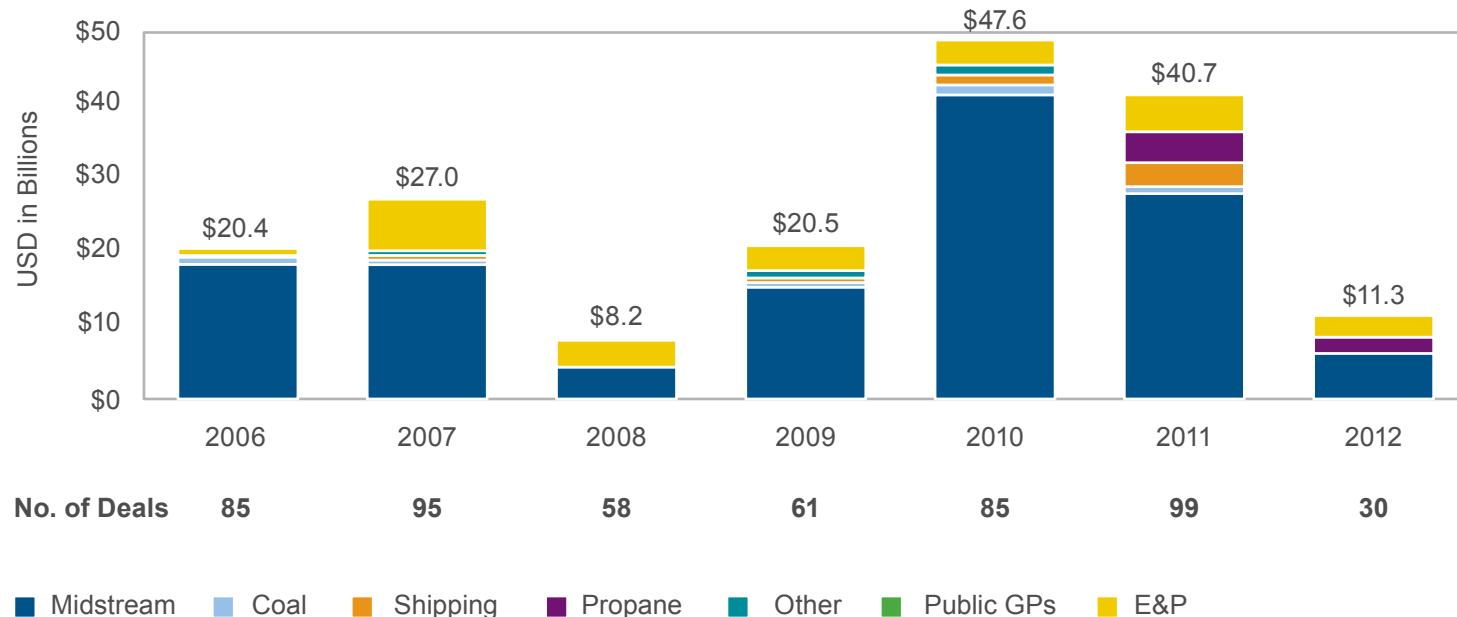
By Decade of Construction and by Region (Miles)



Source: U.S. Dept. of Transportation; Van Nesa Feidman; Federal Highway Administration, at <http://www.thwa.dot.gov/infrastructure/intrstat.cfm>. Accessed Nov 7, 2011 (Interstate bridge conditions); ScottMadden analysis.

## Global demand for infrastructure drives investable opportunity

- Aging infrastructure in developed markets will need replacement
- Absence of infrastructure in emerging economies
- Activity expected to increase in liquid natural gas (LNG) conversion

**Total MLP M&A Transactions**


Source: Crestwood Midstream Partners (May 2012)

**Master Limited Partnerships (MLPs) make private equity exits possible**

- MLPs are publicly-traded, tax efficient structures focused on acquiring midstream assets
- Their ability to generate yield has resulted in broad appeal from public market investors
- Private equity has utilized MLPs as an exit channel or a structure through which to acquire a portfolio of midstream assets

Key risks	Mitigation tools
<ul style="list-style-type: none"> <li>• New build and/or operating costs</li> <li>• Commodity price of input</li> <li>• Regulatory environment</li> </ul>	<ul style="list-style-type: none"> <li>• Acquire low cost operating assets</li> <li>• Back experienced management teams</li> <li>• Conservative capital structure</li> <li>• Invest project capital in tranches over time</li> <li>• Structure long-term supplier contracts</li> </ul>

- Midstream is broadly attractive in the long term given supply and demand requirements
- Energy private equity funds have invested in the development of these assets, while infrastructure funds are interested in the long-term stable cash flows of an established midstream asset
- Key attributes of successful investors in midstream:
  - Ability to source opportunities in local, high demand markets
  - Deep understanding of technical complexity of development of assets
  - Disciplined purchase prices
  - Conservative capital structure
  - Recruiting top management talent

Competitive Matrix										
Fund Manager	Fundraising	Manager Type		Geographic Focus		Investment Type			Comments	
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ArcLight Capital Partners	2014	X							<ul style="list-style-type: none"> <li>Recognized player in power and midstream</li> <li>Back management teams to build assets</li> </ul>	<ul style="list-style-type: none"> <li>Mixed returns</li> </ul>
Blackstone Energy Partners	2015		X						<ul style="list-style-type: none"> <li>Global focus, broader Blackstone support</li> <li>Strong historical performance, capital preservation</li> </ul>	<ul style="list-style-type: none"> <li>Limited realized track record</li> </ul>
Denham Capital Management	2015	X							<ul style="list-style-type: none"> <li>Global focus, opportunistic strategy</li> <li>Experienced team</li> </ul>	<ul style="list-style-type: none"> <li>Mixed returns</li> </ul>
EIG Global Energy Partners	2013	X							<ul style="list-style-type: none"> <li>Invests across the capital structure</li> <li>Income stream/j-curve mitigation</li> </ul>	<ul style="list-style-type: none"> <li>First lien securities offer conservative risk/reward</li> <li>Negative press around investments with Chesapeake</li> </ul>
EnCap Flatrock	2015	X							<ul style="list-style-type: none"> <li>Access to the broader EnCap platform</li> <li>Experienced team</li> </ul>	<ul style="list-style-type: none"> <li>Limited track record</li> <li>Flatrock team still early in working with EnCap organization</li> </ul>
Energy & Minerals Group	2015	X							<ul style="list-style-type: none"> <li>Significant experience in its target sectors, most notably coal, minerals and midstream assets</li> </ul>	<ul style="list-style-type: none"> <li>The Fund I portfolio was tracking well, but remains largely unrealized as of our review in 2011</li> </ul>
Energy Capital Partners	2013	X							<ul style="list-style-type: none"> <li>Excellent track record in power and midstream</li> <li>Experienced team in targeted subsectors</li> </ul>	<ul style="list-style-type: none"> <li>Ambitions to become larger firm, organization recently launched mezz product</li> </ul>
Energy Spectrum	2014	X							<ul style="list-style-type: none"> <li>Strong realized returns and team experience when last reviewed in 2007</li> <li>Affiliated with Energy Trust Partners, which is focused on upstream opportunities</li> </ul>	<ul style="list-style-type: none"> <li>Team turnover and resource concerns</li> <li>High capital loss ratio</li> </ul>
First Reserve Corp.	In Market	X							<ul style="list-style-type: none"> <li>Recognized player in global energy industry</li> <li>Exposure to global deals, services focus</li> </ul>	<ul style="list-style-type: none"> <li>Recent performance challenged</li> <li>Significant team turnover</li> </ul>

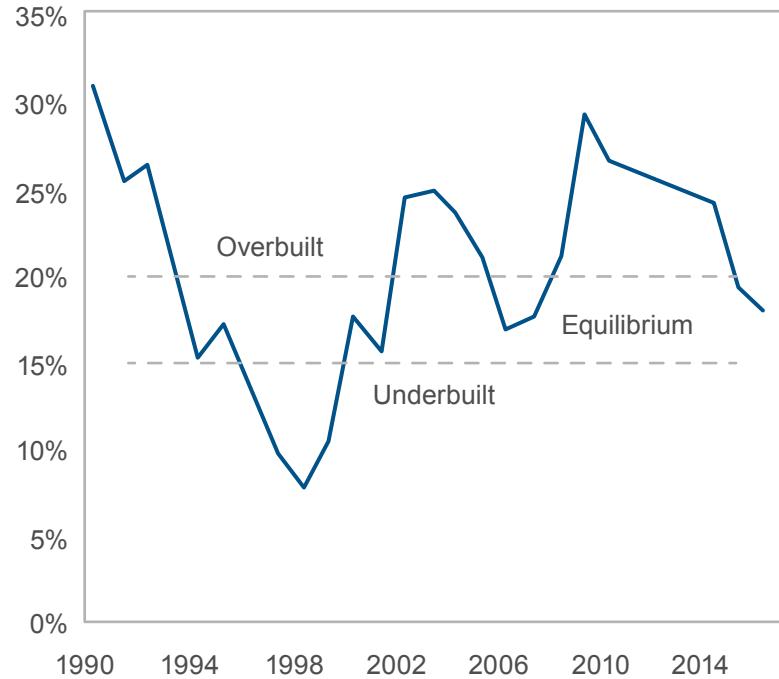
Competitive Matrix											
Fund Manager	Fundraising	Manager Type		Geographic Focus		Investment Type			Comments		
		Energy Specific	Generalist	North America Only	Global	Develop	Buy & Enhance	Services			
	Next Fund								Merits	Concerns	
KKR Associates	In Market		X						<ul style="list-style-type: none"> <li>Access to global KKR resources and deal flow</li> </ul>	<ul style="list-style-type: none"> <li>Energy exposure only through main fund portfolio</li> </ul>	
Natural Gas Partners	2015	X							<ul style="list-style-type: none"> <li>Recognized player in developed upstream sector</li> <li>Experienced team</li> </ul>	<ul style="list-style-type: none"> <li>Performance decline in recent funds</li> <li>Sector-focus has shifted</li> </ul>	
Pine Brook Partners	In Market		X						<ul style="list-style-type: none"> <li>Led by longstanding former Warburg Pincus energy partner</li> </ul>	<ul style="list-style-type: none"> <li>Also focus on financial services</li> <li>Key man risk</li> </ul>	
Quantum Energy	2015	X							<ul style="list-style-type: none"> <li>Strong performance in mature funds</li> <li>Experienced team</li> </ul>	<ul style="list-style-type: none"> <li>Concentrated portfolio construction</li> <li>Management team turnover</li> </ul>	
Quintana Energy Partners	2014	X							<ul style="list-style-type: none"> <li>Experienced and tenured team, led by former U.S. Secretary of Commerce</li> </ul>	<ul style="list-style-type: none"> <li>Potential conflicts of interest when last reviewed given a senior partner's board position at a publicly-traded upstream company</li> </ul>	
Riverstone Holdings	In Market	X							<ul style="list-style-type: none"> <li>Experienced team with significant network</li> <li>Strong historical performance</li> </ul>	<ul style="list-style-type: none"> <li>Fund size increase</li> <li>Departure from Carlyle</li> </ul>	
Tenaska Capital Management	2015	X							<ul style="list-style-type: none"> <li>Experienced team in power</li> <li>Affiliation with broader Tenaska organization generates deal flow</li> </ul>	<ul style="list-style-type: none"> <li>Strategy continuing to broaden to midstream and renewables at time of review in 2008</li> <li>Limited track record of private equity investments</li> </ul>	
TPG Capital	TBD		X						<ul style="list-style-type: none"> <li>Global focus, broader TPG support</li> </ul>	<ul style="list-style-type: none"> <li>Public listing potential</li> <li>Mixed returns in recent funds</li> </ul>	
Warburg Pincus	In Market		X						<ul style="list-style-type: none"> <li>Longstanding generalist investor in energy</li> </ul>	<ul style="list-style-type: none"> <li>One, diversified fund investment model</li> </ul>	
White Deer Management	In Market	X							<ul style="list-style-type: none"> <li>Experienced team led by former First Reserve partner</li> <li>Current portfolio well positioned in oilfield and midstream services</li> </ul>	<ul style="list-style-type: none"> <li>Returns have been mixed</li> </ul>	
Yorktown Partners	2014	X							<ul style="list-style-type: none"> <li>Longstanding name in upstream and midstream</li> </ul>	<ul style="list-style-type: none"> <li>Small team with limited resources</li> </ul>	



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Power

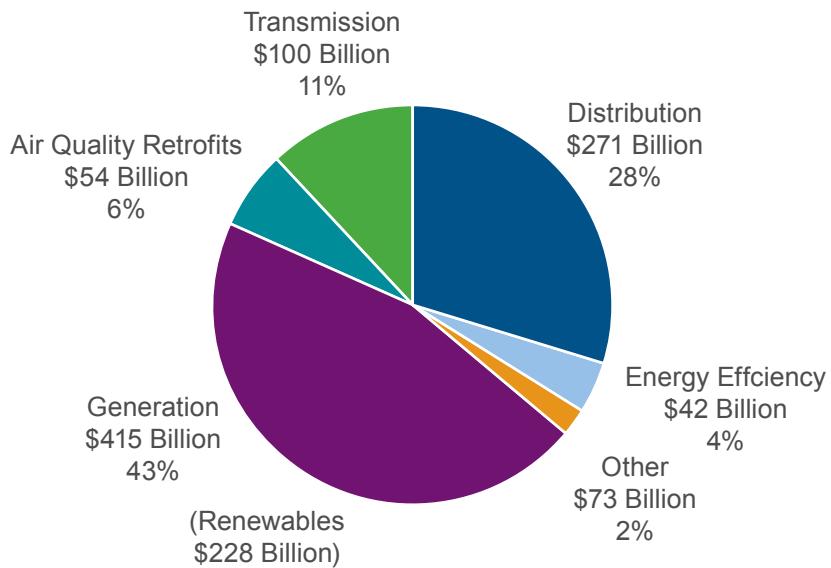
## Historic & Projected Reserve Margins



Sources: SNL, Barclays Capital estimates, EIA, BEA

## Investment Need

2011-20 \$954 Billion (2010 Dollars)

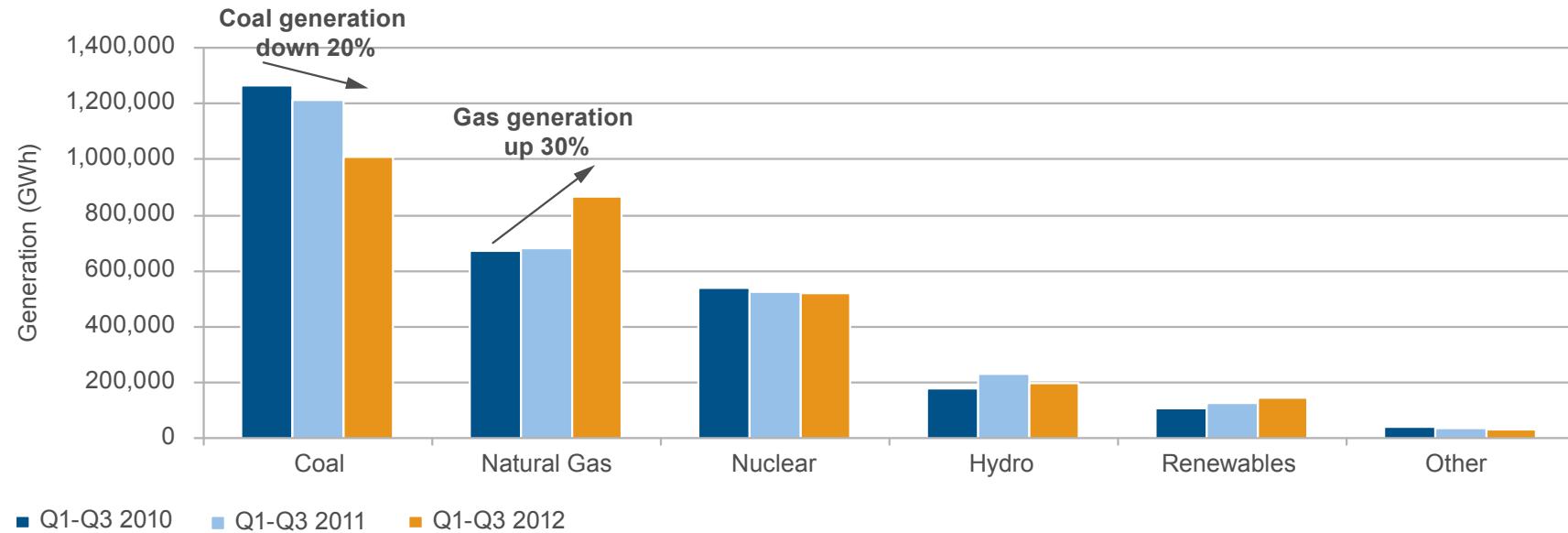


Source: IHS CERA

"Other" includes expenditures on demand response, smart grid, cooling water rule retrofits and general plant investments.

## Power markets expected to recover in medium to long term

- Long-term demand for natural gas remains high as it is a cleaner, more efficient fuel source
  - Aging, inefficient power plants in the U.S. will need to be replaced
  - CAPEX for the power sector is estimated at \$1 trillion over the next decade
- Private equity players target areas where reserve margins, which vary state by state, are expected to be tight (e.g. Texas)



Source: EIA

Power			
Strategy/ Investment Type	Sub Strategy	Target Geography	Target Returns (multiple of cost)
Power Generation	Develop	Global	2.5x, 2-5 years
	Buy & Enhance		2.0x-2.5x, 2-5 years
	Services		2.0x, 2-5 years

### Low gas prices, regulation altering power landscape in U.S.

- Tightening environmental rules are forcing retirement of coal and oil generation plants
- Existing gas-fired generation is selling at a discount to replacement cost, making high quality, well-located assets attractive to private equity buyers willing to hold as power markets recover

### Lack of power infrastructure in developing economies

- This dynamic should produce investment opportunities, especially in new build power generation

**Investments in alternative energy will suffer**

- Global energy sources are, in fact, increasing and alternative energy sources have enormous negative cost comparisons to traditional sources such as natural gas, nuclear or coal
- Alternative energy too expensive
  - Not able to scale in the absence of government subsidies
  - In developed world, will subsidies continue with fiscal pressure on government? (i.e. Spain removal of solar credits)
  - Social pressure may outweigh cost/benefit for certain sectors
    - Safety for nuclear or dirty emissions for coal
    - Social pressure is unlikely to impact overall global trends meaningfully
- Best alternative energy investments likely to be in technologies to “clean” or enhance traditional sources or in high risk venture capital hoping to find a breakthrough technology to bring down cost of alternative energy sources

Key risks	Mitigation tools
<ul style="list-style-type: none"> <li>• New build and/or operating costs</li> <li>• Commodity price of input</li> <li>• Regulatory environment</li> <li>• Cyclicality of sub-sector</li> </ul>	<ul style="list-style-type: none"> <li>• Operational efficiency</li> <li>• Location is key</li> <li>• Conservative capital structure</li> <li>• Acquire assets at a discount to replacement cost</li> <li>• Long-term power purchase agreements</li> <li>• Hedging program</li> </ul>

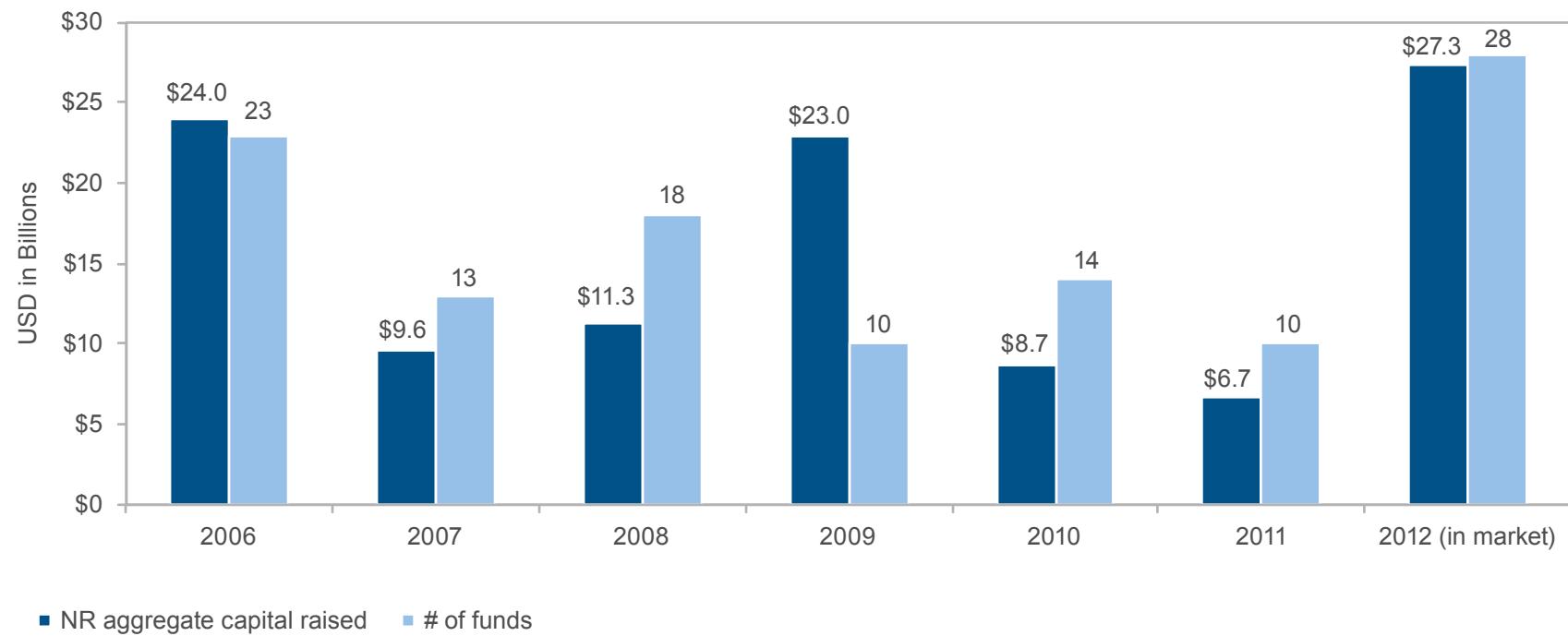
- Due to the cyclicality of this energy sub-sector, investors should proceed with caution in the short term
- In the long term, demand for power assets should continue to make this an attractive area of investment
- Most forms of alternative generation are not capable of responding to fluctuations in demand and construction costs exceed the cost of efficient natural gas plants
- Key attributes of successful investors in power:
  - Ability to source opportunities in locations of supply/demand imbalance
  - Disciplined purchase prices
  - Conservative capital structure
  - Ability to establish long-term power purchase agreements

Competitive Matrix										
Fund Manager	Fundraising	Manager Type		Geographic Focus		Investment Type			Comments	
		Energy Specific	Generalist	North America Only	Global	Develop	Buy & Enhance	Services		
	Next Fund								Merits	Concerns
ArcLight Capital Partners	2014	X							<ul style="list-style-type: none"> <li>Recognized player in power and midstream</li> <li>Back management teams to build assets</li> </ul>	<ul style="list-style-type: none"> <li>Mixed returns</li> </ul>
Blackstone Energy Partners	2015		X						<ul style="list-style-type: none"> <li>Global focus, broader Blackstone support</li> <li>Strong historical performance, capital preservation</li> </ul>	<ul style="list-style-type: none"> <li>Limited realized track record</li> </ul>
Denham Capital Management	2015	X							<ul style="list-style-type: none"> <li>Global focus, opportunistic strategy</li> <li>Experienced team</li> </ul>	<ul style="list-style-type: none"> <li>Mixed returns</li> </ul>
EIG Global Energy Partners	2013	X							<ul style="list-style-type: none"> <li>Invests across the capital structure</li> <li>Income stream/j-curve mitigation</li> </ul>	<ul style="list-style-type: none"> <li>First lien securities offer conservative risk/reward</li> <li>Negative press around investments with Chesapeake</li> </ul>
Energy Capital Partners	2013	X							<ul style="list-style-type: none"> <li>Excellent track record in power and midstream</li> <li>Experienced team in targeted subsectors</li> </ul>	<ul style="list-style-type: none"> <li>Ambitions to become larger firm, organization recently launched mezz product</li> </ul>
Energy Investors Funds	2014	X							<ul style="list-style-type: none"> <li>Extensive track record in power generation and transmission</li> </ul>	<ul style="list-style-type: none"> <li>Low IRRs as a result of long hold period</li> </ul>
First Reserve Corp.	In Market	X							<ul style="list-style-type: none"> <li>Recognized player in global energy industry</li> <li>Exposure to global deals, services focus</li> </ul>	<ul style="list-style-type: none"> <li>Recent performance challenged</li> <li>Significant team turnover</li> </ul>
Hudson Clean Energy Partners	In Market	X							<ul style="list-style-type: none"> <li>Prominent name in renewable power, alternative fuels and low-carbon sectors</li> </ul>	<ul style="list-style-type: none"> <li>Challenging market for alternatives</li> <li>Returns have been mixed</li> </ul>
KKR Associates	In Market		X						<ul style="list-style-type: none"> <li>Access to global KKR resources and deal flow</li> </ul>	<ul style="list-style-type: none"> <li>Energy exposure only through main fund portfolio</li> </ul>

Competitive Matrix											
Fund Manager	Fundraising	Manager Type		Geographic Focus		Investment Type			Comments		
		Energy Specific	Generalist	North America Only	Global	Develop	Buy & Enhance	Services			
	Next Fund								Merits	Concerns	
LS Power Equity Partners	2013	X		North America Only	Global	Develop	Buy & Enhance	Services	<ul style="list-style-type: none"> <li>Expertise in power and transmission</li> <li>Integrated platform generates deal flow</li> </ul>		
Oaktree Power Opportunities	2014		X	North America Only	Global	Develop	Buy & Enhance	Services	<ul style="list-style-type: none"> <li>Active in power sector for many years</li> <li>Utilize low amount of leverage and performance was attractive when last reviewed</li> </ul>		
Pine Brook Partners	In Market		X	North America Only	Global	Develop	Buy & Enhance	Services	<ul style="list-style-type: none"> <li>Led by longstanding former Warburg Pincus energy partner</li> </ul>		
Quintana Energy Partners	2014	X		North America Only	Global	Develop	Buy & Enhance	Services	<ul style="list-style-type: none"> <li>Experienced and tenured team, led by former U.S. Secretary of Commerce</li> </ul>		
Riverstone Holdings	In Market	X		North America Only	Global	Develop	Buy & Enhance	Services	<ul style="list-style-type: none"> <li>Experienced team with significant network</li> <li>Strong historical performance</li> </ul>		
Silver Lake Kraftwerk	In Market		X	North America Only	Global	Develop	Buy & Enhance	Services	<ul style="list-style-type: none"> <li>Unique technology angle in alternative and general energy space</li> </ul>		
Tenaska Capital Management	2015	X		North America Only	Global	Develop	Buy & Enhance	Services	<ul style="list-style-type: none"> <li>Experienced team in power</li> <li>Affiliation with broader Tenaska organization generates deal flow</li> </ul>		
TPG Capital	TBD		X	North America Only	Global	Develop	Buy & Enhance	Services	<ul style="list-style-type: none"> <li>Global focus, broader TPG support</li> </ul>		
U.S. Renewables	2013	X		North America Only	Global	Develop	Buy & Enhance	Services	<ul style="list-style-type: none"> <li>In operation since 2003 with \$750m under management</li> <li>Recognized in the renewables sub-sector</li> </ul>		
Warburg Pincus	In Market		X	North America Only	Global	Develop	Buy & Enhance	Services	<ul style="list-style-type: none"> <li>Longstanding generalist investor in energy</li> </ul>		
									One, diversified fund investment model		

Source: General Partners and Hamilton Lane Database

## Annual Natural Resources Fundraising



- Amount of capital raised by private equity for energy is small compared to the size of the market opportunity
  - From 2006 to 2011, natural resources funds raised \$83.3 billion in aggregate
  - However, fundraising in the energy and natural resources space has increased over the past year

Competitive Matrix													
Fund Manager	Manager Type		Geographic Focus				Oil & Gas Value Chain			Power Value Chain			
	Energy Specific	Generalist	South America	Asia	Europe	North America	Resource Expl. & Prod.	Oilfield Services	Oil & Gas Mid.	Power Gen. (Fossil Fuels)	Power Gen (Alt. Fuels)	Power Trans. and Distr.	Demand Response / Energy Storage
Apollo Natural Resources		X											
ArcLight Capital Partners	X												
Avista Capital Partners		X											
Blackstone Energy Partners		X											
Chambers Energy (Mezz)	X												
Denham Capital Management	X												
EIG Global Energy Partners	X												
EnCap Energy Capital Funds	X												
EnCap Flatrock	X												
Energy & Minerals Group	X												
Energy Capital Partners	X												
Energy Capital Partners (Mezz)	X												
Energy Investors Funds	X												
Energy Spectrum	X												
EnerVest	X												
First Reserve Corp.	X												
Hudson Clean Energy Partners	X												
Kayne Anderson Capital Adv.	X												
KKR Associates		X											
Lime Rock Partners	X												
LS Power Equity Partners	X												
Merit Energy Partners	X												
Natural Gas Partners	X												
Oaktree Power Opportunities		X											
Pine Brook Partners		X											

Competitive Matrix													
Fund Manager	Manager Type		Geographic Focus				Oil & Gas Value Chain			Power Value Chain			
	Energy Specific	Generalist	South America	Asia	Europe	North America	Resource Expl. & Prod.	Oilfield Services	Oil & Gas Mid.	Power Gen. (Fossil Fuels)	Power Gen (Alt. Fuels)	Power Trans. and Distr.	Demand Response / Energy Storage
Quantum Energy	X												
Quintana Energy Partners	X												
Riverstone Holdings	X												
Sheridan Production Partners	X												
Silver Lake Kraftwerk		X											
Tenaska Capital Management	X												
TPG Capital		X											
U.S. Renewables	X												
Warburg Pincus		X											
White Deer Management	X												
Yorktown Partners	X												

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