



Letter to Investors - Tarpon Folio

Part Four: The Opportunity

"Facts do not cease to exist because they're ignored."

- Aldous Huxley

We've gone through the reasons why, at least in theory, the oil market could be off its game right now, leaving us some very attractive opportunities in the common stocks of certain companies - if we can stomach the volatility. On the financial side of the oil market, there appear to be a number of different factors combining in unusual ways that could explain why oil has been trading so far below its marginal cost of production for such an extended period.

The argument that oil is priced incorrectly is heretical to those who see daily closing prices as truth. There are a lot of these people. They may see the market as infallible in its pricing of any asset, or they may have trading strategies that preclude ever needing to look too closely at anything other than daily prices. Regardless, the pressure that those who myopically focus on price can exert on the rest of us to conform to that view can be intense. But we will not.

Not because I'm obstinate. Because math.

Because the math of compounding at high rates of return with low relative risk over an extended period of time off a low cost basis is such a fundamentally attractive proposition that the only rational response is, when probabilities are in our favor, to plant our feet and ignore the noise.

The price-obsessed are correct, however, about at least one material issue:

It may not matter why something is underpriced.

In the end, it really only matters if that mispricing is temporary.

The evidence of mispricing described in Part Three is important only as much as it may explain why the companies in Tarpon – whose share prices are currently so tightly linked to oil prices - might be so undervalued. And, I suppose, to explain a lot of recent volatility.

So if we can establish that oil prices appear lower than warranted, based on some combination of industry cyclical and those other extra-curricular factors in Part Three, then the much more relevant issue becomes...is this temporary?

Part Four of this update is my attempt to show you that the answer to that question is unequivocally, "Yes, this is temporary."

And then, assuming so, how can we take advantage of that?

I am so glad you asked. We've got some diem to carpe.

On The E&Ps

This year's collapse in oil prices has created egregious temporary mispricings in securities across the capital structures of numerous energy companies. The common stock prices of U.S. exploration and production companies ("E&Ps") in particular appear the most untethered from conservative appraisals of true value. A number of these firms represent exploitable, once-in-a-decade opportunities for patient investors to compound capital at high rates of return with significantly less risk than extreme levels of volatility might otherwise imply. And the long-awaited catalyst for these companies' share prices - a legitimate inflection point in oil prices - finally appears near.

To be clear, the energy companies we now own in Tarpon do not require oil to return to anywhere near the \$100-a-barrel price of a year ago in order for us to do really well. By the time oil reaches \$60 a barrel WTI, our E&Ps will be cash flow positive - ignoring hedges - with the capacity to rapidly convert their inventory to production. In the meantime, they have more than enough liquidity to endure, and should things get even tighter, they also have ample assets that could be monetized if needed.

Also, while I do not personally believe in the "lower for longer" scenario for oil prices that I addressed in Part Three, I do believe that it is best to build Tarpon to withstand it - just in case. So that is what I have done.

A Stunningly Boring Insight

Let's adjust some expectations before we go any further.

If you, right now, were waiting in an all-night line to see the opening of *Phantom Menace*...I am your Jar Jar Binks.



Need that answer quick? I am your network connection. And I have been lost.

All set? Alrighty, then.

The opportunity before us comes down to this:

“The market is completely ignoring the global decline rate.”

I know...400 pages for that!?! But hear me out.

Decline vs. Depletion

Let's first define what we're talking about.

I have the unfortunate habit of referring to the “decline rate” as “CADR,” which is short for “compound annual decline rate.” Both mean the same thing.

The reason I typically use “CADR” is probably because I'm a geek – but also because at some level it's a mental shortcut that helps keeps the concept of “decline rate” a bit more distinct from another important aspect of oilfield physics, the “depletion rate.”

“Depletion rate” is the rate that reserves in an oil field are reducing. They are an important aspect of petroleum engineering, there are a lot of impressive-looking papers written about them, and they are related to decline rates...but depletion rates are completely irrelevant to me. At least in the below.

“Decline rate” is the rate that production is declining. That's what matters to me - not the size of the oilfield, but how fast the oil is coming out.

Kiddie pool in the backyard. You fill it with 1,000 gallons of water on Monday. On Friday, only 700 gallons. Subtract, check calendar, adjust for evaporation, humunuhhumunh: “depletion rate.”

Same pool, same 1000 gallons. Kid shoots an arrow into the side of the pool. Dog is okay. Water shoots out fast at first, need lots of buckets. Water barely dribbles out later, need just one bucket. “Decline rate.”

Said a different way, it's the size of the hole that matters, not the pool.

I'll try to keep things as jargon-free as possible here by using "decline rate" and not "CADR" as much as I can in the below - as long as you don't confuse either with "depletion rate."

On with it, then.

The Ghost in the Machine

It might surprise you to learn that the oil industry's greatest challenge at the moment may not be abysmal prices, overactive OPEC or even the stubborn cowboys of U.S. tight oil.

I would make the case that the industry's biggest challenge is decline rates. And because of them, Wall Street's obsession with other far less important things of late has given us a tremendous gift.

Every oil field has a natural decline curve. Due to the physics of oil wells, a field's capacity to produce oil decreases over time. Specifically, removing oil from a field both steadily reduces the natural pressure that drives oil up and out of a well and decreases the permeability of the rock the oil is trapped in, too. So when a good well is first tapped, you may see that stereotypical "gusher" at first....but that doesn't last very long.

Oil comes out of different wells at different rates, and out of the same wells at different rates over time. In U.S. tight oil wells, for instance, oil tapped by drilling horizontally comes out quickly at first, but then fades fast. Those wells have very steep decline curves. In contrast, more than 90% of the world's oil still comes from traditional or "conventional" oil wells - the stick-a-big-straw-straight-down-in-the-ground, "I drink your milkshake" kind of wells. They have much lower decline rates than tight oil wells, but because there are so many of them, conventional well declines nonetheless have an enormous impact on global supply every year.

When aggregated, the individual decline curves from all conventional and tight oil wells across the globe become the industry-wide compound annual decline rate – a production-weighted "CADR" of the world's entire existing oil production base.

Now, the exact impact of decline rates across all oilfields in the world is very hard to calculate. There are too many oilfields in too many different stages of development declining at too many different rates for too many different reasons. Calculating the CADR is an analytically exhaustive effort. Plus, there has been a ton of industry time and money devoted to developing new technologies over the years to slow these decline rates down – making true global decline rates that much fuzzier to determine. The best we can do is estimate, based on the few comprehensive decline rate studies that have been done.



There are three authoritative studies on global decline rates. They have come from the International Energy Agency as part of their World Energy Outlook in November 2013 (*Chapter 14: Prospects for oil supply*). Recent detailed analysis was also done by Uppsala University in Sweden in December 2013 (*Decline and depletion rates of oil production: a comprehensive investigation*). And Cambridge Energy Research Associates also published a highly respected study in 2007 (*Finding the Critical Numbers: What are the real decline rates for Global Oil Production?*).

A straight average of these three comprehensive annual decline rate estimates puts that global decline rate at 5.8%. We can have high confidence in those numbers due to the small spread between them, and because they were each based on independent data sets over a reasonably similar period of time.

Plus, that 5.8% decline rate figure is also in line with global decline rates previously estimated by ExxonMobil to be between 4% and 6%; a “not unreasonable assumption” of an 8% CADR made by the CEO of Schlumberger several years ago; a 6% blended average decline rate estimated by the CEO of Weatherford in 2009; and T. Boone Pickens’ own estimated global CADR of approximately 8%, too, as per testimony he gave to the U.S. Senate Committee on Energy and Natural Resources.

So with global decline rates running at (let’s stick with that averaged) 5.8% level, and IEA estimating a bit earlier this year the world would produce 95 million bopd in 2015, the global oil industry needs to bring on approximately 5.5 million bopd of new production just to stem the industry’s lost production that occurs naturally as a result of decline rates.

Hold that thought.

Why Decline Rates May Not Even Matter

I view the global decline curve as a sort of “macro” margin of safety on the “micro” margins of safety already in each of our current Tarpon names. Here is some back-of-the-envelope math that helps explain why:

The current global oversupply of oil is – estimated on a high (conservative) basis - approximately 1.75M barrels of oil per day (bopd).

The IEA recently projected that global non-OPEC production will decline in 2016 by 600k bopd each.

(As an aside - I think this IEA estimates will prove way too low next year, but for the sake of conservatism and objectivity, we'll use it here.)

Looking forward a bit into next year, then, that previous oversupply is effectively down to just 1.15M bopd (from 1.75M – 0.6M).

But the IEA also expects the demand for oil across the globe next year to increase by 1.2M bopd.

And 1.2M – 1.15 means that, right now, today, from even way down here in the Florida Keys, we can see the current oversupply that the market has been so obsessed about in 2015 will essentially disappear, based on just third grade math.

Before we ever get to decline rates and capex cuts.

And which probably doesn't reflect a much bigger drop-off in production than anticipated by the IEA.

Now, you're probably thinking – balancing the oil market couldn't possibly be that simple in reality. And it is not.

The above is not a serious analysis, as that "back-of-the-envelope" disclaimer I hope made clear. Specifically, it completely ignores any changes in production out of OPEC, which the industry has long-assumed will conveniently fluctuate enough every year to balance global supply with demand - enough to support OPEC-desired oil prices, at least.

I am ignoring OPEC here (more later, though) because blindly presuming that OPEC can play the role of global balancer in 2016 requires some assumptions I'm not quite comfortable making. Specifically...(1) peace throughout the Middle East (see Part Three for my thoughts there), (2) that Saudi is willing to risk permanently damaging their oilfields by overproducing (see investor questions in Part One), (3) that Iran can pump 700k bopd by the end of 2016 (Part One again), (4) that the severe financial crisis that the Iraqi government is currently facing somehow resolves itself enough to increase that country's oil production, (5) and that, most importantly, there is enough spare capacity within OPEC to actually be able to produce enough to balance the market. More on capacity in a bit.

The other obvious criticism of that simple back-of-the-envelope approach is also that it focuses on just "flows" of oil and not "stocks." This same point could be made about that "Oil Glut vs. Price War" section in Part Three, so it's worth addressing here, too.



In both rough estimates I do not attempt at all to try and account for the oil that, because of the recent oversupply, has been slowly accumulating around the globe over time.

You might think that this oil in storage should count, too, when it comes to determining when an oversupply might become a shortage because, well, all that oil is sitting there, just waiting for an increase in demand to be used, right?

Nah. Not in the economic sense. At any given point of time there is a huge amount of oil sitting around the globe in storage – because that’s just how the industry’s supply chain works. And it’s a huge supply chain - from refineries to tanker ships to pipelines to rail cars to tank farms – which is also, incidentally, currently seeing very strong demand for oil on the other side. So the “stocks” of oil sitting around in storage are much less analytically relevant than the “flows” involved.

For the record on “flows,” though - the amount of crude oil and refined products in commercial storage today, as per IEA’s own numbers and compared to stocks a year ago, is up about 9%, or about 240 million barrels. If you expand that glimpse to also include oil stored by the OECD governments (not just commercial stocks), then total stocks are 340 million barrels today – which is 13% higher than the same level in mid-2008...when the market was obsessed with worrying about an *oil shortage*, not a surplus, and *Brent crude prices were at \$140 per barrel*.

And those particular rates of increase aren’t concerning. At least, not to me. Global refineries typically keep around 7 days’ worth of unrefined crude on hand any time and process more than 80 million barrels of crude every day. So refiners need around 560 million barrels at any given time in storage for their own immediate operational needs. But because refiners make a killing when oil prices are low, you might presume that they are loading up on cheap crude right now – which would further reduce the importance you should put on even a modest increase in those “flows” to storage these days.

So whether oil is being stored in big white tanks, or “stored” in the ground...like it, um, has been for tens of millions of years...doesn’t matter in terms of the supply-demand picture next year. Not to me, anyway. In the end, using conservative assumptions and the increase in stocks as per IEA above, the world will chew through the current excess stock of oil storage in about 100 days.

Which may be a big deal if you’re an algorithm making trades every few milliseconds. But “back-of-the-envelope” is good enough for us long-term investors – at least when it comes to establishing that even if I’m off my rocker in discussing decline rates below, the fact that I am ignoring OPEC and the stock of current global oversupply probably means a turn in the market would likely only be delayed by three months, anyway.

So, to summarize this section - for now, to keep the key IEA assumptions in the global supply-demand picture above as clear as possible, I am assuming that the current historically high OPEC production just stays flat the coming year. I am also ignoring the current levels of global oil stocks.

Adjust that math above yourself however you see fit, though. Just keep in mind that if you adjust it for OPEC and global overstocks, you should realize there are other factors, like a massive reduction in global capital expenditures, that you should also adjust for, too...and which I will get to more in a few pages.

I think you'll find the broader point is still the same; the current oversupply in the global oil market – on any kind of reasonably forward-looking basis – is effectively already gone.

And what happens next will depend on decline rates.

Why Decline Rates Will Matter. A Lot.

In normal times, the global decline curve does not get much attention outside the offices of petroleum engineers. At higher oil prices, decline curves are simply not nearly as consequential to the cash flows of the production side of the industry as other factors like well productivity and EUR (Estimated Ultimate Recovery). When a company can earn IRRs, or internal rates of return, in the range of 40% to 50% on each well it drills, the decline curve loses some relevance - because that well is throwing off plenty of cash near-term even as it declines long-term. The relentlessness of the decline curve gets dulled by attractive well economics.

Now, however, in the context of an extended oil price crash, decline rates do matter. Big time.

And the reason is that because as oil prices come down, natural decline rates effectively increase. They become more dramatic because high-cost producers fail to invest in the capital expenditures that would otherwise stabilize the decline rates of their fields.

Depending on their cost structures and how low oil prices might be, high-cost oil producers are the first to “shut-in” their wells – cease all production – or otherwise reduce maintenance and capital expenditures on existing fields to conserve cash.

If it costs you \$90 a barrel to get oil out of the ground, but you can only sell it for \$40, why even bother? The rational response is to either shut-in your wells, or at least do whatever you can to



minimize your losses – like dialing way back on maintenance wherever feasible to decrease your losses.

It's not strictly oil prices that determine whether or not to shut-in or reduce production, either. The age of an oil field is a particularly important variable in that decision. Older wells can produce so much saltwater, for instance, that disposal costs mean a producer's actual breakeven point per barrel is significantly more susceptible to lower prices – putting current production that much more at risk during a sustained price decline.

And after enough of this sort of thing, the global decline curve is not a subtle, gradual slope down anymore. It's a jagged cliff. And U.S. tight oil production in particular becomes Wile E. Coyote, running right off that cliff.

Ah, just YouTube it, millennials.

The point is that global decline curve is now critically important because it exposes a vulnerability in the industry: the risk that oil prices fall through levels that not only remove new oil supply, but that deter maintenance on existing supplies among high-cost producers.

And both mean the true global decline rate is, in reality, bigger than the consensus expects.

Wonderful. And The Point Is...?

So the actual global decline rate is likely significantly higher than currently being modeled by the IEA, EIA and OPEC right now...and specifically because the decline rate is not constant, as they each appear to assume.

At a certain point, logic would suggest that the global decline curve becomes inversely correlated with oil prices for high-cost producers.

Implicit in the CADR's used by those Big Three oil data institutions, however, is the assumption that oil companies are high enough to induce continued capital expenditures and maintenance in existing fields – in order to keep the decline rates of those fields stable. Otherwise, if producers do not attempt to impede the impact of those relentless natural decline rates, then it would follow that the declines begin to compound at a faster rate.

Increased decline rates are not necessarily driven solely by high-cost producers, either. As oil prices fall, all producers begin to reduce their spending to some degree. First, they will typically cut non-core areas like exploration and seismic research. Next, they'll begin shelving

longer-dated projects. Then, companies will typically cut back on the money spent to do maintenance work – including the type of work that would otherwise slow the natural declines of their oilfields.

Now, the extent to which maintenance gets deferred is largely a function of the cost structure of that producer; low-cost operators may not reduce any, while high cost producers may cut way back.

But either way, the point is that with low oil prices, those sorts of projects can make little fiscal sense to pursue for anyone, and the rational response for a significant portion of the industry is to skip or cut back on maintenance - and then base production will decline.

In other words, oil prices need to be high enough to at least cover the costs of maintaining existing wells for higher-cost producers...or else the maintenance won't get done, and CADR grows.

If You Only Remember One Thing...

This, finally, is where I start to really geek out.

Because in times of true industry distress, like 2015, oil companies around the globe are currently cancelling capital expenditures left and right due to abysmal oil prices. (See "\$200B in capex, gone" below.) And the current pause in capital projects throughout the industry is enabling the natural decline rate of oil fields to materially erode supply to a greater degree than indicated by normalized decline rates, *which assume decline rate increases will be held in check by maintenance capex*. Only a lot of that is not currently happening.

And this is where the compounding kicks in.

By 2020, the IEA estimates the global demand for oil will be approximately 99 million barrels of oil per day (bopd), up from the roughly 95 million bopd currently being used at the beginning of this year.

Now that 4 million bopd difference between now and then might not seem like much. But don't forget that the decline curve never sleeps.

Which I think raises this very important question:

"If as the IEA says global oil production declines naturally at a rate of 5.8% a year, and assuming a current production base of 95m bopd, then if the world is going to need 99m bopd in five years, how much of that must come from new wells developed between now and then?"

And the answer to that question is, "About 29 million barrels of oil per day."

Math don't lie, people. The CADR effect is huge.

In order to increase the global supply of oil from 95 million barrels of oil per day to the required 99 million bopd the world will need in five years, due to natural decline rates, the industry doesn't need to just create an incremental new 4 million bopd in new supply.

That's not even close. The industry actually needs to create 29 million bopd of brand new supply over those next five years to meet expected demand then.

In other words, to meet the world's growing demand for oil in five years, the industry needs to discover almost three new Saudi Arabias between now and then.

Or else there won't be enough oil to meet world demand. And prices will rise significantly.

Hunh.

Scenarios:		Start of 2015	End of '15	End of '16	End of '17	End of '18	End of '19	Start of '20	Cumulative mm BoPD Needed	mm BoPD Needed Each Year
Production @ CADR of 3.8%	Low	95.0	91.4	87.9	84.6	81.4	78.3	99.1	20.8	4.2
Production @ CADR of 5.8%	Consensus	95.0	89.5	84.3	79.4	74.8	70.5	99.1	28.6	5.7
Production @ CADR of 7.8%	High	95.0	87.6	80.8	74.5	68.7	63.3	99.1	35.8	7.2

Notes

"CADR" = compound annual decline rate

Using IEA estimates for start of 2015 and 2020; rest are plug figures

In Million BoPD (barrels of oil per day)

Assumes maintenance capex and constant CADR, but no new exploration capex

Now, to be clear – this is not a projection. It is a table to illustrate the power of compounding in the context of oil well physics. The scenarios above do not account for new supply brought online from very recent drilling activities in 2015, which might reduce that 29M bopd by as

much as a fifth. So it's not the numbers-to-the-decimal that matter as much as the broader concept.

And a range of assumptions in the "Low" and "Consensus" scenarios above, decline rates could also theoretically cut between 3.6 million and 5.2 million bpd from the output of existing fields in 2016 and again in 2017.

But, again, that presumes a constant decline rate. Oil prices have gone way down, which means maintenance isn't being done, and decline rates aren't going to stay constant. Actual CADRs could be significantly bigger than the 5.8% consensus in 2015 and 2016.

How much bigger?

Hard to say. Some of that lost production will be replaced by new fields discovered and green-lighted for development a few years ago when prices were higher, and those fields will come into production the next two years. So this table is absolutely not a forecasting tool.

Nonetheless, we can get an approximate gauge of the impact of a big jump under the "High" scenario in the table above. If CADR ends up being 7.8% over the next five years, then never mind those three Saudi Arabias. We're going to have to find a whole new OPEC's worth of oil by then. And if all drilling and existing field maintenance capex around the world stopped today, we'd be short of oil to the tune of 6.8M bopd (87.6 – 80.8) at the end of 2016.

And how realistic is that "High" scenario?

That's also hard to gauge, but it may be relevant that [Saudi Arabia's Vice Minister of Petroleum recently noted that due to low oil prices](#), about \$200 billion of investments in energy had been cancelled this year around the globe. (And that same estimate can be corroborated in at least two other places.)

That \$200 billion reduction in capex represents *nearly 5 million bopd of production either deferred or cancelled over the next few years.*

So between capex cuts and decline rates, in 2016 there is a very real risk that the industry may be unable to increase production enough to control the pace of an increase in oil prices as demand begins to exceed supply.

And the longer those projects are suspended, and the deeper those capex cuts, the more havoc those decline rates will wreak, the quicker production will fall off – and the higher oil prices will rise.



All of which means a few things:

- First, decline rates are about to take over. Market consensus forecasts are relying on unrealistically optimistic (i.e. underestimated) decline rates, and this could lead the industry to dramatically underestimate the amount of production the world will need to meet demand next year, let alone in 2020.
- Second, even the current supply “glut” of 1.75 million barrels per day oversupply is small in the face of today’s decline curve. That decline rate is relentless. It is important. And physics trumps opinions.
- The effects of compounding can also be stunning over time. That goes for things on the way up, or on the way down. Decline rates are likely to have more of an influence on oil production in the long-term than any geopolitical factors. They will also create more demand for new oil than any emerging markets.
- In addition, there is a very sharp natural decline curve rate for a lot of U.S. tight oil that has been added to the global production base over the last five years. The more that U.S. tight oil contributes to global production, the more global CADR will increase, too.
- The maximum rate of additional production increases from U.S. tight oil are behind us.
- The compound annual decline rate (CADR) increases incrementally every year, too, independent of oil prices and capex. Specifically, it rises slowly over time due to the age and geophysics of the big oil fields that produce most of the world’s oil.

In spite of the above, any serious discussion of decline rates – biggest challenge in the industry, folks! - is completely absent from almost all media and Wall Street coverage of the oil price collapse to date. It is clearly, analytically speaking, a huge error to ignore or underestimate the global compound annual decline rate, when thinking about future oil production.

The Big Question

Now we can finally get to the core of why my own view on the timing of a turn in oil prices differs so much from consensus.

Given what we know about decline rates, we can now attempt to independently answer the question:



Can the industry meet the demand for oil in 2016?

Most of the world relies on the predictions of The Big Three – the IEA, EIA and OPEC – to do their thinking for them on these sorts of questions. The reason I would prefer not to is because of that wonky “decline rates are not constant” point, which differs from the assumptions of The Big Three. Again, during an oil price collapse, high-cost producers will eventually reduce maintenance work on (or shut-in) their wells, accelerating the decline curve. When a lot of medium- and high-cost producers make that same decision, global production can relatively quickly fall short of meeting global demand.

So I'd prefer to draw my own conclusions. But to keep this simple and objective, let's still use IEA data to make them, via some back-of-the-envelope arithmetic. And we don't need an elaborate proof here – we just want a quick reality check.

In order to grow production this year to meet demand next year, we need to first offset the natural declines in production, and then, on top of that, add incremental new production.

So the question is really, “What is the change in production needed to meet the expected change in demand in 2016?”

Or, written a bit math-ier...

Production Needed to Replace Declines + Incremental New Global Production = Incremental New Demand

...which is the same thing as, still using IEA numbers and classifications...

“CADR Offset” + New Production from Non-OPEC + Change in ‘Call on OPEC’ = Change in New Demand

...and then plugging in IEA data for those variables...

$[95.0\text{M bopd} \times 5.8\% \text{ CADR}] + [0.6\text{M bopd decline in Non-OPEC}] + \text{Change in Call on OPEC} = 1.25\text{M}$

$(-5.51\text{M}) + (-0.6\text{M}) + \text{Change in Call on OPEC} = 1.25\text{M}$

Change in Call on OPEC = 7.4M

So in order to meet IEA's expected demand growth next year of 1.25M bopd, OPEC, in our little back-of-the-envelope exercise here, has to produce 7.4M bopd of new oil in order to compensate for the global decline curve plus the expected decline in production in the rest of the world.

Can they do that? Well, to answer that we've got to look at OPEC's spare capacity...and, long story short, total OPEC spare capacity at the moment is about 3.3M bopd.

In other words...

In order to meet the 1.25M increase in demand for oil IEA expects in 2016, even if OPEC used all its spare capacity, the world would still be short by 4.1M barrels of oil per day (from 7.4M – 3.3M).

So...

The decline curve really matters, because at best, it indicates oil prices will rise significantly in 2016, as demand outstrips supply. At worst, it is telling us the industry is at risk of sleepwalking into a significant shortage of oil in 2016...also known as a supply shock.

The global decline rate is a simple but powerful concept.

It helps explain why I was buying oil stocks in Tarpon all summer.

It also helps explain why I am not overly concerned about Tarpon right now – in spite of our results so far this year, and the extreme volatility along the way.

The decline curve will also explain why consolidation among U.S. tight oil companies will probably soon be on the way.

It also tells us that a significant rise in oil prices is inevitable. And that oil prices can rise markedly even if OPEC doesn't make a single policy change.

Incidentally, when it comes to the E&Ps companies we own in Tarpon, that inability of OPEC to meet the expected "call on OPEC" in the future - and higher prices resulting from related shortages - will create excellent opportunities for other energy companies to fill the gap that OPEC members were expected to fill, but did not. But that's for another way-too-long letter.

What Are We Missing?

I know. Seems too simple, right? Let me save you some time: here is a quick answer to the first question I am guessing you probably have about all this...

"If this CADR thing is such an important issue, how come nobody else is talking about it?"

Broadly speaking, I would say the vast majority of people just miss the extraordinary importance of compounding – both when investing in general, and then in specific instances like declines in oil fields, too. Compounding is easily the most underappreciated mathematical concept of all time. Period.

A more specific reply would be, "See that Great Pessimistic Feedback Loop thing from Part Three."

It's not that most industry analysts aren't aware of the decline curve, nor that they believe it is unimportant. The global rate of decline by definition strongly defines the required rate of future discovery and production if global oil and gas demand is to be met. Decline rates also effectively represent guaranteed, material demand for the industry every year. Yet as critical as both of those commonly recognized statements are in the industry, decline rates have nonetheless just been getting crowded out of the discussion lately by a lot of other nonsense.

There is some pretty extreme groupthink out there when it comes to IEA projections, too – even though it appears the global decline rate may be systematically underestimated by the IEA.

And that is kind of a big deal, because the IEA is effectively the premier provider of non-OPEC global oil data and projections to governments, companies and financial institutions around the world. In other words, IEA represents the market consensus. And it's possible there could be something off about things at IEA – and OPEC, for that matter - when it comes to CADR.

More specifically, while both groups have considerable expertise in analyzing 'above ground' trends, some researchers have noted that the IEA appears to consistently miscalculate things 'below ground,' including reservoir depletion and production decline rates - which underestimates losses from natural oilfield declines.

And this may be why the IEA in particular keeps overestimating initial non-OPEC production growth; their forecasts have been notably incorrect in seven of the last ten years. And that could be because they're not properly accounting for decline rates.

Here is how an armchair statistician would describe this particular error:

The IEA models future oilfield production by extrapolating historical production data with an exponential decline curve. This results in a curve that is too smooth compared to reality, which is bumpy, and which assumes the future will unfold at pace that is also far too similar to the past...and the real world is never so predictable. And what it means is that the results for projected production every year can be too optimistic.

So, again, it is not the case that various experts disagree about the importance of the global decline rate...it is much more that they blindly rely on IEA data, which doesn't take the fact that the decline rate is not constant into consideration. At all. And while this argument is pretty wonky, it matters because it is material and overlooked. Decline rates will take over in 2016 - and they will absolutely matter more than rig counts, Iranian production and weekly Genscape reports.

Now, the above approach makes plenty of assumptions that could easily be incorrect. But given the size of the shortfall, I believe they're immaterial. One mistake, for instance, could be putting that whole new 7.4M bopd of needed production squarely on OPEC's shoulders. Non-OPEC countries could, in theory, help bridge that production gap, of course. Still, that doesn't change the broader conclusion.

I also willfully ignored the current market oversupply in the above - for the same reasons as described in the "stocks" versus "flows" bit earlier. But I would argue that decline in non-OPEC production is also going to be way, way bigger than the current 0.6M IEA figure, anyway.

And yes, that 7.4M is overwhelmingly influenced by the CADR offset or decline rate...but that's kind of the whole point. These are IEA's own numbers. I just did a quick end-around of sorts because their current production forecast didn't seem to be accounting for CADR properly.

Even if you nixed that 5.8% decline rate and instead plugged in, say, a 2.0% decline rate, the world will still be short oil in 2016.

But don't forget that the real CADR out there right now is probably significantly bigger than that 5.8% rate, and not smaller.

And that if OPEC does use all its spare capacity, then there is no margin of safety whatsoever in the global oil production market - a sobering realization given the potentially incendiary conflicts brewing in the Middle East right now. With no spare capacity, OPEC could be unable to control a sudden price increase.

Other Things That Make You Go 'Hunh'

Now also consider this:

- More than half the world's oil is produced from fields already in decline, where underlying decline rates appear to be at a rate of between 10% and 15% ex-reinvestment.
- Over time, the cost to bring on the marginal barrel of supply in the industry will keep rising, both to higher levels and at a faster rate.
- Global oil demand is now growing at the fastest pace in five years, and double the rate predicted at the beginning of 2015. Gasoline sales in the U.S. in Q3 also surged at the fastest pace in over a decade.
- Despite all the hysteria over an economic slowdown in China, demand for oil there is still actually quite strong and increasing – consistent with the government's goal to add more than 500m barrels of oil to their strategic petroleum reserves over the next five years. Chinese demand is growing at 7% year-over-year, led by gasoline and jet fuel.
- Cuts in industry capex will likely prove excessive. The industry has cut capex by 25% in FY15. Further cuts are expected in 2016, which would be only the second time in 30 years that industry capex has been cut in consecutive years. Yet as discussed in Part Three, this is not 1986.
- There also will likely be much more of a delay between an increase in oil prices and a subsequent increase in drilling activity than Wall Street seems to believe. I discussed this earlier in that Part Three bit about Goldman Sachs. If it proves true, then this, too, would further support the idea that once the production response arrives, it will be fighting a more rapid decline rate.
- The sheer scale of oil and gas projects demands significant capital investment from sophisticated financial institutions. At some point, and I'm guessing within the next five years, those institutions may start to begin to recognize U.S. tight oil as a legitimate threat to replace conventional oil sources. If so, the funding available to develop additional conventional oil fields could become further restricted. Which is a nice way of saying "involuntary capex cuts."

- The supply side of the oil market is much more vulnerable to material disruption than it was a year ago. With prices so low, the motivation for OPEC members (and Russia) to turn hostile on one another increases more every day.

- Oil use in the developed world currently averages about 14 barrels per person per year. In the developing world, oil is used at a rate of 3 barrels per person per year. What do you suppose will happen when billions of people go from consuming 3 barrels a year to – never mind 14 – just 6 barrels per year? The world's appetite for energy in the coming years will be staggering, and most forecasts show that 75% to 80% of that need will be met by oil, gas and coal – albeit more efficiently than today.

- Twenty million people a year in China are moving from rural areas to cities. In 1978, the country was 18% urbanized. Today, it is 50% urbanized, and there are over 170 cities with populations of greater than a million people. China is transitioning to a “mass auto culture” at an unprecedented rate and at a massive scale. As late as 1983, China only produced 10,000 cars a year. In 1990, they sold 42,000 cars. In 2009, more cars were sold in China than the U.S. And by 2020, auto sales in China could reach 30 million a year.

- If China consumes oil at the same rate as the U.S., by 2030 China alone will be using more oil per year than all of the world's current annual production.

- Asia in general is also expected to add around 280 million barrels of crude oil storage capacity between now and 2017. About 185 million barrels (about 65% of that) will be for SPR (“Strategic Petroleum Reserve”) facilities in China and India. The rapid growth in Asian crude storage capacity also has the potential to influence short-term oil market dynamics - by creating a surge in purchases for crude oil over and above that is required to meet its normal refined product demand. The energy consulting firm Wood Mackenzie expects crude oil purchased for storage in Asia to average 240,000 kb/d from 2015 to 2017. So this “oil stockpiling” is also significant for the global oil balance.

I think you see the point. Noodle on these sorts of things long enough, and you may start to get the sense that we may soon have an oil price problem of a completely different kind.

In Conclusion

What we are left with after considering all the above is this:

For a variety of reasons, the current price of oil is unsustainably low, and I believe will eventually be heading significantly higher sooner than consensus. As a result, I have high expectations for Tarpon's returns over the next three years.

And despite how naïve, unpopular or misguided it may sound to make this point today, it is nonetheless true:

For a number of reasons, there is clearly a reasonable probability that oil prices could reach a level significantly above \$100 per barrel within the next three years.

And it's not just me who thinks that. Here's [the head of OPEC](#):

"If you don't invest in oil and gas, you will see more than \$200."

To be clear, forecasting short-term oil prices is a fool's game. We do not attempt to do that here at IIM. And again, we do not need oil to return to anywhere near \$100 per barrel in order to do very well in Tarpon. In the above I'm just acknowledging the potential for an oil price supply-side shortage in the not-too-distant future - a risk which in no way, shape or form is being reflected in the current price of a barrel of oil. Yet should be.

So, to put a fine point on it all:

WTI oil prices are currently \$40 a barrel. I am buying shares in U.S. E&Ps hand over fist. And I'm the crazy one?

Please let me know if you have any questions.

Thank you for your patience, and Happy Thanksgiving.

- Cale

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