



MACRO Voices
with hedge fund manager Erik Townsend

Art Berman: U.S. Oil Production Still Set for Steep Decline in 2021

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Erik: Joining me now is petroleum geologist [Art Berman](#). For anyone who doesn't know, Art is famous for his graphs and charts, so you're going to want to be sure to download the chart deck that accompanies today's interview. You'll find the download link in your Research Roundup email. If you don't have a Research Roundup email, that means you're not yet registered at macrovoices.com. Just go to our home page, look for the red button above Art's picture that says [Looking for the Downloads?](#)

Art, our regular listeners know that I'm dying to ask you about the production decline that you have been predicting.

But before we even get to that, I want to start with this week's OPEC+ meeting when Saudi Arabia surprised a lot of people by essentially resolving a deadlock where they couldn't agree on what to do about production cuts and Saudi Arabia kind of volunteered to go it alone and unilaterally cut on their side in order to allow other OPEC+ countries not to have to cut.

What's going on there? What do you make of this? What brought that about? And what do you make of this meeting in general?

Art: Erik, of course I'm speculating. But my sense of this is that we're looking at classic game theory, that OPEC+ has been trying to manage the world's largest traded commodity now for pretty nearly five years. And that just can't be done.

And so they've reached a point now where Russia doesn't really feel like doing this much anymore. And, honestly, I don't think Saudi Arabia does either.

But they tried a different path back in March with catastrophic results and so that's not really where they want to go. So what the prisoner's dilemma says is that as long as nobody changes their stratagem, we just continue doing whatever we were doing. And I think Saudi Arabia is now saying, okay, we're in control here, and this is what we're doing.

And they're basically saying we can't afford another catastrophe and we're tired of cajoling. Last time around, we threatened you guys with flooding the market. And this time around,

we're saying give it a break, we've got this under control.

And, after all, Saudi Arabia has been – they've really been OPEC all along. So leading into where you and I want to go with this conversation, the real question is: Is it necessary?

And there's no question that the prime motivation is that Saudi Arabia and many others see demand for oil as being lower, perhaps much lower, than expected just a month ago or so. And so they're kind of taking preventative preemptive action right now to cut supply.

Where I think – I mean, I'm certainly happy that they're doing that if they want to, although it hasn't worked very well for the last four or five years. But I also believe that they're probably following EIA's forecast for US production. And I'm more painfully aware than almost anyone of how wrong even my forecasts can be.

So not saying anything about it, but if EIA says that US is going to produce 11 million barrels a day for the rest of 2021 and it's only 10, well maybe Saudi Arabia didn't need to do what it did.

That's kind of where I'll leave it for now.

Erik: I see this as very significant, Art. Because a lot of western analysts who, frankly, have been second guessing all along – we don't really know what the mindset of the Saudis has been, but a lot of people were saying, look, what's going to happen here is the Saudis are not going to let oil prices get back up to the level where you could have a restart of the US shale boom. They don't want oil prices to recover back to \$75 because then the US shale would take off again.

It seems like they're not worried about that.

So what I'm trying to figure out is: Is that because Saudi Arabia is no longer concerned about not wanting to see the US shale industry recover and become its former self?

Or is it more the case that they've decided that the US shale industry is so badly damaged that it can't recover, even if they do allow prices to recover substantially, let's say back up to \$60 or \$70?

What do you make of this in terms of what it means for the US shale industry's ability to recover or maybe not have the big decline in production that you and other people have predicted?

Art: That's a great observation, Erik. And obviously we don't know. But a couple of things come to mind.

And the first is that whatever happens or doesn't happen to the US shale industry, the price of oil, the amount of capital available to the US shale industry, that's all way into the future. If tomorrow everybody in the shale industry decided, okay, we're going to hire as many rigs as

possible, it wouldn't make any difference to production for pretty nearly a year. So, surely, Saudi Arabia understands that.

The second thing, though, I guess, that is maybe the more salient factor, is that without other people's money nothing is going to happen. And certainly the overwhelming sentiment in world markets is that oil is pretty nearly un-investable, to use somebody's terrible phrase. But the money has clearly fled far away from E&P, and particularly US shale.

And so perhaps the Saudis are saying, jeeze, even if price gets to \$60 or higher, there is so much inertia or negative momentum by investors that the money is just not going to flow back to the shale players anywhere near quick enough to make a difference.

What do you think about that?

Erik: Well, Art, the thing that strikes me is that we're seeing so much easy money policy and so much continued printing of money that, on one hand, I agree with you that oil is kind of out now. And also there is an extra headwind, which not only is it kind of out because it's hard to make money on that, but it's also very much out from an ESG perspective.

A lot of people think that investing in fossil fuels is irresponsible if you're a responsible ESG investor. I don't agree with that mentality, but a lot of people feel that way and that's going to hurt the amount of capital that's available.

The other side of that argument, though, is there's a heck of a lot of capital that's going to be available for a heck of a lot of things as we get into this MMT world with central banks just printing money like it's going out of style.

So I don't know how to reconcile that one.

But the one thing that this OPEC meeting definitely speaks volumes to me is the Saudis aren't worried about it. They're not concerned about allowing the price to come up to a level where it could allow the US shale industry to recover.

Maybe that's because they think it can't recover. Maybe it's because they don't care if it does recover. I'm not sure which, but it's clear to me that they're not concerned about it.

Why don't we go ahead and jump into your slide deck.

Starting on **Page 2**, you're talking about the expected decline in demand, which you believe is maybe the reason that Saudi Arabia took this action in this week's meeting.

Art: Let me say first of all that analysts, journalists, producers, are just absolutely obsessed with demand. And, frankly, while I appreciate that, I honestly don't understand it. Because oil markets don't run on demand. They run on supply.

And there's a simple reason for that. And that is that markets can't do anything about demand but they sure can about supply by changing the price.

And so my perspective after looking at these things for a few decades is that, as long as supply adjusts to demand, demand is not the problem. The bigger problem is when demand, which moves very slowly, increases and supply lags behind it as much as it does in the modern world. Then you end up with a supply shortage.

But in any event, **Slide 2** shows OPEC's supply and demand forecast – demand in orange, supply in green, and then the supply/demand deficit in either blue for positive and red for negative

And what it shows is that the supply/demand balance going into 2021 was not too bad. It's about balanced. But it increases to 1.38 or so by the third quarter. And so you'd say, well, that's not too much. Well that's certainly enough to put things into pretty bad money territory.

Now I think what they're doing is they're saying, wow, we were really probably overly aggressive on the demand side and instead of believing that we're going to have 95 or 94 million barrels per day of demand in the first half of 2021, jeeze, we're thinking now it's probably going to be more like 91 or 92.

And so that changes everything. That says that your supply/demand balance, instead of being 1.3 or 1.4, is now going to be 2.5 or 3.0, which is about what it was when oil prices collapsed way back in 2014–15.

That's my sense. I haven't worked out those numbers precisely, but you get the general direction.

Erik: Art, let's move on to **Slide 3**. Longtime listeners immediately recognize this chart as the comparative inventory yield curve. Just for the benefit of any new listeners we may have, if you don't know about this comparative inventory system, which is kind of Art's trademark, be sure to go back to some of Art's earliest interviews on MacroVoices. Just put "Art Berman" in the search box at marcovoices.com and this system of comparative inventory analysis is explained fully in some of those early interviews.

What do we see in the comparative inventory yield curve here on Page 3?

Art: Erik, what we see is that everything is behaving just exactly as it should. It's behaving as I forecast that it would way back in April or May, when WTI weekly price was \$5 or so – I'm showing \$3.32 was the lowest that it got for the week in late April.

But way back when, I had pretty much the same green yield curve drawn in here and I was saying at these levels of surplus I think WTI is going to work its way back up to \$41 or \$42 or \$43. And that's pretty much exactly what it did.

It dropped down a bit, sort of about half way through there – the green circles are what we're following – sort of underpriced for a while because of concerns about COVID, over near where it says January 1. To the right of that, it started climbing back just about as soon as vaccines were announced and made its way back to the yield curve a couple of weeks ago.

And the yellow dot is from today. I see I've got an extra digit in it, 47–48, but I think you all understand that. We're plotting right exactly where it should be.

So the implications of this are that, all things being equal, prices aren't going to get to \$60, that we're going to draw down stocks in the world as we have been now for months and months and months. And at the five-year average, which is the Y axis, we'll be at about \$49 or \$50 WTI.

Now the other thing that I have to say though is, yes, but what about excursions? We've just been on the biggest yield curve excursion in the history of man. And that works the other way too. There are examples circled on this graph that show precisely that.

So the more concern the market has about supply, the higher above or the larger the excursion above the yield curve we might get. So if oil price goes to \$55 or \$60, somebody is sure to say, oh, Art, you were wrong. And I say, well, no, that's what price discovery is about. That's the way the market works.

So the message from this Chart, Erik, is everything is A-Okay, just exactly as it should be.

Erik: It's exactly as it should be now. But let's talk about where it's headed and move on to **Slide 4.**

Because what I think about is – you've been talking about a very significant decline in US oil production which hasn't started yet. But if that is to occur the way that you've projected, presumably that means instead of this great big huge oversupply we're going to have negative comparative inventory at some point.

So is that on the radar? And if so, how far out is it? And what is that going to mean?

Art: Absolutely. And it's not very far out at all. So this graph in Slide 4 is US comparative inventory. And I will anticipate all of the smart people, many of them not from the United States, that say, oh, well, that's a very parochial thing to look at.

And I do look at OECD and everything else too. But my experience is that US storage reporting has the highest frequency. It's weekly as opposed to monthly. And it's got the most accuracy, for whatever reason. And it's a darned good proxy.

So if anybody is worried that US comparative inventory is somehow skewed from world comparative inventory, it hasn't happened so far. So leave it there.

But looking at this graph, what it says to me is that, at the current decline rate in comparative inventory, which is now pretty nearly five million barrels per week, we will be at the five-year average in a matter of six weeks. Now that changes a little each week as we get a bigger draw or a bigger add, but it's been marching in that direction ever since mid-July.

And back to your original comment, we don't have a great big oversupply right now, not in the United States and not in the world. We are fast approaching the five-year average. We are only 30 million barrels above it as of today. We were five times that a couple of months ago in mid-June.

Will we get there? Barring some totally external event that I can't predict, absolutely. Will we get into negative comparative inventory? I don't see how it's possible we won't.

Erik: Now, I want to ask you a question about what this reflects. Because, as I understand it, this positive comparative inventory that we're showing here, this has to do with the reported numbers coming out of EIA inventory reports, which does not include floating storage.

During the crisis, when there was no storage available, a bunch of people were chartering tanker ships and filling them up with oil and using them as great big floating gas tanks.

Has that oil been delivered back into the market? Or do we have a stealth oversupply that doesn't show up on these charts but there's actually a bunch of ships that are full of oil some place?

Art: Well, the way that that works – and it's a really excellent question and nobody really knows the answer to it. But the way that all this works is that it starts with production. Okay. So this is storage.

But EIA has a very good, I believe, understanding of how much oil is produced. And that comes from the states. And they have a very good understanding of it because they get tax revenues from it.

So it may not be 100% accurate this week or it might take several weeks or even a few months to get it all properly balanced, but they want their tax money so they're going to get it right.

And so there's production, which we know. There's oil that flows into the pipes, which we know. As far as I know, nobody is able to go from the well head to an offshore tanker. They've got to put it in the pipe. They've got to send it somewhere, whether that is Cushing, Oklahoma or to the coast to put on a tanker. So we know what's produced and we know its disposition. We know how much goes into the flow and then we know how much ends up in official storage.

And the numbers are massaged a little bit to include a little bit. And that's where we get this

thing called unaccounted-for oil. unaccounted-for oil is oil that EIA knows to be there because it was produced, but it hasn't shown up in the flow.

So the answer to your question is if that floating storage originated from a well in the United States, it is accounted for. Whether it shows up in the storage number or not, it is known.

And so my sense is that I'm not disputing that it's there. I'm just saying that it wasn't a big factor as far as I can tell back in 2015–16–17. It hasn't been a big factor yet. So I'm not losing sleep over it. I acknowledge it. But I don't know.

Erik: Moving on to **Slide 5**. You're moving now into US consumption recovery.

This is something that I think about a lot. Because it seems to me that, on one hand, even though there might be more mutations of the virus and more complications and more issues with the pandemic, it seems that society has become extremely intolerant of lockdowns and if we have more lockdowns they will be minimum in duration and we'll continue to operate as much of the economy as we can despite the situation with the virus.

So in many ways it feels to me like we're going to get back to normal consumption. But I do think international air travel will probably stay very, very subdued for a while to come.

How much of the consumption does aviation fuel account for? And if we have everything come back except for aviation, what would that look like in terms of a recovery for demand?

Art: It's roughly 6%. So if the world produces or produced 100 million barrels a day, six million of that is for air travel. So it's a significant number for sure. But it's not that big of a percentage and especially within the context of the kind of reductions that we've seen.

So if you look at the graph on Slide 5, and you look at kerosene jet, which is the second three columns toward the right, you see that its recovery is 57%. And, for background, that number until just a few weeks ago was half that.

So the recovery was actually – for a while it was below 20%. It rattled around 20%–25% for a while. So contrary to the public belief or opinion, I see this number coming up just about every week.

57% is terrible compared to 100%. But it's more than double what it was not very many weeks ago. So, based on consumption, based on what comes out of US refineries, I see kerosene jet recovering. It will lag behind everything else.

The one that I worry about more than anything else is gasoline. And I would have thought many, many months ago, when you and I first started talking about COVID and what its effect on demand might be, I would have thought that gasoline would be the first to come back.

People get really tired of sitting around at home and they're going to go out and drive their cars even if they've got nowhere to go. And at first that seemed to be what was happening.

But what I've seen now since, oh, two or three months ago, gasoline consumption recovered to about 84%–85% of – and when I say “recovery” I mean between the minimum and the five-year average. We can talk about that a little bit more later if you want, but that's the way I define recovery.

And what I've seen, though, is it's actually been dropping or it's staying below the maximum that it reached.

So, to me, in the past I always used to say, oh, well, diesel, that's the real barometer of the US economy. And the way this crazy pandemic has worked, I guess we're all ordering so many packages from Amazon and you name it that diesel is 134% of recovery right now. So it's above the five-year average. And it's been higher in recent weeks with the holidays and whatnot.

So if gasoline remains stalled at let's just say 80%, that's telling me something about US mobility, that it just isn't what it was for whatever reason. And that is a huge volume. I mean that is – gasoline is like 40% of the barrel. So it's a big number.

Erik: Now, it's hard to put any hard numbers in this, Art, but it seems to me like a trend that a lot of people are talking about is, hey, we've learned how to work from home with this pandemic and we don't need to go back to work. We can save money on office space. So clearly the gasoline has to do with personal vehicle transportation.

So does it ever go back to 100%? Or do we decide not to drive to work as much because we can work from home?

Art: No one knows. But I can't imagine that we're ever going to all go back to the way we were because we've found that it's not necessary. And more importantly, the companies that most people work for, why should they spend so much money on commercial office space when they only need half of it or a third of it?

The other factor though, Erik, is gasoline is the most elastic of all of these numbers, that we're really seeing in gasoline consumption a reflection of discretionary spending.

There are just limits to how much the economy can function without something like diesel or propane or some of the others on there. But gasoline is something where if an American family is hurting, hasn't worked for a while or is only working part time, even though gasoline prices are dirt cheap right now, that's a place where they can conserve. So I think there is some kind of a balance.

I think that so many of the analysts and journalists who look at these things are reasonably well-off. They at least have jobs. And they tend to forget that there are 30–40 million American

who just don't have enough money to put food on the table regularly and they're going to watch their spending. And if they don't need to drive somewhere they won't.

Erik: Art, let's move on to the headline event. When we had you on the show back last June, you first told us that you were predicting that probably by the end of 2020 we'd be seeing the beginning of a decline in US production.

And it was – since you anticipated that might begin in Q4, it was no coincidence that it was the very first day of Q4 that we had you back on. And at that point, you said you still had the same outlook but it probably will slip into Q1 of 2021. It is no accident that you're back on MacroVoices on the very first show of 2021.

Is the outlook still the same? Does it start in Q1? What kind of decline are you – boy, I saw some Twitter interactions between you and people that were talking about five and a half million barrels. That would be half of what we're producing now. That seems impossible to me.

So what is the prediction? And is it still on? And when does it happen?

Art: Well, it's happening right now, Erik. We'll move on and look at the slides. But everybody thinks that the US is producing 11 or 11.3 million barrels a day because that's what EIA says in their STEO, their short-term energy outlook reports.

And I caution people that that's an estimate. It's an estimate based on God knows what, but mostly a survey of producers.

And every month, when they issue their 914 numbers, which are the gold standard, and it's also lagged back a few months. It's always much lower. So they just released the October numbers, and they're barely above 10 million barrels a day.

So we're talking about a decline from the beginning of the year or the end of last year of almost three million barrels a day. That's a pretty healthy decline.

So **Slide 6**, Erik, I have my thought experiment – my forecast was wrong. It wasn't notionally wrong. The timing of it was premature.

And the main thing that I guess I didn't expect was there were a lot of wells that were shut in in April, May, June of 2020. I did not anticipate that they would be reactivated as quickly as they were, nor as many as there were.

It was wrong because I based it exclusively on tight-oil decline and just used a ratio to extrapolate to US production. And in retrospect I tied it too rigorously to the rig count decline, which, up until this time, had worked just perfectly fine. But obviously it didn't go forward.

So what I've done differently, which probably I should have done to begin with, hindsight is –

I've used all the wells from the four states in the Gulf of Mexico. That account for 80% of US production.

I've carefully calibrated what production decline would be if we drilled no wells, looked at all the number of producing wells, the rig count and the drilled and completed wells. And the conclusion is that the output decline has begun but the serious decline will probably not begin until late in the first quarter or early in the second quarter.

The answer, the conclusion is – I've got three cases that I'll show you and those suggest that we could reach below eight million barrels a day. It could dip a little bit below 10. Most likely is it will be somewhere in between.

Erik: Art, let's move on to **Slide 7**, where we can see this graphically. What's going on here?

Art: Erik, Slide 7. The orange line is exactly what I showed you the last time in – I think it was early October, late September. I've taken off the rig count because I can't fit the scales on with it, but that production curve is exactly what it was then. And what I'm showing in blue is the time-shifted US production rates. So we're looking at – one is tight oil the other is US.

And what you can see is up to the present, which is the end of the blue line, the correlation is actually quite good. What you also see is that the divergence between the tight oil and the US production has increased. And that's part of the reason that the forecast was wrong.

Just to be fair and honest, that's where we were, this is where we are.

But if we move on then to **Slide 8**, this is the full picture. So Slide 8, I'm showing the time-shifted US oil directed rig count in blue. And I'm showing production to date up to where it says October 2020, that's the 914 number that I mentioned.

And then beyond that are a series of dash lines. The red is EIA's forecast, which says that we'll be at about 11 million barrels a day forever with no significant increases or decreases.

The next one down is the green. That's the high case of my scenarios, where we'll get below – we'll stay about where we are, maybe go up a little bit, and then go down below 10 million barrels and climb back to 10-1/2 by the end of the year.

The base case, I think the most likely case, is we drop down to about nine.

And the low case, which is – was one of the numbers in the last time around, I still think that's – I say it's not the most likely, but my gut tells me it is – that we'll get below eight million barrels a day.

So that's the answer as I see it right now.

Erik: Let's translate this picture into what it means in terms of OPEC's ability to compensate. You get to some level and it's like, hey, it doesn't matter what OPEC does. They can turn the screws up as high as they want; they still can't make enough oil to make up for the deficit and we've got a real problem.

But, frankly, until you get to that point there's – probably for a smaller deficit it's just, hey, a chance for OPEC to make a little more money. It doesn't really change the supply/demand dynamics that much because they can easily turn up the screws.

Where do we get to a sensitivity where it really puts price pressure on because OPEC can't just make up for whatever the US is not producing?

Art: There's really two answers in your single question. The first is just based on pure supply and demand. And the answer to that is I think – as you stated – that if we go down to 10 million (round numbers) from 11 million, well, that's what OPEC just said last night that they're going to cut. So obviously that's there, right?

Now, that doesn't last forever. But certainly neither does US production decline, at least according to this view.

This view says that – I mean, the rig count has already increased (down at the bottom) from 178 to 234, I mean, that's in the books. That's not changing. And so as far as this graph goes, short of needing to shut hundreds or thousands of wells in – again, for reasons of inadequate storage or disastrously low prices – production will reach bottom and it will have to go back up some.

So in the high case scenario, I don't think it's a big deal. In the base case scenario, it's basically another three quarters of a million barrels a day, which is a bigger deal. But I also believe that OPEC has the spare capacity to cover that.

The low case, now we're getting into some dicey territory.

But I think more important is the market perception. Back on Slide #3, looking at comparative inventory, I spoke about the way that markets use price as a lever to encourage more drilling.

And oftentimes, markets will increase price even though there is no imminent supply crunch in the near term because markets know that, with the rig counts being what they are, that the price has to be higher to encourage more drilling.

And so my sense, Erik, is that – and I wasn't equivocating, but once US production disappoints the forecast, I think you're going to see the price go up pretty aggressively or the pressure for price to go up because that's not what the market is expecting.

Erik: Now, I agree with that very much. And that's kind of my personal base case is I think the market is going to be surprised that that much higher prices are likely before 2021 is out.

But let me take the opposite of this and kind of do my journalist job here of playing devil's advocate.

Look at how substantially that rig count has turned up. And, remember, this is a 13-month lag. So that's going from September to October of 2020, not 2021, where that actual uptick in the rig count occurred.

And, hey, sure, money is a little bit tight these days. But, frankly, there's lots of money being printed. What's to say that this rig count doesn't go back up to 900 in the next three months?

Art: Because it can't. It's just it doesn't happen that quickly. I mean if you believe EIA –

Erik: It went down that quickly.

Art: Well, it's real easy to let a rig go. You've already got the rig on contract. It's not that easy to get one back again, particularly when they're stacked, which is where they are right now.

So there's the physical equipment of the rig, which is stacked. And then there's the crews. These rigs don't run by themselves. They are far more automated than they were five or ten years ago, but you still need several dozen people to actually make it happen.

And the quality of those people is another issue. I drilled a well with my company and partner back in late 2015, early 2016, and we had to run off two or three of the crews because they just weren't any good. They were – the companies were going out and hiring people that were getting out of prison, for crying out loud, because at least those guys could pass a drug test. They couldn't drill a well worth anything.

So there is some substantial lags involved in just getting the rigs out there.

And then you've got the frack crews and all the support, the mud, everything else. You've got to be able to bulldoze a location. You've got to permit a well. There's a myriad of things.

But EIA says that the lag between a price signal and a rig on location is four months. And, frankly, I think that's kind of a long time. But that's what they say.

And I'm not endorsing their perspective, but it gives you some idea. Is it four months? I don't know. I think I could get a rig in two months. I don't think I could get it faster.

Erik: Well, let's pretend that you and I are wrong about an inadequacy of investment capital to support this. Let's suppose they can find the money. How quickly could the industry recover the rig count right back up to what's necessary to get us back to 12 million barrels, go up from here instead of down?

Art: Well, remember this is happening – the production behind it is now out in 2022.

Erik: Okay.

Art: This graph ends in December 2021. So the rig count that we have today, the monthly rig count for November of 234 oil-directed rig count, that's already in the books and we won't see that production until sometime towards the end of this year we're in now.

So the lag is what's important, Erik. You can do all kinds of things. The government can just say, okay, from now on the Fed is making available infinite money to the oil and gas industry.

Erik: So we can see a recovery of US production in 2022 but's impossible in 2021 is basically what you're saying.

Art: It's impossible beyond what I show on this graph.

Erik: Okay. So we're looking at production has to come down some. It's a question of how much.

Even the EIA says – now why does EIA say it only comes down – what do they say? 100,000 barrels or something. Why do they have a flat line here?

Art: That's a really good question and maybe we should ask them. But I have – I respect EIA. I'm not into EIA bashing. None of this that we're talking about, we couldn't have this conversation if it weren't for EIA. They provide me with all this information.

However, I don't think there is one geologist or geophysicist who works at EIA. I doubt there's a drilling or completion engineer. These are mostly economists and accountants. None of these guys – and I'm going to be generous here and say I don't know that there's none, but I'm betting that none of these guys has ever drilled a well or been involved with drilling a well.

So they just don't have any idea how this works. And we can argue about why or should they. And, frankly, that's irrelevant. They don't.

So what they say is that it takes two months from a rig on location to first oil production. And a lot of what they're doing here is based on that assumption.

Now, I've got data that I'll show you a little bit later in these slides – maybe we can go to that now – which shows that that is patently untrue. I mean, it's not my opinion. That's what the numbers tell you.

The numbers say that the average time between starting to drill a well and first oil production is five months. That's the weighted average for the United States. So EIA thinking it's two months is way, way short of what it ought to be, just based on data.

And I think they're completely delusional or they just don't know, in terms of how long does it take once you've got oil coming out of the ground, to begin to offset the horrendous declines that are already in progress, before you even staunch the flow and get back to zero.

And when you add that in that's where you get to the 13-month shift.

Erik: Art, since you've teased the audience, let's jump ahead for a minute to **Slide 11** and visually look at the lag that exists between getting the rig on site and actually producing and selling oil out of that well.

Art: Slide 11 has a lot of information on it. Let me start with the answer to your question.

If you look at the table, in the lower left hand corner of the slide, I have taken these four states and the offshore Gulf of Mexico, which account for 80% of US oil production, and I have used data from Enverus, which comes from the states, as to how many days it takes from beginning of drilling a well to first oil. And I show New Mexico, Oklahoma, North Dakota, federal offshore Gulf, and Texas.

I show the number of barrels in 2019 and the average days. And at the very bottom where it says weighted average well start to first oil, it's 140 days. That's the average, the weighted average by production for the United States.

Erik: And EIA says the number is 60?

Art: Yes.

Erik: Okay, I guess they're wrong.

Art: Well, they're wrong in my experience. And honestly, Erik, again, I'm not criticizing them. The only reason I did this was because I said wait a minute, that's impossible.

All the things that have to happen from the time you start drilling a well until you get it down – if you're really, really lucky, maybe the average time to get a well down is 30 days, if everything goes perfectly.

You've got to log it. You've got to test it. You've got to take the rig off. You've got to put a new one on. You've got to put pipe in the hole. You have to cement it. You have to wait for the cement to dry. You have to perforate it. You have to frack it. You have to flow the water back. You have to flow test it. You've got to do a whole bunch of stuff.

You've got to get the state out there to witness the test. And then you've got to build a pipeline to get it to the nearest pipeline.

If you can do all that in 30 days, you are smoking, man.

I've talked to a lot of people about this who have done what I have done and everybody says that's just nuts. You might be able to do it for one well, but that's not an average number. Not even close.

Erik: Art, I want to come back and talk about the decline rates also on this chart. But first, let's jump back to where we were.

So as we look again at **Slide 8**, it makes perfect sense what you're saying. Why could EIA have that flat line where you've got those big dips? Well, obviously, if they're not taking real-world lag times into account in terms of how long it takes to start producing oil after you drill the hole in the ground, obviously it's going to throw their number off. So this makes perfect sense. We see your numbers.

Let's move on to **Slide 9**. What does this chart show us?

Art: Slide 9 is, again, sort of a calibration. This just shows starkly – this is the 914 data. It shows you we are down 2.3 million barrels a day from March. That's the latest data. And this shows you what EIA thinks. EIA thinks that we're not even going to get down again to the level that we were in October.

And if you believe anything that I just showed you, you've got to shake your head and say, nah, I don't think so.

So that's all that's in this slide.

Slide 10 simply shows where the decline in production is coming from. And what you see here is that the biggest declines in absolute numbers, maybe not surprisingly, are the Gulf of Mexico and Texas, where between the two of those we've lost two million barrels a day.

Moving back to **Slide 11**, I didn't talk about the actual decline rates, which I will just for a second. In the top center graph, this is actually showing for each one of those five areas and the rest of the United States what the rate of decline is. And it is a breathtaking 42% per year annual decline rate. That shocked me, Erik. I didn't believe that. That is such a big number.

If we go on to **Slide 12**, this is the kind of chart you see in Rystad and all these kind of guys where they're going to show you every year's production decline and then stacked together by year.

The graph on the left is 2008 through 2020. And if you go and you measure those things, you will find that the current decline rate or the 2019 decline rate was 43%. Go back to 2014, the last time this happened. The decline rate back then was half. It was 22%.

So people are going to go back and they're going to look and say, well, we lost a gazillion rigs between 2014 and 2016 and production only dropped a million barrels a day.

And I'm going to say two things.

First, the decline rate was half what it is today. And second, you're declining from a much smaller base and therefore you don't need as many wells drilling to support the maintenance.

Slide 13 then puts all of those things (I hope) into perspective. Here we've got the time-shifted rig count going all the way back to 2014 in blue. And we've got the production through – I'm showing a projection into November. And you can see that the correlation between the end of 2016 and recently was quite good.

But you go look then where it says "production" on the lower left, April 2015 we went from 9.66 down to 8.53. So we only lost 1.1 million barrels a day. So people say, well, why do you think we're going to lose two or three this time around. Well, for all the reasons I showed you.

The other thing, of course, you have to take into account is that giant drop in rig count. Most of those that never came back, those were vertical rigs. They just threw them away. Those were outdated. They were never used again.

So this is not like 2013 and 2014. I guess nothing is ever quite like something in the past. But there are good reasons, data-driven reasons, to understand why the production should drop more today than it did then.

And then, really the last slide I want to say anything about is **Slide 14**. And this does the exact same thing as those previous graphs, the stacked vintage, production declines. Except this shows the number of producing wells, not the number of rigs. Same data, same four states plus Gulf of Mexico.

And what you see here is that the number of active wells in the US has fallen by 34,000 and a little bit since, August of 2019. That's a 12% drop in active wells. The last time we had a price collapse it fell by 8,800, which was only 3%.

So what's going on right now is it's just a level higher than anything we've seen before.

And if you analyze and think about this chart, what you'll understand is that most of those retired wells are the older wells. They're the blue ones. They're the previous years, which is to say before 2014. But that's a big part of the production base.

So these are all the reasons that I think that it's reasonable to expect a bigger drop than EIA's flat 11 million barrels a day and why it's reasonable that you can choose one of my cases, whichever the one you think is more reasonable.

Erik: Art, now I want to go back to our earlier conversation about price and the comparative inventory yield curve that we discussed all the way back on **Slide 3**.

And what you said at that point was based on where we are in the story right now: Hey, it's priced exactly where it's supposed to be.

If anything, the futures market – almost \$51 as we're speaking on Wednesday afternoon – is maybe a little over what you think the yield curve is telling you fair value should be.

I don't want to talk about that right now. I want to talk about, based on your projections of what's going to happen with the falloff in production and what you expect the impact of that to be on comparative inventory, what's your guess for where we go? What do you think the highest print is on WTI in terms of price before 2021 is out?

Art: The answer to your question is I think it easily could be \$65. Now that's a guess, obviously. But it's based on analogy.

If you look in Slide 3 at the red circles, those are the past price excursions from the yield curve. And, again, the yield curve is not meant to be some sort of an arithmetic regression. It's a fit. And it's fitting a lot of human behavior in there. So if you want to criticize it, go ahead. But just understand what it is.

But if you go look at those three ovals in the right hand side of the curve, those are in the last few years. Those excursions were up to 30% from the yield curve mean.

So if we are at, let's just say \$50. 30% of \$50, a 30% deviation is going to be \$65 easily.

And we've seen that. We saw, going up to the blue yield curve, you'll see above it in the white area it says "Apr–Oct 2018 Iran Sanction Optimism". We deviated off that blue yield curve clear up into the red yield curve, all based on anticipation of lost supply.

That's what the market does. When it fears that there will be inadequate supply in the future, it raises price today so that people get their butts out there and start drilling wells to cover the supply crunch down the road, whenever that is – three months, six months, nine months.

So that's what I think.

Erik: And that's exactly the scenario that I'm expecting, Art. I think what happens as we get toward the end of 2021 is you get to a scenario where that rig count will be higher than 230 or whatever it is now. But it won't be 900 or 1,000. Or certainly not 1,800 or whatever it was at the high.

And I think at some point when people say wait a minute, what do you mean that Cushing Oklahoma is almost empty again? We had this big crisis where we didn't have enough storage

capacity. Now we don't have any oil to put in the tank. Nobody thought that was coming so quickly.

And I predict that the crisis is not over yet.

We're still in the pandemic. But everybody knows by then, okay, we're getting much more stability around these vaccines. Within another year or so it really is going to be over and then where is the rig count going to come from?

And that's where if you get people panicking and saying wait a minute, we can't recover, then the price can be emotionally driven to a significant deviation away from the yield curve.

And I'm thinking toward the end of 2021 maybe into the beginning of 2022 is about where that deviation happens. And it's the combination of a brighter light at the end of the tunnel than we have now, if we're not dealing with all these mutations and other things.

But it really does look like the vaccine situation is fully in hand. And we've got comparative inventory showing us, not that we're running out of storage but rather we're running out of oil to put in those big empty storage tanks. I think that's where people start to panic.

Would you agree?

Art: I would agree, Erik. And I'd add back into – where we started this conversation, you were talking about all of the ESG-motivated shifts from oil to other more sort of soft subjects and we're kind of done with oil.

I think this is going to be a big wakeup call. And I don't say this as an oil partisan by any means. It's just I think that the world and investors are so completely ignorant of the fact that the economy runs on oil and they honestly believe they don't need oil. I mean what kind of critical thinking goes into that?

And, again, you don't have to like oil. You can hate it. But that is the reality. It is the productivity, the multiplier effect that you get from a barrel of oil that makes economic growth possible.

And right now, because things are so depressed and everybody is so bummed out and the economy is down, everybody is thinking, well, I guess we don't really need it all that much.

Wait until economic growth hits the skids, and you'll see that long before when people start freaking out about, well, where is the oil coming from?

We cannot grow an economy without oil. Not today not in the near future. Maybe we'll figure out how to do it sometime. We are nowhere near that. And if oil doesn't come back into vogue for oil investing, for purely opportunistic reasons, then I guess I don't understand human

nature. Because you can make money.

Erik: Well, I think the key to that, Art, is oil production does continue to move out of vogue in the sense that people don't want to invest in it. It's not the cool thing to do anymore. It's not ESG-friendly. It's all these things are wrong with it. So you do have capital drying up.

But at the same time, you still need oil in order to run the economy. And what that does is maybe it hurts the bottom line of the producers, the companies in the oil industry. But in terms of the price of oil, it goes up not down.

Art: And when the price of oil goes up, the share price of the companies goes up. And when the share price of the company starts going up, investors say, wow, we could make some money.

I refuse to believe that people put as much money into the oil and gas business in 2016–17 and 2018 because they thought oil was a really lovely thing. They did it because they could make money. That oil share price gave them a multiplier on WTI and they're not stupid.

If that opportunity presents itself again, particularly in a zero interest rate world, you don't think people are going to do it? I think if they don't, then they absolutely defy my understanding of human nature.

Erik: Speaking of making money, for people who want to make money trading this stuff, you offer some services at artberman.com. Tell us real quickly. We're already over time, but give us the quick rundown on what the can find there.

Art: I offer monthly subscriptions to, my read and all the data on the oil inventory report and comparative inventory. I do the same for gas. I've got a monthly newsletter and do a weekly rig count kind of thing.

They're all pretty inexpensive. And if you want to know the details, just the facts, you want to know my interpretation, it doesn't cost you very much. Go to artberman.com and sign up.

If you want the free pass, just see me on [@aeberman12](https://twitter.com/aeberman12) on Twitter. And if you can understand it all between all the apples people throw at me, most of the data is there too.

Erik: Well, Art, I can't thank you enough for another terrific interview. Patrick Ceresna and I will be back right after this message from our sponsor.