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The Investment Expert

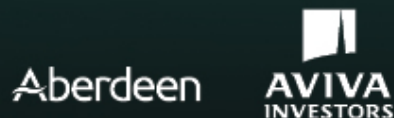
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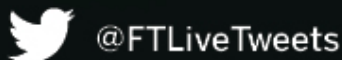
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The Investment Expert



Keynote Address: Energy renaissance – capitalising on the direct and indirect investment opportunities from shale energy

Christopher Moore

Portfolio Manager

Fidelity Worldwide Investment

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Investment opportunities within a Shale theme

October 2013

Christopher Moore
Portfolio Manager
Global Equities

Christopher Moore

Portfolio Manager



Christopher Moore
Portfolio Manager

Based in:
London

**Years of investment
experience:**
8

Education:
MBA, (Said Business
School, Oxford)
BA Philosophy, Politics &
Economics (University
College Oxford)

Funds currently under management

Shale Opportunities Strategy*	March 2013 - present
FF Global Industrials Fund (sole responsibility)	Mar 2012 – present
FF Global Industrials Fund (joint with Angel Agudo)	Jan 2011 – Mar 2012

Experience at Fidelity

Assistant Portfolio Manager, FF Global Industrials Fund	2010
Director of Research, Emerging Markets, Consumer & Healthcare teams	2009 – 2010
Team Leader, Natural Resources, Energy & Utilities	2007 – 2009
European Research Analyst , Mid & Large-cap Utilities	2005 – 2009

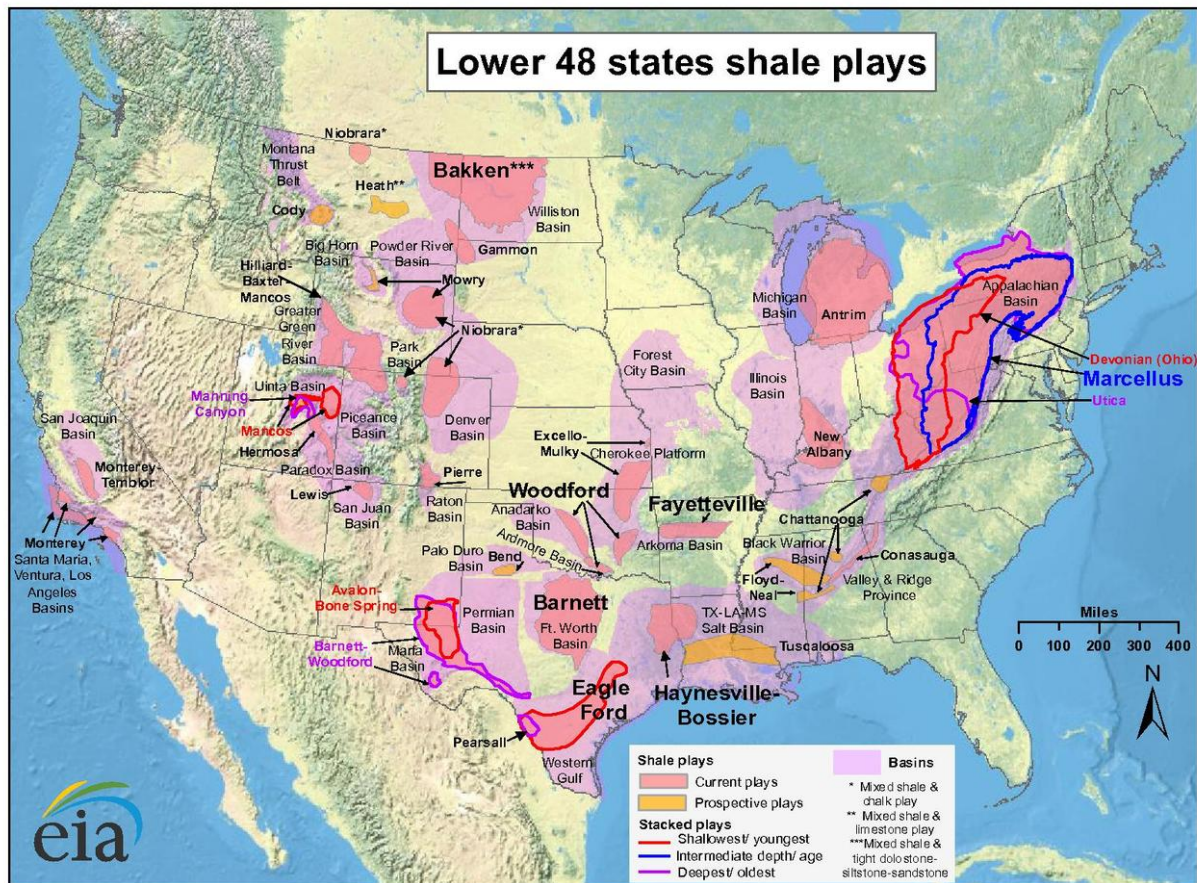
Previous experience

Deloitte & Touche	2002 – 2004
Arthur Andersen Business Consulting	1998 – 2002

Source: FIL Limited as at 30 August 2013. * Segregated Account, not a pooled fund.

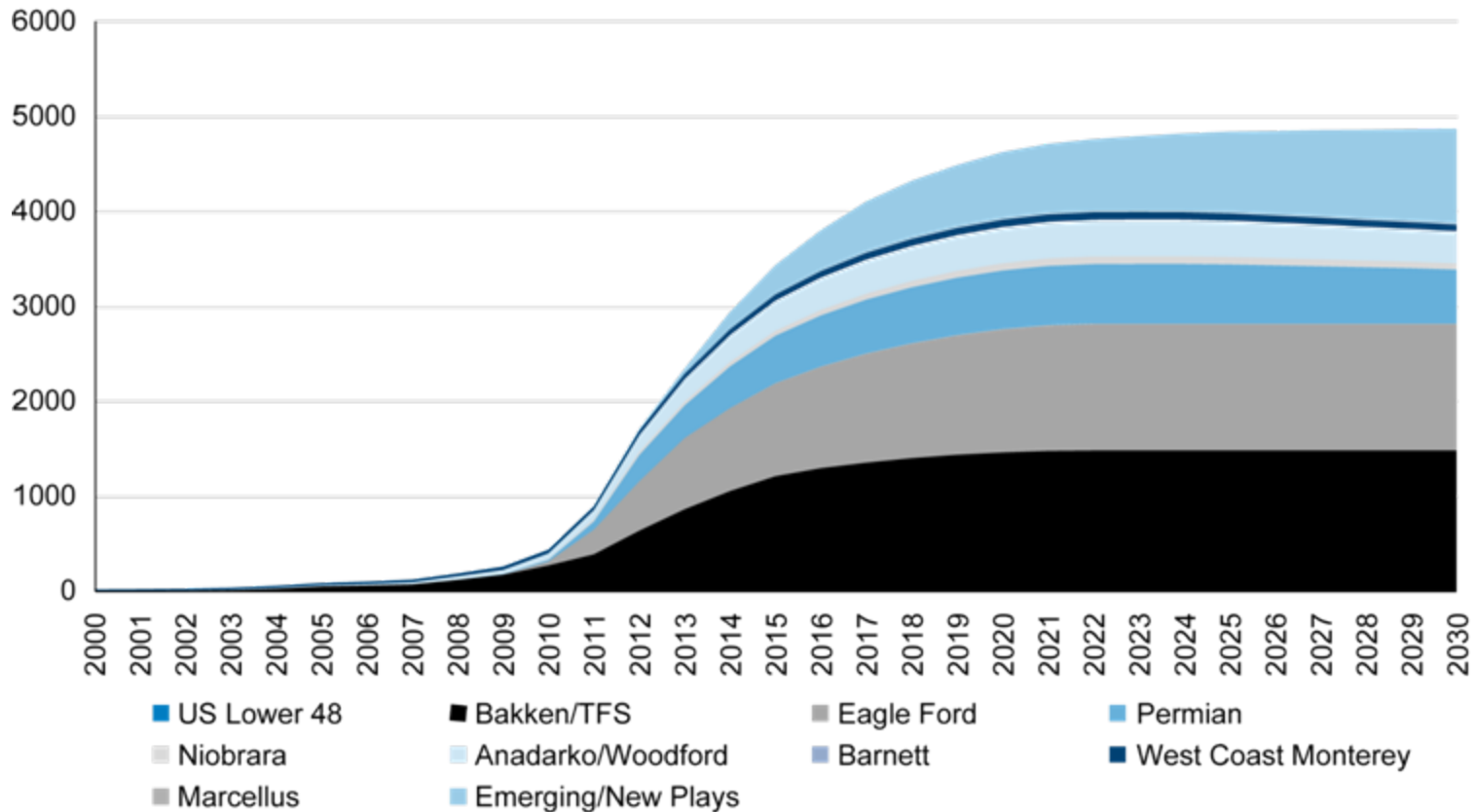
Upstream: The US shale industry has been building out for over a decade & now has an unassailable lead

Proliferation of US shale opportunities



Upstream: The US shale industry has been building out for over a decade & now has an unassailable lead (contd.)

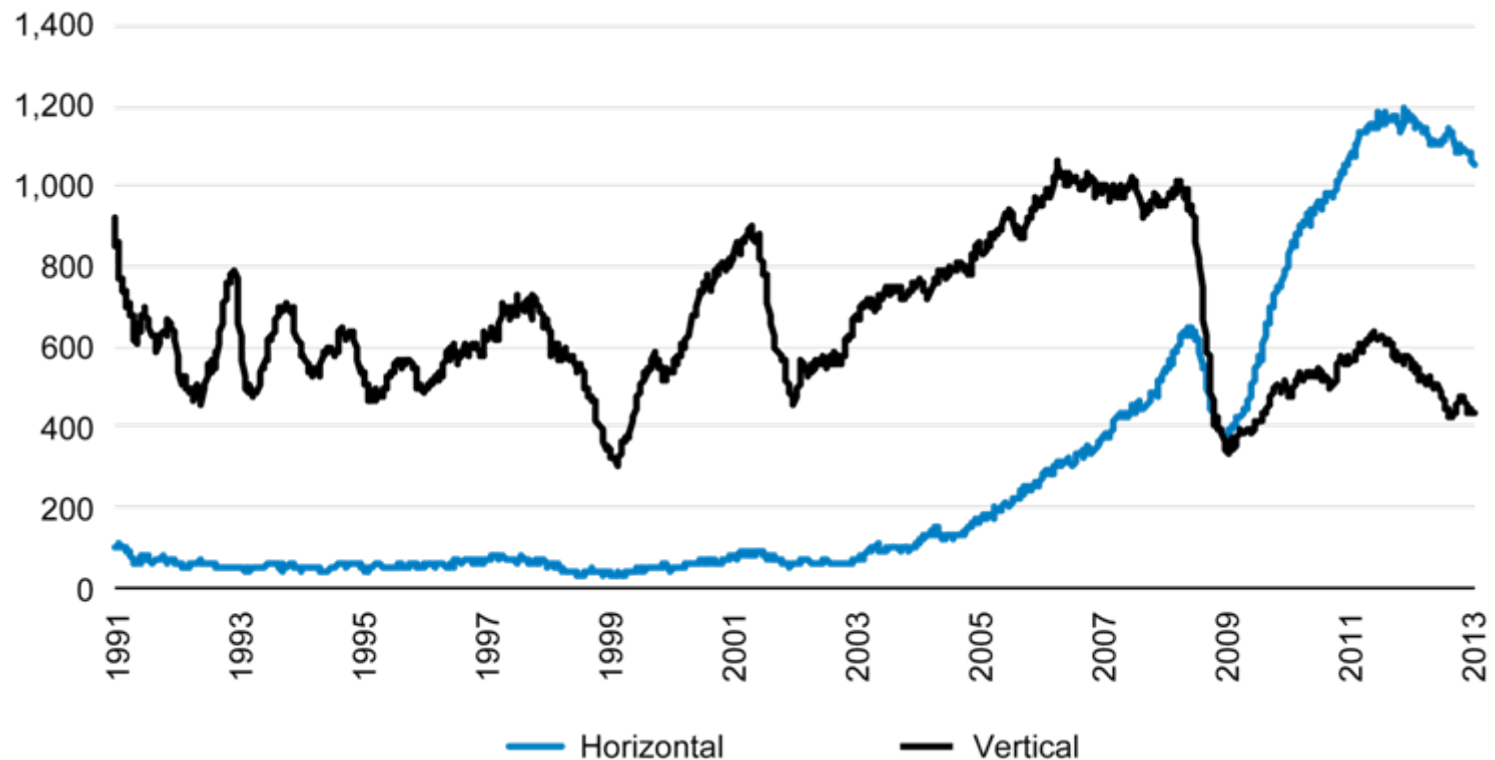
Geology better understood – forecasts revised



Source: Wood MacKenzie

Upstream: The US shale industry has been building out for over a decade & now has an unassailable lead (contd.)

Horizontal & pad drilling is driving the phenomenon



Source: Baker Hughes

Upstream: The US shale industry has been building out for over a decade & now has an unassailable lead (contd.)

This is, & will remain, primarily a US phenomenon

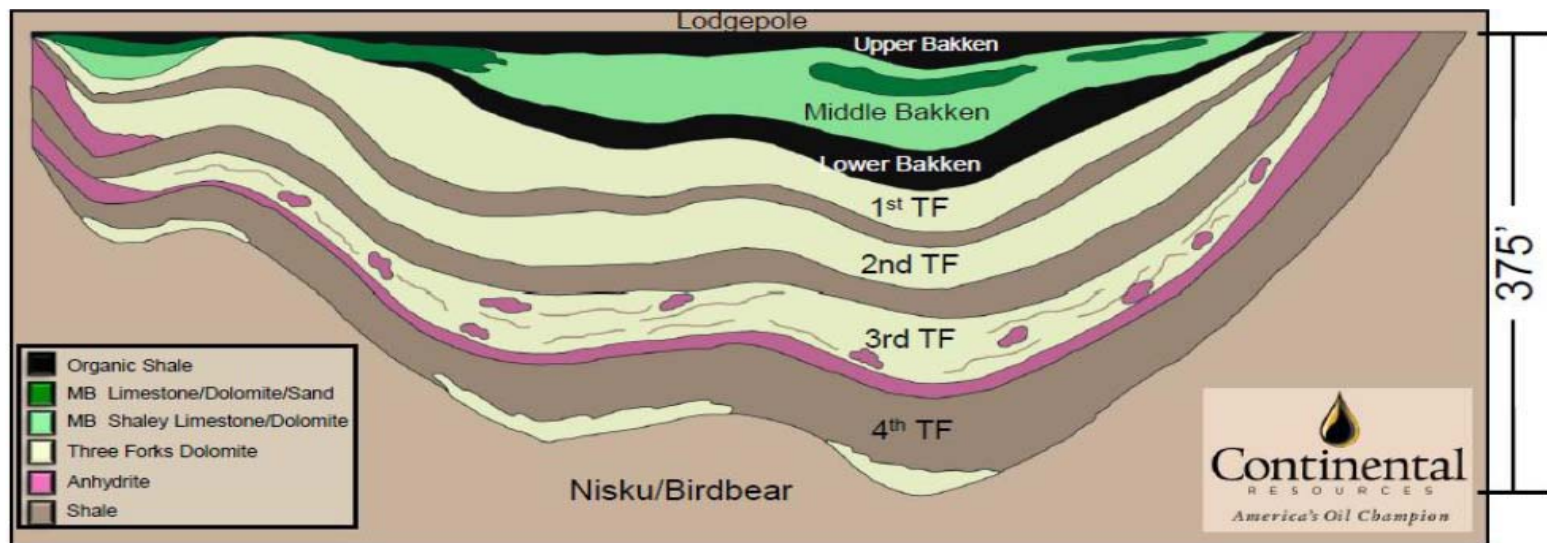
Requirement	North America	Europe	China
Good Geology	+	X	X
Geologic Data	+	+	X
Shale-discovering E&Ps	+	X	X
Private Land Owners	+	X	X
Cheap Efficient Services	+	X	X
Public Support	+	X	+
CBM Success	+	X	X

Source: FIL Limited

US shale technology & efficiency continues to move ahead, currently driven by attacking stacked zones & downspacing

- Stacked zones refer to the discovery of independent oil at different depths
- Multiple zones have recently been proved up in the Permian basin where 22 zones have been discovered i.e. an initial 100k acres could turn into >1m acres.
- The same potential exists in the Bakken, as shown
- Thought about a different way, each acre accrues multiple times its initial value

Three forks potential under the Bakken shale



Sources: Continental Resources

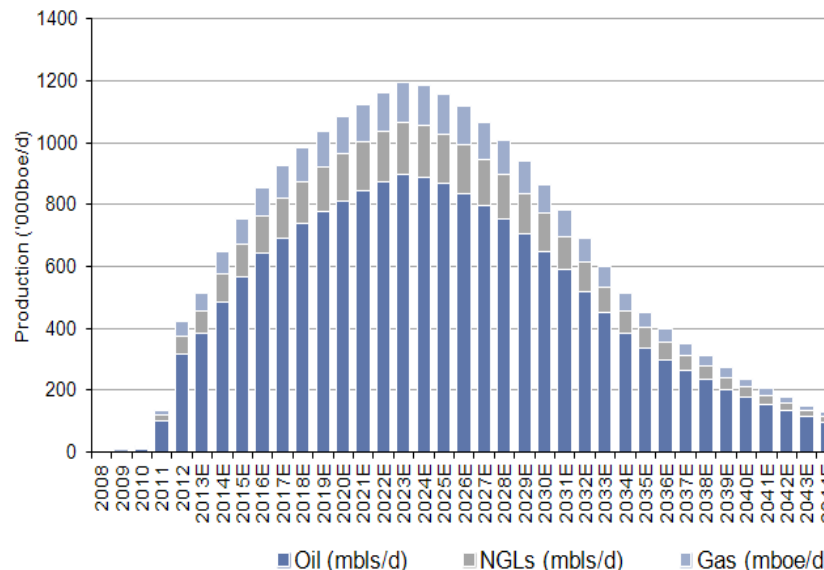
US shale technology & efficiency continues to move ahead, currently driven by attacking stacked zones & downspacing (contd.)

- Better understanding of basins leads to more accurate forecasts of decline rates & peak production giving a base Internal Rate of Return (IRR) stretching out over a decade
- Example: EOG is achieving over 50% returns from the Eagle Ford, but this can increase further from higher recovery rates (only 8% of oil is recovered), downspacing & the discovery of stacked zones

Eagle Ford Economics*

With field model at \$100 Brent	EF Oil
IRR @100 Brent	51.0%
Breakeven \$/bbl (15% IRR)	68.9
NPV \$/bbl @ 100\$ Brent	6.3
EUR	495
Oil reserves (mmbobe)	7,785
2013 oil production mbls/d	456
Differential to Brent	14.9
Well cost (\$)	8.0
Decline rate yr 1 (%)	80%
Decline rate yr 2 (%)	40%
Production peak (yr)	2023

Eagle Ford production profile



*The differential includes an NGL adjustment
Source: EOG Resources

Giving the US greater geopolitical freedom & lower oil/gas costs for a range of industries

- The US oil trade balance has more than halved in the last 5 years, setting it on course for oil self-sufficiency around 2020
- This may suggest an increasing disinterest in Middle Eastern politics, given reducing dependence on its oil

US petroleum trade balance (in billions \$)

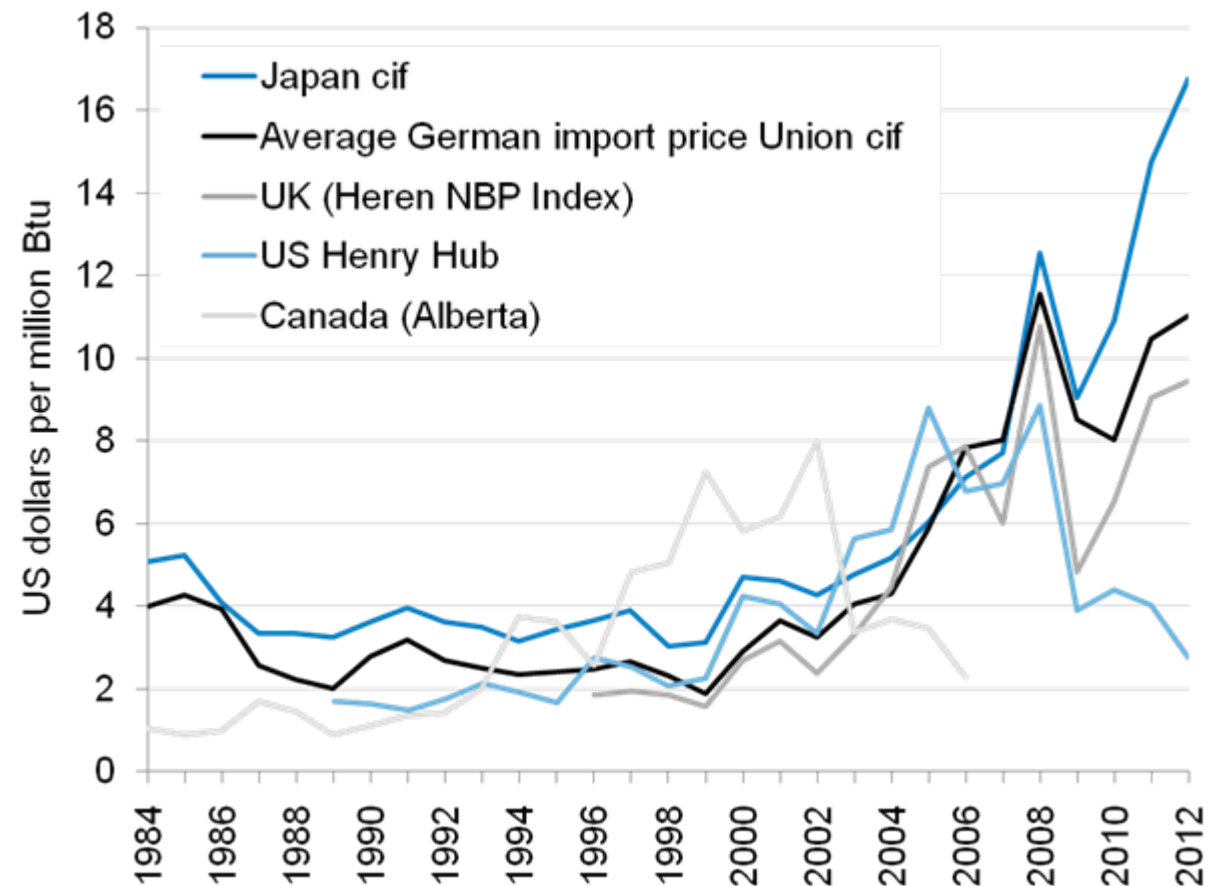


Sources: Boenning & Scattergood

Giving the US greater geopolitical freedom & lower oil/gas costs for a range of industries (cont'd)

- Shale gas has established a 400% US price advantage vs. other regions
- Prior to any manufacturing renaissance, this cheaper energy should drive a 70bp p.a. accretion to US GDP growth by 2015, even excluding the impact of shale oil*

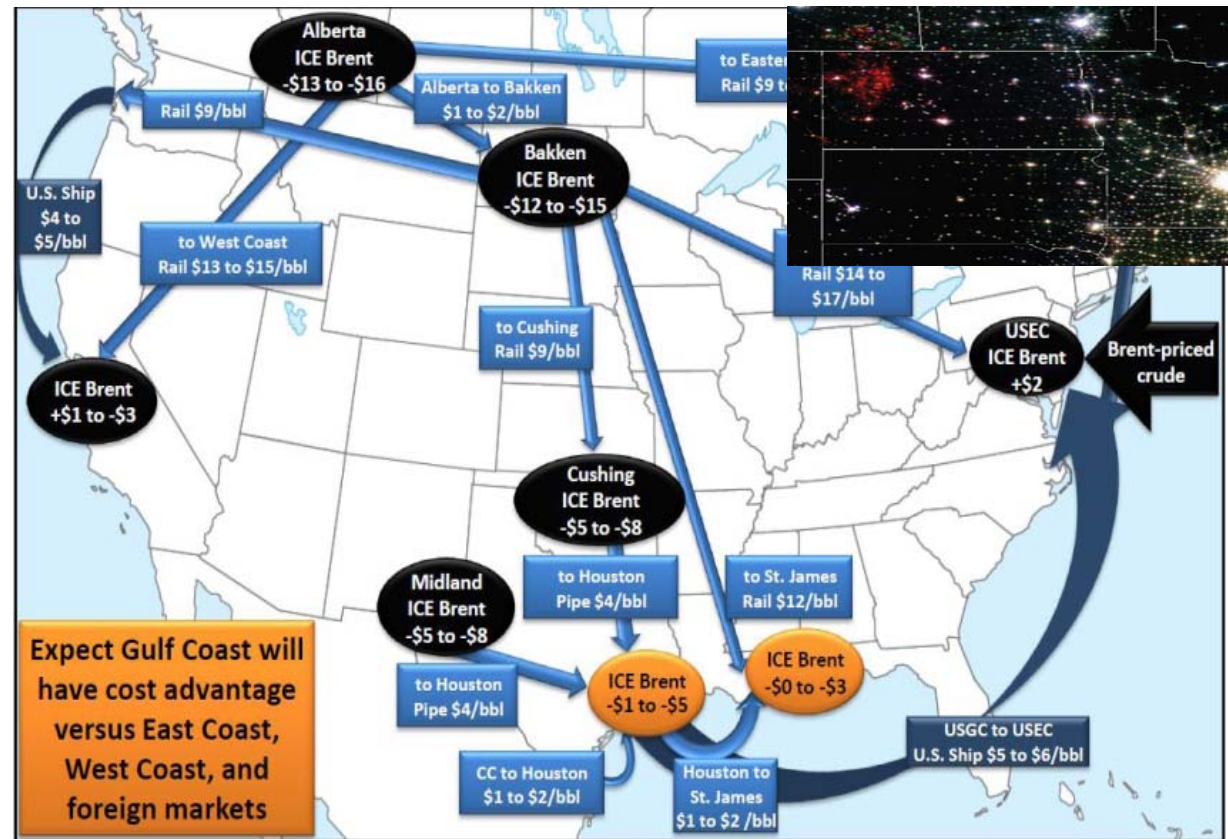
Global natural gas prices – from 1984 – 2012



*IHS Global Insight
Sources: BP Statistical Review

Midstream & logistics: 2013 has been the year of diminishing returns for refiners as pipelines are built & the train takes the strain

- Bakken gas flaring (due to lack of pipelines) has been visible from space.
- Huge ongoing investment in both oil & gas pipelines is now more efficiently getting product to regional hubs

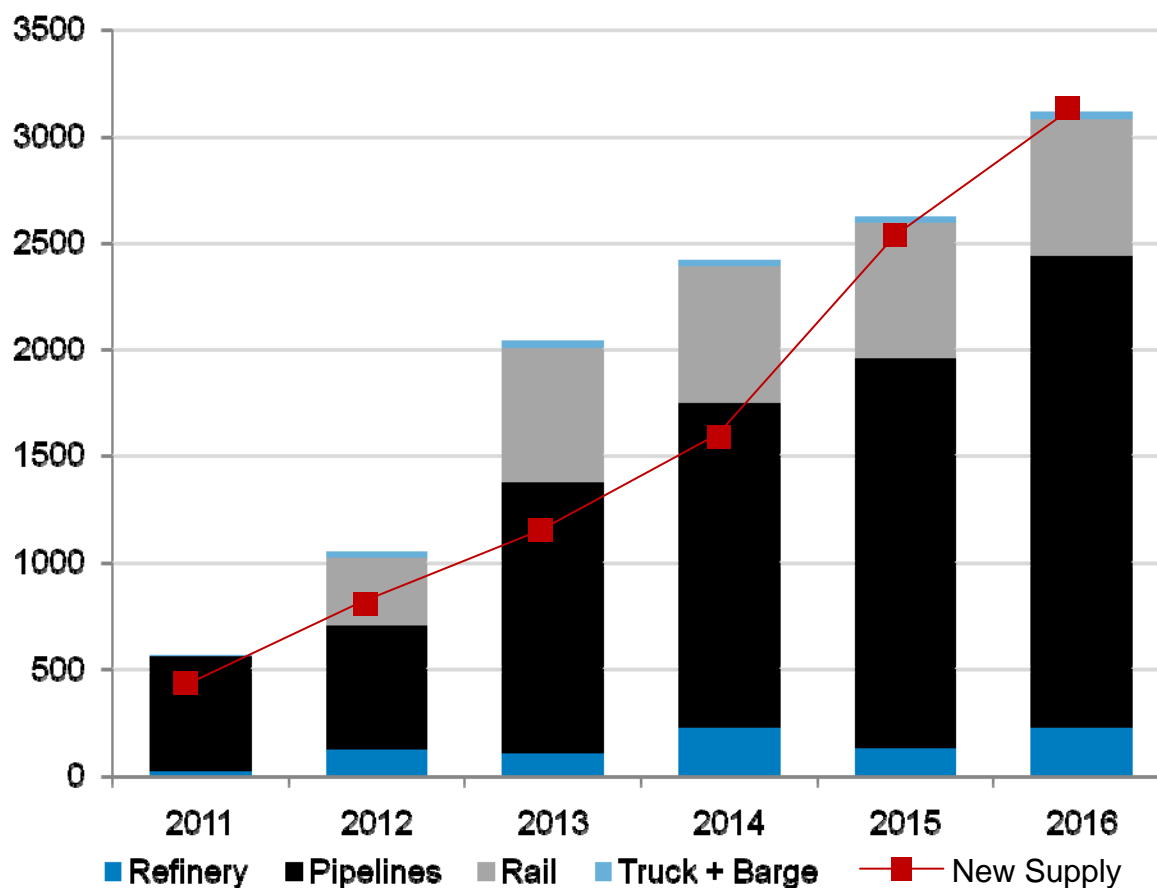


Source: Credit Suisse, August 2013

Midstream & logistics: 2013 has been the year of diminishing returns for refiners as pipelines are built & the train takes the strain (cont'd)

- The oil pipeline & crude by rail network build out has ended the cheap oil windfall received by refiners in 2011/12 when the Brent/WTI spread ballooned to >\$25.
- Pipelines can't do it all - rail, trucking & inter-modal will continue to play a part as oil production increases

Supply and takeaway capacity growth – Base case

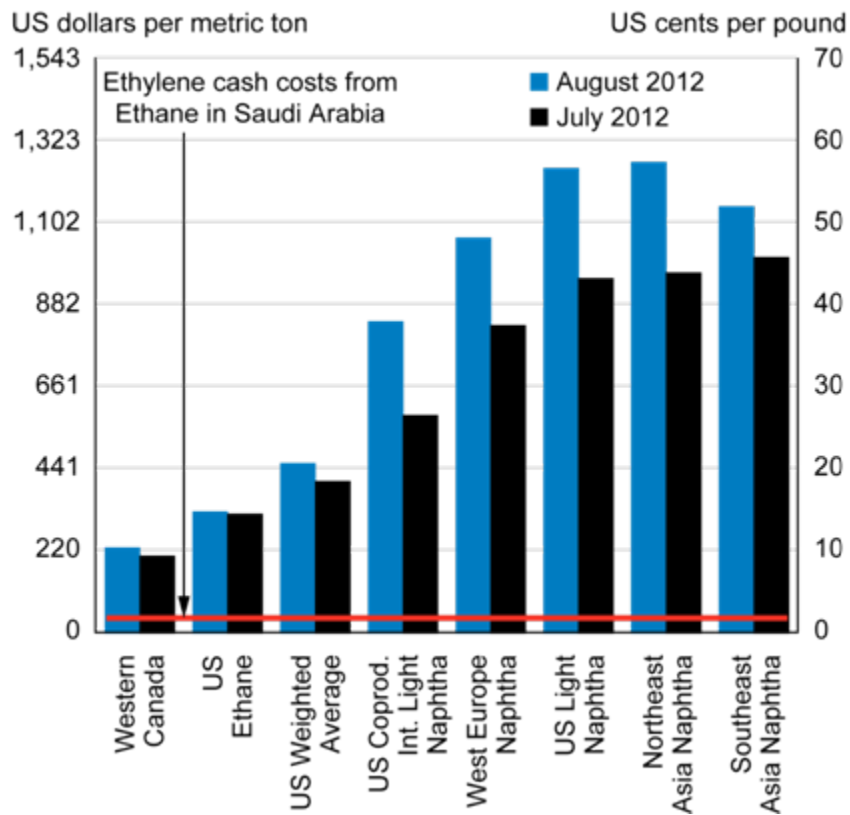


Source: FIL Limited as at 31 January 2013

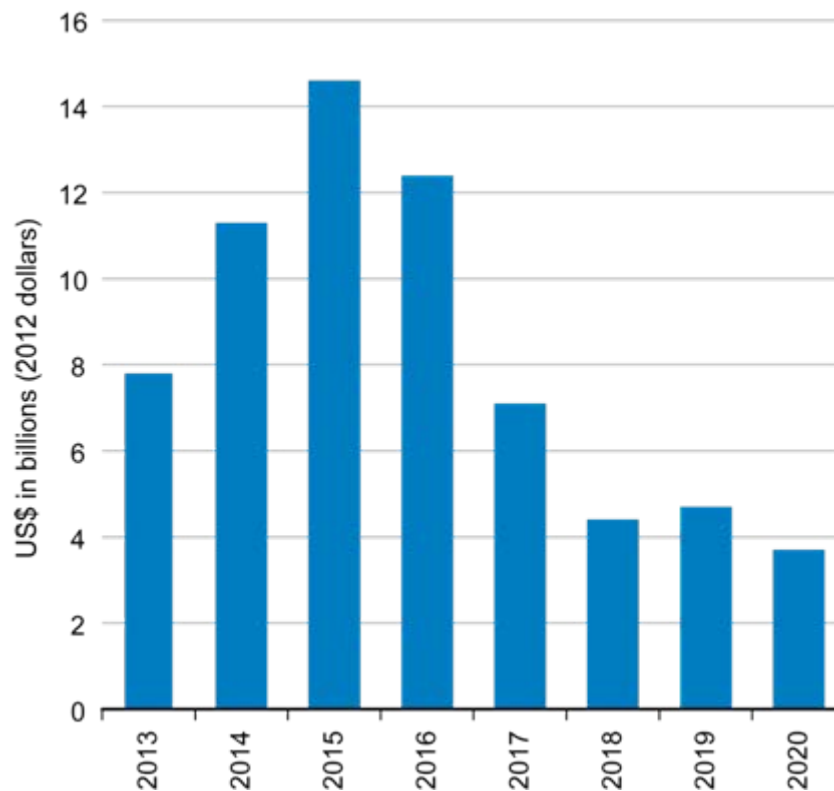
Downstream: the coming boom in petrochemical, gas fired power, fertilizers, & LNG capex

Cheap Ethane leads to ethylene cracker investment

Global Ethylene cash cost comparison



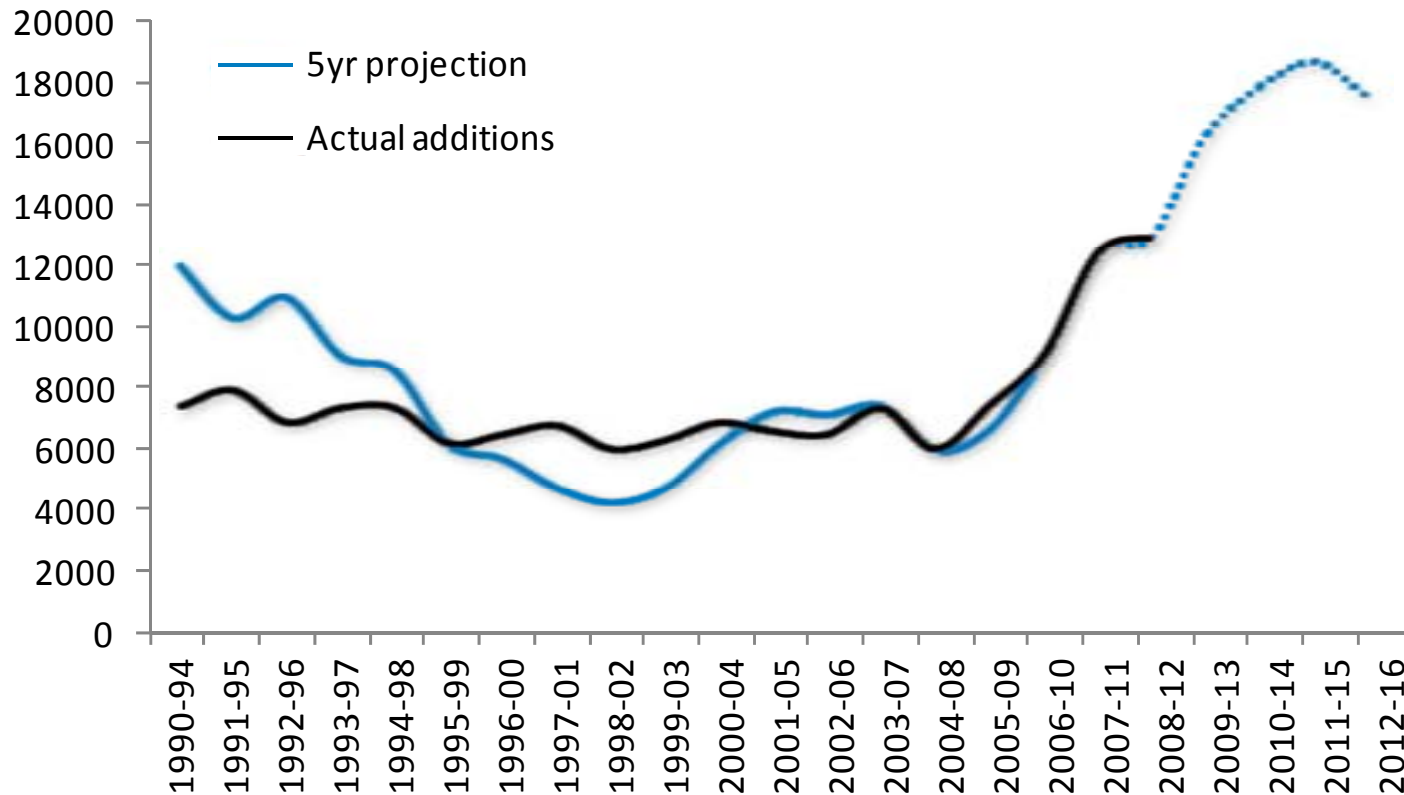
Incremental US chemical capex



Source: IHS, Credit Suisse. October 2013

Downstream: the coming boom in petrochemical, gas fired power, fertilizers, & LNG capex (cont'd)

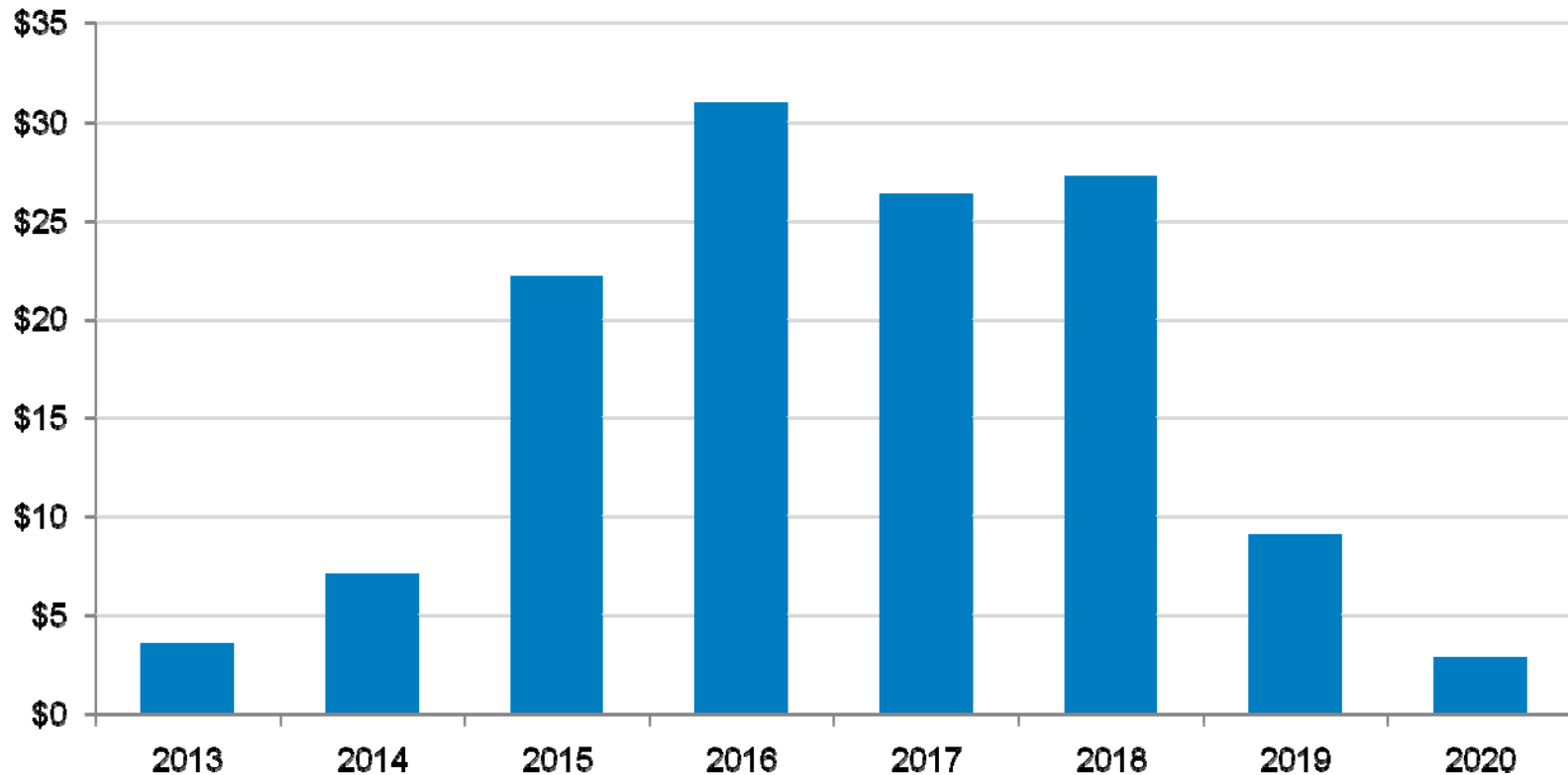
US power generation – Gas fired mix shift puts strain on T&D network, drives transmission investment growth



Source: Citigroup

Downstream: the coming boom in petrochemical, gas fired power, fertilizers, & LNG capex (cont'd)

The award of export licences should drive \$100 – \$150bn investment in LNG export projects this decade



Source: Deutsche Bank, August 2013

With opportunities greatest for EPCs, flow & automation companies

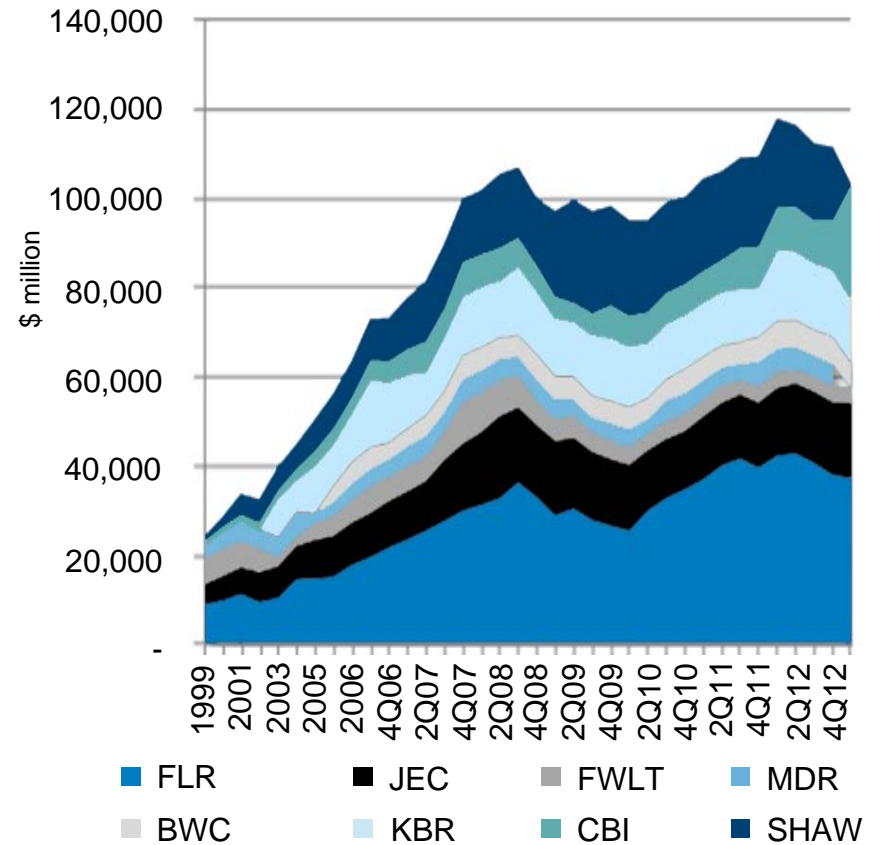
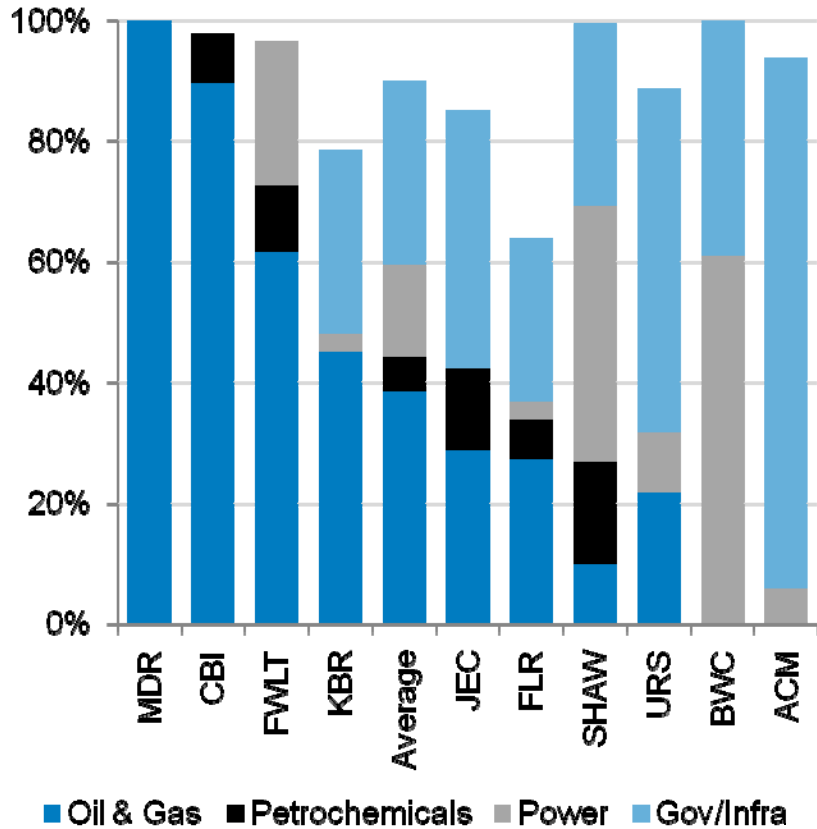
Total EPC* opportunity from various capex plans

Sector	Announced plan capex (US\$ billion)	Reasonable potential	Number of facilities
Olefins	10 – 15	10 +	13
Fertilisers	14.6	10 +	13
Gas-To-Liquid	10	5 +	1
LNG	26	10 +	2
New gas fired power	5	3.5 +	5
Emissions retrofit	15	10 +	–
Total	85 (approx)	48.5	

*EPC stands for Engineering, Procurement & Construction
Source: FIL Limited/Barclays

With opportunities greatest for EPCs, Flow & Automation companies (cont'd)

EPC suppliers – backlogs back to peak and growing

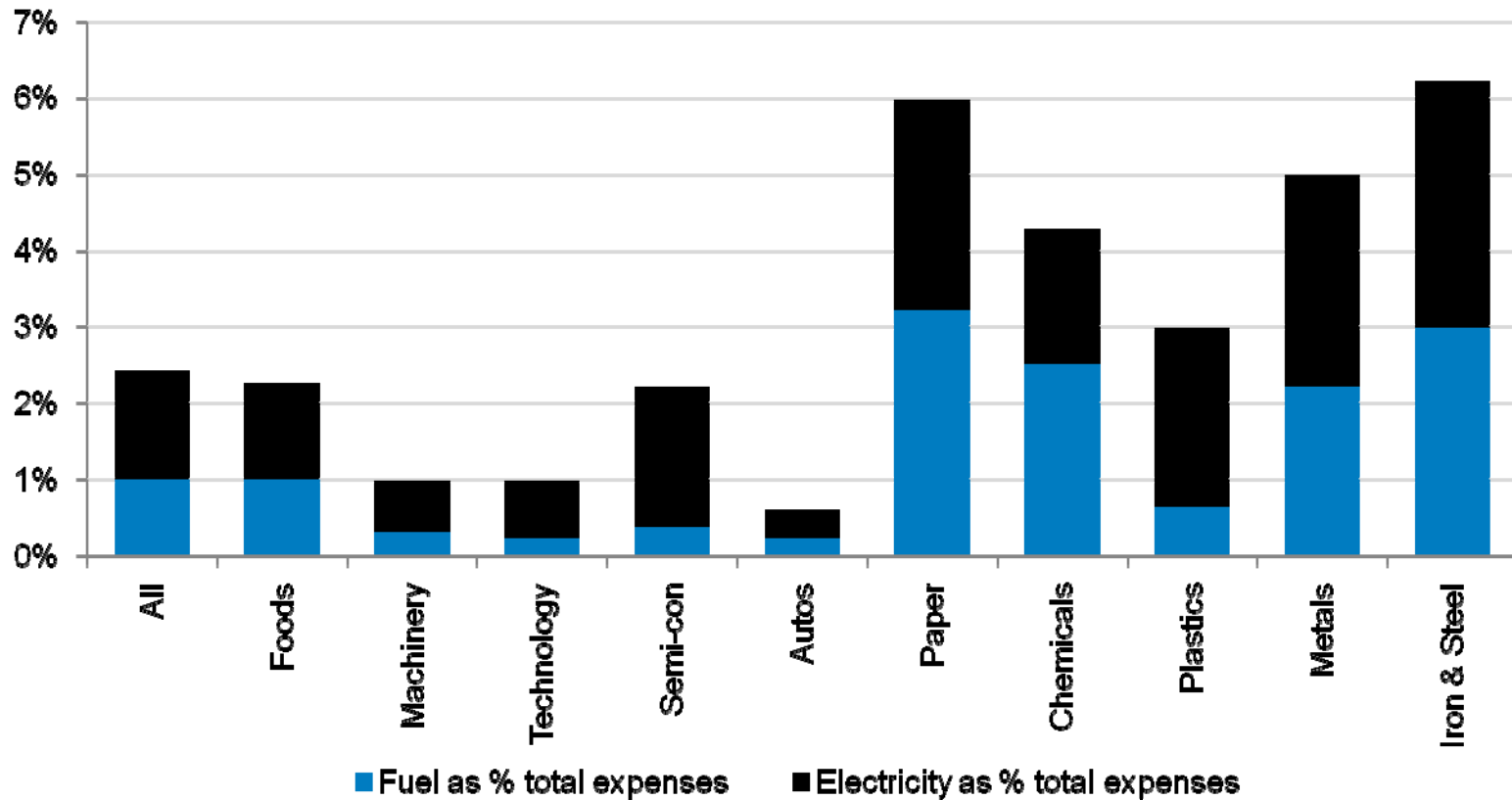


Source: Barclays, August 2013

Source: Company Data

Followed by the wider economic benefits of a US manufacturing renaissance

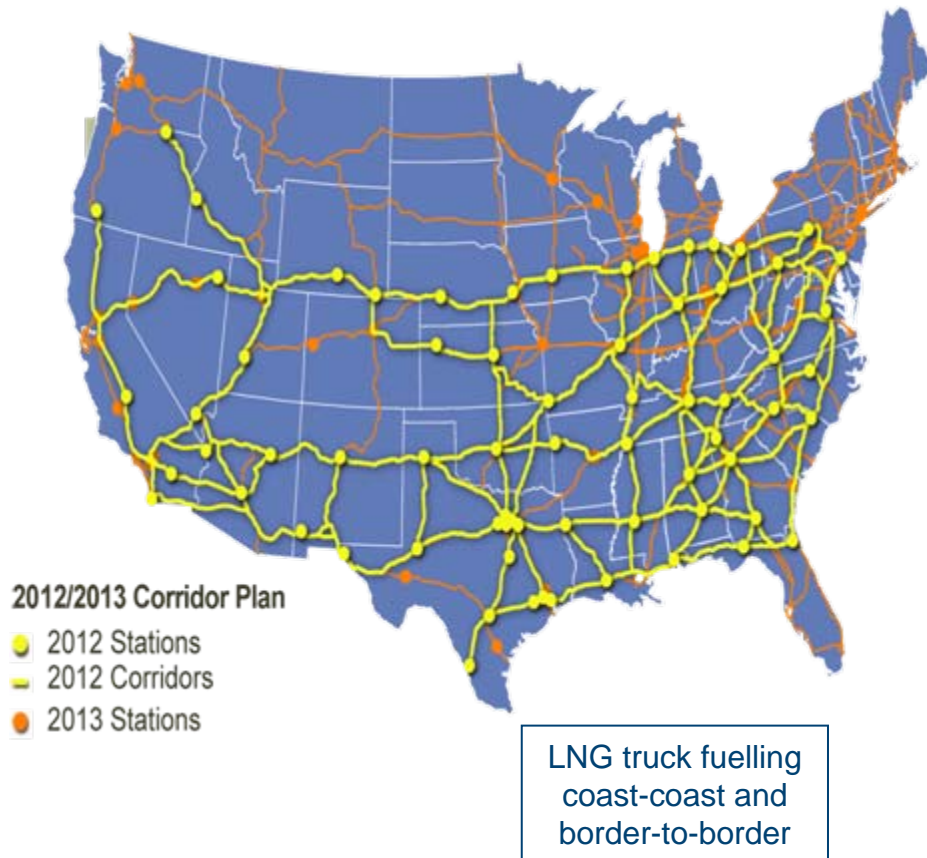
Cheap gas – helps steel, paper, chemicals & metals



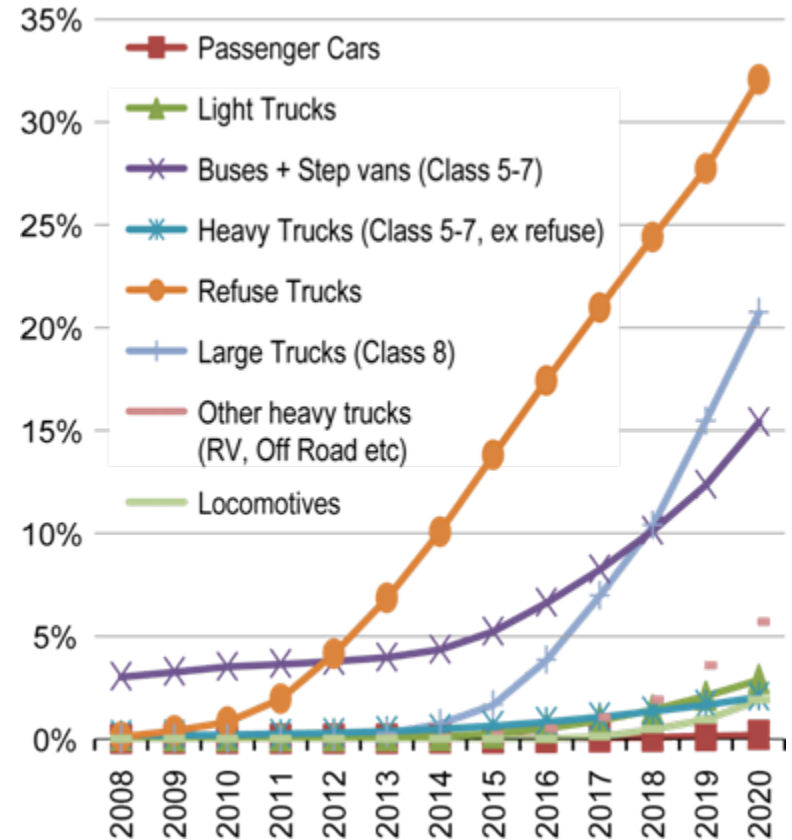
Source: Louisiana State University Center for Energy Studies, FIL Limited. 31 January 2013

Followed by the wider economic benefits of a US manufacturing renaissance (cont'd)

Gas as a transport fuel America's natural gas highway

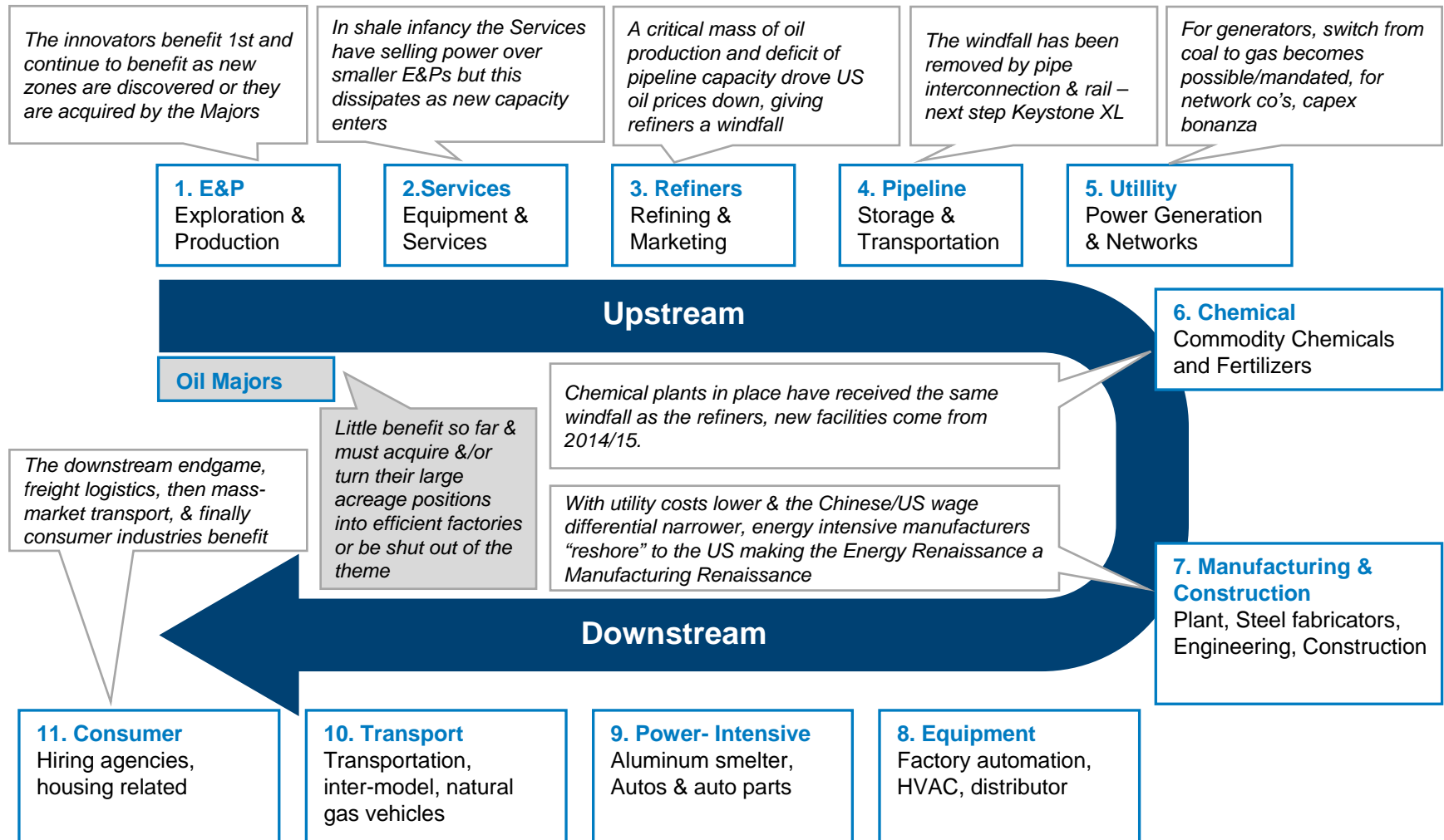


3.7 billion cubic feet per day needed by 2020 for US transport



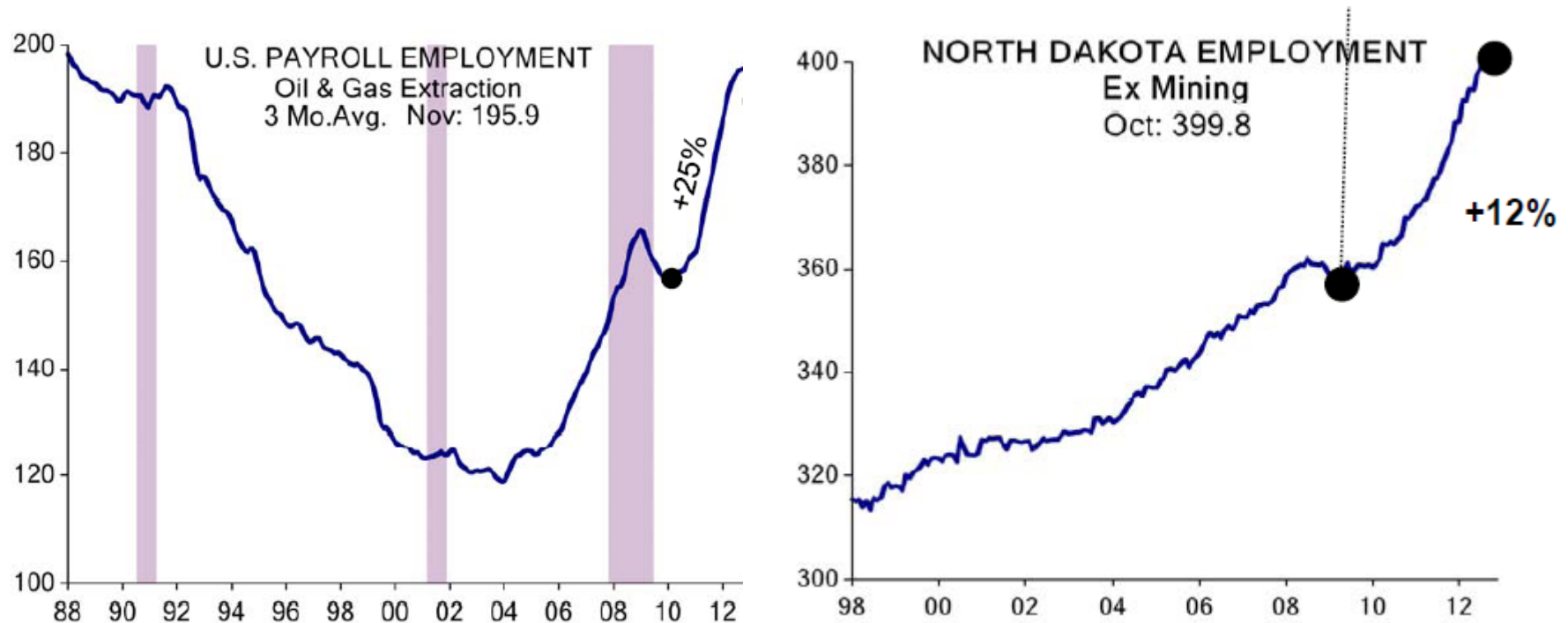
Source: Louisiana State University Center for Energy Studies, FIL Limited. 31 January 2013. Credit Suisse October 2013

The energy & industrial renaissance life-cycle



Followed by the wider economic benefits of a US manufacturing renaissance

Implications for employment & multiplier effects



Source: International Strategy & Investment, December 2012, Louisiana State University Center for Energy Studies, FIL Limited. 31 January 2013

Followed by the wider economic benefits of a US manufacturing renaissance (contd.)

Direct + Indirect + Induced impacts. Example: Louisiana

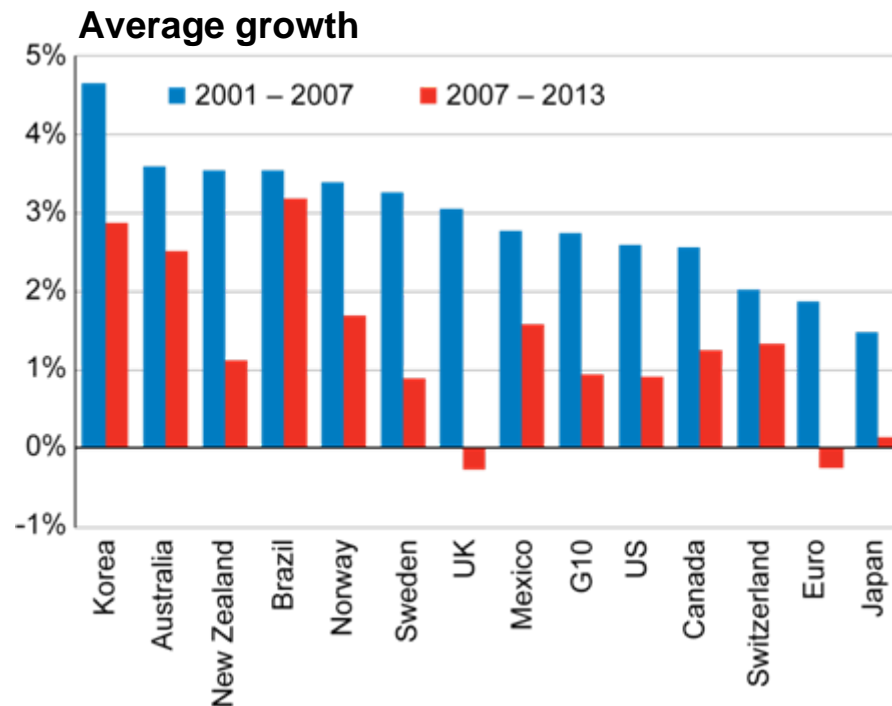
Ongoing impact from expanded production of petrochemicals & derivatives			
Impact type	Employment	Payroll (\$ million)	Output (\$ billion)
Direct	5490	730	10.9
Indirect	18092	1089	6.9
Induced	11893	436	1.3
Total	35475	2255	19.2

Economic impact from new investment in plant & equipment			
Impact type	Employment	Payroll (\$ million)	Output (\$ million)
Direct	9511	499	1240
Indirect	2070	111	1346
Induced	4014	147	448
Total	15595	758	2034

Source: International Strategy & Investment, December 2012, Louisiana State University Center for Energy Studies, FIL Limited. 31 January 2013

Manufacturing renaissance to be the key driver in re-raising US trend growth & providing competitive advantage following global financial crisis

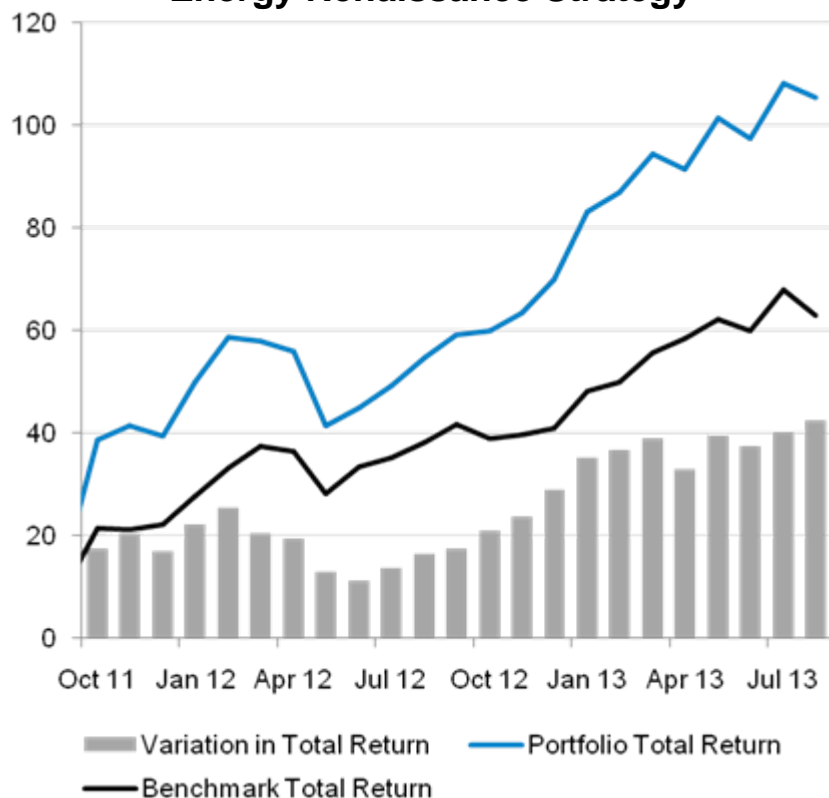
- History suggests lower trend growth rates persist for up to a decade or more following financial crises.
- Shale energy and its industrial implications are a positive economic shock for the US economy, causing capital to flood to its beneficiaries.



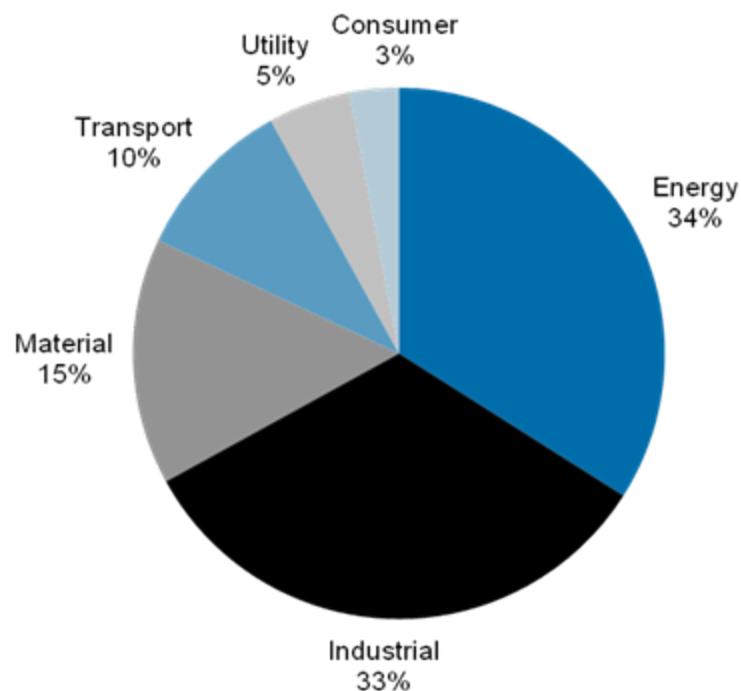
Source: Patelis Macro and FIL Limited as at 30 September 2013,

Investing in shale energy as a driver of manufacturing renaissance has a proven powerful investment strategy

Returns for back-tested Energy Renaissance Strategy



Portfolio construction



Source FactSet and FIL Limited

Oil Services: Efficiency & environmental advances: Schlumberger, Halliburton & Flotek

Schlumberger

- Its HiWAY flow-channel hydraulic fracturing significantly increases fracture conductivity while reducing water, ceramic proppant & sand consumption

HALLIBURTON

- Its CleanStim® fracturing service uses a new fracturing fluid formulation made with ingredients sourced from the food industry



- Provides citrus chemistry in both fracturing fluid formulations & for well-bore cleanout operations. It recently entered a JV to build an R&D lab in Oman to extend this technology to the Middle East

Source: FIL Limited as at September 2013, company websites

Liquefied Natural Gas exports: Cheniere Energy & Shell Canada

CHENIERE Cheniere Energy

- Won federal approval to build the largest US natural-gas export terminal as drillers who extract the fuel from shale formations struggle to find domestic buyers to absorb a glut
- As surging shale-gas drilling pushed US production to record level, LNG importers have switched course and sought permission to export fuel to booming energy markets in Asia



Shell Canada

- Has purchased land at Kitimat and selected TransCanada to build a pipeline across British Columbia to deliver gas to its proposed Kitimat plant
- Its LNG proposal for Kitimat (~US\$12 billion) makes it one of the largest, if not the largest, investment ever in British Columbia.

Source: FIL Limited as at September 2013, company websites

Next generation fuel and energy efficiency solutions: Cummins

Truck engines

- Developed natural gas engines ranging from 5.9 to 12L, enabling trucking companies to take advantage of record spread between shale gas & gasoline/diesel
- Received EPA certification for a 12L engine, meeting new greenhouse gas and fuel efficiency rules taking effect in 2014. The engine launched in August 2013. Cummins projects that by 2020, nearly 30% of its high horsepower engine production will be natural gas



Specialist high horsepower engines for industrial use

- Differentiated offering through dual fuel engines capable of running on either diesel or natural gas ranging from 800hp to 3500hp (597-2610 kW). These include engines for oil & gas well servicing applications launched in mid-2013 which recycle shale gas produced to power further shale energy production

Electricity generators

- Natural gas/propane electricity generators (7 to 150kW), & lean-burn gas generators (315kW to 2MW)

Source: FIL Limited as at September 2013, company websites

US shale as a driver of growth abroad: Mexico

Mexichem - Occidental

- JV with Occidental to build a 500mtpa ethylene cracker that will make it self-sufficient for production of PVC resin used for building materials
- Has 45% of the Latin American PVC market which is set for strong growth this decade from the 100m Latin American housing unit shortage
- As ethylene is 60% of the cost of PVC, tapping into US shale will make it the lowest cost producer globally

Mexichem.



Pemex - Schlumberger / Petrofac

- In partnership with US oil companies to step up efforts to extend the Eagle Ford shale south into Mexico, potentially extending the coming manufacturing renaissance across the border
- It is outsourcing management of mature conventional fields to Schlumberger/Petrofac, and sponsoring new energy law aimed at encouraging foreign investment to unlock Mexico's shale potential



PEMEX®

Schlumberger

Petrofac The Petrofac logo, which is a yellow drop shape containing a white letter "P".

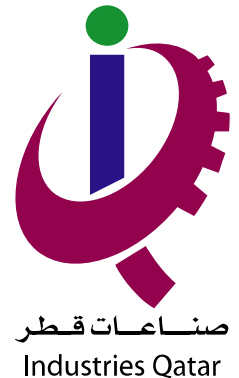
Source: FIL Limited as at September 2013, company websites

A glimpse in the future

A fully integrated model afforded by cheap feedstock

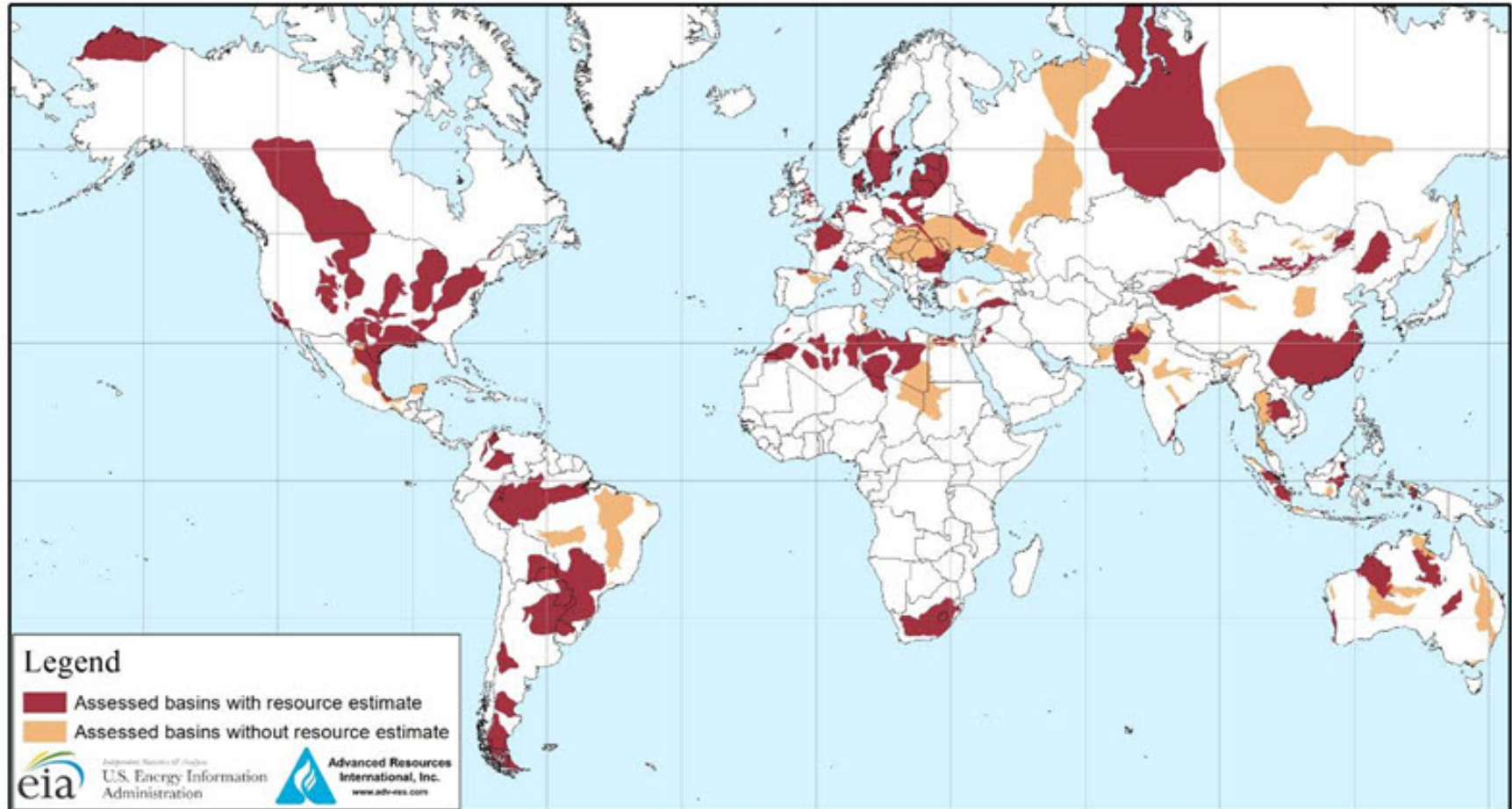
Industries Qatar

- Industries Qatar (\$22.5bn), a listed subsidiary of Qatar Petroleum is a one-company microcosm of the potential afforded by shale gas to related industries.
- It produces urea fertilizer (45% of sales), petrochemicals (35%) & steel (20%) on one single site using \$1-2/mcf gas feedstock for urea & petrochemicals and gas-powered electricity for steel.
- Coming to the end of a capex buildout afforded by its cheap gas feedstock, it now generates a 12% FCF yield, distributes a 5% dividend and it is looking at options to develop further gas-related competencies.
- This level of integration may develop in US shale areas over the next 5 years.



Source: FIL Limited as at September 2013, company websites

Proliferation of global shale opportunities



Source: US EIA. May 2013. US basins from US Energy Information Administration and US Geological Survey; other basins from ARI based on data from various published studies.

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