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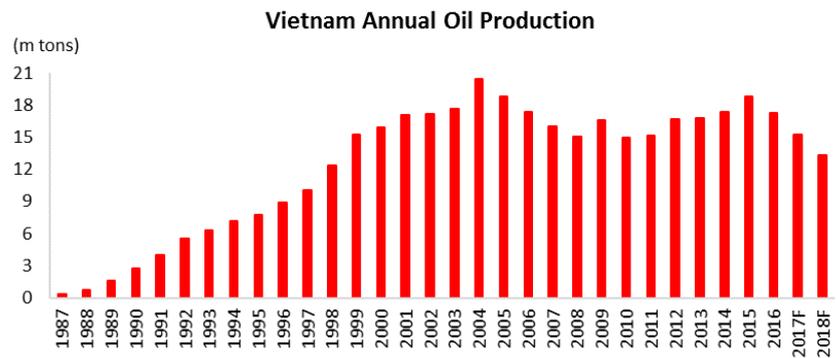
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### Higher Oil Prices are Positive for Vietnam

Vietnam's economy is on track to grow by 6.5-6.7% in 2017<sup>i</sup>, but GDP growth would be above 7%, were it not for an 11% decline in oil production this year; oil production contributes about 5% of the country's gross domestic product<sup>ii,iii</sup>.

The government forecasts a further 15% decline in oil production next year to 13.3m tons<sup>iv</sup>, but we believe Vietnam's oil production will beat expectations in 2018, because:

- 1) The average price of Brent Crude should increase from USD55/barrel in 2017 to USD63/barrel in 2018;
- 2) Vietnam's "all-in" oil production cost is ~USD50, but the direct "lifting cost" is below USD30/barrel;
- 3) The foreign exploration and production (E&P) firms in the JVs that produce most of Vietnam's oil are likely to acquiesce to higher production targets next year.

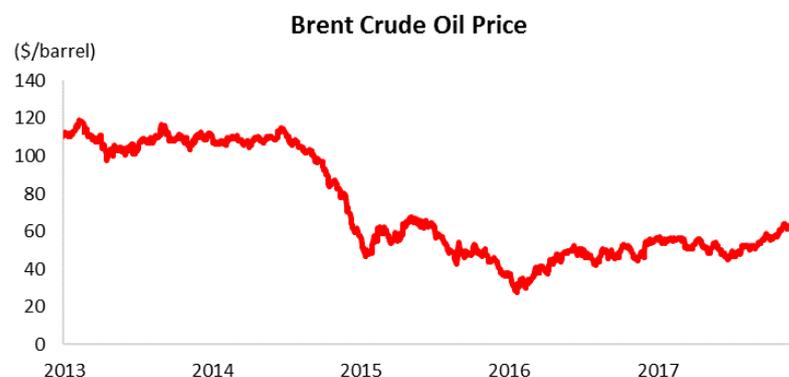


Source: PetroVietnam, National Assembly Budget Committee

Further to that last point, Vietnam's national oil company, PetroVietnam (PVN) only produces about one-quarter of the country's oil; the remainder is pumped from off-shore wells that were developed by various JVs between PVN and foreign E&P firms such as Petronas, Mitsui, Premier Oil, and others<sup>v</sup>.

In our understanding, those foreign E&P JV partners resisted the government's repeated calls for higher oil production this year (in order to boost GDP growth) because oil prices were too low in Q1-Q3. However, we expect those JV partners to acquiesce to higher levels of oil production next year, owing to our non-consensus expectation that average oil prices will increase by 15% (which implies that oil will continue trading at current levels).

Oil prices have shot up about 30% since August due to a series of geopolitical factors/issues recounted below, but industry executives generally believe that prices will fall back once these issues abate - so E&P firms are aggressively selling forward their anticipated, future oil production in order to "lock-in" the current, elevated oil prices<sup>vi</sup>.



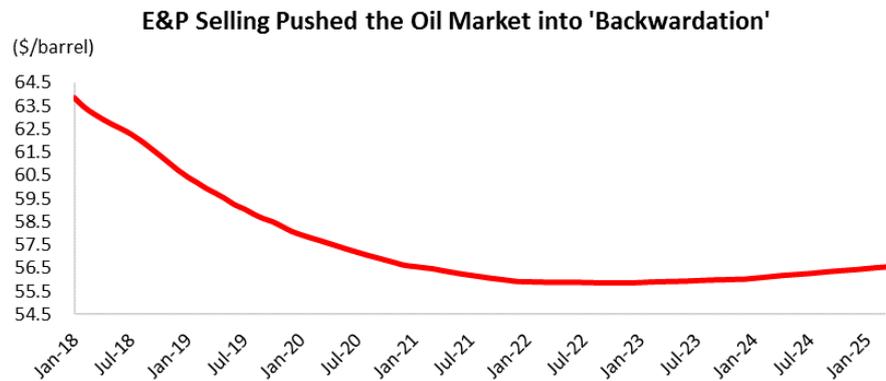
Source: Bloomberg

In addition, the recovery of oil prices in 2017 was supported by OPEC's 1.8 million barrel-per-day (BPD) production cuts that are set to expire in March 2018. Although OPEC is likely to extend those production cuts this week, an extension to the end of

next year is not a certainty. Furthermore, OPEC (plus Russia) is likely to specify that those production cuts will end when the global oil inventory overhang is cleared (inventories fell preciously this year, but are still 7% above the five-year average<sup>vii</sup>).

This makes E&P firms even less confident about the mid-term prospects for oil prices, and prompted those firms to sell so much of their future production that the oil forward curve is now in a state of “backwardation”, meaning that future oil prices are below the current spot price despite the high cost of storing oil.

The backwardation of the oil forward curve demonstrates that sophisticated E&P firms are eager to sell the next two years’ worth of their future oil production at current market prices, so we believe PVN’s foreign JV partners will ramp up Vietnam’s oil production, should the current market prices persist (which we think is likely).



Source: Bloomberg (as of 11/24/17)

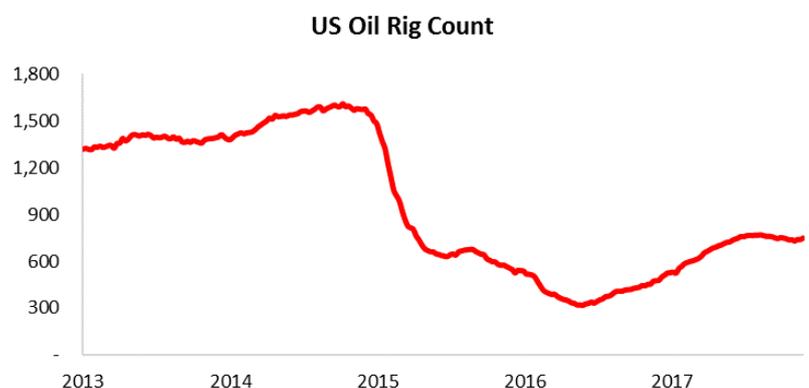
### **Oil prices set to remain firm in 2018**

Oil prices have surged since August, due to a series of geopolitical issues/events, including the normalization of diplomatic relationships between Qatar & Iran in August (which exacerbated tensions between the Gulf States & Iran), the vote by the Kurds to secede from Iraq in September, Saudi Arabia’s corruption crackdown, and Venezuela’s recent debt default<sup>viii</sup>.

Many industry executives expect Brent crude oil prices<sup>ix</sup> to fall back once these geopolitical factors abate. BP recently announced that it expects oil prices to trade in a USD50-55 range next year and most industry analysts expect oil prices to vacillate in a USD50-60 range for the foreseeable future, barring geopolitical issues such as those recounted above, because the median break-even production cost of shale producers, which are the markets’ new “swing producers”, is around USD50/barrel – i.e., analysts expect shale producers to aggressively ramp up production at oil prices of around USD60/barrel.

When oil prices dipped below USD50 in 2015, the drilling of new shale oil wells plummeted, so shale oil firms did act as swing producers on the downside, but it will not be straightforward for shale producers to rapidly ramp up their oil production at prices around USD60, partly because of technological differences between conventional and shale oil production that are discussed in the appendix.

Also, many observers expect the upside for oil prices to be curtailed by the world’s encroaching “peak demand” for oil as electric vehicles (EVs) become ubiquitous, but there is no evidence that peak oil demand will be reached in the next 10-20 years. EV sales are growing 30%



Source: Bloomberg, Baker Hughes

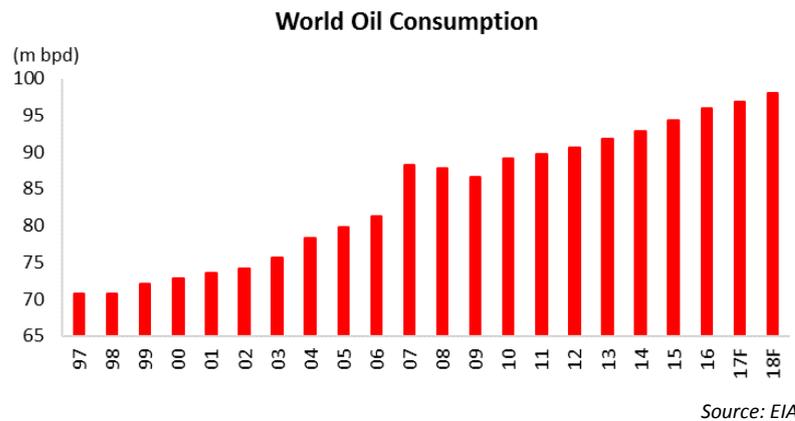
annually, but EVs only make up 1% of overall vehicle sales, so it will take another twenty years before the number of internal combustion engine vehicles actually starts declining – assuming that EV sales

continue growing at the current, rapid pace<sup>x</sup>.

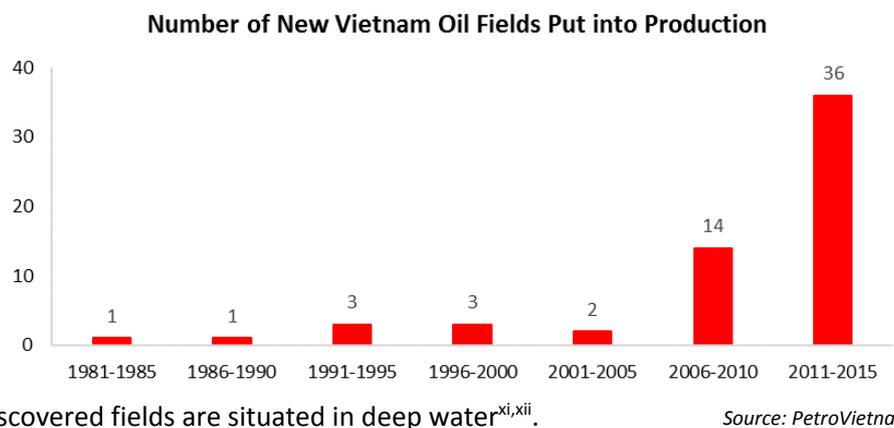
Furthermore, Chinese oil demand is growing by more than 10% annually, driven by demand for gas guzzling SUVs, which is partly attributable to safety concerns (700 people are killed in road accidents daily in China).

### Oil Prices and Vietnam’s Economy

Vietnam’s large *Bach Ho* oil field began producing oil in 1986, and reached its “Hubbard’s Peak” (or point of maximum production) in 2004, prompting the development of a plethora of new, smaller fields.



These efforts reverse the decline of the country’s oil production from 2009-10, as can be seen in Figure 1 above, but the cost of producing oil in Vietnam also increased, because: 1) the initial E&P capex costs of those new, smaller fields are being amortized over a smaller volume of



output, and 2) some newly discovered fields are situated in deep water<sup>xi,xii</sup>.

Vietnam’s exact oil production costs are not clearly disclosed, but can be inferred by scrutinizing the various pronouncements of government officials, and via informal conversations with industry executives. Production costs of the country’s various fields vary considerably, but piecing together the mosaic of available information implies that the direct “lifting cost” of pumping oil out of the ground (excluding the initial capex) is considerably below USD30/barrel, and that the “all-in” costs, including taxes and royalties is about USD50, of which payments to the government in one-form-or-another dominate the difference between direct and total costs.

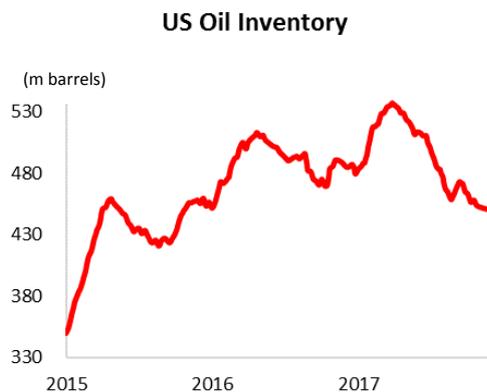
Next, although we believe an increase in average world oil prices from about USD55/barrel in 2017 to USD63/barrel in 2018 would induce higher production, we also estimate that a 10% increase in oil & gas prices boosts inflation in Vietnam by about 1.2 percentage points, split roughly equally between the direct and impact of higher energy prices (for example, higher energy prices increase the cost of producing food, which also raises the cost of eating in a restaurant, etc)<sup>xiii</sup>.

Finally, oil & gas related companies account for around 10% of Vietnam’s stock market capitalization and we estimate that an increase in average oil prices by 10% would boost the sector’s after-tax earnings by about 15% next year (including the impact of increased oil services activity, and higher prices for both services & oil).

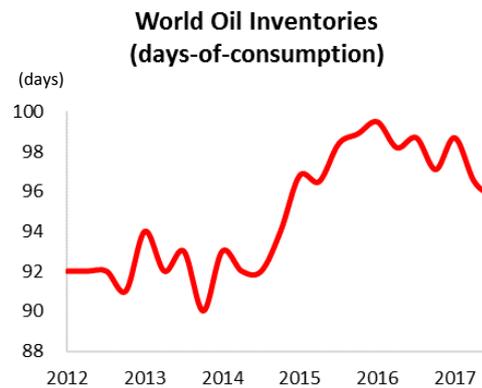
### Appendix: Global Oil Supply & Demand

Oil prices plunged in 2015, when the rapid growth of US shale oil production created a 2.2m barrel-per-day (bpd) global oil surplus, according to OPEC. The resulting lower oil prices stimulated

increased demand, and prompted OPEC (plus Russia) to cut its oil production by 1.8m/bdp from late 2016, which led to a 500k/bpd deficit this year – so inventories are now falling, after having reached record highs at the beginning of this year.



Source: EIA, HFI Research



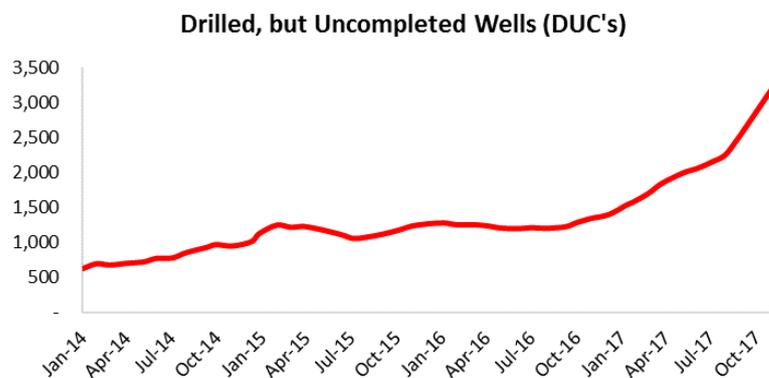
Source: OPEC

The consensus expectation is for a 1.3-1.8m/bpd increase in shale oil production next year, which *would* dampen the pace of oil inventory depletion, but there's a growing divide between the forecasts of analysts working for the Wall Street firms that raise capital for shale oil producers and the views of independent analysts such as petroleum engineer Art Berman (a highly regarded *Forbes* contributor), and others.

Based on the (somewhat technical) work of the latter cohort, it appears that the consensus expectations for shale oil production growth are far too high because: 1) the oil services industry's insufficient capacity is now inhibiting shale oil production growth – as evidenced by a surge in the backlog of shale wells that have been drilled, but not yet put into production (equivalent to ~2m/bpd of production), and 2) the shale oil industry's net cashflow gets very negative when production grows too quickly - so executives' pay packages are starting to prioritize return-on-capital over production growth.

Further to that last point, the amount of capital the shale oil industry raised fell from USD65 billion in 2016 to USD6 billion in 2017 YTD - despite the fact that average oil prices in H1 were over USD50/barrel - the price at which

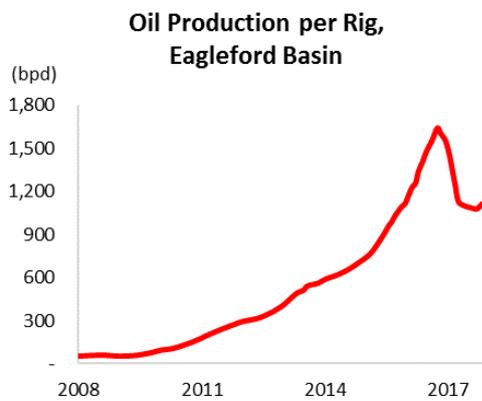
production was aggressively ramped up in the past – because the industry (and investors) is realizing that shareholder value is maximized by growing production gradually (unless oil prices increase significantly from current levels). The cost of developing oil wells soars when too many are developed at the same time, due to surging land, equipment & oil services prices<sup>xiv</sup>.



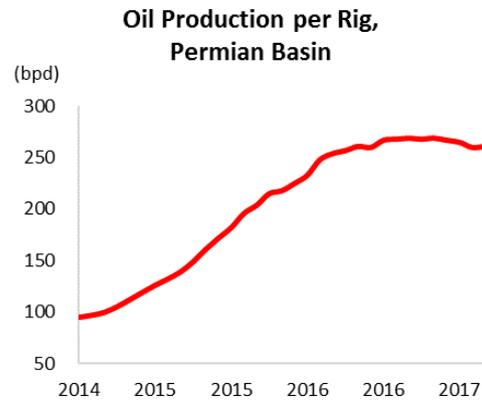
Source: EIA, Labyrinth Consulting Services, Inc.

Unlike conventional oil wells, which tap large oil reservoirs that deplete gradually over a long time horizon, shale wells deplete by as much as 60% in the first year of production, so **many** new wells must be developed in order to grow industry-wide production. As a result, costs increase non-linearly at high production growth rates, as does the amount of new investment required to fund high levels of industry-wide growth.

These physical limitations of shale oil production, coupled with the declining/flattening productivity per well at the major US shale oil basins means that the industry cannot increase production by more than about 400k/bpd in 2018 if firms rely solely on the cashflow generated by selling oil from existing wells at circa USD60/barrel<sup>10</sup>.



Source: EIA



Source: EIA, HFI Research

Finally, conventional oil production still accounts for about 60% of US production, but investment in conventional fields plummeted in recent years. The global E&P industry launched the development of about 15 billion barrels of new reserves annually prior to 2015, but that figure plunged to 8 billion in 2015, to 5 billion in 2016 and to circa 8 billion in 2017, which means that a dearth of new conventional oil production will come on-line in 2018-19.

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## Footnotes

- <sup>i</sup> GDP grew 6.4% yoy in 9M17
- <sup>ii</sup> 10M17 YTD oil production volume versus 10M16
- <sup>iii</sup> General Statistics Office, Vietnam Petroleum Institute, VinaCapital Research
- <sup>iv</sup> This forecast was made at the October 31<sup>st</sup> meeting of the National Assembly budget committee, and equates to about 270,000 barrels per day production, as 1 million tons of oil production is equivalent to 7.3m barrels.
- <sup>v</sup> 75% of Vietnam's oil is produced by joint ventures (Vietsovpetrol alone produces 35% and is one of Vietnam's 10 largest companies); foreign E&P firms typically own stakes of 50% or more in those JV's
- <sup>vi</sup> Aggressive hedging is also attributable to the fact that shale oil producers rely more on PE funds, pension funds, and other financial investors for financing than conventional E&P operators
- <sup>vii</sup> According to OPEC's own analysis
- <sup>viii</sup> The market's primary concern is that geopolitical tensions could cause oil supply disruptions. In Venezuela's case, those concerns are straightforward and convincing; the country's oil production fell by about 25% since 2015 to circa 1.7m/bpd, following years of underinvestment in the industry, and the military is now taking over the national oil company. However, Saudi Arabia's corruption crackdown will likely strengthen the country's commitment to OPEC's production cuts, but also lessens the likelihood that the Saudi Aramco IPO will proceed next year (which was expected to be a catalyst for higher oil prices).
- <sup>ix</sup> The spread between Brent crude prices and WTI (ie Cushing, Oklahoma) prices has widened from about USD2 in July to USD7 at present, partly because the cost of transporting oil from Cushing, which is landlocked, to the coast, has soared along with US oil exports
- <sup>x</sup> Trapping Value Research, "What the Peak Oil Demand Group is Missing", Sept 26, 2017
- <sup>xi</sup> The reserves of the largest of the newly discovered fields are 1/3 that of the Bach Ho field
- <sup>xii</sup> All of Vietnam's oil reserves are off-shore, and most of those proven reserves are situated in shallow waters
- <sup>xiii</sup> We derived our forecast by estimating the direct weighting of oil and gas in Vietnam's CPI basket (which the GSO does not explicitly identify), and we estimated the indirect impact by analyzing a comprehensive Leontief (input-output) matrix the government statistics office (GSO) publishes.
- <sup>xiv</sup> Industry insiders believe oil services prices would soar by 50% if production increases 1m/bpd next year – which would undo all of the cost cutting the shale oil industry achieved when oil prices collapsed in 2015.
- <sup>xv</sup> HFI Research, "Shale is Great, But It's Not as Great as People Think It Is", August 21, 2017

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