

LONG-TERM STRUCTURAL TAILWINDS IN ENERGY

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In this presentation, Jennifer Stevenson discusses investment opportunities in the energy sector and what investors can expect from energy markets moving forward. Stevenson also provides an overview of supply/demand imbalances in oil and natural gas markets and reviews macro and fundamental factors that influence supply/demand: US dollar, Middle East geopolitics, emerging market demand, infrastructure, and more.

Kim Shannon, CFA: Who brings an experienced, informed and contrarian defense to the energy sector overall. Please join me in welcoming Jennifer Stevenson and on her topic, long-term structural tailwinds in energy.

[APPLAUSE]

Jennifer Stevenson: Well, thank you everyone for getting up and making your way here for the 0800 presentation. I appreciate your time and attention, because you can't live without energy. So it's important. Because I keep thinking, when we have concerns and protests about energy usage, we should have people try living without it for a day. Somebody last night said to me, "No, no, no, like two hours would be lots because there'd be no PDAs. There'd be no water bottles. It would be tough to go anywhere."

So let's talk about what's going on in this sector, what we've lived through, because we've had a massive correction that we're still coming out of. And then what the outlook is going forward, because that's what plays into not just an energy investment thesis but a broader economic and investment financial management thesis.

So what we lived through — oil was \$100, to pick a round number, for five years. So why in February did it all of a sudden go to \$26? The biggest thing that happened to kick off this rollover in the price of oil was, demand was growing, supply was growing, the demand growth rate — not the overall amount of demand, but the growth rate — slowed down in 2014. Slowed down so that the supply growth overwhelmed the demand growth. And then that started to compound itself.

So you can see those lines on that graph diverge. So that's the fundamental supply/demand reason why oil prices started to go down. We had more supply than demand. It's a commodity. It's easy, right? There's other things, unfortunately, that affect the price of oil. So if we think about why the oil price went down so much — how much oversupply was there?

We're oversupplied, round numbers, on the worst hour of the worst day, about 3 million barrels a day on a total global consumption every day of 95. So 3 on 95. And you're thinking to yourself, that doesn't sound like enough to push oil from \$100 to \$26. So is the fundamental supply/demand the reason why oil prices went down so much? I'd say no.

So then we have to look at the other reasons. And there's a lot of them. But the big ones — currency has a lot to do with it. Everybody knows that oil, globally, is traded in US dollars. And the US dollar, especially through 2015, went through a period of rapid strengthening. And when you look at the US dollar versus the price of oil, and of course you invert them, the correlation is high over this time frame.

And it's not high all the time, because the fundamentals will win out over time, from time to time. But when there's an oversupply type of issue and you've got a strengthening in the US dollar, that will play a really significant role. So we had the US dollar dramatically affect the price of oil.

And oil as a commodity is something you can trade. You can trade it all the time. If you just look at trading of oil on the top six exchanges globally for various grades of crude, you can trade about 31 times that 95 million barrels a day of physical oil we burn up. So you can do whatever you want with this stuff. So that has an impact.

And in addition, when you look at, over the course of late 2014 into 2015, the amount of activity in the options market on oil, in particular WTI and Brent — WTI being your US quoted oil price in Cushing, Oklahoma; Brent is your globally quoted oil price in the UK North Sea. The options, the put options in particular, were dramatically skewed lower and lower and lower. And you could just watch the oil price trade.

And I would call it these little vortexes, because it went on and on and on. Oil would trade. And it would get to a point where it was close enough for the next put exercise. And it would just whip down two more dollars, down to that put exercise price, which were conveniently stacked in \$5 increments.

So you just watch it trade, trade, fade, fade, whip, and come down. Over and over again. It was predictable and painful. So that financial trading had a big impact on what we saw with the oil price as well.

So then we have to figure out — we've been through that. Where are we now? And is this a supply problem or a demand problem? So we need to look at where supply is, where demand is, and figure out where our problem is. And then we can think about what the solution is.

So if we think about demand — remember, I said this all started — that we had a reduction in the growth rate of demand, not a reduction in total demand. The only time we've had reductions in total demand in the past, if you just look at 20 years, which is the graph on the right, in the global financial crisis when basically the world ended for a period of time, we had a reduction, an actual reduction, in oil demand, which is what I've circled up there on the red bars in the purple circle.

If you look back even further, the only other time we've had an actual reduction in oil demand was after the massive price spike in the '70s. We had reduction in demand in the '80s. On top of that, in the '80s we were adding a lot of production from the North Sea, so that made that downturn particularly painful and protracted. But oil demand continues to go up year over year.

So if we look at where that oil demand comes from. US oil demand — we know that developed markets have not been the growth engine for oil demand, because we're more mature economies. We have things like fuel efficiency kicking in and moderating our demand increases. But oil demand in the US in the last three years has gone up. Last year in particular; continues this year. Why? Because gasoline's cheap.

Right? There's a big difference in how much everybody drives when gasoline is \$4 a gallon US, versus when it's \$2. So that's the chart on the left there. More miles driven, more gasoline. And when you look at — I've put the chart in here about the fuel economy, which is not to say that the fuel economy of the vehicles is going down. It's not. But when you weight the fuel economy by the type of vehicles that are sold, it's going down. Why? Because when gasoline is cheap, we got demand for horsepower, which is less efficient.

The number-one-selling vehicle in the United States is the SUV. We're going to talk about China next. Guess what the number-one-selling vehicle type is in China? Three letters, begins with an F. So more demand for fuel for driving. And we are set up globally for transportation fuel to be a liquid.

So China — people always talk about it. And it drives me bonkers. They talk about demand for oil from China being tied to GDP. And we know it's related to GDP, but you can't do straight linear math on it. You could 20 or 30 years ago, when it was all industrial demand. But now the demand for oil in China is very much consumer-centric.

You guys all know that you've watched the Asian economies, China taking the lead, moving to a more consumer society, seeing more middle class growth. And when they do that, they buy cars. And they drive them. So we see the gasoline demand fueling that increase in oil demand from China. So when you count the barrels, as opposed to saying, oh, Chinese GDP is only going to go up 6%, not 6 1/2%; that means oil demand's going down. You need to count the barrels. And when you do, it's consumer-driven gasoline. And it continues to go up.

And India is a similar situation, earlier, in the ramp-up stage. But we're still seeing that consumer edge to that demand growth. And again, from vehicles for transportation. So when you move from a tuk-tuk to a car, it's an internal combustion engine. And that increases your demand for gasoline.

I mean, the government-mandated preferred fuel for transportation in China is not diesel; it's gasoline. So if we think about demand, this price collapse that we've been through is not a demand problem. It started out that the demand growth slowed down. We let the supply growth get ahead of us. But we had the financial factors. Demand has been robust. That's all the stuff you don't get when we have our hydrocarbon-free hours.

So then we have to think about supply. And I like to compartmentalize my supply, so I put it in buckets. I have my "OPEC" bucket. I have my "North America" bucket. And then I have my "rest of the world" bucket. And the "rest of the world" bucket is the "sneaky" bucket. So don't forget the "rest of the world" bucket. There's 80 countries in the "rest of the world" bucket. And you don't read about them in the *Wall Street Journal*. So it's sneaky. We read about the US all the time. And we certainly read about OPEC all the time.

So if we talk about the US, we get data from the US on production and rig count. Rig count just means how many rigs are out in the field doing stuff. We get that every Friday. We get the production data every week, which is an econometric model. We get real production data that lags by two months. We get that every month. That's the 914 data. And when we don't drill, production doesn't go up.

Now, rig counts in the US, total rig counts. This chart is just horizontal rigs. So, horizontal rigs mean that you can drill down and actually turn the rig so it turns the bit sideways and drill horizontally. And I always use my example of Black Forest cake. It's all about that layer in the middle with the cherries in it, right? So if you drill straight down, you might get one. But if you could take your straw or your drill bit and turn sideways, you can get more cherries.

So horizontal wells are used in the type of rock that's not productive enough to justify just drilling straight down vertically. So they are the more productive rigs. But if we look at total rigs, the US, when it was running and gunning really hard, was almost running 1,900 rigs. That's vertical, directional, horizontal, gas, oil, the full deal. And at the bottom, we were under 400.

Now, last year — do you remember last year in about April? Oil prices went up. It went up to \$60. Everything was going to be great. And then it crashed again in the summer. So what happened there? So let's put aside the financial noise and the trading and the currency. Fundamentally, what happened there was, everybody was looking at these statistics. Rig count's falling off a cliff. And everybody goes, "Awesome; that means production's going to fall." But it takes time, because the nature of what we drill to provide growth — we use a lot of horizontal rigs. And we drill multiple wells in a row. We call it "pad drilling." Think of going out onto a square mile by a square mile of land. And we're going to drill 10 or 12 or 20 wells.

So we drill and we drill and we drill. And then we go back and we complete them. Fracking is a completion method. And then we tie them into a pipeline. So between the time when you put your rig to work to the time when you get your production, can be six or nine months.

The same thing happens when you take the rig out of service. OK, it's finished drilling. We're not going to do another pad. But all of those wells we drilled are getting completed and tied in. So there's a delay between taking the rigs out of service and seeing the production fall off. So that's what head-faked us last year.

So this time of year, when people see the rig count go up a teensy bit, like we're back just snuggling over 400 total rigs in service now, it's not the same impact because what we're still experiencing is the impact of all of these rigs being taken out of service. So the decline in US production is still at a rapid rate. We'll get the new 914 numbers, which will be to the end of May. I think they come out next week. And we'll probably be down over another 100,000 barrels a day of production. Even though we added 10 rigs last week, we'll see the impact of those 10 rigs in another six months. So there's that lag. And we're in this decline phase.

So the US production continues to go down. The US was almost producing at the peak, not quite, but close to 10 million barrels a day. And based on the weekly data right now, were about 8.4. So that's how much it's come off. And when we were running hard, 1,900 rigs in the field — that's all rigs, that includes gas — but 1,900 rigs, the US could add a million barrels a day of production. That's pedal to the metal, flat out. So remember that million barrels a day of production. That's an important number. But we're declining now because we're not spending the money.

So if we look at the rest of the world — so moving from our US, "North America" bucket to the "rest of the world" sneaky bucket — if you don't look at OPEC, and you don't look at the US, this is what the production profile looks like. Not surprisingly, it's going down. Because when oil is at these kind of prices, countries and companies are not spending money on it.

The interesting thing, and we're going to talk about this in a little bit when we think about the future, but these declines are not spending money today. That's what's causing this graph. But further out from today, there's a trillion dollars — trillion — not being spent on oil projects. So

again, remember that number because that doesn't affect oil today or oil production tomorrow for the rest of the world. It will affect it going forward. So that's part of the longer-term thesis.

So again, "rest of the world," outside of the US, outside of OPEC. We've had disruptions. I'm from Calgary, Alberta. We had a lot of stuff on fire. Now, it's raining so much you can't believe it. But Fort McMurray, which is in northern Alberta, is the town that provides a lot of labor and service to the oil sands operations. It's a town of 90,000 people. And the entire town got evacuated.

I had a friend of mine in New York. And I said, "What would this be like if this happened in New York?" And this is him; this is not me. But he said, "If this had happened in New Jersey, there'd be 60,000 people dead." I don't know. There was nobody injured or killed. There was one traffic accident with two fatalities. So it's quite Canadian. But this impacted about 1.3 million barrels a day of production for a couple of months. So we even have outages in the developed world in our "rest of the world" numbers. There's your evacuation route. That's brave.

So the last bucket on the supply side is OPEC. It's a very exciting bucket. Now, there is this view out there that OPEC has endless lakes of oil and can tap it very easily, very quickly. Now, the interesting thing is that Saudi Arabia is producing at the maximum that they have ever produced at, which is about 10 and 1/2 million barrels a day.

We have seen growth from OPEC countries. We've seen growth from Iran. The sanctions were lifted. They were able to start producing again. They were also able to sell product that they had stored. A lot of that was something we call "condensate," which is super, super light oil, not as useful as a refinery feedstock.

So it sells when it's parked in a ship off the coast of Iran. It sells for a lower price. But it does go into the volume. So you saw those volumes. Iraq grew production from projects that were underway before the downturn. So both the things — those countries look like they're stabilized and the growth rate will slow down.

The graph on the right there is what another friend of mine calls the OPEC "Fragile Five," includes countries like Nigeria and Venezuela, which are having significant issues politically, let alone with other surface issues, and are seeing their production decline. So Saudi Arabia, I'm going to talk about them, is the biggest producer within OPEC. That makes them the most important data that we watch.

But there are OPEC members who have serious production issues, like the "Fragile Five," places like Angola, too. And places like Iraq and Iran, I don't expect the growth rate to be what it was, because we've seen it. So Saudi Arabia, changes over there in key people. We have a new king, King Salman. His number two person in charge is his number one son, Mohammed bin Salman, who's been quite visible over time in the media since the change in power over there.

They just put out their Saudi Arabia Vision 2030. Did you have a question? OK. They just put out their Saudi Arabia Vision 2030 that talked about diversification of their economy, expanding of their ability to allow investment to become broader investors using Saudi Aramco as a global industrial conglomerate, using their sovereign wealth fund as having it become the biggest sovereign wealth fund globally and having it invest more globally. So when you read through that document, it's a very broad-ranging document that talks about diversifying their economy so that it's not just on oil.

So when you see people in the media talking about Saudi Arabia's going to flood the world with oil and crush everybody else and take all the market share, that's not their vision. When you look back at the OPEC meetings over the last couple of years, what Minister Al-Naimi, who was the previous Saudi oil minister, said about a year and a half ago is, we are going to let the oil market balance itself. We're not going to be the guys that take production off the market when we saw that demand growth rate slowing down. We're not going to be the guys taking that production off the market. Because if you roll that strategy out, it just hurts them and benefits everybody else over time. So they said, we're going to let the market balance itself. Supply and demand. This is a commodity.

We know about all the financial noise. And their strategy has worked, because supply is down and it was never a demand problem. Yeah, the growth rate slowed down. But the demand continues to grow.

Now, the new Saudi oil minister has been with Saudi Aramco since 1979 until 2015. He was the CEO for the last eight years or so. And it's been really noticeable, the OPEC meetings — not the actual meetings themselves, but all the press conferences before and after — are all webcast on the OPEC website.

So it's interesting just listening to the chatter before and after the meetings and seeing the difference in tone at the OPEC meetings with the new minister coming in, because he's obviously making a very concerted effort to be friendly and play nice. And it was reflected in the comments that you got from the other countries' ministers coming out of the last meeting.

Now, they didn't do anything. But again, there's nothing really to be done because the supply/demand is rebalancing the market. It was just really, really educational to see that change in tone from Mr. Falih. So I think that's an important development going forward as well.

So other OPEC countries — today was the first day in a long time that we haven't seen something be destroyed in Nigeria. So the Niger Delta Avengers — I found that cool picture on the website — have been very, very busy and quite effective. Nigerian production is down a lot; affects the government, affects people like Shell.

But we've got outages. We talked about the outages from Canada. We've got outages from Nigeria. We've got disruptions still occurring in Libya. It was getting better. Now it's not. Venezuela is a

problem. Venezuela production won't go to zero, because the Chinese will continue to need to receive the oil that they deserve because they loaned the country money, but Nigeria production is down at multi-decade lows. Venezuela produces 1.6 million barrels a day.

We don't have spare capacity anywhere. We have inventories, which we we'll talk about, that can act like spare capacity for a while, but if Venezuela were to go all of a sudden to nothing or to just what they give to China, which is less than half of that, that would be a serious impact on oil supply and therefore oil price. So these outages and the precarious nature of these countries is not to be underestimated.

So this is what we've lived through — that supply being above demand, both of them growing, but supply winning, pushing down on price, and those excess barrels building up an inventory. So there's two things that have to rebalance. We have to rebalance that daily production, and we've done that, and you can see that. You can actually tangibly count it, because when demand is greater than supply, you will draw inventories. And we have drawn inventories globally, including in the United States, for the last nine weeks. So that's stage one. Demand is higher than supply — check.

Stage two is that we need to start to draw down the inventories that we built up while supply was over demand. That will take longer than having the supply fall off, and you saw how long it took for the supply/demand to rebalance. So when we look at inventories, we have inventories everywhere in the world that uses oil — more in some places than others — but the biggest inventory and storage capability globally is in the United States. The world's largest refining complex is the US Gulf Coast, and there is a lot of oil storage there. There's a lot of oil storage in Cushing, Oklahoma, and it's tracked. So we can see those numbers, and the crazy financial markets can trade around them every week, but the interesting thing is, because you can track it, you know what it's doing, and the US has been the repository of a lot of this excess global supply.

So we're starting to whittle that down, but it will take time, which is one of the reasons why this oil price recovery — I don't expect it to shoot the lights out, because we do have this inventory that we need to draw down, but it's underway. So I think that's a really important data point when you're thinking about energy longer term.

So when we think about supply longer term, when the US was running and gunning, million barrels a day of growth — million barrels a day of growth from the United States full on. Global oil demand growth this year looks to be about 1.3. Last year it was 1.7, but oil was super cheap. 1.3 and 1. So OK, maybe the US can feed demand growth, but of our other 95 — it's closer to 96 now, but of that other 95 million barrels a day of oil that we burn up globally — that declines every year by 5%, 6%, 7%. So pick a round number and say we need another 5 or 6 million barrels a day just to keep that flat, because we're using all of that up.

So if the US feeds the growth, where do we get the other stuff? From big rest of the world — remember the sneaky bucket? The rest of the world production. Now, the issue with that is that those projects are not fast like the US shale. They're big, and they're long term. So the ones that were underway two years ago, most of them — not all but most of them — for example, some of the oil sands projects in Canada — are still underway. So they will start their production in another year or two, because you want to pick a time frame. You say three to seven years, maybe settle on five, to get those big projects actually producing, but we have canceled, or delayed, or deferred \$1 trillion worth of projects in the future.

So then you think to yourself, OK, well I got my growth covered. I've got my million barrels a day someday eventually again from the US, hopefully, if they go hard. I still have my million barrels a day of growth, which is not a high growth rate when you burn up 95, right? One on ninety-five, that's a pretty low growth rate. That's fine. Where am I going to get the other five? This is tough. This is tough when we've canceled, delayed, or deferred \$1 trillion worth of projects. There's millions and millions of barrels a day of production that are not gone. They're just not going to come to market in the next three or four years. So it gets a little tricky, and you start to think, ugh, I think these oil prices are going to go up again.

So natural gas — I've got a whole slide on natural gas. Not that it's not an important commodity. It is. It's just in still an oversupply situation. We live the oversupply dream in North America in natural gas in the last few years. Great drilling rates. Great productivity. Demand couldn't keep up. What happened to the price? Whoosh.

And then liquefied natural gas, LNG, which is just the same natural gas molecule that run your furnace with if you're natural gas heated at home. If you cool it enough, that gas will turn into a liquid, and that makes it more efficient to transport. So that's why liquefied natural gas is the product that gets transported globally, but because gas prices were robust globally, there were a lot of projects build over the last 10 years, and guess what? There's a lot of supply, which means that global gas prices, while they're higher than the prices in North America, sure, but the global gas prices are weak, because there was a lot of liquefied natural gas, LNG, supply.

So the market is literally awash in natural gas. So again, that will take some time to sort itself out, and if you think, "Well, yeah, but gas in the US is \$3, and gas in England is \$6; can't we just send our LNG?" Because we can export LNG from the US. The Cheniere project is exporting. Can't we just send our gas there? The problem is, it costs money to turn that natural gas into a liquid in the United States, put it in a ship, send it across the Atlantic, re-gasify it, and send it to the customer. So you're kind of breaking even.

So that's why the whole gas market is going to take longer, but as a consumer, or as an industry, if you think about natural gas being a long-term bridge fuel between oil and something renewable,

it's awesome to have lots. It's just, right now, it's a more difficult investment. So you have to be really narrowly targeted on it.

So if we look at energy long term and what the opportunities are, this is data you've heard over and over again, and it actually still rings true. What drives long-term energy demand growth? People and income. So if you think about people and you look at what Exxon — Exxon, and BP, and Statoil — all the huge oil companies have really great economics departments that do a lot of detailed work and come up with — and they talk about renewables, and they talk about gas. They [talk] about electricity, coal, oil, but when — this is Exxon data, but when Exxon looks at their population growth forecasts, this report goes out to 2040. The population growth would be the equivalent numbers of adding China, and the United States, and Indonesia — just numbers. That's a lot of people.

GDP — the GDP equivalent, same forecast out to 2040, would be like adding the economy of the US five times over. So I think they might need a little bit of energy. So where are we going to get that from?

If you look at simple, grassroots energy demand, in 1985, one household out of every 50 in China had a fridge. Now it's 40. You think about, OK — fridge, computer, car, and there's a lot of people, which is why you see these graphs go up and to the right. And it's not that every person or every item consumes a ton of energy, but they all consume a little wee bit times a lot of people. And it makes an impact on the demand for oil and for hydrocarbons in particular.

So urbanization is the other big trend. You use more energy when you live in a city than when you live out in something more rural. So then that's nothing new, but it does continue to give us that long-term tailwind. So you see that energy demand coming from emerging markets, coming for hydrocarbons, and the interesting thing is that the trend that we have seen is that developed markets like us have been flatline or reducing energy demand, because we have — energy being hydrocarbons — because we have more renewables, because we're more fuel efficient, but it's interesting. The last couple of years, the price has made our demand go up. So the Economics 101 still works.

So, big-picture energy demand — yes, renewables will grow, and we're going to talk about electric cars because they're so cool. But renewable demand will grow, but it doesn't take the place of hydrocarbons. The growth rate in renewables is massive compared to the growth rate in hydrocarbons, but it's coming off of a lower base. So that will continue, and we're not replacing the internal combustion engine with the electric car in the markets that are using the oil for transportation, like the emerging markets.

So this is your picture. Again, this is Exxon data. The BP data is very, very similar. So is the Statoil data, but that's your longer-term view of the demand for different forms of energy driven by urbanization, population growth, income growth, and transportation, which is not something

people generally think of. You think of just economic growth and industrialization, but transportation, which comes, again, right back to the consumer, is a real focus. So more people and more cars, and the cars are being driven.

I mean, if any of you have traveled to China over time, you can notice the difference and go talk to the car dealership individuals — you can notice the difference in the social use of the car. When you want to demonstrate that you have received or achieved some success level, you have a car. Now, we talk in North America about, oh, the kids are all Ubering, and they don't buy cars, and they don't get their driver's licenses. That's not the trend in emerging markets, in emerging markets like China or even India. So it's interesting just to bear that in mind. That's why it's always good to go travel around and see what's happening in other places.

So I get asked the question a lot — because the Tesla sales surprised everyone — and that is a good-looking car. But will electric vehicles eclipse the use of oil, and we just don't need oil and gasoline anymore, and we just don't need it? So if you go crazy and you start extrapolating electric vehicle sales numbers, which are low-single-digit percent of the vehicle fleet today, but say it goes to 10 in like 15 years, gasoline demand would go down by 1%. OK, so that's not going to have a devastating impact on the oil industry, but what it does do is make you think about the opportunities that that business can create. And even if you think about 20% of all cars that are sold — say, look out farther. Say, by 2050, if 20% of those cars are sold are electric — not electric/gasoline combo, but pure electric — then we're going to cap out global oil demand by 2050 at 105 million barrels a day. I worry how we get the supply to get there in the first place, so these electric vehicles and combo electric/gasoline hybrids better hurry up.

The other thing to think about from an opportunity side is the whole infrastructure side of what we need to run this part of the cycle for transportation — so if you're driving from your home to your mom's, or your own, or your buddy's lake cottage and you have to stop and charge, is there a lineup? That would be horrible. And is it a supercharging station that can charge you up in 40 minutes, or is it one of those cheaper, slower ones, and it takes hours? And is your lifestyle one that you can build that time in, or is your friend's house set up or cottage set up that you can get there and all five of you that show up in your five vehicles can plug them all in and charge?

So you just think about that infrastructure. We have the technology. It's improving. The cost is coming down. It's getting more efficient. It will come over time. So I think there are some opportunities there, but when you think about impacts on transportation fuel demand, which impacts the oil business, it's a protracted impact, and I think we need the help to make sure that oil prices don't run away on us too much. So, all in favor of electric vehicles. I don't have any power where I park where I go for the summer, so I can't drive one to the lake, because I'll never get home because I can't charge it.

So I do think we should make people appreciate oil by having a hydrocarbon-free day or a hydrocarbon-free hour, which will make us live like my Neanderthal friends here on the picture. But when

you think about energy, and you think about it as an investment, and you think about the longer-term opportunities and challenges for economies with energy, we've got that tailwind from things that we've always known about — population growth, urbanization, increasing incomes — and to feed that, it is emerging market focused, and to feed that, we need energy. We need renewable energy. We need natural gas, and we definitely need oil. So I do think there's opportunities there.

We've walked through where we are on the rebalance with supply versus demand. Demand is now ahead of supply, so we're drawing down those inventories. That will take some time. So that will be good for economies, but it will also create some more noise because it's easy for people to forget the financial noise when oil prices are going up. Everybody was really happy when oil went from 26 up to 50, and now that it's bouncing around between 43 and 47, everybody is worried. But that will be the norm, and you'll see companies hedge when oil gets above \$50 again. They hedged last time.

The Americans are better at that than the Canadian companies. I hope the Canadians are listening. Do some more hedging, but it guarantees their capital program, but that takes the acceleration off the rate of increase and the price of oil — which, again, is a good thing, because when you think about economic growth, what can hinder it is when energy prices get too high. So energy prices are going up, but I think the pace — barring any kind of catastrophic event on the supply side, I think the pace will be reasonable.

I get asked about Brexit and what does that do for oil prices. It was an awesome buying opportunity in some of the big European companies I like when the results came in, but when you think about what it does, you can think, well, OK, maybe the European demand for energy slows down a bit. Well, the growth rates for energy aren't driven by Europe anyway, so I don't view that as being anything material. If Europe gets really disastrously weak economically, then you could paint a scenario that's more negative and say, well, maybe the Chinese then aren't trading as many goods to ship to Europe to be purchased by European consumers. OK, we haven't seen that yet, but this will be a long process to work through.

I think the biggest impact — and we've seen it already — is that it causes the US dollar to go up, which, again, impacts the price of oil because it's priced in US dollars, but remember — I mean, I showed you a chart at the beginning that just has that correlation of the trade-weighted US dollar inversely to the price of oil, but remember that that is a really high correlation in points in time. And when you see that correlation start to fade is when the fundamentals on oil become more impactful, and the fundamentals on oil become more and more impactful the more we rebalance.

So we're through phase one of the rebalance with that daily production versus demand, and now we're chewing through inventories. So I expect to see that USD oil price correlation fade over time, which, again, gives us more support for oil prices. So that's the long-term structural tailwind for energy, and I'm happy to take any questions that you've got. Kim's got one. That always scares me.

Kim Shannon, CFA: Terrific. Thank you. You did an excellent job of giving us a great landscape on what's happening in the energy industry. Just touching on recent news, Trump has named Harold Hamm energy secretary. Can you talk about what that might mean for investors in the energy space?

Jennifer Stevenson: Yeah, if that comes to pass — and that was chatter this morning for sure. So Mr. Hamm is the founder and CEO of an oil company called Continental Resources, and their focus was originally always in the Bakken oil play, which is in North Dakota, and they've added some more activity more recently in areas we call the SCOOP and STACK in Oklahoma. A very successful company, extremely experienced individual — I think having somebody like that as your adviser on energy would be positive for the energy business, because then you'd have correct, thoughtful views. And he certainly would be, in my view, in favor of fracking, because that's how they get the oil out of the place that they're in.

Kim Shannon, CFA: Terrific. And to what degree does an energy analyst have to be a political economy analyst, as well?

Jennifer Stevenson: Yeah, I mean, there's so much that influences the fundamental supply and demand of oil that the politics of that are really important. I mean, I've spent a lot of time figuring out who the best people, in my opinion, are that follow, and know, and understand that stuff, and I talk to them regularly. And that's definitely a meaningful part of it, but the other side is, then you have to try and figure out the black box of sentiment in the market, which these days is influenced by so many crazy tangential things; it's difficult. But I end up spending a lot of time, as well, talking to trading desks of the firms that I used to trade, and just seeing what the chatter is, and then trying to filter that and think, OK, well, what does that mean for funds flows? And what does that mean then for share prices?

Because, I mean, we saw part of a run in energy stocks was because there was a big funds flow trade coming out of health care, and it went into energy. So you need to be aware of all these things, whether it's politics or fund flows, financial implications to then make a decision on your timing of your trading or investing activity. And then that is based on the fundamentals.

Kim Shannon, CFA: There's a question in the back of the room here.

Audience: Part of it seems like the price of solar is falling almost as fast as computers, and do you see a point in time where solar-infused hydrogen will be able to influence the price of oil?

Jennifer Stevenson: Yeah, so you're right. The price of solar is coming down dramatically, and I think the biggest buildout on that is more for residential heat, and maybe that translates into things like hot water tanks and stuff as well. It's more difficult for transportation. I mean, you're not going to wait for your solar plane to recharge, but as far as using solar power to create

hydrogen, like your example, I definitely think it comes. I just think the time frame is more protracted, because if you think about the whole infrastructure that's required for delivery of that — I mean, Ballard Power was making hydrogen cells in Canada 20 years ago, but I think it will come. I think the technology pace is more rapid, but will it come soon enough to impact in our lifetime? Our investment thesis on the margin, probably, but in the entirety, no. No. Yep?

Audience: So I pretty much agree with you on long-term views on supply dynamics and also long-term views on demand, but I'm not sure if I agree with you on the next few years, because typically what happens in the commodity cycle is, you go to excesses one way or the other. You don't look for oil. It's expensive. We look for it, but not too much. Prices stay low for a few years.

Also, it's a pretty common phrase now, it's all about the "new normal" — lower gross, lower growth — that this could, something that we deal with by the next few years. For instance, something to compare it to is like trade, because trade is something that's virtually always grown for the last few decades, but the growth in trade has ground to a halt. And there's a variety of reasons why that's taken place. So I think that's an example of where we could see slower demand, insuring, and all sorts of things that are taking place now, trying to be more efficient there.

A couple other points are that the price of oil in other countries — especially emerging market countries — we talk about them being where there's demand growth, but with their currency getting killed, they're paying higher prices in their own currencies than people in the United States are paying. So I was just double-checking this.

Jennifer Stevenson: Yeah, no, they are. That's true, because the price is still in US dollars. Then on top of that, because the financial situation of a number of those emerging market countries is weak, a lot of the subsidies that had previously been in place for consumers to purchase oil products has come off. Yeah.

Audience: As an example, India's currency is off 40% of its peak in 2007, so you're paying for oil.

Jennifer Stevenson: And it's oil demand year to date's up 16%.

Audience: And year to date — I don't know exactly what's going on, per se, in India, but that could seem a little bit extreme.

Jennifer Stevenson: Well, when you look at the gasoline demand numbers, they're up. So yes, the prices are higher, but we haven't reached the point yet where those higher prices have evidenced themselves in reduced demand or even in reduced demand growth rates. And globally — I mean, I agree with you. Global demand or trade could slow down, but when you think about the oil demand growth rate, it's tiny. It, guess I'm taking a round number. It's a million barrels a day on 95. So, I mean, say that falls in half. Then it's half a million barrels a day.

Audience: My one other point is, I do think it's going to be slow. And one other point on that is when we're in a time of searching for commodities, we use a lot of energy looking for energy, so infrastructure and development, mining and filling out mines, whatever like that. That's usually very energy intensive.

Jennifer Stevenson: Yeah, mining has really impacted the demand for diesel. Yeah. Yeah, and then the difference with energy now — not the big offshore place, because that is still, your example — that's actually still exploration, but when you look at the North American example and how that's grown, the risk profile is totally different now because now it's more manufacturing. So we drill these pads. We do the horizontal well programs as opposed to going out and looking for, is there a reservoir over there? I mean, now we're drilling a rock that is unproductive with a vertical well, which is why it has to be horizontally drilled and fracked. So it is a different character of it, but all of that can cost more money even today with, prices are lower. Efficiency is better. We can't get oil out of the ground and make money with oil at \$20. And the first 12 years of my career, oil was \$20; and if it went crazy, it was \$28 or \$22.

So the baseline has moved up. I mean, we were at a point where the back end of the forward curves all seemed to be anchored at 85, and now I think we're moving into a place where maybe they get anchored — the back end of the curves — at 60 or 65, which is more of your long-term global supply cost that gives a return to the companies and countries that are doing the exploration and the capital development.

Audience: One little question, one with a slightly broader scope. The little one is that, in 2014, you stressed that demand growth slowed quite a bit. What was it mostly behind that? The other question is that, from an investment standpoint, do you believe that there is going to be more interesting returns to be made in the new segment of energy production, the renewables, and so on? Or in the traditional fossil fuel side of supply looking out 10, 20 years?

Jennifer Stevenson: Yeah, so your first short question — what caused that growth scare in 2014? It was more of a global economic growth scare. So I mean, we saw it in a variety of industries, and it was about three months in duration, and then things went back on track. So I mean, there wasn't any one data point that you could really point to as a catalyst. And then as far as what's a better investment long term — standard old-school hydrocarbons or renewables? I think there will be a lot of attention and a lot of flash in the renewable space, and they might be good stocks for a while. It doesn't mean that they're good investments long term.

So I just, for me — and I'm trying not to sound like a biased “oil blowing gas” person, but it's really exciting technology, but I don't want to get sucked into an investment hype and not invest in companies that make money. So I think there will be some, but I think it will take time for them to prove themselves. I mean, you've seen what's happened to the solar stocks in the last 12 months. I mean, part of that was the financial structure, but they went from being darlings — and

I'm generalizing — to a disaster. So I just think, for me, it will just take time to find the ones that have got a truly revolutionary, sustainable, global, technological advantage, but I think there will be some for sure.

Yeah, I mean I'm looking at that. I've got my clients that ask me that, and I say, yeah, I'm looking. I just don't want to put you in one that's risky or crummy. So I need more time, more selection. At the back there; yeah?

Audience: You only briefly touched on natural gas, but you've seen the exports since Mexico increase. You have LNG coming on some down there. A lot of that is contracted out. Imports from Canada have decreased, and you've seen this switch from coal to natural gas in a generation within the US. So even though you have this supply kind of flatlining and the associated gases coming from horizontal drilling, that's in decline. Demand has been relatively robust, so what's your outlook for natural gas for mid to long term?

Jennifer Stevenson: I think natural gas — globally, we need to get through this LNG oversupply phase, and the volumes are contracted, but they're not all contracted with end users. So when they're contracted with markers, those volumes still need to find a home. So that, I think, just puts some pressure on the global market. And when you look at North America — yeah, we've got increasing exports to Mexico, which most of them are pipes, so that's great; and the Canadian production is down, but we still ship a lot down into the US. The LNG exports out of the US — they'll still go, but the growth rate will be lower.

When you look at natural gas, I worry — I mean, the demand is robust because it's been really hot. And it sounds really trite, but natural gas demand is significantly influenced by the weather. If it's cold in the winter, if it's hot in the summer, you need more heat or you need more electricity for air conditioning, so that will impact it. And this summer, that's been really helpful because it's been really hot, and those of you here in Chicago know it's really hot.

So the thing with natural gas is, longer term, I like it. I think the demand is going up. I think it is a fuel that, as more countries focus on the environmental side of the energy business, it's got all the cleaner-burning attributes, even as a bridge fuel for a number of decades. In North America, I want to get through to after the storage refill season, because at least — so natural gas, we produce it all year. We use more of it in the winter and the summer, and in the intervening periods, the spring and the fall, we put the natural gas in storage, underground salt cavern storage.

And storage, thankfully, can only get full. Full is full. So come November 1, I think storage will be full, because we've got about, what, 500 Bcf extra in there still, despite the hot summer. So once we're through that, then it's level playing field again, and the productivity out of the US Northeast has been dramatic. And the wells they drill in the Marcellus and the Utica are really, really productive. There's pipeline space coming on there, so that production will probably continue to grow.

The associated gas that you mentioned — when you produce an oil well — just to explain what that is, because you obviously know — when you produce an oil well, you also get some natural gas with it, and we call it associated gas. So when we produce less oil — I showed you the charts — you get less gas. So that is contributing to lower gas production, but the US Northeast is awesome. So that's overwhelmed any of that reduction. The rig count for gas rigs has come off dramatically, and the production is up because the wells are super productive, and they're adding the pipeline capacity.

So demand is going up. There's some weather fluctuation. We have coal retirements. It's never as fast as we think it's going to be in the United States, but that's still a bit of a tailwind for gas. Less rigs drilling is still good. I think gas is a great fuel longer term. I just don't — I just don't see the price going crazy, which is good, because that will help give it a broader market appeal on a longer-term basis. So I do like gas. I just think from a commodity price impact standpoint, it's more muted than oil is, say, over the next three years, but it's definitely a good feel-good thing to look at for investment. Yeah?

Ron Rimkus, CFA: I got a couple questions. The first one is from our live-stream audience. Could you clarify what your comments were about the future oil demand growth? One of the comments here suggested that you might have said it was a decline of 5% to 6% from the current 95 million barrels a day.

Jennifer Stevenson: No, so the 5% or 6% decline comment — just to clarify what that is. The 95 million barrels a day of oil that we produce, that's the natural decline rate of that oil production. The demand for oil is growing this year at about 1.3 million barrels a day over the course of the year.

Ron Rimkus, CFA: OK, thanks for the clarification. And then the second question is from me, which is: Can you comment about the marginal cost of production, where it is today, and where you see that going in the next, say, three years?

Jennifer Stevenson: Yeah, so that's a loaded question — what's the marginal cost of production — because companies are really good at telling you numbers that are really not all in. So if you want to bookend it, people say, well, Saudi Arabia can produce oil for \$13. Yeah, they can get it out of the ground for \$13, but about 85% of their GDP comes from producing oil. So if they're going to balance all their payment obligations, they need to sell it for \$80 or \$100. So what's their cost? Tricky.

Oil sands projects — you hear numbers thrown around. Just to throw out another example — and I will answer the question. Oil sands projects — people say, well, it's \$85. It's \$80. If you are going to build a greenfield oil sands mine, you will want to be able to model an oil price of \$65, \$75, \$85 depending on what you're modeling for cost, what your cost of capital is for a greenfield

standing-start oil sands project. For Suncor, just to pick on them, to produce the oil from their oil sands mine costs them \$23. And their maintenance capex to keep that 40-year reserve life, keep the production flat — it's about another \$5.

So what's their marginal cost of production? Different whether it's an operating project, a brown-field project, greenfield project. Are you putting in your corporate costs? Or are you just putting in your field costs? When you look at globally what our prices need to be to add enough supply to offset declines and meet demand, I think long-term prices need to be in the \$60 range. So that would be my answer to what is the marginal cost of supply. That price will give you, ideally, enough corporate cash flow to invest, make a return, and provide the supply, and offset decline, and meet demand. There was a question in the back there — yeah?

Audience: I have two questions, as well. One is related to natural gas and two things that sort of impact the drilling there. One is the liquids that also come out of the ground, and that was kind of keeping drilling going for a little while. And I'm wondering, so what impact does that have on drilling natural gas today? And also, what they used to do is burn off the extra natural gas to get the liquids, but now I think there's regulations that kind of restrict that.

Jennifer Stevenson: Yeah, so on the flaring of the natural gas, it depends what state you're in whether it's allowed. Any of the states that used to allow it have regulations in place that are either underway to disallow it, or you cannot do it anymore. So we won't be flaring. I mean, you guys saw those on the Internet, right? I mean, the North Dakota from space, right? That's flaring natural gas.

So there are regulations in North Dakota to stop that, and natural gas liquids — so the liquids that you mentioned that come out with the natural gas — so natural gas liquids, or NGLs, are stuff that comes out with the natural gas. You get some of them with oil, too, but it's stuff like propane, butane, that stuff I mentioned called condensate, which is super-light oil — which actually in Alberta is more valuable than oil because we mix that stuff with the heavier oil that looks more like molasses so that it can flow in a pipeline.

So all of those NGL products — if you hear people talk about, we're going to drill a liquids-rich natural gas well, that means it's got NGLs in with the natural gas. If it's just natural gas, we call it a dry natural gas well, which is a good thing as opposed to dry well, which has no hydrocarbon, which is a bad thing. We need a whole terminology course in this industry, but when oil was high priced, natural gas liquids, which are related to oil — things like propane and butane — they're inputs for the petrochemical business. Propane is used for heating, crop drying, stuff like that. Butane is used for fuel blending to increase octane content in gasoline.

Those products were super valuable when oil prices were high. When oil prices collapsed, those products were not super valuable. So that did impact the character of what was drilled for gas, but

it was still enough of an economic uplift because gas prices were even lower that it still made those wells worthwhile, and different wells, different projects have different compositions of what's in it. So you saw the drilling skew more to wells that had more condensate, because that would be the highest-value natural gas liquid, and less ethane, which was the stuff that turned out to be so cheap that guys would just put it in with the natural gas and sell it for that, right?

We call that ethane rejection. It's so cheap, we're not going to pay the money to make it into its own product. We're going to put as much of it as we can in the pipeline and sell it with gas, because it's not worth enough. So yeah, you've seen that composition change, and as oil prices have improved somewhat, that impacts the drilling for those kind of wells and makes them more economic than, say, the dry gas wells, because their NGL products are worth more money. Yeah?

Audience: Kind of briefly, you comment on the productivity of US rigs. And also, how fast do you think the US is going to bring back the backlog of the rigs? And what are the implications for the price and supply?

Jennifer Stevenson: Yeah, so the productivity of the rigs — that's a really good point, because if you think about how an oil company reacts to low prices, what are they going to do? They're going to spend less money, but what are they going to spend their money on? They're going to spend it on the best rocks they have. So productive zones, infrastructure is already there. They're going to use the rig with the best crude that they have. So not only are oil companies learning about these reservoirs, the shale plays that they're drilling, and that's improving efficiency, but when you have restricted capital, you are drilling your best stuff. I mean, people call it high grading.

So the efficiency has improved for two reasons. One is the high grading, and one is just that we learn over time how to complete this part of this reservoir in this state, and it's that kind of specific. So you have seen the efficiency improve, and then when you think about the other part of your question, which was the backlog of rigs coming back on, it's going to be totally dependent on commodity price, but it's going to be measured because the companies have been through the wringer, and they will make sure that they are hedged to a much larger degree before they deploy capital. So they know they've got that cash coming in, and they still need to repair their balance sheets.

So every incremental dollar of new cash flow doesn't go out to the field. So it will be a measured rollout of further equipment. So I still think the service sector, because there is so much equipment that's not utilized, there's not any pricing power, so to speak, in the service sector for some period of time, because the equipment needs to get utilized before you have any ability to increase the price on it. Who was next?

Kim Shannon, CFA: Last question, please.

Jennifer Stevenson: You didn't ask one yet.

Audience: Simple, pretty straightforward question. Do you see — barring an unforeseen geopolitical shock, do you see oil coming back to \$100 a barrel? And if so, would you expect any demand destruction from that, even if it's future demand that's being destructive instead of current demand?

Jennifer Stevenson: I think \$100 is a push. If it went to \$100, for sure you'd see demand destruction, but I just think we've got enough inventory to work through. We've got slow enough demand growth thankfully that a push to \$100 seems pretty aggressive to me, say, over a five-year time frame. \$60, \$80 is not out of the question, but \$100 starts to get — that has an impact on demand growth for sure.

Kim Shannon, CFA: Terrific. Well, thank you very much —

Jennifer Stevenson: Thank you.

Kim Shannon, CFA: — Jennifer. You were so informative and engaging. You really — I think we could have sat here for hours asking questions. So thank you to our live audience for joining us for this session. You may access the recording online after the conference. Other sessions from this conference will be available as webcasts and podcasts in the coming months on the CFAInstitute.org. We hope is that in the future, you can consider joining us, spending four days of your time with 100 or so of your colleagues in the industry, and socializing and spending time with engaging and informative speakers like Jennifer and, yesterday, Professor Altman. Thank you very much.

[APPLAUSE]