

# National Oilwell Varco, Inc.

## Analyst Day 2018

**KIRK SHELTON**  
President, Completion & Production Solutions

[Video plays]

Unidentified Speaker: In a world where time is money, things work better when they work as one. A millimeter here, a half second there. He's concerned about every little detail and how he can get more from less.

He's constantly connected. Seamlessly integrated. Because in the end, it isn't about just finishing the race. It's about finishing first. He's the extractor, the refiner, the maximizer. He is the crew chief. This is Completion and Production Solutions.

[Video ends]

Wow, if that didn't get you excited about oilfield equipment, I think you're in the wrong room. Down the hall on the left is the boring stuff. So, as you just learned, we're the finisher. We're the maximizer. Once the well has been drilled, that's when the businesses within Completion & Production Solutions go to work. We help the customer complete the well and then we help the customer produce the well.

We're going to look at the businesses in this segment today from three viewpoints. We're going to look at it from completions. We're going to look at it from onshore production. And we're going to look at it from offshore production. You'll see how each one of our businesses participates in these various phases of the well's life.

Our vision is to provide safe, efficient, innovative solutions to maximize the flow of hydrocarbons and discrete production streams everywhere our customers operate. Safety underlies everything we do, for ourselves, for our own employees and for our customers. We want to help our customer get as much product as he possibly can. And then it's our job to make it pipeline quality.

Since we're in a room full of analysts, I guess we have to have the obligatory financial slides and then we'll move on to the fun stuff. Everyone in the room knows that the last two or three years have been somewhat painful.

You've heard Joe and Isaac both talk about it. But, as you can see, we're on the mend. If you look at where we are year-to-date in 2018 - and this is through quarters - you can see that we're on a growth trajectory versus our trough in 2016.

The interesting thing about that is we've done that without the benefits of our offshore businesses starting to recover yet. As Joe pointed out earlier, his business had a lot of backlog coming into the downturn, so it kind of insulated him in the early years.

Well, we had offshore businesses that had the same thing and we are still waiting on those businesses to recover. In late 2016, we saw our land-based businesses start to heal a bit. The market started to get better.

These are businesses that were levered to North American shale. They're businesses that were levered to the Middle East. In 2018, we saw our offshore conductor pipe business start to recover. But if you look at the line, you can see that even as of this year our offshore business has remained pretty flat. That will be a key point to think about going through this presentation. - their days still coming.

The first lens we're going to use is completions. We have two businesses that participate in the completion space within Completion & Production Solutions. Our Intervention and Stimulation Equipment group, which manufactures and supports frac equipment, coiled tubing equipment, and wireline equipment on a global basis with service aftermarket consumables, and our completion tool business which is one of the newer businesses within NOV. In the early days of this business, we're still generally focused on multi-stage completions. Let's think about what's been going on in this particular niche of the market for the past few years.

We're seeing longer laterals. We're seeing more stages per well, more clusters per stage. We're seeing as many as 20 clusters per stage. A lot more sand, a lot more water. You watch the horsepower build this year. And you see how that horsepower gets consumed.

And we're using zipper fracs on about 60% to 80% of the wells, which again, is hard on equipment. This is also driving the need for bigger coiled tubing equipment and is driving some robust demand in our wireline business.

Now let's look a little closer at some of these trends. You see that this year laterals are averaging about 8,000 feet versus the previous three years at about 6,400. We see super laterals that are now out around 13,000 feet. And you heard Isaac talking about laterals going to 15,000 feet and maybe longer. We see more stages per well. We have seen about a 12% increase over the previous three years. This is driven in part by longer laterals, but it's also driven by more intensity. We're putting more stages in a given well and more clusters per stage as I mentioned before.

We also see that sand usage is really going up, as is frac water usage. We see that the average proppant intensity per well is really climbing as well. It's up like 33%, 35%. What this is really

leading us to is an average pumping intensity that has really climbed. It's almost doubled this year over the previous three-year average, and it's also leading us to bigger coiled tubing equipment and a host of other ancillary equipment and, some might say, opportunity.

So what impact has this had on a well? In 2008, completions were about 12%, 14% of the total cost to complete a well. By 2012, they were up to about 38%. This year, we see that completions are consuming about 56% of a well's budget. Based on the trends we see, we feel that that will probably continue to increase in the coming years.

Everyone is focused on the US. Obviously, we have the biggest concentration of frac horsepower in the market and you can see that 2018 has been a very good year. This slide is made up of a combination of some published information as well as some internal estimates from our own group and in conversations with customers.

I think there's probably a question as to whether all of the three-plus million new horsepower last year was really new horsepower versus replacement horsepower. This year, it looks like by the forecast, we'll see about 250,000 new horsepower.

As we talk to customers, they tell us that on any given year about 5% of the active horsepower may get replaced and about 20% of it may get refurbished. We don't know that this is 100% going to happen in 2019. They're conversations we have with customers and things we observe in our shops.

We also note that over the next few years, from 2019 on, the opportunity continues to grow. But the real point here is not whether the new horsepower or the replacement horsepower is dead accurate or not. The real thing to point out here is that there is opportunity. There is opportunity to participate in whatever is happening with the horsepower, whether it's a full refurb or just a refurb that's maybe moderately more than just repair and maintenance.

But it's not just a US or a North American opportunity. We see this opportunity around the world, maybe not as large, but around the world. China is the second largest market outside the US for frac horsepower.

Unfortunately, the vast majority of that equipment is built by local Chinese manufacturers and it's also refurbished by them, so our opportunity to participate in that is somewhat limited. The areas that we will focus on the most are Mexico, Argentina, and the Middle East.

We think that these will be the areas where we'll see the most opportunity for our equipment. And they're areas that we'll be focused very hard to ensure that we get our share of the business.

Now, I'd put another footnote out there. We're active in all these areas in one way, shape or form with service or aftermarket or sales presence. NOV is truly global. But with regards to

Russia, due to US sanctions and other country sanctions, the opportunities that we have to participate in Russia are a little bit limited. There are certainly no-play zones.

If you add all these together, as you can see 2019 won't be quite as active as 2018, but then from that point forward it's going to be a steady to growing market. Again, it's not necessarily about whether these horsepower numbers are right or they're wrong. It's to make the point that it is a huge opportunity. It's a global opportunity. And at NOV, we're going to be out participating in that opportunity wherever it's taking place.

Let's talk about a frac site. Some of your faces are familiar from 2014. I made a statement in 2014 that I'll repeat today. Fracking a well is the perfect business model if you're a manufacturer. We take sand and we push it through steel under high pressure for extended periods of time.

It gives a manufacturer the opportunity to really showcase the quality of their equipment and their aftermarket services. But frankly, no matter how good you are, pressure pushing sand through steel wears some things out, and that's what really drives this robust aftermarket opportunity we have, that and the fact that we're running these trucks about 24 hours a day on zipper fracs now.

It is a hugely important aftermarket business for us but it's not just about aftermarket. It's also about consumables. We're a big player in valves, seats, fluid ends, plungers, centrifugal pumps and a lot of items that are just used up and thrown away. We also manufacture flow line which, while not as consumable as some of the frac pump consumables, it is a consumable item.

It also provides us some aftermarket opportunity for recertification. It is impactful enough that when we look at our ISE business, we believe that about 40% of the ISE revenues are aftermarket revenues. So that just explains that capital equipment is the gift that keeps on giving. Of that 40%, about 35% of that is consumables so you can see how impactful the consumables can be to company like NOV or an equipment manufacturer.

Now, earlier today, you heard Clay talk about all the benefits that an operator has to standardization on one manufacturer's equipment. Note the name on that data band, Legend Energy Services. Legend Energy Services was a coiled tubing service provider, they had standardized on NOV equipment and when they made the decision to enter the pressure pumping space, it was a pretty easy decision for them to come back to NOV and standardize on our equipment in that space as well. We're really proud of our relationship with Legend and we wish them the best as they go forward.

As you can see, we've built a lot of equipment, a lot of horsepower, a lot of process units. I believe we're the market leader in process units and we've spread this equipment around the world. So, when you look at an opportunity like this, it's easy understand why we have such strong aftermarket potential in this business.

But it's not just about fracking. Everyone loves fracking. I do, too. But it's not just about fracking. These longer laterals are driving a change in our coiled tubing equipment as well. This would be a traditional coiled tubing unit, the size of which has been in use for a number of years. It would typically have about two-inch tubing on it, but due to the length of these laterals we're now getting to the area where it just can't push that tubing that far. Think about pushing string. So, this is our Genesis Unit. You can see that it's a much bigger unit. Longer laterals means longer tubing, it means bigger tubing, it means more weight.

This unit can handle 25,000 pounds of two and five-eighths without a booster and it can push tubing about 10 to 15% further in the well than a traditional coiled tubing unit. But we're going to hit a point where even that's not good enough. And when it comes to that, we build a state-of-the-art snubbing unit that uses jointed pipe. Theoretically, you could push jointed pipe down any lateral, your limitation would become the amount of weight, but we do believe that as the laterals get longer, technology like this will start to take a larger role.

But we don't just make the big capital equipment. We also make a lot of the ancillary equipment that goes with this. We manufacture the highest strength conventional coiled tubing in the market today. In Q1 [2019], we're going to launch our Advent coiled tubing, which is a thermally processed product.

This larger, stronger tubing requires a more robust injector to handle. This is our new 6 Series injector, which is designed to be able to maneuver this new generation of pipe. It's also much heavier, it's harder to shear and our Texas Oil Tools Group stays on the leading edge with BOPs. They can shear anything on the market. In the case of a well control event where they do have to shear, they can handle the weight hanging off the well.

But it's not just capital equipment and it's not just the surface equipment that goes with it. You heard Isaac earlier talk about his downhole tools and where they're going with downhole tools. Well, they are one of the leading providers of coiled tubing downhole tools in the market today. They can provide tools to do any job. It's their agitator that it has enabled these longer laterals and it enables coiled tubing to service longer laterals. So if you think about that, we've got the capital equipment, we've got ancillary surface equipment and we've also got the downhole tools. NOV is the only company in the market today that can provide a full coiled tubing system.

We've built a lot of coiled tubing units, we've built a lot of injectors, and we've built a lot of tubing. In 1972, our Hydra Rig Group was founded and that is the preeminent name in coiled tubing equipment today.

In 1962, a company named Bowen designed the first coiled tubing unit and injector and we acquired them. In 1976, our Quality tubing group was founded and it was the first company to manufacture continuously milled coiled tubing. So, if you think about that, you could say that NOV invented the coiled tubing space. And frankly, we don't mind if you do.

With this much installed base out there, you can see that we have huge aftermarket opportunities to keep this equipment running via refurbishment or consumables. We've also opened a number of field locations where we do spooling of coiled tubing for our customers as well as coiled tubing repairs.

We have talked about the fact that there's multiple wells on a pad now and that means there's simultaneous operations taking place. A multi-well pad's getting pretty busy out there and, in talking to our wireline customers, they've explained to us we can't see what's going on these multi-well pads.

A traditional wireline truck has about 18 degrees of visibility, even the open back trucks only have about 74 degrees of visibility. So, in conversations with our customers, we put our designers to work and this is what we designed. The IMAXX™ coiled tubing unit which has 176 degrees of visibility.

At NOV, when the customer talks, we listen. And this is an example of taking our tools, our engineers and helping a customer solve a problem. With this unit, they can operate much more safely and much more efficiently.

This would be kind of a representation of how many wireline units that we think are in the market today that we manufactured, how many are actually active. The heart of a wireline unit is the winch. Offshore, a winch will last about 15 years. But in today's unconventional, five to seven years is about all you get out of one. And during that time, they consume parts, they need repairs and they need aftermarket support. And we're there to do that.

Today, at lunch and this morning, there's a lot of conversations around sand and silo systems. We are not new in the sand space on a well site. We've been building sand equipment for a well site for years. So to come up with the next best thing is not a stretch for us.

Again, in talking to our customers, we worked to ensure that we understood what the pain points are. I'm sure most of you in this room could probably recite those pain points maybe faster than I can. And we've designed our new sand bank silo system.

Each one of these silos holds about 400,000 pounds. We have two drive-over loaders that are configurable depending on how your well site is laid out and how much space you have. Each drive over can handle two trucks. We unload both sides at the same time and we can unload those four trucks in about 20 to 25 minutes.

We use a bucket-style elevator system that'll handle 550 tons an hour. We fill two silos simultaneously and we can be filling and offloading at the same time. We have manual or automatic controls so you can feed two blenders at the same time, but to me the most important thing about this unit is we have a completely enclosed feed path from truck to blender.

Silica dust is a problem on well sites and this is our way of addressing that problem. We think we have the features that are going to make this one of the market-leading or the market-leading product today.

We don't just manufacture equipment, we also monitor that equipment. Let's talk about that just a little bit. We have condition-based monitoring and equipment life fatigue. It's nothing new at NOV. We've been the leading provider of coiled tubing software for the past 20 years.

Our Cerberus™ system has been modeling fatigue on tubing since the mid '90s. A string of coiled tubing has a finite fatigue life based on manufacturer's design and how it's used in the field. And using our Cerberus system, an operator can understand at any given time how much remaining life he has on his coiled tubing.

This can allow him to prevent having a downhole event, a piece of tubing break off. Clay talked earlier about how impactful that was, but it also allows him to maximize the life on his tubing for maximum ROI, both very important to the customer. But it's not just about equipment monitoring and fatigue, we also do process monitoring.

We were working with a customer in Oklahoma who is experiencing too many stuck-in-the-hole events when drilling out plugs, and it was determined that if they had a better view of what was going on downhole real-time that they could help resolve this issue. Using our data acquisition system, we measured a number of downhole attributes. We took data from the fluids company and using our GoConnect™ system, we streamed it to the customer's office. Their data scientist looked at what was happening and understood what it looked like right before they stuck. They used it to measure the efficiency of other operating procedures that they had downhole around this space.

They actually changed some of their standard operating procedures, and the end result for them was that. By making data-driven decisions, they were able to reduce their drill out cost by 65%. That's significant.

Earlier this year, we announced the launch of our GoConnect data and condition-based monitoring system for all our Intervention and Stimulation Equipment group. This system has three levels. The first level is asset link. Think about asset link in terms of what's the equipment doing right now. You've got a dashboard for operations. You can stream or share data.

The second level is asset insight. Think about this from the standpoint of not only what is the equipment doing now, but what has the equipment been doing. It'll give you alarm or warning messages if you have an asset event. You can use it for diagnostics, root cause analysis, KPIs.

The third level is asset optimization. Think about this level in terms of what is the equipment going to do. This is where true predictive maintenance and condition-based monitoring really comes to life. This would allow an operator to select what units to send on a job based on the

remaining life before key component failures. We're currently monitoring data and gathering data in the field so that we can write the algorithms we'll need to make this level a reality.

In 2016, we entered the completion tool business. And there were a number of reasons that we chose to enter this business. One is we're already working all around this space. We knew the customers, we felt like it was an easy transition for us. It's an R&D and product development intensive business, which is an area that we're really comfortable in NOV. We think that this is one of our strengths.

It's also a manufacturing intensive business. We think manufacturing is a core competency at NOV and frankly we had quite a bit of capacity available, too.

It's also an asset light business model which fits well with the rest of our business units. We have a global footprint and when we acquired this business, they were selling products in four countries. We're selling in 27 countries today. Our global footprint has the ability to take a business from local to global.

But that's not the only reason we got into this business. The other reason we got into this business was the market. It's a very large market, it's a market that we were not participating in and we saw it as big upside for NOV. It's dominated by the four major service companies and they like to bundle their equipment with their services. Below the four major service companies, you've got a number of smaller product-specific or geographic-specific companies.

We felt that this was the perfect market for a global, independent, non-service company to disrupt and that's what we're hard at work trying to do. Our number one market today is multi-stage completions. We hold over a hundred patents in this space, allowing us to participate in some of the less commoditized areas.

We're also in well construction with our liner hanger systems. We're in intelligent completions with our ReAct™ systems and we're moving into upper completions with our new subsurface safety valve that we've recently commercialized. With the product lineup we have today, we can't attack this entire market yet, but we're working hard to grow our product portfolio and our footprint around the world with an eye toward the market.

I would like to highlight just three of the tools out of this business. Ninety percent of the wells drilled in the US are plug-and-perf so, if you're going to be a completions company, you've got to participate in plug-and-perf. About six months ago we launched our Setter fully composite frac plug and we've been steadily gaining traction in the marketplace since then. We've got our Rottweiler series of plugs and we're on the verge of commercializing our newest composite plug which will be the shortest plug on the market, allowing for faster drill outs and less debris in the hole.

But what we're most excited about today is we're getting ready to commercialize our dissolvable plug. This plug is 50% shorter and has 50 to 60% less material than competing plugs on the

market. By design, a larger percentage of our surface area is also exposed to the dissolving medium, which this is going to allow us to have fast, even dissolution on this product.

Early this year, we launched our Bulldog coiled tubing annular frac system. And we've been gaining a track record in Canada and Russia since then. Those are the two markets that we think coiled tubing annular fracking is most accepted today. And we have several competitive advantages for this product versus what you see on the market today.

Our sleeve is only two-feet long, which makes it about half the length of competing products. It's also a full-bore design, giving it greater flow area as we shift up to both open and close sleeve, which eliminates the challenges some are having with inadvertently closing the sleeves when they pull their tool out of the well.

We don't need an additional packer with our system. While not a true differentiator, we also have multi-open close opportunities or multi-open close sleeves which can allow the operator to close sleeves in the later years of the well if it's producing too much water in certain zones or would allow for refracking. We can run these in either cemented or open holes.

All of those are really good benefits but they're not the most important benefit. The most important benefit that a tool like this gives you is the ability to have pinpoint stimulation over an unlimited number of sleeves. This helps you eliminate what has been a growing challenge - frac hits on adjacent well borers when you're fracking and you can't really control how far your frac's going, because of so many zones at once.

This is one of our flagship products, our BPS toe valve. This is a patented unit with frac ports that open at a precise pressure. It's full-bore for maximum flow, and since it has no moving parts, it's got the ultimate in reliability downhole. The use of this system gives you the opportunity to have repeatable, selective isolation of downhole intervals for fracking. Again, this helps minimize the risk or the impact of having frac hits on adjacent well bores. Once you've fracked however many BPS valves you have in the well and you pull your tool out, you can immediately start production. There's no plugs, no balls or seats to mill out.

Now in the North American, Latin American, and Middle Eastern markets, this usually is used for a toe initiation valve as it was designed, but we find in Russia that it's one of the principal mains for fracking a conventional well.

We've built a lot of frac sleeves. We introduced frac sleeves in 2015 or in 2010. We've put over 15,000 units out there and we've been one of the premier manufacturers of frac sleeves since that time. And we've already talked about our workhorse BPS product where we've put 22,000 units out there and honestly, as long as we have worked on this presentation, it may be 23,000 by now.

We've talked about completions, let's talk about onshore production. We have two business units that play in the onshore production space. Our Process and Flow Technologies group

manufactures, designs, and supports production equipment as well as doing some turnkey well site work.

Our FiberGlass Systems business manufactures both spoolable and jointed pipe for a wide variety of applications. Looking at the trends we see in this space, the same things we see impacting the completion space are also impacting this space. More water to dispose of, an increase in water management. It's estimated in the Permian Basin over the next five years, water management cost will double to over 20 billion dollars. More pipeline construction, multi-well pads, more sand, which is a real headache on a production site.

Looking at little bit deeper at these trends, we see that the number of wells fracked is going to continue to grow. We see that they're going to continue to put more sand in those wells and they are going to use more water to do it. This is going to drive higher levels of produced water and flow back water. It's going to provide more opportunity for disposal and treatment. You have probably all heard the nightmares about trying to hire truck drivers to haul water, which has been a principal means. This is driving demand in our fiberglass pipe business.

So let's look at how our Process and Flow Technologies group participates in the life of a well. Once a well has been fracked, it usually goes on flowback for 30 to 60 days and we manufacture the entire suite of equipment necessary for a flowback operation. Then it's time to set up the well site. It could be for a multi-well pad, it could be a gathering station, it could be for a single well.

We design and manufacture the critical components needed to help our customer get pipeline-quality product. Once we have given our customer that pipeline-quality product, we move into the midstream phase of the well where we manufacture LACT units, transfer pumps, closures, etc.

We manufacture services valves. This has been a very nice growing business for us. Then, once we're out of the midstream phase, there's a lot of water to get rid of at some point in this operation. This is a well site that we actually turn-keyed for a customer. We designed the site, we designed the separation equipment, we installed the pumps, we installed fiberglass pipe. We commissioned the system for the customer and we use our GoConnect system to monitor the oil water rather to ensure that they're not pumping crude oil down their disposal well.

We've built a lot of equipment in this space as well and we have some of the most respected brand names in the industry. In a lot of cases, our product lines are made up of what used to be individual companies. Reciprocating pumps are probably one of the best aftermarket opportunities we have.

They use consumables on a daily basis and with proper maintenance and periodic overhauls, they have a very long life. A choke by its very design is a consumable product. It chokes the flow from the wellhead and, these days, that flow can have some pretty aggressive abrasives in it.

Spherical sand traps are another interesting product for us. We started manufacturing that product only in 2014, and due to the trend you've see of more sand, more sand, and then some more sand, we're finding demand for this product really soaring. We use them in frac flowback and we also find more and more use on a production well site longer and longer into a well's life.

Larger volumes of water are driving the need for more and bigger fiberglass pipe. We designed our SuperSeal pipe with this application in mind. The connection is designed to be easy to put together. No special tools, no bonding like you see with a lot of fiberglass.

Why do we use fiberglass pipe though? It's impervious to corrosion. Saltwater and the elements we find in the well-bore or in the frac fluid have no effect on fiber glass pipe. It is a little bit more upfront to use fiberglass pipe than just standard steel, but when you look at it from a lifecycle cost, it is much more efficient, much less expensive.

Not only is fiberglass used in surface applications, we also use it to make downhole casing and tubing that we sell around the world for the same reasons, it's impervious to the corrosion. A little-known fact about our FiberGlass group is that we're in 50% of the gas stations in the US.

Since 1945, there's been over a hundred million feet of our red thread dual alloy product installed subsurface in the gas stations around the US. We've built a lot of spoolable pipe, that's our Fiberspar brand. Some of our best customers are in the Middle East and we're in the process of opening a new plant in Saudi for both spoolable and jointed pipe.

And as you can see, we have built a lot of jointed pipe. I can't even say that number. I tried yesterday and failed dismally. But we don't just use it in pipeline applications, we use it offshore as well. Due to our corrosion resistance, we have a very robust chemical and industrial market. The incremental spend we've seen in the pharmaceutical industries and the power industries here in the US over the past few years have been a boon to this business.

We're on the majority of the FPSOs in the world as well as other types of floating and fixed production equipment offshore. We're on some drilling equipment for fire water systems. You may not know this, but there's a new set of diesel emission regulations affecting the shipping the industry, starts in 2020. And it's estimated that as many as 9,000 vessels may have to have scrubber systems put on their diesel exhaust. The neat thing about scrubber systems is that each one has fiberglass pipe.

We've talked about completions, we've talked about land-based production, let's talk a little bit about offshore production now. We have five business units that participate in the offshore production arena. They work independent of each other and then they also work together to deliver bigger projects.

Some of the trends that we see offshore today, we see a lot of conversations around digitalizing equipment. People want to be able to reduce manpower. It's safer, it's more efficient. We see

conversations starting to come to life around subsea production again as they try to get equipment off the surface.

We're moving into an environment where we think we'll see eight to ten FPSO awards a year. In 2016, we saw zero. We're also seeing some private equity back developments, which has been kind of new coming out of this downturn. The benefit or the opportunity that those give is that you may not have these huge staffs of engineers to tell the manufacturer exactly how to build the equipment. They're more open to conversation around "this is the job I'm trying to do, can you sell me a piece of equipment that will do my job."

That really suits a company like NOV. Depending on which forecaster you want to believe, it'd be about 650 to 800 billion dollars spent in the offshore production arena over the next five years. We've looked at this and we think that 10 to 15% of that would be applicable to products that we manufacture in CAPS.

Today, we're living in a world of short cycle projects. We're using subsea tree awards as a proxy for activity here and as you can see they troughed in 2016 and they've slowly been climbing. We see that Greenfield is outpacing Brownfield which matches the trends you hear about. We took a look at the published estimates for the number of fixed production facilities that would be built over the coming years. Then our own internal teams looked at which of those would be applicable to at least one piece of equipment that we build in Completion & Production Solutions. Could be more but at least one. These are the estimates we came up with. Now, in this particular case, it's not about whether this is growing or declining. What it does signify is that we have consistent repeatable year on year opportunities to sell into this space because these are short cycle projects. They can usually put one of these in operation in about a year and a half.

In the next couple of years, we'll start to move into more of the long cycle projects. And we just mentioned that FPSOs, we're going to see 8 to 10 of those a year, we think, but it's not just about FPSOs for us. We look for all kinds of offshore floating production opportunities. We look for all sorts of offshore production opportunities.

Well, we're going to use an FPSO in this example just to kind of paint the timeline of how long it really takes an equipment manufacturer to get an order on a project like this. So, they're going to start with a pre-feed which is usually multiple companies in a contest to see who gets to do the feed for the operator. At the end of the pre-feed, then, they'll move into a feed phase, 12 to 16 months for these offshore projects. We think an FPSO's typically a little closer to 12.

But at the end of the feed phase, they know what their project looks like. They've got a pretty good idea of what their project is going to cost, plus or minus some smaller number, but they're still not ready to buy equipment. They're ready to make their final investment decision. If they give a thumbs up, that's when you might hear of a hull being awarded to an FPSO owner operator. But it's still not time to buy equipment.

Now, it's time to do detail engineering so you know exactly what you want the equipment manufacturers to build for you and that's about a six-month process. At the end of the six-month process, now we have to do the infamous three bids and a buy in some cases and that takes another six months in tendering. And it's at the end of that tender phase then that you'll finally start to see POs awarded to equipment manufacturers. So, what this means is that from FID or hull award to orders can be as much as 18 months. If you're thinking in terms offshore LNG, it'll be longer than that. Those are much longer cycle projects.

Now let's talk about our floating production strategy for a minute. Shown here is a HoneyBee [FPSO]. It's designed for marginal fields. It's designed to be able to easily be redeployed from one well site to a different well site. That would be one phase of our strategy and it's really a three-part strategy. The second phase, or the second element to it, would be when we work with operators or all companies on larger, some might think more bespoke, vessels, but we're looking for opportunities for repeatability. Brazil, West Africa offshore would be good examples of that.

The third leg to our strategy is where we use our floating production group as the ultimate integrator for other NOV businesses and equipment. And this is where we'll put together larger suits of equipment. We might furnish an operator a complete topside that you could use on an FPSO. It could be used on a semi. It could go on to a jackup. You'll see that we use our own APL mooring systems on our HoneyBee and we do this because that separates subsea construction from the FPSO. So, you could actually be ready for the FPSO when it arrives.

Now, let's move subsea for a minute and all I want to do here is really remind you of the subsea equipment that we had in 2014. We're one of three major manufacturers of subsea flexible pipe and this has really been one of our steadiest products during the downturn. We manufactured riser supports, riser anchors, midwater arches. We manufactured PLETs, PLEMs, and just your basic surf type subsea infrastructure.

One of the things that we said in 2014 was that we're not going to be the next big subsea equipment manufacturer, but we are going to go after some unique and disruptive products that we can use to sell to other subsea equipment manufacturers or to all companies. We'll talk more about that in just a second.

This is our buoy loading system from APL. We built this in Nigeria during the downturn. It was another one of the things that really helped us, carry us through the early part of the downturn and this was commissioned earlier this year as and is in operation in offshore Nigeria, supporting the [Egina] FPSO for Total.

Our Process of Flow Technologies group acquired Fjords Processing in 2016 and this acquisition has made us one of the leading manufacturers of offshore process equipment in the world today. But we also participate in LNG and FLNG. Our APL manufactures loading and offloading systems and our process and flow technology group manufactures a variety of pretreatment. We're one of the leaders in hydrate innovation using our [LAG] systems.

Now let's look subsea. What you're going to see is the new and disruptive products that we've developed during the downturn and these things all have one thing in common. They're enablers for our customer to help them have flexibility in the way they want to develop their fields. Subsea automated pig launchers with less infrastructure allowing for longer tiebacks, subsea storage, pipeline bridges for congested areas, hot taps that would allow you to tie in to an active pipeline, cocoons for subsea trees, and our Seabox system which I'll show you a little bit more about in a second.

This is the B.P. Clair Ridge. When this platform was designed, it had 26,000 feet of Bondstrand™ pipe on it, but they had a need to take a little bit more weight out of their design. So, in collaboration with our fiber class systems group, we put 29,000 feet of composite grading on this unit. We put 14,000 feet of our [MARRS] handrail systems which you can see very prominently here. We designed over 290 composite pressure vessels and we saved them 700,000 tons. That was one of the things that was a facilitator in how they were able to install this particular platform.

So, this is our Seabox treatment system. It's one of the most exciting new products we have in completion in production solutions. This disruptive technology was recently commercialized, and Unit Number 1 is in operation offshore Norway and we move seawater treatment from the platform in the surface to subsea. And this offers some really good benefits for the customers: flexible cost-efficient field development. You can use it to extend the life of matured fields by changing the water sweep or adding more water flood. You can use it for debottlenecking existing surface facilities. You can complement the water processing capabilities or just take it completely off of the topside if that's what you need to do.

You can have as much as 50% energy savings when removing sulfites, reduce salination on the sea floor versus the surface. But one of the most important attributes to this is that the Seabox unit itself has no moving parts. It makes it the ultimate and reliable for a subsea product.

You probably know our X.L. conductor systems group for deepwater, large I.D. conductor pipe. Recently, our product was used to help a customer offshore Trinidad develop a marginal gas field. Aquatera Energy designed this conductor supported platform. They went looking for the proper connector system so that they wouldn't have to weld the conductor pipe together and they chose NOV. They chose us do our optimized geometry, our fatigue resistance and our enhanced stuck structural strength.

Earlier, Joe talked about Gusto [MSC]. That was an acquisition that our Rig group made, and Joe is a sharing, caring guy. So, he lets us play in that space, too, and this provides us a lot of benefit to CAPS. They design offshore production jack ups which is huge for us and they also really enhanced our offshore marine engineering capability. So, we're really happy to have Gusto as part of the family.

This offshore process equipment also is the perfect environment for our GoConnect™ system. It's very complex equipment. It lends itself well to being monitored. Our process and flow

technology group, they are fluid experts. They think not only in terms of what is the equipment doing, but what's the fluid doing, what does the fluid need to do. And with that in mind, they know what to monitor and they know how to monitor it. Today, we're monitoring seawater treatment systems and we're fast moving into other offshore production modules.

We've built a lot of this equipment, over 3,000 topside process modules. They're complex. They need maintenance. They need a lot of tender, loving care and it's perfect for our aftermarket business. If the customer decides they need to tie more wells to a platform or the well profile is changed, this is where you go about the debottlenecking process, within the process modules and this is a core competency for us.

We've got 82 turrets in the market today. They typically have a 20, 25-year design life when our customers like to have us out there about every 7 to 10 years to really look them over and make sure that everything is the way it should be, because these are truly critical components.

I have told you a lot of things about Completion & Production Solutions. I hope you've learned some things. I hope you're excited about this business. We are. But if you remember only three things, I'm going to tell you the three things. So, pick up your pencils. We're continually growing our capabilities in the completion phase in the well and as you know, it's a growing opportunity. We've made major strides in our ability to provide not just products, but total solutions in the onshore and offshore production space. We're going to continue to do this. It's a big growth opportunity for NOV.

We talked about where our businesses are in the cycle. Our land-based businesses have started to recover. Even our XL conductor pipe business has started to recover, but we haven't seen that recovery for our other offshore businesses yet. So, with that in mind, the best days for completion in production solutions are still to come.