Thoughts on U.S. Unconventional Oil Production and Investment Following the Paris Agreement

February 16, 2017
KAPSARC/IEF – Riyadh, Saudi Arabia

Trisha Curtis – Co-Founder, PetroNerds, LLC
trisha@petronerds.com

Comments by BP and Shell

Bloomberg Markets Tech Pursuits Politics Opinion Businessweek

Energy Giant Shell Says Oil Demand Could Peak in Just Five Years

by Rakteem Katakey
November 2, 2016, 7:02 AM MDT *Updated on* November 2, 2016, 6:01 PM MDT

- → Shell focusing on long term with renewables and gas, CFO says
- → Demand to top out in 5-15 years, before supply peaks

AUGMENTED REAL

BP Sees a Future of Slowing Oil Demand Growth, Abundant Supplies

by Rakteem Katakey
January 25, 2017, 7:30 AM MST *Updated on* January 25, 2017, 5:01 PM MST

- → Low-cost Middle East, Russia, U.S. crude to grow market share
- → World has enough oil reserves to meet demand beyond 2050

...have moved the needle on peak oil demand discussions, but are not necessarily accurate and may be harmful to the market causing volatility in future investments

World Business | 61

Davos 2008

Demand for oil and gas will outstrip supply within 7 years, says Shell chief

Carl Mortished
World Business Editor

World demand for oil and gas will outstrip supply within seven years, according to Royal Dutch Shell.

The oil multinational is predicting that conventional supplies will not keep pace with soaring population growth and the rapid pace of economic development.

Jeroen van der Veer, Shell's chief executive, said in an e-mail to the company's staff this week that output of conventional oil and gas was close to peaking. He wrote: "Shell estimates that after 2015 supplies of easy-to-access oil and gas will no longer keep up with demand."

The boss of the world's second-largest oil company forecast that, regardless of government policy initiatives and investment in renewables, the world would need more nuclear power and unconventional fossil fuels, such as oil sands.

"Using more energy inevitably means emitting more CO_2 at a time when climate change has become a critical global issue," he wrote.

prints", envisages a world of political co-operation between governments on efficiency standards and taxes, a convergence of policies on emissions trading and local initiatives to improve environmental performance of buildings.

Shell has not committed to either scenario. The oil company regularly uses scenario-planning to test the likely impact of widely divergent economic and political scenarios on its long-term strategy.

Unsurprisingly, Mr van der Veer indicated that Shell preferred the Blueprints scenario but he expressed caution over the likelihood of it coming to pass without a global approach to emissions trading.

The Blueprints scenario assumes that 90 per cent of CO_2 is captured by coal and gas power plants in developed countries by 2050, and at least half of the CO_2 emitted by power stations in the developing world. No such plants are in operation today, noted the Shell chief. "It will be hard work and there is little time," he said.

Mr van der Veer's comments emerged in the same week that the

Source: http://royaldutchshellplc.com/2016/11/03/no-credibility-in-shell-peak-oil-forecasts-says-john-donovan/
Bloomberg.com

Market Views and Observations

Among global oil companies, there is now a divergence in views and commentary regarding future oil demand and the prospect of imminent peak oil

- ✓ Stranded assets concerns often raised

Whilst in the US – capital continues to flow amidst a flurry of acquisitions

- ✓ Right or wrong, there is no talk of stranded assets
- ✓ The industry is also more nimble and built on shorter cycles

But if companies promoting the idea imminent peak-oil demand are correct…

- ✓ Do capital intensive mega/offshore projects with long-lead times make sense in a world of halting/slowing demand growth? Particularly when more nimble, responsive supplies are available adjust?

Unconventional oil reservoirs vs. unconventional oil completion methods

- ✓ Permian Basin – teaching us that 100 year old conventional oil plays can be rejuvenated through the application of unconventional methods and knowledge of the reservoirs
- ✓ Shale business model could inspire renewed or alternative development in *existing* oil regions – its flexibility might make more sense in a world of slowing growth

Schlumberger’s Thoughts – Resilient Without Free Cash Flow

As the up-cycle begins, growth in E&P investments will be led by the North America land operators who appear to remain unconstrained by years of negative free cash flow as external funding seems more readily available and the pursuit of shorter-term equity value takes precedence over a full cycle return. E&P spending surveys currently indicate that 2017 North America E&P investments will increase by around 30% led by the Permian basin, which should lead to both higher activity and a long overdue recovery in service industry pricing.

Schlumberger Q4 2016 Conference Call, Jan 20, 2017, Seeking Alpha

Global E&P Investment is a Concern for Medium and Longer Term Oil Production Levels

In the international markets, the recovery will start slower driven by the constraints of the international E&P industry where the various operator groups determine their investment levels based on full cycle returns and their available free cash flow.

At current oil price levels this will result in the third successive year of lower Capex spend, which will further weaken the state of the international production base. Over the past two years there has been very few [FID] approvals of new sizeable oil development and outside of the Gulf countries most of the international production is today depleting producible reserves with little or no reserves replacement.

This is equivalent to borrowing barrels from the future. As a result, the activity and Capex required going forward to replenish reserves in order to uphold production for the medium to long term will be much higher than the current decline rates may suggest. This concerning trend cannot be reversed or mitigated by North America unconventional resources alone, which currently represents only around 5% of global crude production.
The future supply challenges of the industry can only be addressed by a broad increase in global investment.

Schlumberger Q4 2016 Conference Call, Jan 20, 2017, Seeking Alpha

US oil rig count is up, shalers are increasing expenditures, but Exxon, Shell, Chevron, BP, ENI, and Total combined CAPEX down 7% (2017 vs. 2016) and total over $100 billion

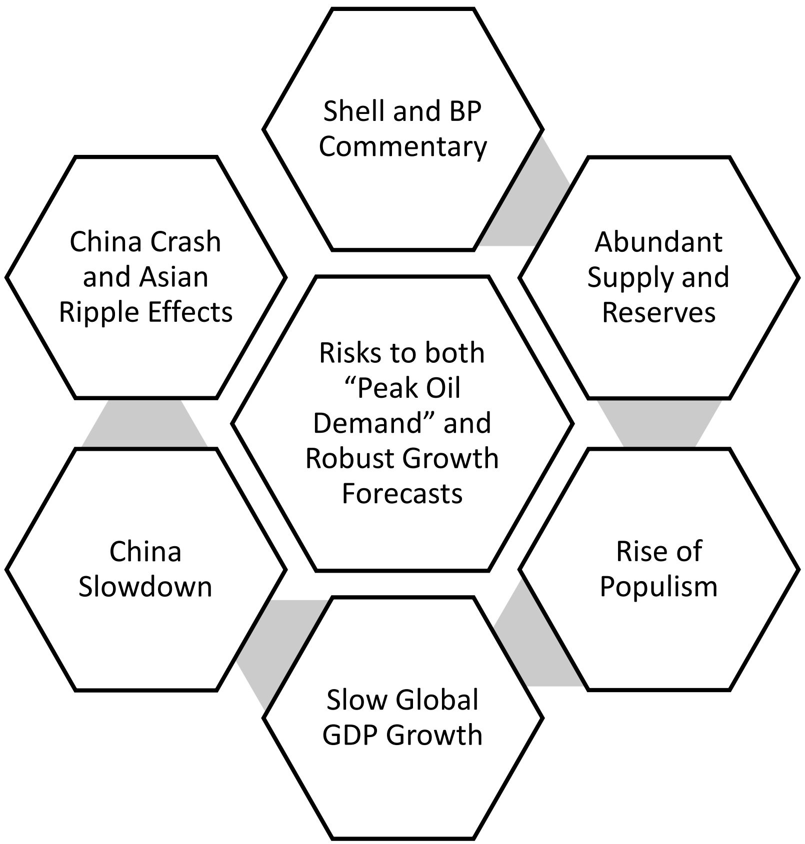
Source: WSJ, "President Trump Gives Final Approval For Dakota Pipeline," NEANDA SALVATERRA, Feb 8, 2017

Divestments in Oil and Gas Hit US Dakota Access Pipeline

Estimates in divestment figures range between $3 and $7 trillion

US Universities, Rockefeller Family Fund, Norway, Ireland, California, DC

Forecasting Risk Goes in Both Directions



Commentary by majors could cause instability in the global E&P investment space, thus impacting supply levels in the medium and longer term, potentially causing price disruptions

Abundant supply and lower oil prices mean reduced incentives for alternatives.

But at the same time, renewable penetration in solar and wind has exceeded expectations

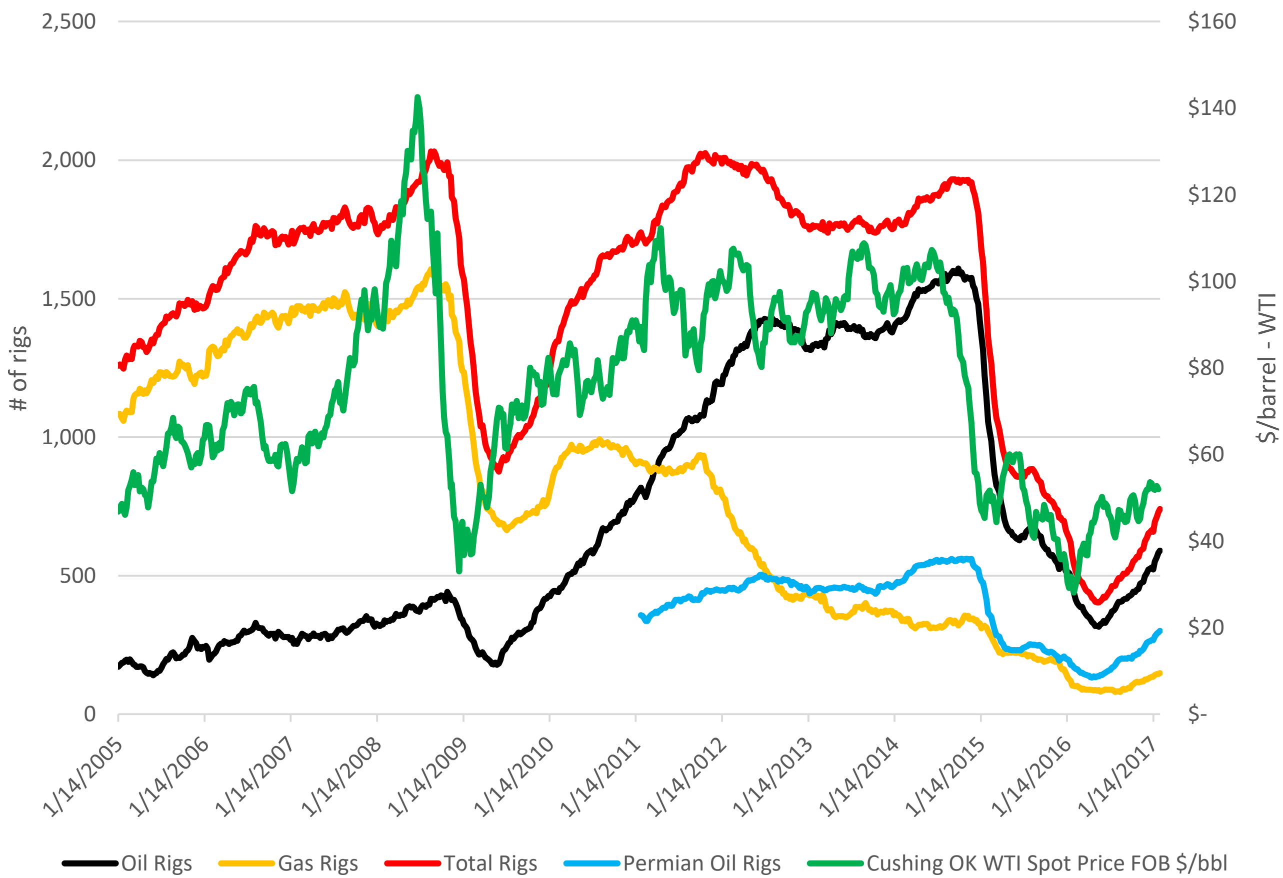
The rise of populism and potential protectionist measures around the globe could put the "Paris Agreement" at risk

Slow global GDP growth is impacting global oil demand in the short-term, but should this change there could be problems with supply responding to rising demand

Chinese slowdown means reduced oil demand, but also reduced incentives to move to alternatives

Chinese slowdown could end up looking more like a crash as China restricts capital outflows, utilizes foreign currency reserves (at lowest level in 5 years), and business flounders – This could have significant ripple effects on surrounding Asian economies and oil demand

US Oil Rig Count Rises – Primarily Driven by the Permian Basin



April 29, 2016 – 132 - Permian Basin rig count bottom

Feb 10, 2017 – 310 - current Permian Basin rig count

May 27, 2016 – 316 – oil rig count bottom

Feb 10, 2017 – 591 – current oil rig count

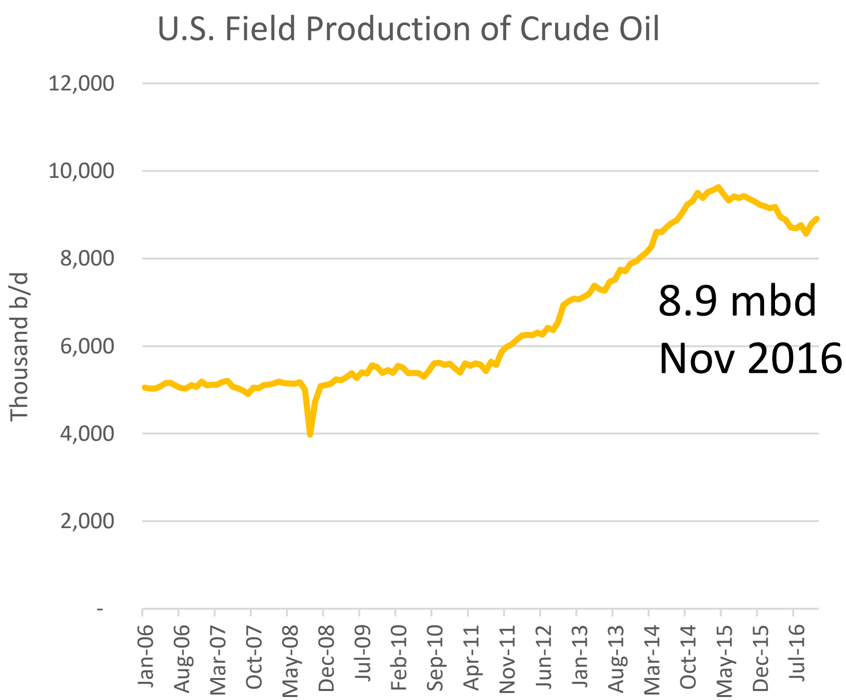
Feb 12, 2016 - $28/barrel WTI bottom

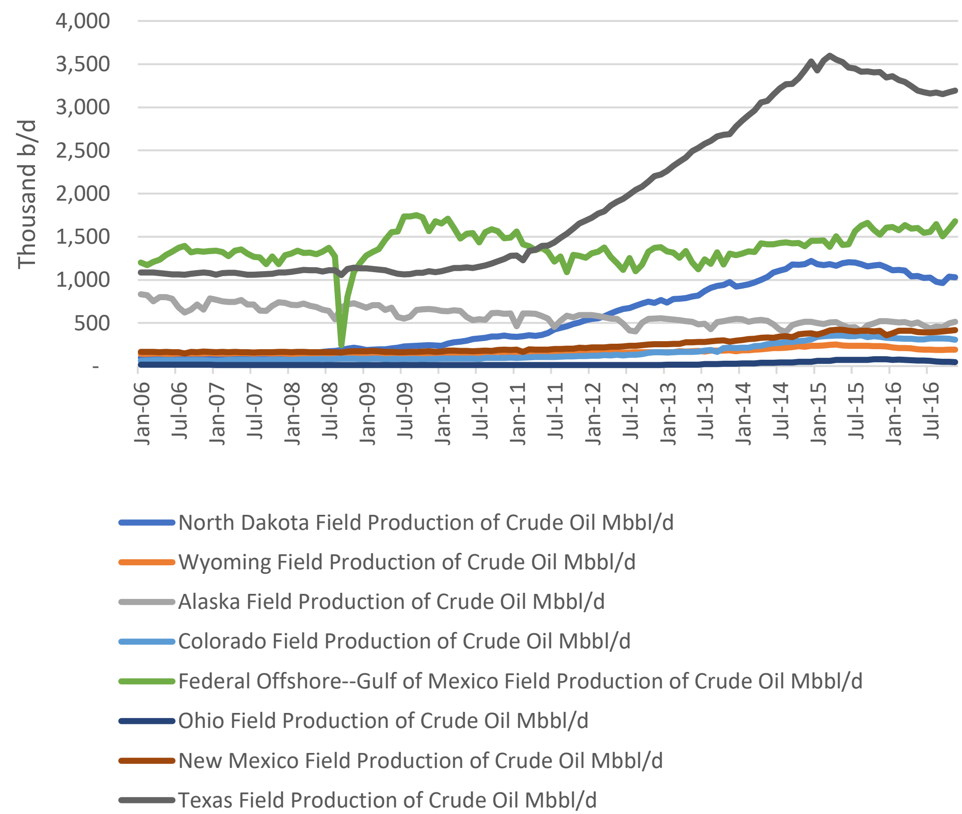
Feb 10, 2017 - $53/barrel WTI

Source: Baker Hughes, EIA

US Crude Oil Production Edges Upward

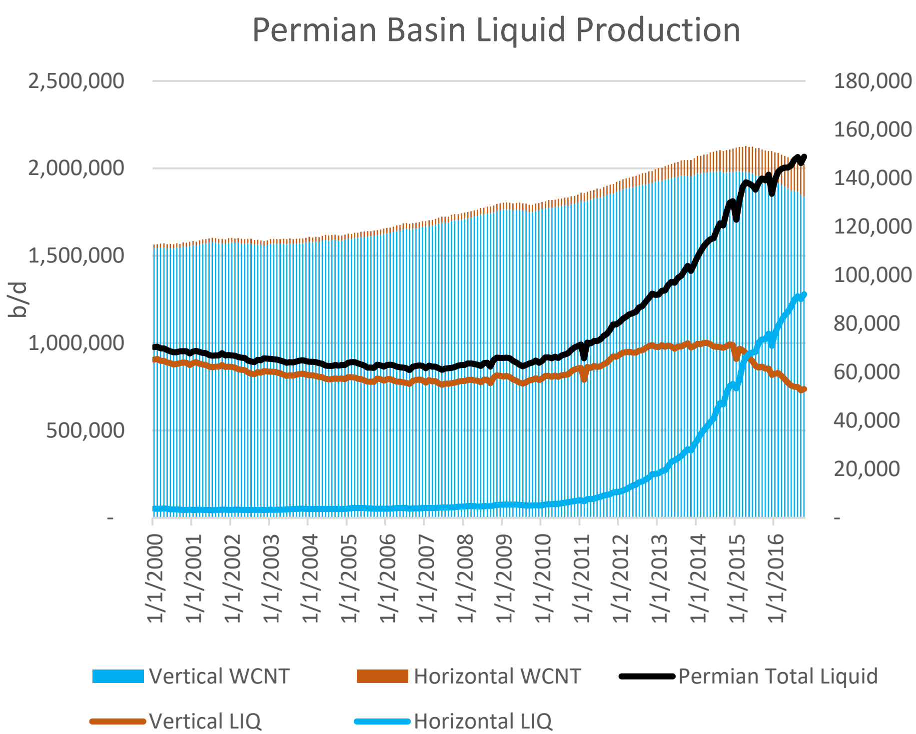
US production growth driven by Alaska and GOM, flattening declines in shale

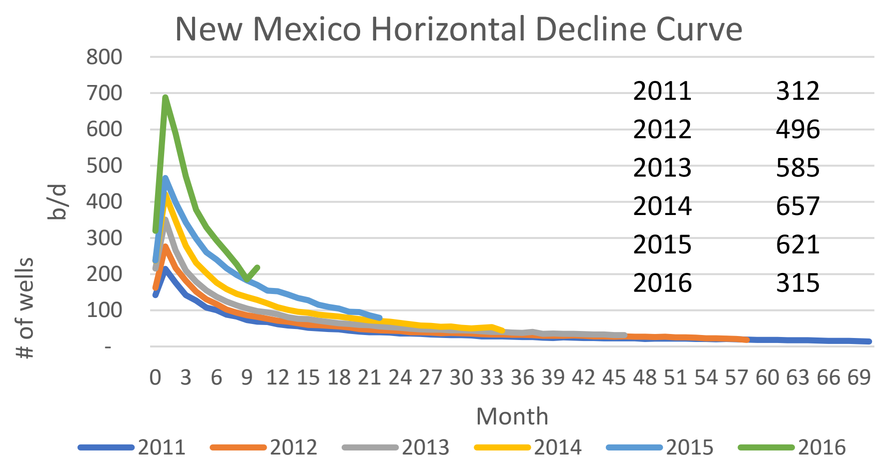


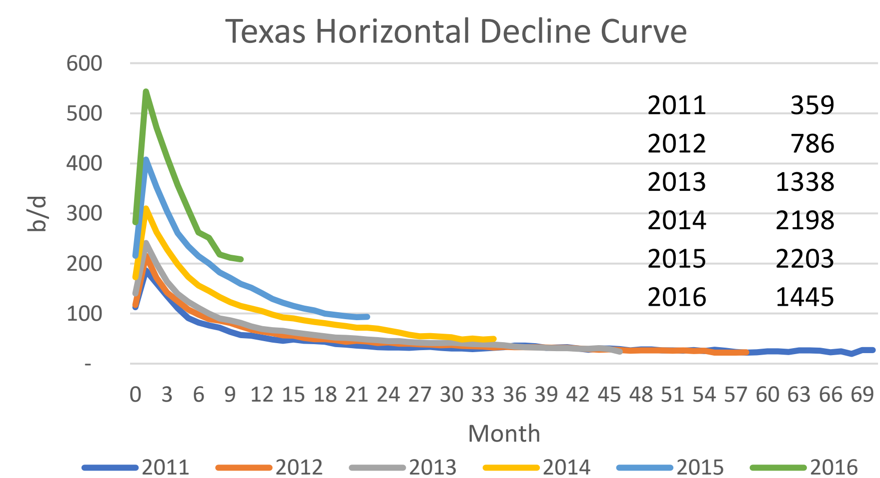


Source: EIA

Permian Basin Production and Well Performance





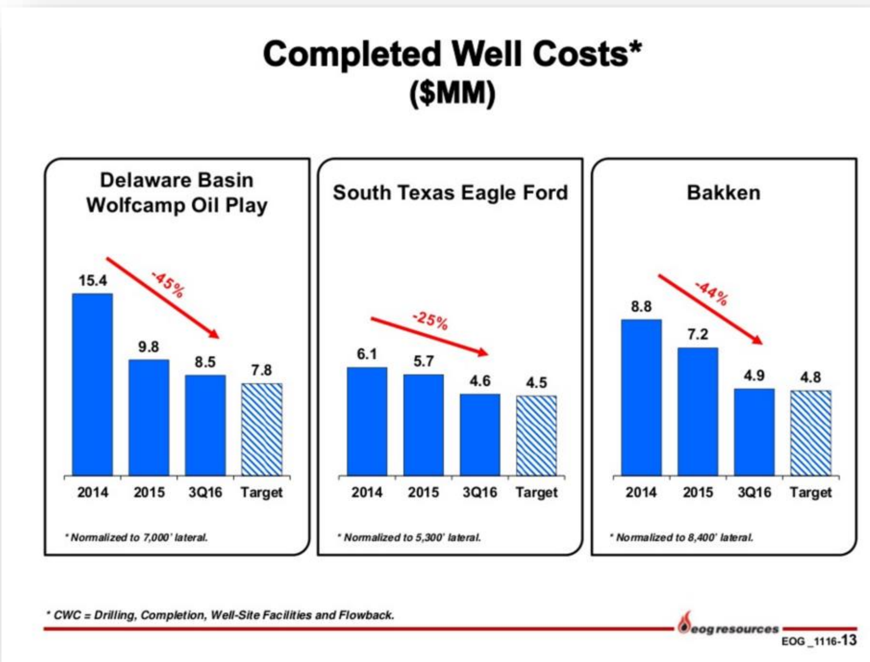


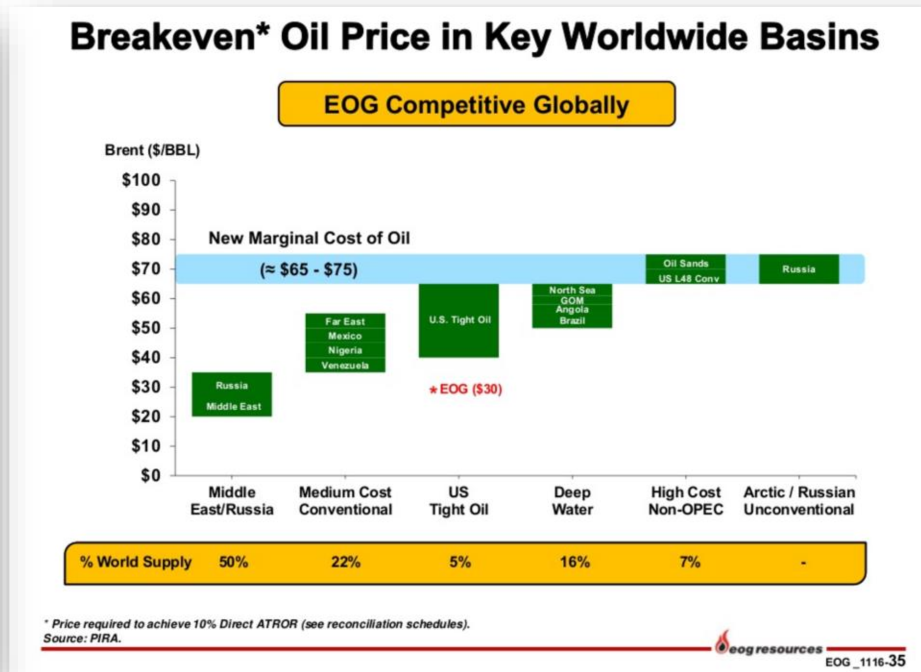
New Mexico - predominately Bone Spring, Delaware, and some Wolfcamp reservoirs vs. Texas which is predominately Trend Area and Wolfcamp and some Bone Spring reservoirs

Source: PetroNerds, Raw data DrillingInfo

Shorter Cycle, Lower Costs, and Rising Productivity

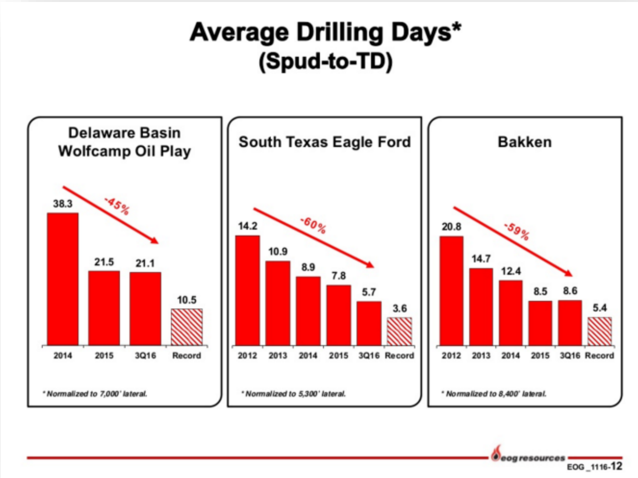
One of the top shale/tight oil producers in the world is actively working to drive costs to $30 a barrel and has committed to 30% rate of returns at $40.

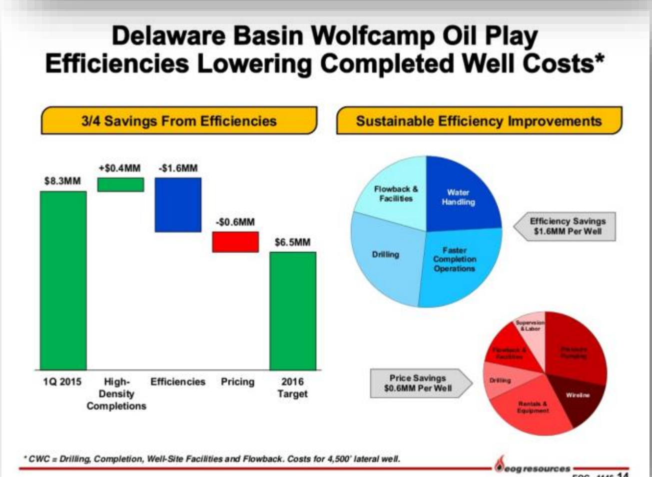




Source: PetroNerds, Raw Data DrillingInfo

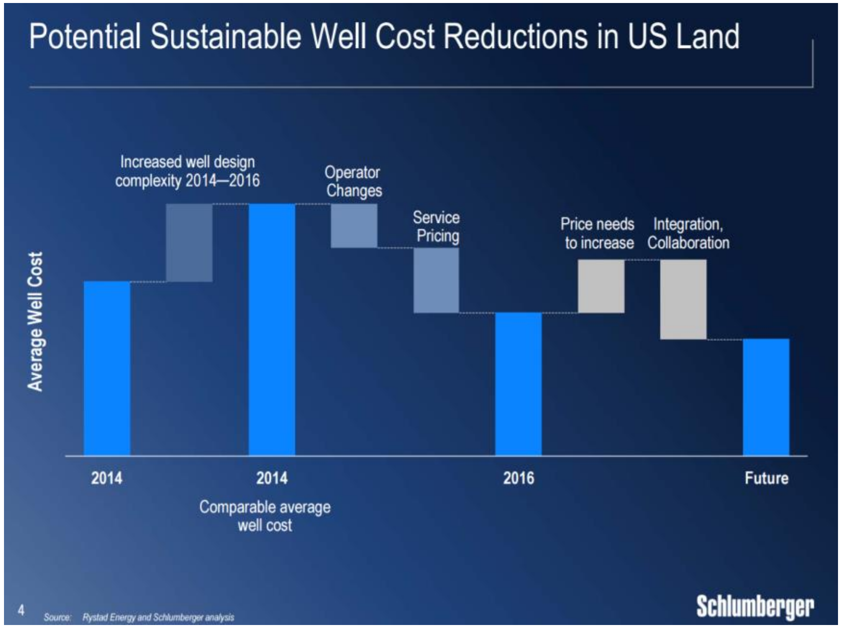
Cost Reductions and Efficiency Gains





Source: EOG, Q3 Presentation, Nov 4, 2016

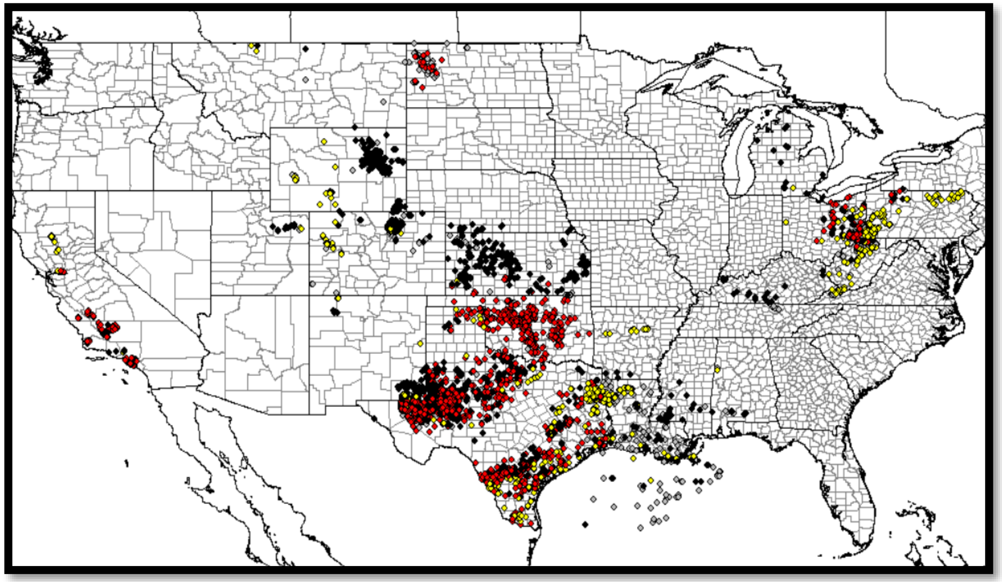
Yes, some of these cost cuts are temporary, but productivity improvements should not be underestimated (increasing output and lowering long-term costs)



Source: Schlumberger Presentation – Simmons 2016 European Energy Conference, Aug 2016

Extras

Recent US Permit and Completion Activity Robust Despite Sub $55 WTI



Operator	Permit Count
ANADARKO E&P ONSHORE LLC	349
CHEVRON U.S.A. INC.	250
EOG RESOURCES, INC.	171
EOG RESOURCES INC	149
WAVE PETROLEUM OPERATING LLC	147
ANSCHUTZ OIL COMPANY LLC	137
TEP ROCKY MOUNTAIN LLC	131
XTO ENERGY INC.	124
HILCORP ENERGY COMPANY	122
PEAK POWDER RIVER RESOURCES LLC	117
CHESAPEAKE OPERATING, L.L.C.	113

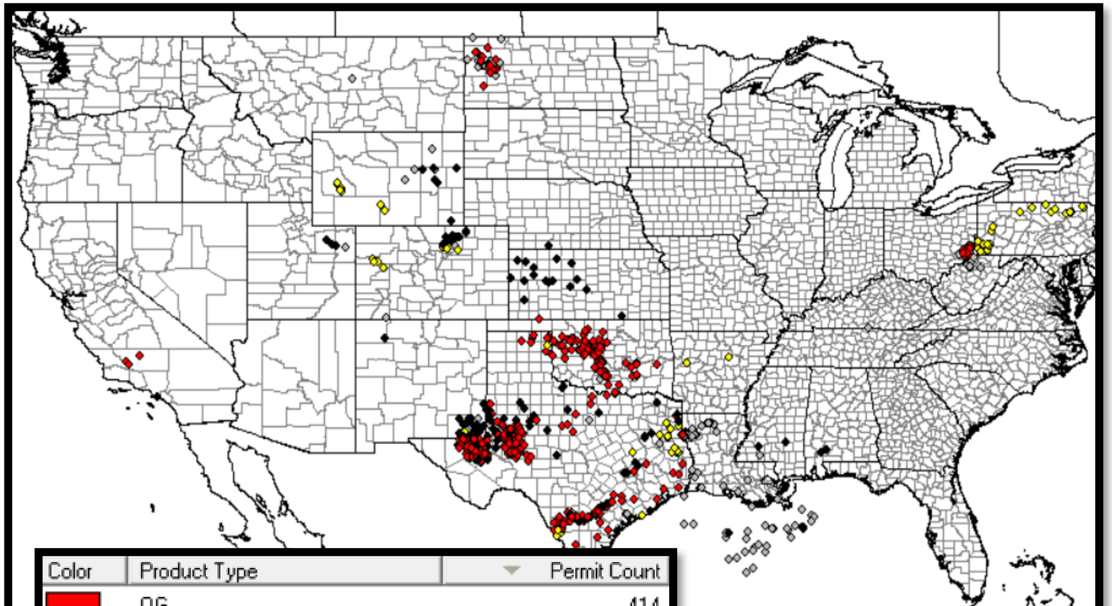
Status	Permit Count
PERM	6219
ATD	1523
PENDING	525
DRL	432
COMPLETED	119
DRL-CENTRD	46
OLD	1

Permits
Filed in Past
90 Days

Reservoir	Permit Count
(N/A)	885
UNKNOWN	775
TREND AREA	751
NIOBRARA	725
WOLFCAMP	541
EAGLEFORD	233
CODELL SAND	201
EAGLE FORD-2	171
WILLIAMS FORK	170
EAGLE FORD-1	166
MARCELLUS	152

Source: PetroNerds, Raw data DrillingInfo, Feb 10, 2017

US Rig Count Heavily Concentrated in Permian Basin Reservoirs



Color	Product Type	Permit Count
	OG	414
	OIL	169
	GAS	77
	(N/A)	55
	PMT DETAILS PENDING	54
	CONFIDENTIAL	25
	INJ	7
	DSP	5
	DH	1
	STR	1

Operator	Permit Count
COG OPERATING LLC	17
CONTINENTAL RESOURCES INC	17
PIONEER NATURAL RES. USA, INC.	17
APACHE CORPORATION	15
EOG RESOURCES, INC.	14
XTO ENERGY INC.	14
ANADARKO E&P ONSHORE LLC	11
BP AMERICA PRODUCTION COMPANY	11
PARSLEY ENERGY OPERATIONS, LLC	11
CHESAPEAKE OPERATING, L.L.C.	9
NEWFIELD EXPL MIDCONTINENT INC	9

Reservoir	Permit Count
TREND AREA	110
(N/A)	97
WOLFCAMP	88
WOODFORD	32
UNKNOWN	27
MISSISSIPPIAN	24
HUNTON	21
EAGLEFORD	20
BONE SPRING	19
EAGLE FORD-1	16
NIOBRARA	14

Source: PetroNerds, Raw data DrillingInfo, Feb 10, 2017