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It's a Good Time to be a Fracker

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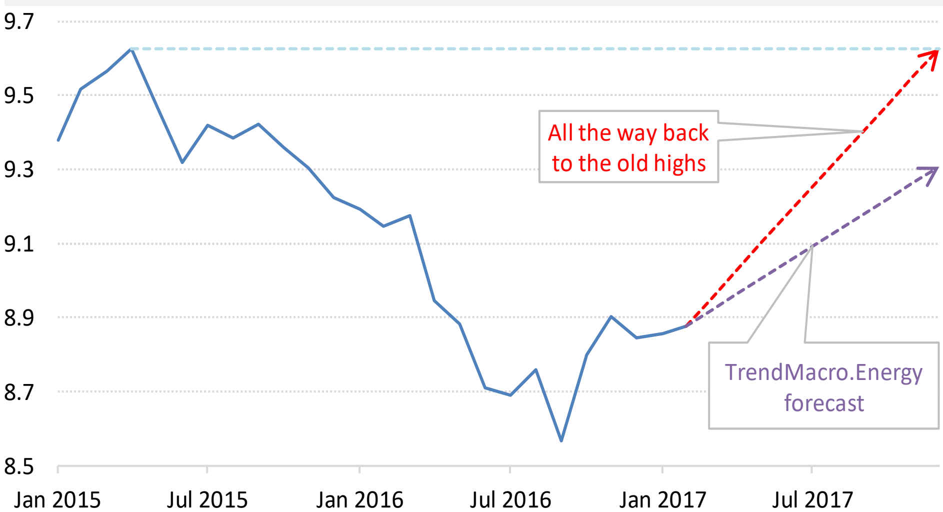
Costs and regulations coming down, production going up – and oil is still headed for $65.

With the Trump administration's deregulatory drive lowering costs at the same time as OPEC's production cuts are supporting prices, it's a good time to be a US fracker (see "2017: Making American Crude Again" December 29, 2016). We disagree with the breathless predictions we hear almost daily, inspired by only modest turnarounds in rig-counts and net production, that US crude output will return as soon as year-end to the highs of mid-2015, running so far ahead of demand as to cause prices to crash again.

- *What these predictions don't understand is that US production has only recovered as much as it has because oil prices have recovered as much as they have. If you want even higher production, it's going to take even higher prices.*
- At some point there will be an equilibrium of price and production, and we continue to believe that for the present that is about $65.
- We think that equilibrium will be associated with an increase in US production of about 430,000 barrels per day, year-end versus year-

US crude oil production with $60-plus price Millions barrels per day



Source: DOE, TrendMacro.Energy calculations

Update to strategic view

OIL, US RESOURCE STOCKS: US crude production will increase by 430,000 barrels per day in 2017, year over year. This is a consistent equilibrium with our price target of $65, which some analysts wrongly believe will bring forth twice that production increase. Calls for oil to crash in the face of a new US glut are groundless. Almost all the rig gains implying production growth are in the Permian – some other plays are below subsistence. The touted efficiency gains per rig are real, but vastly exaggerated because statistics wrongly include fracklog drawdowns. The fracklog has already been reduced in 2016, so it isn't a significant source of immediate supply anymore. New pipelines arriving this year are welcome, but they don't go to the destinations that would fire up new demand for Bakken production. And as shale grows in the US production mix, depletion becomes a bigger hurdle. We think OPEC will extend its cuts for six months when it meets in May, even if that means losing market-share to the US.

end. Our estimate is considerably lower than that of some analysts, who think a $65 price would bring forth production gains of from 500,000 to 1 million barrels (please see the chart on the previous page).

- We haven't by any means given up on our techno-futurist vision of a new epoch of infinitely abundant and historically cheap oil (see "I Have Seen the Future, and It Fracks" February 24, 2015). But not this year. For 2017 430,000 barrels per day is the maximum feasible production gain.

Much has been made of the increase of 117 rigs by US operators since OPEC announced a production cut in late November (see "Trump and the Art of an OPEC Deal" November 28, 2016). *But for all that only the Permian Basin and Oklahoma's various plays have enough rigs in operation to raise production.* The Eagle Ford finally added enough rigs in February just to maintain production. The Bakken and Niobrara are short by fifteen and six rigs, respectively, to even stabilize production.

- To be sure, rig-efficiency has been rapidly improving, as we have highlighted many times (see "Just-In-Time Energy" April 27, 2015). So we don't need to get back to peak rig-count to get back to peak production. But even Moore's Law needs time to work its miracles.
- A case in point is our poster-child for the fracking revolution, EOG Resources (again, see "I Have Seen the Future, and It Fracks"). From 2015 to 2016, EOG's after-tax rate of return on new wells in the Eagle Ford has grown by 7%. Impressive in a difficult year for frackers, yet headline new production for the Eagle Ford was reported in the DOE's Drilling Productivity Report as growing by a breathtaking 31%.
- The DOE overstates seemingly soaring rig productivity gains, because its statistics falsely attribute production from completions of drilled-but-uncompleted wells (DUCs) to however many rigs happen to be operating at the same time. Recently DUCs held in inventory during the period of too-low prices are finally getting drawn down, and their production is being attributed to the small number of rigs operating.
- Hence the apparent mismatch for EOG. During the downturn of mid-2014 to early 2016, EOG famously held a large "fracklog" of DUCs, waiting for higher prices. With the price recovery already seen in 2016, it now says it's carrying only "a normal level of inventory." The production from that inventory drawdown – entirely from completions of DUCs, not drilling new wells, has been falsely attributed to the Eagle Ford's rigs.

Productivity aside, the sheer number of DUCs remaining at this point is exaggerated, with the DOE claiming 4,527 of them in the Permian, Eagle Ford, Bakken and Niobrara as of January. First, many wells in this seemingly capacious count are in fact mostly gas-producing, not oil producing. And we believe that these are mostly uneconomic wells that will *never* be completed in any event. We think a meaningful number is more like 1,500 oil-producing DUCs, of which only 850 could be considered "high-grade." While we still believe that the US is moving toward being the

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global swing producer of crude oil (see "The Shale Boom Shifts Into Higher Gear" June 1, 2015), it currently doesn't have the fracklog that would provide sufficient on-demand additional production to fully take on that role.

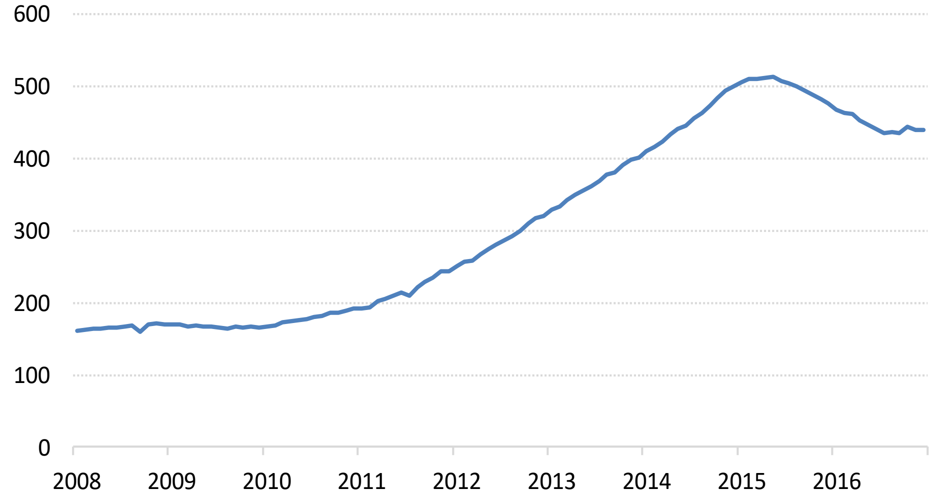
Also exaggerated is the immediacy of the benefits of the Trump administration's decision to green-light completion of the Dakota Access Pipeline. When operations begin in the second half of 2017, the pipeline can carry theoretically carry as much as 450,000 barrels per day of Bakken crude to the Gulf coast, but we expect initial flow volumes to be half of capacity. These volumes will need to be exported, because they can't compete on price with more nearby sources in Texas. It will take time to sniff out overseas buyers.

- The Dakota Access Pipeline – and, for that matter, the Keystone XL Pipeline as well – will do little to make Bakken crude more competitive for east coast domestic refiners. Those pipelines only take Bakken crude to the Gulf coast, where it has to be put on costly domestically-operated tankers, as mandated by the antiquated Jones Act. On net, that's not much of a savings over the prevailing rail alternative.
- Remember, the Bakken boom was accelerated in the early years of this decade by a very wide spread between WTI and Brent crude benchmarks, driven by the collapse of Libyan exports in 2011. With Brent made artificially expensive, Bakken producers had room to build in large rail-transport costs and still be competitive for east coast buyers. Until there is an east-west pipeline that replaces those rail routes, it will take another geopolitical shock to perturb price spreads sufficiently to make Bakken crude competitive again.
- With the east coast still barred by high costs, and given the uncertainty of when exactly the Dakota Access Pipeline will be completed, we are assuming a 2017 production increase in the Bakken of a little less than 100,000 barrels per day.
- Meanwhile, in the Permian Basin, we expect oil pipeline capacity to expand by another 170,000 barrels per day in the first quarter of 2017. Given the Permian's rapid rise in rig count – up 68 since the OPEC production cut – and its limited increase in pipe capacity this year, we see DUCs growing in West Texas, to build up a fracklog for next year's expected much greater transport expansion.

Finally, as US production recovers, it must first offset the lost production that occurs naturally every day as wells get older. We estimate that at year-end, total depletion-per-month in the US (lower 48 states, excluding Alaska and Gulf of Mexico offshore) was 439,000 barrels per day (please see the chart on the following page). This means that over two years we must replace 50% of total production with new production just to keep total production constant.

- This challenge becomes greater as fracking assumes a greater share of total US production, because light-tight and shale wells decline by 50% to 70% in their first year, while conventional only decline 6% to 8%.

Decline in existing crude production Thousands barrels per day



Source: TrendMacro.Energy calculations

The equilibrium we are describing – in which crude moves to $65, and US production increases by about 430,000 barrels per day – should lead to consistent draws against crude stockpiles. But especially given the strangely large builds we've seen so far this year, draws going forward will probably not be sufficient to fully meet OPEC's stated goal of "restoring a global oil demand and supply balance, in particular the drawdown in the stocks overhang."

- *Though OPEC will have lost market-share since the cuts went into effect, we expect that the cartel will renew its production cuts for an additional six months when it meets again in May.*
- The heedless pursuit of market-share that began when OPEC decided in November 2014 to stand aside while a global glut developed, barely even produced a Pyrrhic victory. US frackers were put under intense pressure, but the so were the entire economies and political structures of oil-producing states – who, all the while, were selling record volumes at distress-sale prices.
- Their present strategy seems more rational. The production cut of about 2% has enabled them to sell oil for about 15% more – virtually an arbitrage. And if it helps spiff up the upcoming Saudi Aramco initial public offering – now beset by rumors of a lower-than-expected valuation – so much the better. The pride of growing market-share is one thing, but apparently dollars and cents are another.

Bottom line

US crude production will increase by 430,000 barrels per day in 2017, year over year. This is a consistent equilibrium with our price target of $65, which some analysts wrongly believe will bring forth twice that production increase. Calls for oil to crash in the face of a new US glut are groundless. Almost all the rig gains implying production growth are in the Permian –

some other plays are below subsistence. The touted efficiency gains per rig are real, but vastly exaggerated because statistics wrongly include fracklog drawdowns. The fracklog has already been reduced in 2016, so it isn't a significant source of immediate supply anymore. New pipelines arriving this year are welcome, but they don't go to the destinations that would fire up new demand for Bakken production. And as shale grows in the US production mix, depletion becomes a bigger hurdle. We think OPEC will extend its cuts for six months when it meets in May, even if that means losing market-share to the US.