Supplemental Documents
Natural gas inventories surpass five-year average for the first time in two years

Working natural gas inventories in the Lower 48 states totaled 3,519 billion cubic feet (Bcf) for the week ending October 11, 2019, according to the U.S. Energy Information Administration’s (EIA) Weekly Natural Gas Storage Report (WNGSR). This is the first week that Lower 48 states’ working gas inventories have exceeded the previous five-year average since September 22, 2017. Weekly injections in three of the past four weeks each surpassed 100 Bcf, or about 27% more than typical injections for that time of year.

Working natural gas capacity at underground storage facilities helps market participants balance the supply and consumption of natural gas. Inventories in each of the five regions are based on varying commercial, risk management, and reliability goals. When determining whether natural gas inventories are relatively high or low, EIA uses the average inventories for that same week in each of the previous five years. Relatively low inventories heading into winter months can put upward pressure on natural gas prices. Conversely, relatively high inventories can put downward pressure on natural gas prices.

This week’s inventory level ends a 106-week streak of lower-than-normal natural gas inventories. Natural gas inventories in the Lower 48 states entered the winter of 2017–18 lower than the previous average. Episodes of relatively cold temperatures in the winter of 2017–18—including a bomb cyclone—resulted in record withdrawals from storage, increasing the deficit to the five-year average. In the subsequent refill season (typically April through October), sustained warmer-than-normal temperatures increased electricity demand for natural gas. Increased demand slowed natural gas storage injection activity through the summer and fall of 2018. By November 30, 2018, the deficit to the five-year average had grown to 725 Bcf. Inventories in that week were 20% lower than the previous five-year average for that time of year. Throughout the 2019 refill season, record levels of U.S. natural gas production led to relatively high injections of natural gas into storage and reduced the deficit to the previous five-year average.

The deficit was also decreased as last year’s low inventory levels are rolled into the previous five-year average. For this week in 2019, the preceding five-year average is about 124 Bcf lower than it was for the same week last year. Consequently, the gap has closed in art based on a lower five-year average.
The level of working natural gas inventories relative to the previous five-year average tends to be inversely correlated with natural gas prices. Front-month futures prices at the Henry Hub, the main price benchmark for natural gas in the United States, were as low as $1.67 per million British thermal units (MMBtu) in early 2016. At about that same time, natural gas inventories were 874 Bcf more than the previous five-year average.

By the winter of 2018–19, natural gas front-month futures prices reached their highest level in several years. Natural gas inventories fell to 725 Bcf less than the previous five-year average on November 30, 2018. In recent weeks, increasing the Lower 48 states’ natural gas storage levels have contributed to lower natural gas futures prices.

**Lower 48 states natural gas inventories and Henry Hub futures prices**

**Natural gas inventories, difference to five-year average**

$\text{billon cubic feet}$

**Henry Hub front-month futures price**

$\text{dollars per million British thermal units}$


Principal contributor: Jose Villar

Tags: storage, natural gas, inventories/stocks
Finally, Some Visibility That India Is Moving Towards Its Target For Natural Gas To Be 15% Of Its Energy Mix By 2030

Posted: Wednesday October 23, 2019. 3:45pm MT

It’s taking longer than expected, but we are finally getting visibility that India is investing significantly towards its goal to have natural gas be 15% of its energy mix by 2030. Earlier in Oct, India Oil Minister Dharmendra Pradhan said that there are $60 billion of natural gas infrastructure and LNG import terminals that are “under execution”. He said “I am not talking about potential investment. This number relates to the project that are under execution”. Natural gas consumption in India is only now back to 2011 levels at 5.6 bcf/d and represents only 6.2% of its energy mix. If India hits its 15% target of its energy mix by 2030, it would add natural gas demand, on average, of >1.5 bcf/d per year. At the same time India’s domestic natural gas production peaked in 2010 at 4.6 bcf/d, but has been flat from 2014 thru 2018 at ~2.7 bcf/d, which means the big winner will be LNG. The most important factor driving this expectation for natural gas consumption growth is likely price. Asian LNG landed prices are down about 50% YoY and, more significantly, the expectation is for future Asian LNG prices to be at lower levels than prior cycles. India, by itself, may not be a LNG global game changer, but it is another positive support for why we believe LNG markets will rebalance sooner than expected ie. in 2022/2023. We see mid term Asian LNG landed prices lower than prior cycles in a rebalanced market (ie. +/- $8), which means that low capital costs will be critical for future LNG projects. We believe that BC’s LNG key potential projects (LNG Canada Phase 2 and Chevron Kitimat LNG) can compete in this price environment as they have the potential for brownfield capital costs if they move to a continuous construction cycle following in lockstep to LNG Canada Phase 1, much like Cheniere does for its LNG projects in the Gulf Coast.

India has a pollution crisis. We don’t think it is unfair to say India has a pollution crisis. In every pollution ranking, India has several cities among the most polluted cities. The 2018 World Air Quality Report (AirVisual) list of the World’s Most Polluted Cities 2018 has 20 of the world’s 25 most polluted cities being in India. India has all of the top 25 most polluted cities other than #3 Faisalabad (Pakistan), #7 Hotan (China), #10 Lahore (Pakistan), #17 Dhaka (Bangladesh), and #19 Kashgar (China). Like us, many people have been to Beijing on business and believe Beijing’s reputation as a very polluted city is deserved. But to put in perspective, Beijing’s ranking isn’t even close to the 15 most polluted cities in China, let alone the world. Beijing’s score on their scale is 50.9 vs the other Chinese cities #7 in the world, Hotan at 116.0, and #19 Kashgar at 95.7, and the world’s most polluted city #1 Gurugram (India) at 135.8.

World’s Most Polluted Cities 2018

<table>
<thead>
<tr>
<th>Rank</th>
<th>City</th>
<th>Country</th>
<th>Rank</th>
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<tbody>
<tr>
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<td>Moradabad</td>
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<td>India</td>
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<td>China</td>
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<td>India</td>
<td>26</td>
<td>Mandi Gobindgarh</td>
<td>India</td>
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</tbody>
</table>

Source: Airvisual

India natural gas consumption is only now back to 2011 levels. For the past couple years, we have been highlighting that the growth in India’s natural gas consumption (and linked LNG imports) has been very low due to the slow buildout of domestic natural gas infrastructure and LNG import facilities. BP data shows India’s natural gas consumption was 5.6 bcf/d in 2018, and this compares to its peak of 5.8 bcf/d in 2011. To put in perspective, China’s natural gas consumption in 2011 was 13.1 bcf/d and reached 27.4 bcf/d in 2018.

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Perhaps the best reason why there is better visibility – LNG prices are expected lower than prior cycles. A key reason for this lack of growth has been the price of LNG relative to coal. Our June 17, 2018 Energy Tidbits [LINK] highlighted comments from the Q&A from BP's Chief Economist speech “Energy in 2017: two steps forward, one step back” on this relative cost concept. We then wrote on the BP Chief Economist comments from an India company on why there isn’t more natural gas and why coal is still going up. He said that the Indian executive said it was because the cost of natural gas was significantly more expensive than domestic coal and that the push in India is to get more power to more poorer people, but if natural gas is significantly higher, it can’t be done, they have to rely on coal. What has happened since the BP Chief Economist June 2018 comment is that Asian LNG prices are down 50% and the expectation going forward is that future LNG prices are not expected to be at prior cycle highs. But the other question is what does it mean for LNG prices. There is an increasing supply of reasonable priced LNG around the world, whether it from Qatar, Papua New Guinea, the Gulf of Mexico and even Canada. And each of these areas has anchor projects to support future brownfield development. Couple that with increasing linkage of LNG prices away from oil indexed contracts, we believe this means that a balanced LNG market going forward is going is not going to see sustained high Asian LNG prices from prior cycles, but around more costs related more to lower LNG supply basins ie. LNG prices around mid to long term +/- $8 landed Asian LNG prices, and not the prior $10 - $12 range. As the BP Chief Economist highlights, price is a huge issue for India and it is likely that the expectation for lower LNG prices than prior cycles is the most important reason to push India to increased natural gas consumption.
India is now getting serious about increasing natural gas consumption, has $60b of projects under execution. We follow the key India news as part of our weekly news scan for our Energy Tidbits memos and there is no question that the Indian government and its people realize they have to deal with this increasing pollution problem. And perhaps most of all, India is now taking specific, significant action to set the stage for increasing natural gas consumption and LNG imports. Earlier in Oct, Japan Times picked up a Reuters story “India investing $60 billion on gas grid to link up nation by 2024” [LINK]. The story notes “India, one of the world’s largest consumers of oil and coal, is investing $60 billion to build a national gas grid and import terminals by 2024 in a bid to cut its carbon emissions, the oil minister said on Sunday. India has struggled to boost its use of gas, which produces less greenhouse gas emissions than coal and oil, because many industries and towns are not linked to the gas pipeline network. Gas consumption growth was running at 11 percent in 2010 but growth slid to just 2.5 percent in the financial year 2018/19.” The most significant part of this story is that this is $60 billion of projects under execution, not planned or potential projects. The story quotes Oil Minister Dharmendra Pradhan “I am not talking about potential investment. This number relates to the project that are under execution”. The critical natural gas infrastructure requirement is a domestic natural gas pipeline network to deliver gas throughout India. The India Ministry of Petroleum & Natural Gas Oct 3, 2019 release [LINK] said “On the issue of moving towards the gas economy, Shri Pradhan said that over 16,000 km of gas pipeline has been built and an additional 11,000 km is under construction. With the tenth bid round for City Gas Distribution completed, it will cover over 400 districts and will extend coverage to 70 percent of our population”. Progress is being made. Plus LNG regasification projects continue to be completed. Below is our updated table of India LNG projects that are estimated to come on stream in 2019 and 2020. We haven’t included the projects beyond 2020, but there are several planned projects already on the books.

### India Current/Planned LNG Regasification Projects Est. In Service In 2019/2020

<table>
<thead>
<tr>
<th>State</th>
<th>Coast</th>
<th>Operator</th>
<th>Capacity (mtpa)</th>
<th>Capacity (bcf/d)</th>
<th>Expected Timelines</th>
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<td>West</td>
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<td>West</td>
<td>GAIL &amp; NTPC JV</td>
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<td>West</td>
<td>Adani &amp; GSPC</td>
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<td><strong>27.25</strong></td>
<td><strong>3.59</strong></td>
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</tbody>
</table>

Source: Bloomberg, Company Reports, Street Reports

It reminds us of when China got really serious about natural gas in 2018. We should be clear that we do not consider India anywhere near as significant to global LNG markets as China. But conceptually, India getting serious about increasing natural gas consumption reminds us of what we were seeing in China in 2016/2017. India is probably more like China in 2016 as opposed to the summer of 2017, when it seemed clear that China was on the cusp of a major push in natural gas consumption and LNG would be the winner in 2018. India’s impact should start to play out by year end 2020 as opposed to this winter. We first outlined the China LNG thesis in our Sept 20, 2017 blog “China’s Plan To Increase Natural Gas To 10% Of Its Energy Mix Is A Global Game Changer Including For BC LNG” [LINK]. Our Sept 20, 2017 blog wrote “The news flow from China this summer on its increasing fight and urgency to fight pollution supports China’s plan to increase natural gas to 10% of its energy mix in 2020 and 15% of its energy mix in 2030. This is a game changer to global natural gas markets and, by itself, can bring LNG to undersupply 2 to 3 years earlier than expected. China’s natural gas consumption increased by ~15% per year from 2005 thru 2016 and ~1.5 bcf/d per year vs China’s 8.5%...
growth rate in energy in total. Yet natural gas only got to 5.9% of China’s energy mix. If China is to hit 10% by 2020, it will need to increase natural gas consumption by 4 to 5 bcf/d per year. Assuming China continues to grow its domestic natural gas production by 0.6 bcf/d per year (its growth rate for last five years), China will need to import an additional ~3.5 to ~4.5 bcf/d per year. This is “per year”! And if so, we believe BC LNG will be back and there is a higher probability than ever before for a Shell FID on its BC LNG project in 2018.” As it turned out, Shell did FID its LNG Canada project on Oct 1, 2018.

Natural gas is only 6.2% of India’s energy mix vs its target of 15% in 2030. India, similar to China, has a target to have natural gas to be 15% of its total energy mix by 2030. This is not a new target, rather it has been in place and we first highlighted India’s 15% target of its energy mix in our Nov 23, 2018 blog “India’s Natural Gas Consumption Would Be Up ~1.3 Bcf/D Per Year If Its To Reach Its Target Of 15% Of Its Energy Mix By 2030” [LINK]. At that time, we noted some specific steps that were happening in 2019 and 2020 to put them on that long term plan. The impact to get to 15% of energy mix is significant to world LNG markets. This is a big increase from natural gas being 6.2% of India’s energy mix in 2018. To put in perspective, in 2018, natural gas was 30.5% of US energy mix, 21.9% of Japan’s energy mix, 16.0% of South Korea’s energy mix, and 7.4% of China’s energy. Note, China is up from 6.6% in 2017.

Hitting 15% of its energy mix would increase India’s natural gas consumption by >1.5 bcf/d per year. We projected how much India’s natural gas consumption would increase if it can hit its target of 15% of total energy mix in 2030. BP data shows India’s natural gas consumption in 2018 was 5.6 bcf/d and natural gas was only 6.2% of total energy mix. BP also estimates India’s total energy consumption grew at a rate of 5.2% per year for the 2007 – 2017 period, but energy consumption growth increased to +7.9% in 2018 YoY vs 2017. But if we only assume a 5% growth in total energy mix to 2030, then if natural gas is 15% of India’s energy mix, it would be 18.8 bcf/d in 2025 and 24.0 bcf/d in 2030 ie. growth of +13.2 bcf/d to 2025 and +18.4 bcf/d to 2030. India’s domestic natural gas production peaked in 2010 at 4.6 bcf/d, but has been flat from 2014 thru 2018 at +/- 2.7 bcf/d. We expect there to be some increased focus to at least return India to modest domestic natural gas production. But, until then, any growth in natural gas consumption will be met with LNG. Our model forecasts of >1.5 bcf/d per year, on average, in consumption is the equivalent of 2.5 Cheniere LNG trains per year.

India’s Projected Natural Gas Consumption @15% Of Energy Mix (bcf/d)

Source: BP, SAF

India may not be a LNG global game changer by itself like China, but does support the call that LNG markets rebalance sooner than expected. We had our SAF Group 2020 Energy Market Outlook on Monday Oct 7. A replay of the call and the supporting slide presentation are available on our website at [LINK]. Two of our key off consensus calls were on LNG including our view LNG market would balance earlier than expected ie. 2022/2023. We noted that we agree with markets that LNG will be oversupplied thru 2021, but where we disagree is that we see LNG markets balancing in 2022 or 2023. Our presentation reminded that LNG supply capacity needs to be in excess of demand to provide for turnarounds and...
allowance such that suppliers can deliver contract volumes. We also expect the required over capacity of supply is increasing as contract mix shifts away from historical oil indexed take or pay contracts with destination clauses to an increase share of portfolio contracts. There is no firm number, but we believe the required excess supply capacity relative to demand has increased from approx. 5% to 10% to +/-15% ie. LNG markets are effectively balanced when LNG supply capacity is >10% of demand. As a result, we believe that LNG markets rebalance in 2022/2023, a view which is similar to Total’s Sept 25, 2019 Investor Day [LINK] (see below graphs). We should note that our view of balanced LNG markets doesn’t mean a return to $12 or more Asian landed LNG prices, rather, we see the emergence of anchor LNG projects in areas with brownfield expansion potential means that a planning case for mid term Asian LNG price is in the $8 range. Our outlook presentation also includes our view that BC’s LNG key potential projects (LNG Canada Phase 2 and Chevron Kitimat LNG) can compete in this price environment as they have the potential for brownfield capital costs if they move to a continuous construction cycle following in lockstep to LNG Canada Phase 1, much like Cheniere does for its LNG projects in the Gulf Coast. Our outlook call did not specifically work in the India Energy Minister’s comment on in execution projects, but, if anything, it provides us with more confidence for the call for LNG markets to rebalance in 2022/2023.

**Total’s Medium And Long Term LNG Supply & Demand**

*Source: Total Sept 25, 2019 Investor Day*
The number of liquefied natural gas tankers identified as floating storage appears to be peaking, tightening the market for shipping and adding to a supply overhang. The phenomenon happens when LNG tankers loaded with cargoes either travel slower than usual to their destination or wait at sea for a buyer.

The most recent episode can be traced back to Qatar’s decision to send out more ships ahead of maintenance work on its facilities. The result is making it more expensive for traders to charter a vessel on the prompt market in the Atlantic basin, replicating a similar bout of floating storage in Asia last year.

It’s another sign that abundant supplies of gas are weighing on prices across Europe. Storage sites on the continent are more full than usual after slack demand earlier in the season. Traders also have built up buffers to cope with potential supply disruptions at the start of next year with the expiration of Russia’s agreements to ship gas through Ukraine.

Qatar appears to have joined the floating game, with at least four vessels loaded but waiting outside the production plants at the biggest LNG producing nation. Two Qatari vessels are expected to deliver in India at the end of this month and in the first half of November, while normal voyages there take about three days, said Madeleine Overgaard, an LNG market analyst at data intelligence company Kpler.

Qatargas informed buyers in Asia that the shutdown of its
two liquefaction production lines, or trains, at the Rasgas LNG facility is for planned maintenance. It isn’t clear how long the trains will be shut and shipments haven’t been affected.

“The majority remain in the Atlantic basin, however, we also observe some new floaters offshore Ras Laffan,” Overgaard said by email. “This new group consists of Qatargas-controlled vessels only. They have all just loaded earlier than would normally be expected. It is possible that plant maintenance in Ras Laffan could bring on such behavior.”

Kpler estimates that as many as 28 vessels are behaving as floating storage globally this week, up from 19 last week. Bloomberg also included vessels that are taking long voyages, such as those skipping a shorter route via Suez Canal, and have been on the water for longer than 20 days. It may be normal for at least some shipments to take that long, since cargoes travel from the U.S. to Asia.

LNG vessels get tagged as floating storage by Kpler if they were loaded more than 10 to 14 days ago; if they signal vague intermediate points on their journeys; or if they log slower average speeds. Last year, about 30 vessels were considered floating storage in mid-November.

Some vessels such as Marshal Vasilevskiy, idling off Rotterdam, were loaded as early as the middle of August when LNG prices were at the bottom. That suggests traders may already have profited from the steep contango.

The use of LNG ships as temporary storage echoes the practice use in the oil market for decades. However, LNG is a super-cooled gas that needs to be kept at low temperatures, and some product is lost during a voyage, known as boil-off.

The rise of the floating storage comes as the LNG markets are oversupplied and demand is muted.

“Certainly we look at floating storage just like other players are looking at floating storage provided it makes economic sense,” Peter Abdo, managing director and global head
of origination and LNG at Uniper Global Commodities, said in an interview in London earlier this month.

For some players, however, it may not be a strategy but lack of clarity on what to do with cargoes. Those have been slow sailing in the hope that when they go to the Far East an Asian buyer will snap it up at higher prices, Jason Feer, global head of business intelligence at Poten & Partners Inc. in Houston. “There’s no point to go there to sail in circles,” Feer said. “From a trading point, then everybody knows you are desperate.”

While LNG prices have softened after gains in previous weeks, further direction depends on winter temperatures, geopolitics and the outcome of discussions on pipeline gas shipments between Russia and Ukraine, Oystein Kalleklev, chief executive officer of shipowner Flex LNG Ltd. in Oslo, said by email.

However, the market expects these vessels to unload in November. That’s in part because the spread between Asian and European prices is not sufficient to move the vessels between the regions, given increased shipping rates, and as further fuel price gains seen limited.

If an LNG cargo delivery is deferred from Oct. 15 until the beginning of November, this floating storage operation can yield as much as $0.69 per million British thermal units of additional profit, according to Anna Borisova, a research analyst at BloombergNEF.

“We should be around peak floating storage as the contango play has mostly played out now,” Kalleklev said.

--With assistance from Stephen Stapczynski.

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Permits for the Baltic Pipe project have been issued

Press Release • Oct 25, 2019 10:04 AM CEST

The Danish-Polish pipeline project has been authorized to construct a natural gas pipeline in the Danish maritime area.

The Minister for Climate, Energy and Supply has today granted a permit to the Energy Network for a section of the Baltic Pipe natural gas pipeline on the maritime and continental shelf in the North Sea and the Little Belt and a permit for Gaz-System SA on the maritime and continental shelf in the Baltic Sea. On July 12, 2019, the Environmental Protection Agency granted permission for the land portion of the project.

Baltic Pipe is expected to contribute to a transition in Poland from coal to natural gas, which will reduce greenhouse gas emissions. In addition, Baltic Pipe is considered to increase the security of supply for natural gas in Denmark as a direct access to the Norwegian upstream pipeline, Europipe II, to the Danish gas system is established.

The pipeline project

The pipeline in Danish waters is part of a major project that will transport natural gas from Norway to Poland. The pipeline project runs from Europipe II in the Danish part of the North Sea, across Denmark, among others through the Little Belt, in the Danish, Swedish and Polish parts of the Baltic Sea, to eventually land at Niechorze or Rogowo in Poland. (figure 1).
The Baltic Pipe project's capacity at full utilization is DKK 10 billion. m$^3$ natural gas per year. The total length of the pipeline route is projected to approx. 850 km, of which approx. 105 km of the route is in Danish waters in the North Sea and 4 km in Danish waters in the Little Belt and 133 km in the Baltic Sea. According to the companies schedule, establishment activities are expected to start in early 2020 and be completed by 2022.

**The Danish part of the pipeline project**

The establishment permits set a number of conditions to ensure that the establishment and operation of the offshore pipeline project is environmentally and safety-sound, including conditions for minimizing impact on humans, guinea pigs, oats and eelgrass.

The companies have carried out a number of studies in the North Sea, the Little Belt and the Baltic Sea. Several route alternatives have been investigated in the Danish maritime area, including a route through a Natura 2000 area in the Little Belt and a route exclusively at sea. A route through a Natura 2000 area can only be selected if there is no reasonable alternative outside the Natura 2000 area, unless other considerations are so important that a route through a Natura 2000 area is the only option. The route, which is granted permission in the North Sea and the Little Belt, goes outside Natura 2000 areas and is therefore considered a reasonable alternative. A route exclusively at sea was investigated by the builders in the initial stages, but was opted out as the route was neither economically nor technically feasible and could have significant consequences for marine nature.

**The Danish Energy Agency finds that the offshore pipeline project can be established and operated without unacceptable impacts on the environment and safety if the framework for the project's establishment and operation as described in the submitted application and environmental impact report, including the mitigation measures described in the environmental impact report are implemented and the conditions for permitting respected.**

Read more about the Baltic Pipe permits and the underlying material.

**Switch, Contact:**

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The Danish Energy Agency works to ensure that Danish citizens and companies have a cost-effective, good and stable supply of electricity, gas, heat, water and telecommunications as well as waste management.

The Danish Energy Agency is responsible for the entire energy sector's value chain from energy production, including exploration and extraction, energy supply to energy consumption, energy efficiency and savings, and energy economy and technology monitoring. We are also responsible for supporting the economic efficiency of the supply sector, which in addition to energy includes water, waste and telecommunications, including user conditions, universal service and statistics in the telecommunications field, as well as regulation of water supply and waste management.
The Danish Energy Agency is responsible for ensuring that the Danish energy and supply legislation supports the desired development and, for its use, conducts ongoing analyzes and assessments of developments nationally and internationally.

The Danish Energy Agency safeguards Denmark's interests in the energy and supply sectors in the EU and, through targeted cooperation with individual countries and international institutions, seeks to disseminate the Danish experience with the energy conversion for the benefit of Danish export companies.

The Danish Energy Agency was established in 1976 and is a board of the Ministry of Climate, Energy and Supply.
Denmark approves Baltic pipeline to Poland

Link will help Poles in transition from coal to natural gas

Earlier this month, Russia stepped up pressure in an attempt to get Denmark to approve letting the Nord Stream 2 gas pipeline pass through Danish waters.

But while that green light remains to be seen, now the Danish energy agency, Energistyrelsen, has now approved the Baltic Pipe link traversing Danish territory on its way from Norway to Poland.

“Baltic Pipe is expected to contribute to a Polish transition from coal to natural gas, and thus reduce greenhouse emissions,” Energistyrelsen wrote.

“Moreover, it is believed that the Baltic Pipe will increase supply security for natural gas in Denmark, as the Danish gas system will have direct access to the Norwegian Europipe II link.”

READ ALSO: Putin: Denmark under pressure on Nord Stream 2 pipeline

Russians still waiting

The pipeline is scheduled to land in Denmark from the North Sea at Hostrup Beach I west Jutland, go across Funen to Faxe in Zealand, before heading to Poland via the Baltic Sea.

Work on the pipeline is expected to commence sometime in 2020.

Meanwhile, there is no news regarding the contentious Nord Stream 2 pipeline yet, despite the Russian government applying pressure earlier in October.
Robert E. Reilly, Executive Vice-President and Chief Operating Officer

All right, thank you. J.J. First and foremost thanks goes out to the men and women within the CN team that helped deliver this quarter's outstanding results. Some of the operational highlights this quarter include the team handled an all-time record GTMs for third quarter, 1% more than last year's Q3 and 5% higher than 2017. Train speed improved 4% over the same quarter last year. Car velocity improved 7% and train productivity, increased 2% versus the same quarter in 2018.

As J.J. mentioned, this quarter's financial results were in large part assisted by our strong cost control efforts. In the quarter, we delivered an all-time best fuel efficiency performance improving 4% year-over-year. That means we moved 4% more tonnage the same distance with the same amount of fuel. CN continues to be the North American Class 1 railroad leader in fuel efficiency using a little more than eight tenths of a gallon of fuel per 1,000 gross ton miles. These results were not an accident, but the result of an intense day to day commitment by the operations team, disciplined by our locomotive engineers and utilizing onboard tools, minimizing idling locomotives and a strong execution of the number of locomotive used on trains to achieve these savings.

From a railcar perspective, we are in process of returning nearly 3,000 railcars that were on lease, scrapping another 2,000 railcars and have parked over 6,000 cars to saving car hire expense. All of these actions help to rightsize our fleet to the rail volumes we are experiencing and decrease our expenditures associated with them. As a result of these efforts, our active online inventory has dropped 6% year-over-year leading to a more fluid railroad. On the locomotive front, we continue to return lease locomotives and will return the last of these locomotives in Q4 as we rid ourselves of further expense related to lease locomotives. The increased reliability of our upgraded locomotive fleet has given us the flexibility to make these moves. As J.J. also mentioned, within our mechanical department, we are aligning our resources with the increased reliability of our fleet and the softening traffic volumes. These moves will allow us to more proactively schedule maintenance at the right locations and continue to improve our fleet's availability while minimizing the amount of inventory we carry at outline locations.

Regarding safety, we continue to progress on plan for completion and conversion of all of our mandated Positive Train Control PTC subdivisions as we now have just two remaining subs to convert. All required territory on the CN will be completed by year-end, which is a full year ahead of the PTC mandate of December 31, 2020. This will allow us to continue to work with other Class 1 railroads on progressing interoperability between railroads in 2020. In addition, we now have received our first two autonomous track inspection cars, which are being commissioned now with another six more to be completed by year-end. These cars will allow for increased testing and more consistent results that ultimately leads to a safer and more reliable railroad. With winter preparation in high gear, the team has worked very hard preparing for this upcoming season. To that end, the team has added 40 more aircars to our fleet, bringing our total to 100 cars ready and prepared for this winter season. Our capacity additions continue on track and will aid in our resiliency to the impacts of winter as well. While we don't know the severity of cold weather this season, we are (technical difficulty) as we have ever been.

To close, I am very proud of the results that this team has delivered as we continue to prepare and adjust, where needed, working with James and Keith's teams on the economic scenarios ahead.

With that, I'll turn it over to James.

James Cairns, Senior Vice-President of Rail Centric Supply Chain

Thank you, Rob. Overall, revenue for the quarter was up 4%. Keith and I will walk you through the top line performance for our respective markets in Q3, and provide some insight of what lies ahead. The North American rail industry is facing a challenging economic environment and as you heard from Rob, we are managing our costs very closely.

Looking at year-over-year results. It is clear that our unique three coast market reached a footprint in North America, our structural advantages that allow us to diversify our traffic mix and adapt to changing market conditions. A great
example of this structural advantage in action was our performance in North American coal segment in the third quarter. Coal is a tale of two markets in Q3. Strong growth in Canadian exports up 80% driven by the ramp up of Coalspur’s new mine that opened earlier this year, was partially offset by sluggish US thermal coal exports, down 38% as a result of low [ph]APIQ pricing. Looking forward, we will continue to see a sequential increase in run rate for Canadian Coal in Q4 and expect the same for US coal.

The Canadian grain crop has been delayed as a result of poor weather conditions. We ended the quarter 1% below last year. We expect to recoup those volumes in the spring of 2020. Again our market reach is a structural advantage. We run longer trains with direct CN to CN service from country elevators to west coast ports. The new G3 grain terminal at Vancouver is expected to be in service in the second half of 2020. This will be the first grain loop track to loop track supply chain in Canada and will facilitate quicker asset turn times and allows the ship more tonnage with fewer cars. We are creating new capacity and increasing resiliency to respond to higher Canadian crop yields.

The structural change in the BC Forest Products industry was at the root of 11% decline in revenue for the segment in Q3. Several BC sawmills curtailed production in response to low pricing and high stumpage fees in 2019. We have reset our cost to support a new sustainable run rate moving forward. Natural gas liquids revenue was up 32% in Q3 driven mainly by propane and the full ramp-up of the AltaGas export facility in Prince Rupert. Volume is now running near Phase 1 capacity at 60 plus cars a day and we expect to see this production level continue going forward.

Prince Rupert is a gift that keeps on giving. In Q3, we saw the start up of the Ray-Mont plastics bagging line which feeds the container export market. Looking ahead we see more growth in carload transload for several commodities at the Port of Prince Rupert, producing container exports that improve steamship line round trip economics. Refined petroleum products revenue was up 20% on the back of new long haul jet fuel business from Alberta to Ontario, as well as year-over-year increase in run rate from the Northwest refinery in Alberta, which began operation in late 2017.

Our market reach allows us to directly connect Alberta production of refined products with desirable end markets. Sand revenue was negatively impacted by a slowdown in drilling activity in Western Canada. We don’t expect to see a recovery until second half of 2020. Crude revenue was up 34% in the quarter despite several of our customers shipping below their take-or-pay contract level, idling capacity in response to production restrictions. Recall that in Q4 last year crude differentials were very high and we shipped on average about 230,000 barrels per day of crude by rail, so the year-over-year comps in Q4 will be challenging.

Now, I will turn it over to Keith to speak to our consumer product supply chain Q3 results. Keith?

**Keith Reardon, Senior Vice-President of Consumer Product Supply Chain Growth**

Thank you, James and good afternoon, everyone. The consumer markets produced strong results in the third quarter. Our ability to adapt to the market realities with strong cost management as well as our ability to provide our customers with solutions have allowed us to outperform our markets. Revenues were up 13% and RTMs were up 2% for the Group in the third quarter versus 2018. In both intermodal and automotive we continue to win with our unique network reach and consistent high levels of customer focus. The cost-effective and efficient gateways with which we serve continue to produce sustainable long-term results.

Starting out with automotive. CN’s team has worked extremely well together to provide our customers with solutions that generated slightly above 5,600 carloads growth, allowing us to outpace the industry growth rate and setting record monthly volume. Our strategy to increase the number of auto port storefronts as well as providing a very solid supply of railcar capacity is winning in the market. Our new Vancouver auto port facility is also now open and producing results. In intermodal, the initiatives we presented at our Investor Day will continue to provide efficiencies and additional capacity in our inland terminals. CN has room to grow and we continue to generate new ways to improve our position as a cost leader in this segment.
So clearly, we've had a slowdown in the economy, but it does seem to me that some of the volume growth that you were anticipating in 2019 has simply been deferred. And there, I'm thinking about crude by rail, the Coalspur mine and Canadian grain. So I appreciate that it's too early to talk about 2020 yet, but maybe you could just give us some more color in those areas.

Jean-Jacques Ruest, President and Chief Executive Officer

So I think, James. That's in your [ph] market space. So maybe you can provide color on these three segment.

James Cairns, Senior Vice-President of Rail Centric Supply Chain

Yeah. So we were disappointed to see the late -- the late harvest for the Canadian grain crop. We're still confident that moving forward, we're going to have a pretty good grain year this year. All indications are that it could be one of the largest crops in Canadian history. So we are eager to start moving that. We have the resources to do so.

On the crude side of things, a little more difficult, there was some government intervention that took place in that market segment and we build out capacity to move about 300,000 barrels a day of crude. In September we moved about 180,000 barrels a day, we still have that latent capacity available to move that crude, if fact it does become available.

Indications are pretty clear that we will see the Alberta Government crude contracts going to private hands here, in short order possibly by the end of the month. And we're very excited to start moving that at crude volume when it does. Talking about the Coalspur mine, they had some challenges kind of ramping up. But right now, they're kind of where we expect them to be in a annualized rate of about 3 million tons a year. We're hopeful moving forward that that rate is going to continue to accelerate. We see could see sequential improvements and and get to that 5 million ton per year on you base [ph].Thank you for the question, Cherilyn.

Cherilyn Radbourne, Analyst

Thank you. That's my one.

Jean-Jacques Ruest, President and Chief Executive Officer

Thank you.

Operator

Thank you. The next question is from Chris Wetherbee from Citi. Please go ahead.

Chris Wetherbee, Analyst

Hey, thanks, good afternoon.

Jean-Jacques Ruest, President and Chief Executive Officer

Good afternoon.

Chris Wetherbee, Analyst
Ken Hoexter, Analyst

Hey, good afternoon. Maybe just a little clarity on that outlook Ghislain, are you, just to understand, are you now targeting negative earnings in the fourth quarter given that the upper teens, or mid-teens kind of growth in the first couple of quarters. And I guess just trying to understand is this beyond economic, is it forest product secular shift or delayed coal, grain, crude that could ramp up as we move forward. Just want to try to understand how you roll into the fourth quarter and then into early 2020. Thanks for the time.

Ghislain Houle, Executive Vice-President and Chief Financial Officer

Thanks. Yeah, thanks, Ken. For the question. I can take the first part and then maybe, I'll turn it over to you James for the commodity outlook. Obviously, I mean, Ken you can you can do the math, but we went from a low double-digit EPS growth and now we are high single-digit EPS growth. So obviously we -- Q4 will be a challenging quarter and if you look just from a volume standpoint, month-to-date. I mean our volumes and we do report our volumes both in terms of carload and RTMs our volumes are down 10%. So obviously that impacts EPS and and I'll let you do the math, but obviously that the volume deterioration or challenge is the story. Maybe -- James, you want to touch closely on some of the commodities.

James Cairns, Senior Vice-President of Rail Centric Supply Chain

Yeah, I'll talk about a couple of markets. You mentioned forest products. So forest products, that is a structural change in the BC forest products industry. That business is not coming back, but you can expect to see the same run rate in or similar run rate in Q4 that we saw in Q3. On the crude side of the business, that's a little different.

If you look at the comps from last year Q4 compared to Q4 of this year, we had an all-time record 232,000 barrels a day that we move in Q4 as we are getting to ramp up to take on this additional capacity and the government contracts that were coming into bear that didn't happen. And this year we're not going to see that level of shipment. We don't expect to see the same level of shipment that we saw net last year. So it's going to be very difficult comparison year-over-year basis. Coal is going to continue to be a very, very favorable year-over-year comps in Canada. Coal in the US as much as we are seeing a improved run rate from Q2 into Q3 and expect to see that continue into Q4. We are not going to hit the record coal volumes of US export that we saw in 2018. I hope, I get to the root of your question there.

Ken Hoexter, Analyst

Absolutely I appreciate it, thanks James.

Jean-Jacques Ruest, President and Chief Executive Officer

Thanks Ken.

Operator

Thank you. The next question is from Ravi Shanker from Morgan Stanley. Please go ahead.

Unidentified Participant
Hi, good afternoon. You've got (inaudible) on for Ravi, maybe just bringing back to crude by rail here. I guess the question is how quickly could you get teams in place to be able to move higher volumes in the event that the Alberta Government does transfer the program to private hands and removes curtailments there and then maybe just any way to frame how you guys could see volumes ramp into 2020 in that case?

Jean-Jacques Ruest, President and Chief Executive Officer

So maybe I can start on the resource side. We have the locomotive, the people and the track capacity to ramp it up now up to the 300,000 barrel that we talked about earlier in terms of what's may happening in the marketplace, I'll let James talk about what was the color there.

James Cairns, Senior Vice-President of Rail Centric Supply Chain

Yes, I don't, it's unclear to us what might happen in 2020 as far as what crude is going to look like. It's really going to be dependent on if the -- the Alberta Government is successful in placing the contracts in private hands, and if they lift the curtailment on production. There is about 200,000 barrels a day of crude that is not moving. It's in the ground that wants to move if the production curtailments are lifted and if that does happen, we're ready willing and able to move that volume. Rob asked me all the time, he says, when is the crude coming -- when is the crude coming, And I'm saying, I'm glad you ready to go Rob. And as soon as I know I'll make sure that you know.

Unidentified Participant

Great. I appreciate the color there.

Jean-Jacques Ruest, President and Chief Executive Officer

Thank you.

Operator

Thank you the next question is from Allison Landry from Credit Suisse. Please go ahead.

Allison Landry, Analyst

Thanks, good afternoon. I just wanted to ask a little bit about the Q4 guidance and specifically be LR [ph] it seems like the implied operating ratios maybe a bit worse sequentially than we've seen historically so I was wondering if you could talk about the factors that might be driving that. If it's mix driven. If there is any seasonality with transacts that we need to think about, any color would be helpful.

Thank you.

Jean-Jacques Ruest, President and Chief Executive Officer

As you know Allison , we don't do guidance by quarter. But I -- let's see if Ghislain can help you a bit with.

Ghislain Houle, Executive Vice-President and Chief Financial Officer
Thank you the next question is from Steve Hansen from Raymond James. Please go ahead.

**Steve Hansen, Analyst**

Yes, good afternoon guys. Just a quick one from me on forest, if I may. James, I think you mentioned earlier in the call that forestry is down to a more stable run rate now, are you getting good indications from the BC customers, the millers [ph] that is that the predominance of the capacity curtailments or shutdowns since occurred thus far. Should we, should we expect or are we at risk of another step down once some of the log -- burn through just curious, any color that you might have there.

Thanks.

**Ghislain Houle, Executive Vice-President and Chief Financial Officer**

I think longer term as you to look out past 2020 and 2021, you're going to see additional take down in capacity, just because of the allowable cut. Right now the indications we're getting is it's stable pricing indications are that we've kind of reached a new stable level that we've seen through Q3, that we expect to continue on moving forward and that's what we are resourcing against.

**Jean-Jacques Ruest, President and Chief Executive Officer**

And if I may add this, Steve, if I may add to, (inaudible) deal was actually moving in the province of Alberta. And there is a number of producer that tell us that they think the province will have to do with BC has done, which is to control the prime beetle, they will have to open up the forest to a higher rate of cut. So we even though this the fast pace of cutting of the Pioneer [ph] in BC has done. At some point, we may see some of that in Alberta in an area that's favorable to (technical difficulty).

**Steve Hansen, Analyst**

Understood. Thanks guys.

**Jean-Jacques Ruest, President and Chief Executive Officer**

Thank you.

**Operator**

Thank you the next question is from Seldon Clarke from Deutsche Bank. Please go ahead.

**Seldon Clarke, Analyst**

Hey, thanks I just want to get back to CapEx for a second and so can you just help me better understand why the intensity of investments wouldn't come down next year, sort of, I guess below your typical historical range given your envelope this year is unchanged at CAD3.9 billion, RTMs have been, your RTM assumptions have come down from up high single digits to now down slightly year-over-year.

So could you just give us a sense of why that -- you wouldn't see savings roll over into next year, based on your capital both for this year.
Jean-Jacques Ruest, President and Chief Executive Officer

I think -- if I may start. So definitely for all railroad manufacturing sector is actually probably -- as you were saying negative growth versus positive growth. The Alberta energy space whether it's frac sand accrued is also going to be producing short-term negative growth as opposed to positive growth to the point made earlier by James.

There is crude production available in Alberta, but it's been curtail. So we obviously, we can't move it. In the case of Forest product, the fact that the price of lumber is down and the price, the cost of stumpage is up and the fact that forest does not have as many dying tree that it had, it's a combination of secular shift and also just cyclical -- cyclical is about the price of the stumpage fee and the selling price of lumber.

So you know the story about US coal. And US coal company who are producing thermal coal are increasingly having a tough challenge making any money and obviously that has an impact on how much volume is available for the railroad in the case of CN, we're talking the the export market.

So I think the issue here is more about the broad economic environment, then our customers not being able to perform in their space. There space is under pressure. So, all of them are either producing less or they've had to take some curtailing production. So we, we can only -- we are not losing market share but the market that we're serving on manufacturing, natural resource, energy and trade is not as big as it was. And I think that's true for all of the North American railroad. When you see volume down for the North American railroad it's way beyond just the precision schedule railroading impact a big part of that is what demand is available for us in term of the overall economic environment.

David Vernon, Analyst

So the projects that were identified are still going to be vary. They are just going to have some offsets to work through, is that the right way to interpret that or is there specific...

Jean-Jacques Ruest, President and Chief Executive Officer

That right.

David Vernon, Analyst

Okay.

Jean-Jacques Ruest, President and Chief Executive Officer

The DP World expansion in Rupert is going ahead. AMCI who bought the -- the coal and the bulk terminals that's going ahead. There is expansion coming up at two of the container terminal in Vancouver. We're still very much focused on the Rupert of the East we have a number of initiative on the carload side, the biggest one is crude by rail. We can actually execute as soon as either the production curtailment are lift or when the province of Alberta transfer these commercial contract into the hands of private shippers. Just as a, for example.

David Vernon, Analyst
Jean-Jacques Ruest, President and Chief Executive Officer

Thank you.

Operator

Thank you. The next question is from Brian Ossenbeck from JP Morgan. Please go ahead.

Brian Ossenbeck, Analyst

Hey afternoon. Thanks for taking the question. I just wanted to come back to crude by rail one more time. It sounds like you're keeping a lot of resources ready in terms of capacity and employment level. So it's coming at a cost to CN. So wanted to see if you're able to get any liquidated damages as an offset and then if you have any specific comments on the volume number embedded in the updated guidance that would...

Jean-Jacques Ruest, President and Chief Executive Officer

Yeah. So I think, let's maybe start. So we do have locomotive. As Rob mentioned, a number of them are parked. And then, how many are parked Rob?.

Robert E. Reilly, Executive Vice-President and Chief Operating Officer

150

Jean-Jacques Ruest, President and Chief Executive Officer

And then we are returning the last of the leased locomotive on the people side, we do have the qualified crews and either they don't furlough or they taking vacation and it's partly across -- partly across we can avoid partly across worth the carry. And when it comes to the take or pay system maybe you want to add color James.

James Cairns, Senior Vice-President of Rail Centric Supply Chain

Yeah. When we got back into the crude by rail space. We were very clear to have these new contracts based on take-or-pay volume commitments so we always want to move, move the railcars, we always want to move the crude but if we don't these are take-or-pay contracts.

Jean-Jacques Ruest, President and Chief Executive Officer

That's right. So the -- it was done from the beginning and the capacity was going to be made available which obviously, we have. I'd just mentioned that we have the capacity we could do up to 300,000 barrel a day. We could do that in October, November, December if need be. But in order for us to create the capacity there was an agreement in his contract for us to be protected with some minimum amount of cash just to have the capacity available, even if you don't move the crude. So I hope that answer your question.

Brian Ossenbeck, Analyst
And the fourth quarter expectation similar to 3Q. And so these are this get you...

Jean-Jacques Ruest, President and Chief Executive Officer

You want to give some color on the fourth quarter crude by rail volume, James.

James Cairns, Senior Vice-President of Rail Centric Supply Chain

Yeah, I would say we're looking at. Again looking at difficult comps, but if you look at Q3 going into Q4, we were flat Q3 from Q2. We're going to be slightly down, I think in crude by rail volume going Q3 to Q4, unless something changes. At the end of the day if the customers bonus up that have these take-or-pay contracts and say I'm ready to move let's go we're going to be ready to move. The differentials aren't quite there yet, we're looking at differential somewhere in the range of CAD14 to CAD15 per barrel.

Should be a strong pricing single moving forward to get back in the game, but again I think the government curtailment and the kind of cap on the amount of crude produced puts an artificial cap on the differential customers look very, very hard about getting back into the crude by rail space without some notion of longevity.

Jean-Jacques Ruest, President and Chief Executive Officer

Yeah. So fourth quarter of last year on average we move 233,000 [ph] barrel per day and the peak month was the month of December, where we moved 250,000 barrel per day, we actually provide you with those stats on Page 19 of our appendix. It gives you the reference point of what is our comparable for crude by rail.

Brian Ossenbeck, Analyst

Got it. Thank you very much.

Jean-Jacques Ruest, President and Chief Executive Officer

Thank you.

Operator

Thank you. The next question is from Scott Group from Wolfe Research. Please go ahead.

Scott Group, Analyst

Hey, thanks. Afternoon guys.

Jean-Jacques Ruest, President and Chief Executive Officer

Good afternoon.

Scott Group, Analyst
Productivity and Cost Control Heightening

• Sweating our assets
  - Reducing our car fleet by returning leases and selling less reliable and less productive railcars (5,000 railcars in the process to be returned)
  - Returning all leased locomotives
  - Managing crew level to lower demand
  - Aligning our mechanical operations to lower demand and younger fleet of rolling stock

• Record fuel productivity
  - Fuel efficiency up 4% in Q3
  - Better process, technology, higher matching of HHP to tonnage

• Safety
  - Meet and exceed all regulatory targets to protect our people and communities

• Ready for winter
  - Increasing air repeater cars in service by 40 (now 100 in total)
Weakening Demand Environment For the Rail Industry

<table>
<thead>
<tr>
<th>Rail Centric Supply Chain</th>
<th>Consumer Product Supply Chain</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Coal</strong></td>
<td>International intermodal market – focused on 2020 and beyond</td>
</tr>
<tr>
<td>• Strong growth in Canada - ramp up of Coalspur’s new mine</td>
<td>• Prince Rupert currently running at nameplate capacity (1.3-1.4 M TEUs) with expansions planned for 2021 (250K TEUs) and 2022 (200k TEUs)</td>
</tr>
<tr>
<td>• Weak U.S. thermal coal exports. Volumes well below 2018 levels</td>
<td>• Additional Cosco Vancouver business (started mid Q3) and The ONE returning to CN (effective June 2020)</td>
</tr>
<tr>
<td><strong>Grain</strong></td>
<td>• Enhancing export capabilities - new grain source-load export terminal in Regina (Nov 2019) and new plastic transload in Prince Rupert (Sept 2019). Phase 2 expansion in progress</td>
</tr>
<tr>
<td>• Canadian grain harvest delayed due to poor weather conditions - volumes pushed to 2020 as the harvest is quite late</td>
<td>• New CN-CSXT agreement for containers from NY/NJ/Philadelphia to Montreal and Toronto (Q3 2019)</td>
</tr>
<tr>
<td><strong>Forest Product</strong></td>
<td><strong>Excess truck capacity impacting domestic intermodal volumes</strong></td>
</tr>
<tr>
<td>• Lumber in a secular shift in British Columbia. Several saw mills curtailed production given low lumber price and high stumpage fees</td>
<td>• CargoCool and EMP growth outpacing the market substantially</td>
</tr>
<tr>
<td><strong>Petroleum and chemicals</strong></td>
<td>• Stronger E-commerce volumes now moving by rail</td>
</tr>
<tr>
<td>• Propane volume ramp up at the Altagas export facility in Prince Rupert</td>
<td>• Leverage TransX product suites to convert truck to rail intermodal</td>
</tr>
<tr>
<td>• Uncertainty around crude by rail volumes. Difficult comps in Q4 2019</td>
<td><strong>Automotive volumes flat</strong></td>
</tr>
<tr>
<td>• Solid market reach in refined petroleum. Connecting Alberta production with desirable end markets</td>
<td>• Vancouver autoport operational October 2019</td>
</tr>
<tr>
<td>• Prince Rupert plastic export transload sold out the first month of operation</td>
<td>• Impact of GM strike with union deal pending</td>
</tr>
<tr>
<td></td>
<td>• Strong carload trend at CN-served OEM locations in Michigan and Ontario</td>
</tr>
<tr>
<td></td>
<td>• New autoport facility near Minneapolis scheduled to open in Q3 2020</td>
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 Rail Centric Supply Chain is comprised of the following: Petroleum and Chemicals, Metals and Minerals, Forest Products, Coal, and Grain and Fertilizers.
Consumer Product Supply Chain is comprised of the following: Intermodal and Automotive.
Please see Forward-Looking Statements at the beginning of the presentation.
Crude Oil By Rail Trend

Crude Oil Shipments in Carloads

<table>
<thead>
<tr>
<th>Year</th>
<th>2014</th>
<th>2015</th>
<th>2016</th>
<th>2017</th>
<th>2018</th>
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<tr>
<td>Annual carloads</td>
<td>~127,000</td>
<td>~98,000</td>
<td>~52,000</td>
<td>~61,000</td>
<td>~82,000</td>
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<table>
<thead>
<tr>
<th>Quarter</th>
<th>Q1-18</th>
<th>Q2-18</th>
<th>Q3-18</th>
<th>Q4-18</th>
<th>Q1-19</th>
<th>Q2-19</th>
<th>Q3-19</th>
</tr>
</thead>
<tbody>
<tr>
<td>Monthly carloads</td>
<td>~11,000</td>
<td>~16,000</td>
<td>~20,000</td>
<td>~36,000</td>
<td>~27,000</td>
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<table>
<thead>
<tr>
<th>Month</th>
<th>Mar-19</th>
<th>Apr-19</th>
<th>May-19</th>
<th>Jun-19</th>
<th>Jul-19</th>
<th>Aug-19</th>
<th>Sep-19</th>
</tr>
</thead>
<tbody>
<tr>
<td>Quarterly carloads</td>
<td>~6,000</td>
<td>~8,000</td>
<td>~9,000</td>
<td>~10,000</td>
<td>~9,000</td>
<td>~8,000</td>
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</table>

Crude Oil Shipments in Barrels Per Day

<table>
<thead>
<tr>
<th>Year</th>
<th>2014</th>
<th>2015</th>
<th>2016</th>
<th>2017</th>
<th>2018</th>
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<tr>
<td>Average barrels per day</td>
<td>~209,000</td>
<td>~162,000</td>
<td>~85,000</td>
<td>~99,000</td>
<td>~133,000</td>
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<table>
<thead>
<tr>
<th>Quarter</th>
<th>Q1-18</th>
<th>Q2-18</th>
<th>Q3-18</th>
<th>Q4-18</th>
<th>Q1-19</th>
<th>Q2-19</th>
<th>Q3-19</th>
</tr>
</thead>
<tbody>
<tr>
<td>Average barrels per day</td>
<td>~69,000</td>
<td>~101,000</td>
<td>~129,000</td>
<td>~232,000</td>
<td>~176,000</td>
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<table>
<thead>
<tr>
<th>Month</th>
<th>Mar-19</th>
<th>Apr-19</th>
<th>May-19</th>
<th>Jun-19</th>
<th>Jul-19</th>
<th>Aug-19</th>
<th>Sep-19</th>
</tr>
</thead>
<tbody>
<tr>
<td>Average barrels per day</td>
<td>~116,000</td>
<td>~149,000</td>
<td>~180,000</td>
<td>~198,000</td>
<td>~180,000</td>
<td>~159,000</td>
<td>~180,000</td>
</tr>
</tbody>
</table>

Tough comps in Q4 2019, given volatile market and lower crude WCS/WTI differentials
Vancouver – Investing to Accommodate Future Growth

Rail investments (close to $300M jointly funded by CN, Port of Vancouver and Canadian Federal Government)

1. BI Line – 4.3 KM extension of double track (Q4-2021)
2. Improving rail access to North Shore
   • 5.8 km staging track, and tunnel ventilation improvements (Q4 2020)
   • Grade separation (Q1 2024)
3. Glen Valley 5.6 km double track (Q2 2021)

Customer investments – Over $1B in private sector investments

1. Centrex - increasing capacity from 600k TEU to 1.5M TEU (early 2022)
2. Vanterm increasing capacity from 850k TEU to 1.07M TEU (2020)
3. Neptune – Coal capacity from 12.2MT to 18.5MT (2021) and Potash capacity from 6MT to 11.5MT (completed)
4. Fibreco (Grain / wood pellets) – added grain
5. Kinder Morgan – increased agriculture products through terminal
6. Cargill (Grain) – added third dumper
7. Richardson International Ltd (Grain) – Increased storage and throughput 4-5MT capacity
8. G3 (Grain) – New grain terminal with 8MT capacity in 2020
9. Fraser Surrey Docks – DPW proposed acquisition of terminal
10. Deltaport – increased capacity from 1.3M TEU to 1.9M TEU (completed) and further expecting to increase to 2.4M TEU
focus and priority.
So with that, I'll keep my comments short. I'll hand it over to John to provide some color on the markets and then turn it over to needing to elaborate more on the numbers.

**John Brooks, Executive Vice President and Chief Marketing Officer**

All right, thank you, Keith and good afternoon everyone. So, total revenues were up 4% this quarter to $2 billion our teams were down 1% FX was flat while fuel was negative 1% and as expected, our pricing. We ended in the targeted 3% to 4% range, while mix was positive. Despite our book of business, and frankly, particularly our bulk franchise facing some unintended unanticipated headwinds in the quarter. The CPE team is closely aligned. As we continue to deliver industry-leading growth built on the strength of our service product in the execution of our surgical growth strategies we view these bulk headwinds largely of episodic.

Looking ahead, the fundamentals for grain and potash and coal look good grain volumes were down 1%. While revenues were up 6% wet weather delayed the Canadian grain harvest significantly in the quarter with weekly volumes averaging about a 1,000 cars per week less compared to our prior years. More recently, these the volumes have begun to pick up and we are confident that any volumes not move this fall, we’ll move in 2020 currently, in Canada, the latest stats show we about 70% harvested versus our three-year average closer to 85% the crop size will look similar to last year and we continue to watch closely the impacts of quality resulting from this late harvest in the US, although recent weather events have also taken their toll in the upper Midwest and have slowed shipping in that territory. We've seen an increase, most recently in our export soybean program as more positive news the emerges around US Trade settlements and talks with China on the potash front, volumes were down 15% and revenue decreased 10% after all time record volumes over the past year, the ongoing delay with international contract resolutions have weight heavy on our export volumes. It is our understanding that ongoing discussions between the parties remain very constructive. So while we believe will continue to face some near-term uncertainty into Q4 the macro demand for potash remained stable for 2020 and as we look beyond

On the coal front, revenues were up 7% while volumes were essentially flat Canadian coal volumes were down slightly with some supply chain challenges. However, this was offset by increased volumes of our US coal into our Midwest power plants as they rebuild their inventories and the merchandise front, revenues and forest products were up 3% and volumes were up 1% we continue to drive success in this space.

Through strong service, asset utilization and utilizing our network of transload to create optionality for our customers. With our unique terminal capacity in land available for low cost expansion our transload strategy is extremely powerful tool and extending our reach similar to the recent developments. We've made in this space in Vancouver and Toronto. I’m excited about new development opportunities to further create multi-commodity transload at CP terminals across Canada in the US in the MMC space. Revenues declined 4% volumes declined 2% largely driven by lower shipments of steel scrap steel and frac sand.

Partially these were offset by growth with our short-line partners in the steel market. We have seen reduced volumes from our steel mills resulting from lower market prices. High, finished product inventories in the need for less inbound scrap, frac sand shipments into the Permian Basin continue to decline as a result of increased use of in basin sand as an offset the team continues to work hard on the development of new destinations to help grow our share in the market such as the Bakken, Marcellus and into Canada.

I also note that we have our annual short line conference coming up here next week and I'm extremely pleased with the growth initiatives. We've been delivering with these key partners in the energy, chemical and plastics portfolio.

Revenues were up 12% despite sequential growth in crude by rail volumes to over 28,000 carloads in the quarter. Crude by rail shipments fell short of our expectations and our contractual commitments as a result of these shortfalls total freight revenue did benefit by approximately 1% from liquidated damages.
I should also note, we are increasingly optimistic that the Alberta Government will come to a resolution on the transfer of our crude contract and we are supportive of the new mechanisms that allowed crude production to move via rail to count as an offset against the curtailment and anticipation of this, we've seen the spread begin to widen. And we are seeing growing interest with our shippers and expect volumes to increase sequentially into Q4.

And then, automotive, despite a weak North American demand environment. Revenues were up 1% and volumes grew 2%. We continue to see success-driven by CPUs unique inland terminal capacity across our network. This is highlighted not only by our growth at our Vancouver Auto compound which is a gift that keeps on giving. And also the new opportunities in Southern Ontario in the upper Midwest and finally on the intermodal side of the business. Overall revenues were flat. We saw strength in the international with volumes up 9% and then domestic.

The results were mixed with strength in the retail space and record volumes of our refrigerated products being moved being offset by softness in the wholesale market. So let me close my remarks by saying a couple of things in certainly the softer a more challenging demand environment pressures grow for growth and cost savings there can be a tenancy for some to try to really commoditize the service we provide. We're not going to fall in that trap. I want to say, rest assured that the volumes we're bringing on to this railroad or at a price that reflect the value of our service. As we've said in the past, we're not going to grow this railroad for growth sake.

As I look ahead, we have a strong pipeline of unique opportunities to bring incremental volumes to this railroad the sales and marketing team is collaborating closely with our operating team to ensure we are right sized for any business environment and we are selling to the benefits of our available capacity and our service advantages I'm proud of the results of team delivered, and we have a high confidence level in our strategy to deliver sustainable profitable growth.

With that I'll pass it on the Nadeem.

**Nadeem Velani, Executive Vice President and Chief Financial Officer**

Thanks, John, and good afternoon. I'm proud to announce in Q3 operating ratio, decrease of 220 basis points when all time record and industry leading [ph]OR 56.1% at record number is the outcome of running the business the right way. Thirdly, managing resources and adapting to changing volume environments proactively structuring contracts that protect CP in the costs we incur to have resources in place the disciplined approach we take the pricing irrespective of the demand environment and having the best team in the industry.

We continue to drive margin improvement. The railroad is running extremely well, which is a reflection of the strength of our model, the of our operating team and just how embedded in our G&A precision scheduled railroading is at CP taking a closer look at the, at a few items on the expense side. As usual, I'll be speaking to the results on it on an exchange adjusted basis.

Comp and benefits expense was down 3% or $11 million versus last year. The primary driver of the decrease was lower stock-based comp of $13 million resulting from a lower share price workforce is down 2% sequentially as we continue to adapt to changing volume environment. At the end of 2019 expense, I expect our end of your workforce to be down versus Q4 2018. Fuel expense decreased $19 million or 8% primarily as a result of lower fuel prices.

Although slightly worse year-over-year. This was our second best all time quarter from a fuel efficiency perspective. Materials expense was up 6% or $3 million primarily as a result of increased locomotive maintenance, some of which was one-time as well as some in-sourcing work equipment rent expense was flat year-over-year with increased automotive and inter-volume -- and intermodal volumes, you would expect this line item to increase.

However, as we actively managed our car fleet through the quarter. The Associated operational efficiency savings fully offset the cost of increased volumes depreciation expense was $185 million, an increase of 6% as a result of the higher asset base. services was $277 million, an increase of $13 million or 5% this line item is less volume variable than others. Increase in the quarter is largely driven by higher support cost and higher property taxes as we head into Q4 we expect this line item to be flat to modestly down on a sequential basis as we do not anticipate any material land sales
will take that into any competitive dynamic and provide a value proposition for our customer that price can't replicate the market sets the rate. We've got one of the best if not the best cost structures in the market. If we want to play and it makes sense for our network we can compete for business. If the market goes to a place our competitive options go to a place, it's not healthy for this railway.

We've shown. And we will show again that we have the discipline. We're not going to get in a race bottom. It's not a race. If you're not in it, we know where our bottom is we know what our bottom line is, and again I'll finish where I started, we're not going to allow this railway for this team or the value that we represent in present to all of our customers to be commoditized. Tom again add anything more to that. That was pretty good.

Operator

Our next question comes from the line of Fadi Chamoun from BMO Capital Markets. Your line is open.

Fadi Chamoun, Analyst

Okay, thank you. Maybe, John, quickly, what would you consider to be kind of the right spread for crude by rail for the volume to kind of ramp up sequentially, like you've indicated given the liquidated damages and what that bar in that.

John Brooks, Executive Vice President and Chief Marketing Officer

Yes. So it's interesting Fadi like right now. Spreads have moved up into that $16, $17 range and that's starting to hit the sweet spot. I think it is indicative of I think the momentum and I think people feeling more and more comfortable that these contracts are going to get resolved in that they're actually might be a what they're calling a SPA program as an offsetting insta a curtailment to move, barrels by rail.

I just. I'm looking specifically at the our contracts. What we did in Q3 and what we have line of sight to with our customers here for Q4 and I expect that uptick two or 3000 additional load up to that 30,000 level to be realistic it's been a dynamic that crude space has been a dynamic area, there is no doubt about it, we're not counting on it, but certainly I view more optimism right now then there not.

Fadi Chamoun, Analyst

Okay and maybe ask a Tom question a little differently, like in the past you've had a lot of success. Obviously, converting traffic to your network from trucking from rail and so on. Now we have a little bit of a softer environment, maybe a little bit more capacity in the market. Is that opportunity diminished versus what you've seen over the last two, three years. It's sound like you feel good about what's ahead of you, if you can just help us understand kind of what the next year or two may look like compared to what has been occurring in the last couple of years.

John Brooks, Executive Vice President and Chief Marketing Officer

Yes. So, maybe I'd characterize it like this. We've got , given the strength of our bulk franchise that number one Fadi give me give me some comfort because at the end of the day. Again, that green coal potash . I think those fundamentals look strong in each of those, frankly. Give us a tailwind as I look into 2020 and beyond some of the other areas, I think certainly the merchandise and some of the industrial sectors, given some of the challenges in terms of broad base volumes. There is some question marks that remain in there certainly frac Sand. As I look forward, but I think the differentiator for us that we've been talking about is the unique inland capacity gives us a sales tool to our customers that no other railroad out there is able to replicate over the road capacity is one
thing, but the ability to, they have the land to attract the customers to make them sticky is something that you've seen us just begin to sort of leverage with some of our transload that we've developed with our Vancouver compound with some of those unique opportunities that we've talked about, but the potential for that and what that looks like in the 2020 and beyond is what sort of gives us this comfort the automotive sector is an area that, as I think by all our is going to continue to face headwinds.

And frankly, I look into the 2020 in 2021, I see us significantly outpacing the industry and our peers in that space. Just because we have the unique ability to create models and mouth droughts out there in the industry that is going to bring us share or incremental opportunity in that area and other area that I have talked about and I mentioned here is (inaudible) space it is the ability for us to go into these major metropolitan hubs across Canada and in the US, we have the land of developable it at a very low cost to be able to attractive multi-commodity customers to our franchise and a lot of that is singles and doubles and carload business, but that's really high margin strong business for us.

The add-on to our 7,000 foot manifest trains and and build that out of low cost.

Fadi Chamoun, Analyst

Great, thank you.

Operator

Our next question comes from the line of Chris Wetherbee from Citi. Your line is open.

Chris Wetherbee, Analyst

Hey, great, thanks very much. I wanted to maybe pick back up on that crude by rail comment, I think there is an expectation that you could see some better volumes as you move through 4Q and then certainly in 2020 with the government taking action here. It looks like you're targeting 30,000 in the fourth quarter. What do you think your capacity is or what do you think you could get to you on a quarterly basis without a lot of effort as we think about 2020.

Unidentified Speaker

So, Chris, I'm a little hesitant to call that given all the variability. We've had I look back, we get to the 30,000 run rate level I look back, that was sort of our peak level during the last crude by rail renaissance, is there another 5,000 or so, could you get to 35,000 run rate. Yeah, I think, I think there is the bandwidth to do there. Now look, it's not a slam dunk this we still have to get over some hurdles, but in terms of the capacity people the mobile resources to go to that level on a sustained rate. I think that's a pretty good number.

C- Unidentified Speaker

But I think it's critical to point out that that optimism on the upside is not fueling our optimism on our potential for growth in 2020 or even in the fourth quarter.

Chris Wetherbee, Analyst

Okay. So that will be incremental. That's very helpful. (inaudible), you talked a little bit about headcount in in 4Q or do you think out to 2020. Can you give us a little bit of sense of where do you think you are obviously the operating ratio performance in 3Q was with very, very strong. Could you give us a sense of where, how heads play into that when
That being said, as we build out our 2020 model, I think the expectations remain pretty strong that the volumes that we've become accustomed to will normalize pretty, pretty quickly. And don't forget, we do have cable us continuing to ramp up that production.

So, we're going to see I think a pretty decent jump with them to, it's part of this.

**Unidentified Speaker**

Finally, the first quarter of this year, we could not and we were not in a position to move the demand that was there in the normal market given our unique challenges that we had with our catastrophic derailment.

**Brian Ossenbeck, Analyst**

Got it. All right, thanks for all that. Maybe a quicker follow-up on crude and just the liquidated damages. John, I think you mentioned it was about 1% of freight revenue growth, I guess $20 million in this quarter. Needan, could you give us a sense as to what type of cost that those are going to cover it was just a material mover on the numbers this quarter and it sounds like you're expecting this to come through based on the contract structure in this -- the speed or lack of speed. I guess, transferring from the government, but I just wonder if you could put some more context around that and if you expect this to be kind of a one-and-done event here in 3Q as volumes hopefully ramp-up in 4Q?

**Unidentified Speaker**

Well, obviously, Brian, the good liquidated damages that the premise to protect you to have the resources in the capacity to service the business, which we did. So whether it's counts capital investments, et cetera that we put towards set aside to move that traffic or it's not taking on other business that would consume some of that traffic in that capacity.

So, in terms of expense associated with it, there are expenses, there is expenses with people, there's expenses with locomotives with assets and network maintenance and so forth. So I'd characterize it that. I'm not going to give you an operating ratio on that the margin on that business. But safe to say there are expenses associated with it to based on the premise of liquidated damages.

**Brian Ossenbeck, Analyst**

Okay, got it. Thanks for your time.

**Unidentified Speaker**

Thanks, Brian.

**Operator**

Our next question comes from the line of Benoit Poirier from Desjardins. Your line is open.

**Unidentified Participant**

Yes, thank you very much and good afternoon. Could you discuss a little bit about the dynamics between the western ports and Eastern ports on the back of the trade issues with China? I was wondering if the volume is weaker in
be seeing is people sort of hold-off on decisions as to what to do? Thanks.

**Unidentified Speaker**

Well, have we seen certainly with the volume pull ahead that took place last fall, create an inventory good across the US and in Canada? Yes, to the point, I was just talking around Allison's question is, I think we've seen that subside a little bit. We're seeing a little bit of a of our peak season. But what we're until a lot of these trade resolutions get ultimately resolved, I think, yes, that continues to be cautious area. We do in the West, we have seen some blank sailings continue as volumes have been muted with some of our steamship lines.

But it's sort of a watch and see. That's one we're keeping close and frankly there's other areas to attack that can create some unique opportunities in that space outside of just going after and trying to win some additional of that streamline -- steamship line business.

**Operator**

Our next question comes from the line of Ravi Shanker from Morgan Stanley. Your line is open.

**Ravi Shanker, Analyst**

Thanks for (inaudible). If I can follow-up, the international intermodal question, some of the US rails are now kind of starting to openly acknowledge that you're seeing share shifts from the US sports to the Canadian ports and you mentioned going to Vancouver being a shorter distance Chicago and such.

How early innings are we do you think in that share shift? Do you think the bulk of that has happened and we stabilize here or do you think more of that volume keeps coming way?

**Unidentified Speaker**

Well, yes, I think the Vancouver have benefited in that process. I think overall, the base [ph]LOE is is down, so some of that might be muted in terms of the real value of what has shifted between the US ports up to Vancouver.

I can tell you, I think, we think it's an ongoing value proposition that we're targeting, whether it'd be into the Minneapolis market or in the Chicago market.

**Ravi Shanker, Analyst**

Okay, got it. And just a follow-up on crude by rail, it's in guarding to see you saying that we are pretty close to gain the volumes milling, with the exception for crude by rail to the curtailments. But are you still looking at crude by rail as a two or three-year window of opportunity or do you think I know with (inaudible) this becomes more of a longer-term opportunity for you guys?

**Unidentified Speaker**

Yes and yes, we think it's 2 to 3, our best guess based on the probability of win pipelines might be built. But we think, there is a high degree of probability that a DRU will come to fruition, and again this railroad is uniquely positioned to benefit from that, be it built in [ph]Hardisty, which we will uniquely serve or Edmonton, which we would equally serve with destinations that offer franchise strengths with optionality to our customers.
Nadeem Velani, Executive Vice President and Chief Financial Officer

Yes, I don't -- I don't just to build on Keith's comments like, I don't see any imminent pipeline coming into play that this three year opportunity, three years ago to me, it still feels like a two to three year opportunity before we realistically see new pipes.

Operator

Our next question comes from the line of Justin Long from Stephens. Your line is open.

Justin Long, Analyst

Thanks, and good afternoon. Wanted to follow up on just kind of the cost opportunity going forward. Nadeem, I know you gave kind of an initial head count look for next year. May be flattish to slightly up, but as we think about the company's specific opportunity for cost improvements in the business, is there anything you would highlight into 2020? I know we've talked a lot about kind of volume and revenue opportunities that are cost specific or company specific, just wanted to get your take on the cost side of the equation.

Nadeem Velani, Executive Vice President and Chief Financial Officer

I mean we'll get into in January a couple of things I would point out. We have a very easy comp in Q1 given a very difficult winter and catastrophic incident that we had that had a huge amount of casualty costs. So, certainly that's a tailwind to us in Q1. I'd say some of the headwinds could be pension depending on how interest rates that will at the end of the year, but certainly pension could be a bit of a headwind.

Beyond that, certainly, we've shown what we could do in terms of operating leverage when volumes are growing and this quarter, we've shown what we can do from a cost control point of view when volumes are flat to slightly down. So, it is in our DNA to improve our cost that is something that that we're very focused on. We're going to drive the earnings one way or another.

You're not talking about potential when you're talking about (inaudible), you're seeing the real execution of cost take out and I know my boss has a expectation of of what we do as an organization in terms of continuing to take out our costs and doing it's in a constructive way and doing it while not compromising safety or service.

So all that to say, we do have a number of initiatives in place. Some of the items we highlighted at our Investor Day a year ago as we continue to get the benefits from the new grain cars and what that means to our overall capacity and throughput both on the loading side and on the unloading side the density of our grain trains. What we're doing on the locomotive modernization side and what that means to overall fuel efficiency, what that means to the liability. The overall network fluidity.

So, we do have other productivity initiatives that that we have direct capital investment tied to, some of the things that we're doing on the technology side that we've put in place, whether that's RPA robotic process automation that's helped drive our head count down that will continue to see opportunities on that side.

So, I mean we could go on for at length with other initiatives. Suffice to say, we've taken [ph]ROR down to industry best this quarter and we expect to that to continue.

Justin Long, Analyst

Great. That's helpful. And then Nadeem maybe to just follow up on pension if rates stay in line with where they are today through the end of the year, any initial take on what that pension headwind could look like in 2020?
Saudi Arabia's Best Bet Is to Crash the Oil Price: Julian Lee
2019-10-20 06:00:24.492 GMT

By Julian Lee
(Bloomberg Opinion) -- Saudi Arabia should give up trying to manage the global crude market and return to the pump-at-will policy it briefly adopted in 2014 under its longest serving oil minister Ali Al-Naimi.

In the mercantilist world in which we now live, where decisions are based on narrow national interest, it makes no sense for the world's lowest-cost oil producer to subsidize shale and prop up other high-cost suppliers. Of course when it does, oil prices will crash just as they did in 1986 when the country finally abandoned fixed official selling prices. And then, in the aftermath, global investors will get in a flap about all things Saudi: the IPO of the kingdom’s state oil company, the financing required to fund a young and under-employed population, Mohammed bin Salman’s ambitious Vision 2030 plan to transform the economy away from its dependence on oil.

Despite the risks, it’s time to admit that market management is failing, even though Saudi Arabia and its “allies” say that it isn’t.

The OPEC+ agreement was meant to drain excess stockpiles in six months. But we are now approaching a fourth year of Saudi Arabia leading a global alliance of producers in trying — and failing — to push up oil prices in a sustainable way.

For a while it appeared that the cuts were having the desired effect. Inventories came down and Brent prices rose from about $45 a barrel in June 2017 to reach a high of $86 in October 2018. But they swiftly fell back towards $50 and a second round of cuts that began in January has failed to keep
them above $60. Even the temporary loss of more than half of
Saudi Arabia’s oil production — and most of the world’s spare
capacity — in an attack on two of the kingdom’s biggest
processing facilities failed to lift prices for more than a few
days.

The latest data from OPEC itself — along with the
International Energy Agency and the U.S. Energy Administration —
show the failure of the policy.

All three see global oil inventories building in the first
half of next year in the face of what is starting to look like
America’s forever trade war. The global gridlock has also
prompted a reduction in forecasts for growth in oil demand this
year and next. The average level of Saudi oil production in the
first eight months of 2019 was the lowest since 2014 — even
excluding the dip caused by the Sept. 14 attacks on the
kingdom’s oil processing infrastructure. And it will have to
come down further next year if the kingdom wants to continue
trying to manage the market.

Meanwhile Russia, the kingdom’s leading partner in the
OPEC+ group of countries that came together to manage supply,
has seen its output continue to rise each year, even as it has
come to dominate OPEC+ policymaking.
Saudi Arabia should let American shale drillers take the strain. After all, aren’t they the producers of the marginal barrel of crude now? As long as Saudi Arabia and its cohorts continue to restrict output and subsidize shale they are merely delaying an answer to the question. It’s time to discover a true price of oil.

Saudi Arabia will learn to work with this over time, just as it did after 1986. And it will probably find that that price isn’t as low as the kingdom fears. Eventually, shale producers will be forced to cut back — or they won’t. If they are forced to cut, then Saudi Arabia will get the price support it craves, without having to lower its own output. But if shale production can just keep going up and up, even in a lower-price environment, then it proves just as emphatically that the Saudi-led policy of market management is a busted flush anyway.

Will they do it? I doubt it.

Current oil minister Abdulaziz Bin Salman sees it as his job “to ensure that the oversupply doesn’t continue.” December’s OPEC and OPEC+ meetings will likely yield the promise of further output cuts and Saudi Arabia will pump even less next year in a vain attempt to prop up prices. But it would be nice to believe that they are capable of change.

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A Big Plus To Post 2020 Oil If Saudi Is Even Directionally Right That Permian Plateau Is “In A Year Or Two Years or Four Years”

Posted: July 3, 2019. 4:00pm Mountain

Oil market attention has been on Saudi Arabia’s clear messaging to the market that it is prepared to make additional cuts to keep a stable market as this implies they are prepared to keep ceding market share to US shale. Al Falih said “We’re comfortable with where our production level is, we’re willing to go either way from where we are today to keep markets balanced”. But the more significant Al Falih comment was “There will be a plateau for these unconventional resources in the US, the Permian being one of them. is it in a year, or two years or four years, I don’t know but certainly its not indefinitely.” No one is calling for Permian plateau (peak oil) in a year or two and not likely 4. Maybe people didn’t see these comments at 3:45am MT or maybe most assumed it was just musings from Al Falih. But we think its more than musings because Saudi Arabia is taking a different tactic this time than their normal strategy to get market share – increase oil production, crash oil prices, ruin growth prospects for other oil basins. They want solid oil prices, an increasing oil market share, and strong oil outlook for the mid/long term valuation of Saudi Aramco massive oil reserves for the IPO. And this time, Al Falih’s comments suggest they believe that, they can regain market share, by letting US shale play out. If Saudi Arabia is even directionally right in Permian reaching plateau (peak oil), it means that Permian and US oil is going to hit peak oil probably at a few years earlier than expected. This will be very bullish to oil post 2020. Unfortunately, it will likely be impossible to determine if Saudi Arabia is directionally right in 2019 with the increased Permian takeaway in H2/19. But we expect to this call, or at least the confirming nor discounting views to this call, play out over the next 18 months. There is no certainty that Saudi Arabia will be right and it may just be an educated gamble, but it is something that should be at least considered as the thesis of an earlier than expected plateau in US oil seems to fit to the recent Exxon presentation that implies a ~7% decline rate in overall global oil supply. If these two views are right, it’s a big plus to post 2020 oil prices. Its not just oil prices, there are multiple implications to differentials, Gulf Coast takeaway, pipeline utilizations, Cdn light oil opportunities, etc. At a minimum, these view should at least give people a reason to at least consider the potential for better post 2020 oil prices.

If Al Falih is even directionally right on his Permian call, it’s a big plus to post 2020 oil prices. We decide to write this book because we didn’t see the markets focus on Saudi’s change in tactics to regain market share and what the implications are to post 2020o oil prices. Saudi Arabia may well be wrong on Permian reaching oil plateau (peak oil) sooner than everyone else expects, but its not musings, they are actually letting that call dictate a change in strategy to regain market share. And if Saudi Arabia is even directionally right, it means the Permian and US shale will be hitting plateau (peak oil) sooner than expected and this will have huge implications to post 2020 oil prices and a range of oil items ie. Gulf Coast infrastructure, Permian pipelines, differentials, etc.

Saudi Energy Minister Al Falih’s fulsome answer provides a clearer picture than a sound bite. The CNBC Worldwide Exchange interview with Al Falih ran early this morning (345am MT). One of the reasons we like CNBC Worldwide Exchange or other overnight news is that they will play longer portions of interviews than the pre market opening shows that normally only provide shorter snippets. Of course, the exception being when they have an items like a exclusive Warren Buffet interview. For something reporting on the OPEC meetings, this won’t happen as all networks will be running sound bites from Al Falih. Al Falih said some of these comments in sound bites yesterday post the OPEC+ extension. But as seen over and over, short sound bites do not do present the picture and this morning’s more fulsome coverage present the comments in a fuller picture. (i) Do not need to create a market share war and hammer prices to reach their objective. (ii) Prepared to wait out US shale. (iii) Every basin production will eventually peak and then declines. (iii) Even under stable oil markets/prices, US peak oil plateau and Permian plateau (peak oil) in a year or 2 years or 4 years. (iv) Saudi Arabia will be there when that happens to regain market share. CNBC posted the video at [LINK]. Here is the SAF Energy created transcript

Q: How fast do you see the Permian wells draining? Do you think we overestimate the longevity and the life of these wells in West Texas? Al Falih: “I think it’s not just in West Texas. All shale oil wells do decline rapidly, 70% of them, obviously in the US there is a fantastic service industry that keeps on drilling and fracking, completing the wells. So but its going to take a lot more money and resources to keep existing production base because of that decline, and any incremental production requires, of course, a lot more. We will need time to understand the geology and how much can we increase production. But in all cases, just like in any other basin, there will be a
plateau. There will be a plateau for these unconventional resources in the US, the Permian being one of them. Is it in a year, or two years or four years. I don’t know but certainly its not indefinitely. I think its really an oversimplification to assume that we can extrapolate a straight line forward and assume the same number of rigs that we have that production will continue to increase by a 1 million and a half or so a year. So I see production ultimately plateauing, is it in two or three years or four years, time will tell.”

Q: have US oil companies taken on too much debt? Al Falih “well definitely they have not been generating enough cash flow to their investors and I know that, in fact the appetite is for investors to continue putting money into unconventional resources. So the combination of infrastructure which has constrained, a combination of service industry constraints, financial constraints as well as the unknown constraints of geology will ultimately bring us back to reality that there has to be a plateau and ultimate decline. In all cases, we have the conventional resources ready to deploy and step in when its time. We’re comfortable with where our production level is, we’re willing to go either way from where we are today to keep markets balanced. We’re happy to have 23 other countries join us today, not only on the 9 month extension but on a permanent framework to continue to analyze and pre-emptively step in to prevent imbalances from taking place in the future”

Do not need to create a market share war today (crash oil prices) to support Saudi Aramco IPO valuation. Saudi Crown Prince MBS and al Falih have both recently stated the Saudi Aramco IPO is still expected in 2020. We believe that Saudi Arabia needs to have increasing oil market share, near term outlook for stronger stable oil prices to have a chance to support a big Saudi Aramco valuation. Al Falih’s new tactic is the biggest difference in their long term strategy. Going into the OPEC/non-OPEC meetings, one of the biggest risks to no OPEC+ extension was the stated Russia concerns about continuing the OPEC+ deal and ceding increasing market share to US shale. Many thought that Russia wouldn’t agree to a straight extension and would need some relaxation of their quota. Arguably, the Druzhba problems made it easier for them to agree to stay at reduced levels. However, Russia did come along. But looking at Al Falih’s comments, its clear that they (rightly or wrongly) believe they can get to their goal without creating a market share war today (and crash prices) like they have done for the last 30 years. They don’t feel they have to increase oil production, get oil prices to drop, so that capex and production in the new growth basins loses its ability to attract capital and replace declines as their oil drilling only works at high oil prices. The ability to rein in new basin oil growth was dependent on having low oil prices. Whereas today, they don’t believe they need to crash oil prices to rein in new basin oil growth. Rather they are prepared to let US shale oil play out.

Their market share/price crash tactic worked in 2015/2016. This is the biggest difference in their tactics. It was only 4 years ago that oil prices were up $100, capital was pouring into the E&P sector, and there was growth around the world in high cost basins (ie. oil sands) and also the US shale. Saudi Arabia then went after a market share war that led to oil prices crashing to below US$30, and no surprise oil growth (apart from projects in execution) stopped. US oil production has just grown from ~5 mmb/d in Sept 2011 to 9.6 mmb/d in June 2015, but then declined by ~1.2 mmb/d in one year to 8.4 mmb/d in July 2016. Saudi’s oil market share tactic worked.

US Oil Production Vs WTI Price
But this time, Saudi Arabia is prepared to take the leadership role (ie. cut again) to keep a stable oil market even if they lose more market share. Saudi Arabia has seen the amazing success of US shale oil in the last three years with growth of ~3.8 mmb/d since July 2016. And al Falih acknowledges it will be giving up market share to the US over the near term. And yet they will still work to keep stable oil markets. This was the common takeaway from the al Falih soundbites yesterday as it should be because he seems pretty clear on this. Al Falih says “We’re comfortable with where our production level is, we’re willing to go either way from where we are today to keep markets balanced.” The general view (which we agree with) was that Saudi Arabia continues to stress the importance of stable markets, for both consumers and producers, it plans to keep production around current levels for H2/19 but, if needed to keep oil markets stable, is prepare to cut production further. The closing OPEC/non-OPEC statement [LINK] did not say anything about conformity to voluntary production levels, but one of the themes going into the meeting was that Saudi Arabia was expected other countries (read Nigeria and Iraq) to comply with their targets. As much as al Falih was clear that Saudi Arabia was prepared to cut more to keep market stable, we believe there was also a Saudi reminder to the others that a first step is more countries complying to their targets. 

Even under stable markets/prices, Saudi Arabia believe will reach peak oil supply and the Permian will reach plateau (peak oil) in “a year or 2 years or 4 years”. Its no secret that Saudi Arabia has been studying shale for the past several years in part due to developing their own unconventional gas resources. But, we believe the primary reason has been to understand the geology and competitive nature of US shale for the short, mid and long term. The interesting aspect of al Falih’s comments is that they don’t believe low oil prices are needed to stop US growth, rather under stable markets/prices, US shale is near reaching peaking oil supply and then will decline. Al Falih didn’t go into details on tier 1 vs tier 2 acreage rather clearly stated twice that US is going to reach plateau (peak oil) soon. Interestingly he chose to highlight the Permian reaching plateau soon. Al Falih said “There will be a plateau for these unconventional resources in the US, the Permian being one of them, is it in a year, or two years or four years, I don’t know but certainly its not indefinitely”. If markets start to see indications in 2020 that this could play out as Saudi Arabia suggests, it will be a huge positive to Saudi Aramco valuation.

Saudi US peak oil supply view also fits to the Exxon mid/long term view of global oil supply and demand. Perhaps the key reason why al Falih’s comments stood out for us was the recent Exxon sellside presentation that included their long term oil supply/demand views. We thought al Falih’s comments on an earlier than expected peak oil supply for the Permian (and the US) fits into the big picture challenge for oil supply in the Exxon outlook. Our June 20, 2019 blog “Exxon’s Math Calls For Overall Global Oil Decline Rate of ~7%, A Very Bullish Argument For Post 2020 Oil Prices” [LINK] said “We believe Exxon presented a very bullish argument for oil prices beyond 2020 and that it has been overlooked because most readers only flip thru a slide deck and don’t listen to or read transcripts of management’s spoken words. Exxon’s spoken words highlighted one of the forgotten (and perhaps most important) oil supply/demand concerns for post 2020 - the mid term challenge to replace increasing rate of overall global oil declines. And what is eye opening is Exxon’s estimated overall global oil decline rate, which is way higher than any we can ever remember seeing. Its impossible to tell
from the small oil supply/demand graph in the slide deck, but Exxon’s spoken words says long term oil demand is 0.7% per year and then “When you factor in depletion rates, the need for new oil grows at close to 8% per year and new gas at close to 6% per year.” Exxon may not specifically say what the global decline rate is, but their math is that the world needs new oil supply to grow annually at close to 8% to meet the 0.7% annual increase in oil demand and offset declines ie. an overall global decline rate of approx. 7%. This is an overall global oil decline rate for OPEC and non-OPEC. This compares to BP’s estimate of overall global oil decline rate of 4.5% and we expect most are probably assuming something around 5%, certainly not above 6%. No one should be surprised by the increased decline rate given that high decline US shale and tight oil have increased by ~2.5 mmb/d in the last ~2 years. But an implied ~7% overall global oil decline rate is way higher than expectations. There is a big difference between needing to offset oil declines of ~7 mmb/d vs declines of ~4.5 mmb/d ie. an additional 2.5 mmb/d of new oil supply every year. Even if the implied difference was to 6%, it would still be an additional 1.5 mmb/d of new oil supply and that would also be very bullish for post 2020 oil. We recognize that the 2019/2020 oil supply demand story is the need for OPEC+ to keep cuts thru 2020, but Exxon’s math implying ~7% overall global oil decline rate sets up a very bullish view for oil post 2020. We believe the reality to replace oil declines post 2020 is overlooked.”

Oil Supply/Demand (moebd)

Source: Exxon US Sellside Conference Presentation June 18, 2019
US smuggles Syrian oil to other countries - Russian Defense Ministry

Igor Konashenkov added that oil was extracted with the use of the equipment supplied by the leading Western corporation bypassing all US sanctions.

MOSCOW, October 26. /TASS/. The United States smuggles Syrian oil to other countries, the convoys are guarded by US private military companies and special operations forces, Russian Defense Ministry Spokesman Igor Konashenkov said.

"Tank trucks guarded by US military servicemen and private military companies smuggle oil from fields in eastern Syria to other countries. In the event of any attack on such a convoy, US special operations forces and combat aviation are immediately used to protect it," Konashenkov stressed.

He added that oil was extracted with the use of the equipment supplied by the leading Western corporation bypassing all US sanctions.

Konashenkov noted that the contract for transporting oil was executed by the US-controlled company Sadcub created at the so-called autonomous administration of
eastern Syria. "Revenues from smuggling Syrian oil arrive at numbered bank accounts of US private military companies and intelligence services through brokerage firms that interact with it," he said.

"To secure such a continuous financial flow free from control and taxes, the top officials at the Pentagon and Langley will be willing to guard and protect oil wells in Syria from the imaginary ‘hidden cells of the Islamic State’ (IS, terror group, outlawed in Russia) indefinitely," Konashenkov added.

**Satellite images confirm US controls Syrian oil**

The United States controlled the extraction and transportation of Syrian oil both before and after terrorists were defeated in the country, Konashenkov said.

"The space intelligence images show that Syrian oil was actively extracted and transported on a mass scale by tank trunks for processing outside Syria under the reliable protection of US troops both before and after the defeat of the Islamic State (terror group, outlawed in Russia - TASS)," Konashenkov stressed.

He added that all hydrocarbon reserves were the property of Syria, not terrorists or the Americans, who claim that their goal is to protect Syria’s oil fields from Islamic State militants.

"What Washington is doing now, that is, capturing and holding oil fields in eastern Syria under its control, is, putting it bluntly, international state-sponsored gangsterism," Konashenkov noted.

The Pentagon earlier said that the US was planning to send additional troops to northeastern Syria to protect oil fields from Islamic State terrorists.
IMO 2020 Monthly

I don't want no scrubbers

Richard Chatterton, CFA

October 2019
Executive summary

With just over two months to go until the commencement of the IMO 2020 marine fuel regulations, oil markets are preparing for and pricing in the expected shift in demand away from high-sulfur fuel oil.

This monthly report assesses current trends for fuel prices and cracks, refining margins and scrubber uptake, and provides an update of our outlook for marine bunkers.

- A drone strike on Saudi export infrastructure and a missile strike on an Iranian tanker in the Red Sea shocked oil markets in September, causing a spike in crude prices and tanker freight rates.
- Gasoline and middle distillates have moved in line with crude, but crack spreads have remained relatively stable over the past month. Fuel oil prices have continued to fall, however, eroding fuel oil cracks and refining margins.
- Orders for the installation of exhaust gas scrubbers aboard ships has slowed – new orders in October have fallen to almost zero. This is due to many shipping firms having already placed their orders and high tanker rates discouraging vessel owners from pulling ships out of service. We expect just under 3,000 scrubbers will be installed by year end.
- The spot price of 0.5% marine fuel has moved sharply toward the gasoil price and away from high-sulfur fuel oil (HSFO) as demand grows for IMO-compliant fuel. This brings the spot-spread for 0.5% over 3.5% more into line with futures prices for Jan-2020, which is above $250/t.
- We expect at least 1 million b/d of 0.5% fuel oil to be available to the bunker market by the new year. Shell, Exxon, BP and Total have said they will be able to offer 0.5% grades to all customers at major ports. Sinopec, India Oil, and a number of other NOCs and refiners have said a total 500-600k b/d will be ready by 1 Jan.
- We expect demand for 3.5% marine bunkers to decline from 2.86 million b/d in 2019 to 1.55m b/d in 2020, falling to 1.38m b/d in 2021. IMO-compliant fuel demand (MGO or 0.5% spec fuels) will be 0.50m b/d in 2019 and 1.86m b/d in 2020, according to our latest modeling.

<table>
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<th>Price spreads between marine fuels</th>
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<td>$/metric ton</td>
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<td>$2.5m</td>
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<td>$250/t</td>
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Source: BloombergNEF, Platts, CPC Corp. Note: Platts reported prices are for January 2020 marine fuel futures FOB in Singapore. Dotted red line shows IMOFO spread for spot prices reported by CPC Corp. of Taiwan at the Port of Keelung.
Prompt fuel oil prices and cracks collapse as demand drops ahead of IMO 2020

Front-month fuel oil prices

HSFO disconnecting from the rest of the barrel

Fuel oil prices rise in line with crude and product prices following the drone attacks on the Abqaiq and Khurais processing facilities in Saudi Arabia on 14 September. The rally was short-lived with fuel oil prices falling back to new lows ahead of declines across the rest of the barrel.

High-sulfur fuel oil (HSFO) prices in Northwest Europe (Amsterdam-Rotterdam-Antwerp market) have declined by over a fifth since the start of October, while crude and lighter product prices have risen or remained relatively flat.

The expected decline in demand for HSFO has led to a collapse in fuel oil crack spreads (the difference between the price of fuel oil and crude oil). The Northwest European fuel oil crack for November has fallen to $30/mt, in line with forward HSFO cracks for early 2020 that fully price in the impact of IMO 2020. Falling fuel oil cracks are hurting refining margins, with simple plant margins firmly negative for Q1 2020 (see slide 5 for more on margins).

For more information on current oil and product market trends, see our Q4 2018 Oil and Product Markets Quarterly (web) (terminal)
Scrubber update in freight rates impact

New scrubber orders fall to almost zero

Some 3,000 scrubbers to be installed across the fleet by end of the year

- Scrubber orders have grown at a rate of 100-200 per month since the start of 2019, but growth in the order book ground to a halt in October as many fleet operators have already scheduled installs and high freight rates encouraged vessel owners to delay scrubbers installation (see next slide).

- The order book currently stands at 3,750, with around 3,000 expected to be installed across the fleet by the end of 2019. Around a third of installed scrubbers will be aboard bulk carriers, with container vessels, crude tankers and product/chemical tankers each with 400-550.

- Scrubbers are being installed mainly on larger ships. According to Clarksons, around 25% of the ~700 active very large crude carriers (VLCC) will have scrubbers installed by the end of the year.

Source: BloombergNEF, DNV GL AFI.
Spike in tanker rates encourages owners to delay scrubber installs

**VLCC day rates**

<table>
<thead>
<tr>
<th>Route</th>
<th>Day Rate ($)</th>
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<tr>
<td>Arab Gulf to US Gulf</td>
<td>350,000</td>
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<tr>
<td>VLCC Arab Gulf to China</td>
<td>300,000</td>
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<tr>
<td>Rotterdam to Singapore</td>
<td>250,000</td>
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<tr>
<td>Arab Gulf to India</td>
<td>200,000</td>
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</table>

**Increase in revenue for voyages priced in Oct. versus Sept.**

- Arab Gulf to US Gulf: $2.5 million per voyage
- Arab Gulf to China: $2.0 million per voyage
- Rotterdam to Singapore: $1.5 million per voyage

**Payback period of a scrubber based on tanker rate at the time of installation**

- Payback period increases with increased opportunity cost of taking the vessel out of service to install a scrubber.

Source: BloombergNEF, Galbraiths, Poten and Partners. Note: Increase in revenue per voyage is estimated based on daily average VLCC rates on each route in September and October up to 23 October. Payback period calculation assumes installation cost of $4.5m, 20 days of downtime for installation, operating costs of $0.2m/yr, $150/t price spread been 0.5% and 3.5% fuel oil and 95% utilization. Payback period increases in line with increased opportunity cost of taking the vessel out of service to install a scrubber.

- Tensions in the Middle East and U.S. sanctions on two subsidiaries of Cosco, China’s biggest owner of oil tankers, have caused daily rates for oil tankers to surge. VLCC rates on some major east-west routes jumped above $300,000 per day before falling back, but remain high.
- This poses a dilemma for tanker owners that have not yet installed scrubbers but intend to do so. Scrubber installation requires several weeks of downtime, and the opportunity cost of taking a VLCC out of operation is over $2.5 million for a one-way voyage between the Arab Gulf and the U.S. or China, or Rotterdam and Singapore. Lost revenue would increase the estimated payback period for investment in a scrubber by up to a year.

IMO 2020 Monthly: October 2019
Topping and hydroskimming margins are sharply negative through 1Q 2020

Northwest Europe refining margins

Historical prices

Forward prices

Source: BloombergNEF, Oil Analytics. Note: margins shown relate to Forties crude and are based on assumed refined product slates for different refinery configurations.

- Widening fuel oil cracks have caused indicative refining margins for simple topping configurations in Northwest Europe to turn negative. Forward topping margins through 1Q 2020 are sharply out of the money as IMO 2020 drives down demand for high-sulfur marine fuel oil and higher tanker rates increase the cost of crude. More complex margins are less impacted by fuel oil prices as cracking configurations produce a lower residual yield.

- Several months of negative forward prices threaten runs at less complex refineries that face the prospect of losing money processing crude oil based on the forward prices today. Most at risk are coastal refineries unable to produce marine fuels compliant with IMO regulations, or those that produce less middle distillates such as diesel that are likely to benefit from IMO 2020.

- For more data on forward refining margins, see the Oil Products Playbook (web | terminal) and OILA<GO> on the Bloomberg Terminal.
IMO-compliant fuel oil falls in line with HSFO

Gasoil, HSFO and 0.5% price trend

GOIMO and IMOFO spreads

Comparison of 0.5% indicators with blending price indicator

Source: BloombergNEF. Note: all prices are Singapore benchmarks except CPC IMOFO spread. The Bloomberg ticker for the Platts 0.5% Jan-2020 futures is SICFO Comdty.

- Jan-2020 0.5% futures are currently priced around $500/t, at a discount of ~$60/t to gasoil. The price of high-sulfur fuel oil has declined, opening up the forward spread between 0.5% and 3.5% fuels, the so-called 'IMOFO spread'.

- This is to be expected as from 1 January vessels without scrubbers have to choose between gasoil or 0.5% grade marine fuels. As a result, 0.5% fuels are priced relative to gasoil. The blending ratio for 0.5% bunker is approximately 7:1, and the futures price has moved toward this level over the past month.

- In the spot market, prior to early September, the price of 0.5% fuel (as published by CPC Corp. of Taiwan) fell toward HSFO as there was insufficient physical demand for IMO 2020-compliant fuel to create price tension between 0.5% fuel and gasoil. Demand has picked up in recent weeks, however, widening the spot IMOFO spread to above $200/t. We expect this trend to continue as demand for 0.5% fuel grows between now and the end of the year.

- We expect at least 1 million b/d of IMO-compliant bunkers to be available on the market by January 1, 2020. Shell, Exxon, BP and Total have said they will be able to offer 0.5% grades to all customers at major ports. Sinopec, India Oil, and a number of other NOCs and refiners have said a total 500-600k b/d will be ready. See tables on next slides for a full breakdown of announcements on bunker availability by company.
## Major suppliers have said 0.5% fuels will be available at all major ports (1/2)

<table>
<thead>
<tr>
<th>Company</th>
<th>Locations in Americas</th>
<th>Locations in Europe and Africa</th>
<th>Locations in Asia Pacific</th>
<th>Note</th>
<th>Source</th>
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<tr>
<td>Shell</td>
<td>Montreal &amp; St.</td>
<td>ARA, Barcelona,</td>
<td>Fujairah, Mauritius,</td>
<td>Shell has conducted a number of IMO-compliant marine-fuel trials and says its 0.5% VLSFO is available at all major Shell bunkering hubs</td>
<td><a href="https://www.shell.com/business-customers/marinefuels/marine-network.html">https://www.shell.com/business-customers/marinefuels/marine-network.html</a></td>
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<td>Total</td>
<td>Hamburg, ARA,</td>
<td>Singapore, Yosu (Korea)</td>
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<td>Total intends to supply 0.5% fuel oil &quot;at least in those ports where we already supply high sulfur fuels.&quot;</td>
<td><a href="https://www.marinefuels.total.com/products-services/low-sulfur-fuel-oils">https://www.marinefuels.total.com/products-services/low-sulfur-fuel-oils</a></td>
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<td>major French ports,</td>
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<td>SK</td>
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<td>South Korea</td>
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<td>34,000 b/d of 0.5% fuel oil to be produced from a new vacuum residue desulfurization unit in Ulsan due to come online in February 2020.</td>
<td><a href="https://www.hellenischippingnews.com/south-korea-sk-energy-increases-gasoline-gasoil-output-in-h1-ahead-of-imo-2020-rule">https://www.hellenischippingnews.com/south-korea-sk-energy-increases-gasoline-gasoil-output-in-h1-ahead-of-imo-2020-rule</a></td>
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<td>Oilbank</td>
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<td>Japanese</td>
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<td>Companies</td>
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<td>Fuji Oil and Cosmo</td>
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<td>have begun supplying 0.5% in Japan. Volume unspecified.</td>
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<td>Mitsui</td>
<td>Singapore</td>
<td>300,000-400,000 metric tons per month (ex wharf), equivalent to 75,000-100,000 b/d</td>
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Source: BloombergNEF, company announcements and news reports.
Major suppliers have said 0.5% fuels will be available at all major ports (2/2)

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<thead>
<tr>
<th>Company</th>
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<tr>
<td>Sinopec</td>
<td></td>
<td>Chinese ports</td>
<td></td>
<td>Sinopec plans to supply 10 million metric tons per year (200,000 b/d) of 0.5% marine fuels from January 2020, increasing to 15 million metric tons (300,000 b/d) by 2023.</td>
<td><a href="https://www.angusmedia.com/en/news/1917212-marinben-sinopec-partner-on-moccompliant-fuel-sales">https://www.angusmedia.com/en/news/1917212-marinben-sinopec-partner-on-moccompliant-fuel-sales</a></td>
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<tr>
<td>Indian Oil</td>
<td></td>
<td>Gujurat, Haldia</td>
<td></td>
<td>IOCl Gujarat refinery &quot;will be ready to produce 700,000 tonnes per year of low-sulfur marine fuel starting in October&quot;, equivalent to 15,000 b/d.</td>
<td><a href="https://www.reuters.com/article/asia-oil-apec-india-indian-oil-corps-gujarat-refinery-ready-to-make-imo-2020-fuels-by-qct-exec-jidUSL3N26115G">https://www.reuters.com/article/asia-oil-apec-india-indian-oil-corps-gujarat-refinery-ready-to-make-imo-2020-fuels-by-qct-exec-jidUSL3N26115G</a></td>
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<tr>
<td>Petrobras</td>
<td></td>
<td>Singapore</td>
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<td>Petrobras has contracted 120,000 metric tons (900kblt) of storage capacity in Singapore and plan to supply of 100,000-150,000 metric tons of 0.5% fuel oil per month (ex wharf), equivalent to 25,000-37,500 b/d</td>
<td><a href="https://shipandbunker.com/news/world/831472-petrobras-beefs-up-singapore-presence">https://shipandbunker.com/news/world/831472-petrobras-beefs-up-singapore-presence</a></td>
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<tr>
<td>Freepoint/ Pertamina</td>
<td></td>
<td>Singapore</td>
<td></td>
<td>Freeport will market 0.5% fuel oil in Singapore produced by Pertamina at Platu and Balongan. Supply volume is not confirmed but is likely to be around 50,000-60,000 b/d</td>
<td><a href="https://www.hellenicshippingnews.com/imo-2020-draws-more-participants-into-singapore-s-bunkering-pool/">https://www.hellenicshippingnews.com/imo-2020-draws-more-participants-into-singapore-s-bunkering-pool/</a></td>
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<td>Saras</td>
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<td>Sardinia</td>
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<td>Saras building bunkering infrastructure at its Sarroch refinery in Sardinia. It plans to supply &quot;500,000-600,000 tonnes per year&quot; of 0.5% fuel oil, equivalent 10,000-12,500 b/d</td>
<td><a href="https://www.reuters.com/article/saras-imo/saras-invests-in-new-bunkering-terminal-ahead-of-imo-switch-jidUSL6N1XGYYY">https://www.reuters.com/article/saras-imo/saras-invests-in-new-bunkering-terminal-ahead-of-imo-switch-jidUSL6N1XGYYY</a></td>
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Source: BloombergNEF, company announcements and news reports.
Marine bunkers outlook update

Marine bunker demand outlook, 2019-25

Million b/d

- BNEF has published a comprehensive long-term analysis of the outlook for marine bunkers that is available to download. See Marine Bunkers Outlook: IMO 2020 and Beyond (web | terminal).
- We have updated our assumptions for scrubber uptake and compliance to 2025 based on revised market data.
- Our forecast for demand for 3.5% marine bunkers is 1.55 million barrels per day in 2020, falling to 1.38 million b/d in 2021.
- The volume of IMO-compliant fuels required (either 0.5% spec or 0.1% gasoil) will be 500k b/d in the second half of 2019 and 1.86m b/d in 2020, according to our estimates. We expect a significant level of incremental 0.1% gasoil demand next year, which will decline as refiners increase the supply of 0.5% compliant fuels.
- Assuming a 7:1 blending ratio (0.1%:3.5%), the increase in demand for middle distillates from next year resulting from the IMO 2020 regulations will be as much as 1.63m b/d.

<table>
<thead>
<tr>
<th>Fuel</th>
<th>2019</th>
<th>2020</th>
<th>2021</th>
<th>2022</th>
<th>2023</th>
<th>2024</th>
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<tr>
<td>3.5% HSFO</td>
<td>2.86</td>
<td>1.55</td>
<td>1.38</td>
<td>1.38</td>
<td>1.41</td>
<td>1.47</td>
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<tr>
<td>of which non-compliant</td>
<td>0.84</td>
<td>0.62</td>
<td>0.46</td>
<td>0.39</td>
<td>0.38</td>
<td>0.37</td>
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<tr>
<td>of which scrubbers</td>
<td>0.71</td>
<td>0.76</td>
<td>0.92</td>
<td>1.02</td>
<td>1.09</td>
<td>1.15</td>
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<td>0.1% MGO</td>
<td>1.27</td>
<td>1.27</td>
<td>1.26</td>
<td>1.26</td>
<td>1.25</td>
<td>1.25</td>
<td>1.25</td>
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<tr>
<td>0.1% or 0.5%</td>
<td>0.50</td>
<td>1.86</td>
<td>2.05</td>
<td>2.07</td>
<td>2.06</td>
<td>2.01</td>
<td>1.96</td>
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<td>LNG</td>
<td>0.23</td>
<td>0.24</td>
<td>0.26</td>
<td>0.28</td>
<td>0.31</td>
<td>0.34</td>
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<tr>
<td>Other</td>
<td>0.09</td>
<td>0.09</td>
<td>0.09</td>
<td>0.09</td>
<td>0.09</td>
<td>0.09</td>
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<tr>
<td>Total</td>
<td>4.94</td>
<td>5.02</td>
<td>5.05</td>
<td>5.08</td>
<td>5.12</td>
<td>5.16</td>
<td>5.19</td>
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</table>

Source: BloombergNEF

IMO 2020 Monthly: October 2019
The industry will continue to add perforating clusters per stage, yielding less but more complex stages, while lateral lengths are near maximum owing to frictional forces. Perf clusters are increasing to as many as 15 to 20 and may be going to 25 per stage, reducing the time and cost for well completions and stimulation programs owing to the lower stage count.

The reason for more perf clusters and fewer stages are our clients are changing the way reservoir rock is being stimulated to produce the maximum amount of stimulated reservoir rock volume in close proximity to the wellbore. Long frac channels are to be avoided as they are the source of well interference and child -- parent-child well relationships. It is possible to Rebelize more Stimulated Reservoir rock volume in the near-wellbore region and avoid costly well interference problems using more perf clusters.

Addressing a new and growing market, the acquisition of Guardian Global Technologies continues to be a technological windfall for Core Laboratories. We continue to receive positive client feedback, and we have increased market acceptance and market share of our industry-leading preassembled energetic system via the company's GoGun. Core's current biggest challenge is scaling up to meet GoGun demand as automated systems continue to be added.

The most critical components of any preassembled energetic system remain the perforating charges and their interaction with the reservoir rock. Core's industry-leading ballistics team continued to innovate the best performing perforating systems, including Core's most recently introduced refrac system that significantly improves the results and economics for refrac-ed wells. The number of wells that will be refrac-ed in the future will go up significantly. The last and most important trend for Core is that client activities have increased -- continue to increase in the international and deepwater longer cycle projects that will be needed to meet future production demand. This foreshadows the increase of activity from the 25 FIDs that were approved in 2017, another 25 to 30 in 2018 and approximately 25 more that are queued up in 2019.

Revenue from longer cycle projects have mainly been absence -- absent from Core's Reservoir Description revenue streams dating back to 2015. However, this increased international activity did bolster Reservoir Description revenue in the third quarter of 2019, our highest revenue since the fourth quarter of 2015.
Now for some comments on worldwide crude supply. The macro outlook in looking at worldwide liquids production. Current worldwide production is about 100 million barrels a day, an all-time high. This is made up of about 84 million barrels a day of crude and 16 million barrels of natural gas liquids. Of note, worldwide conventional discoveries over the last three years are at a 70-year low. The last decade in which the globe discovered more oil than it produced was the 1970s. U.S. production is currently at 12.4 million barrels a day, another record. 8.85 million barrel of this are from unconventionals. This is led by the Permian at 4.55 million barrels a day. Of note is the Eagle Ford is now in permanent decline and the Bakken nears its peak production. 3.35 million barrels are from conventional reservoirs, 1.8 million of this is from the Gulf of Mexico, which is also at a record production. Non-OPEC and non-U.S. production is down for the 7th-year in a row, offsetting gains in Russian production, which fell by 50,000 barrels a day in September.

OPEC production is right now, at an 8-year low at 38.9 million barrels of oil a day, down 750,000 barrels last month due to the disruption in Saudi production. Future supply growth will be limited to 4 countries. The U.S, which is estimated now to be up 700,000 barrels a day in 2020. By the way, we'll take the under on that. Norway, the Johan's Sverdrup is to introduce 440,000 barrels of new production in 2020. Guyana, the first oil from linked Liza is at 190,000 barrels a day early next year. There'll probably be another 200,000 barrels a day. So total new supply will be about 1.3 million barrels a day in 2020.

It's also noted that significantly lower ads are targeted for 2021 and 2022. Remember that the decline curve always wins and it never sleeps. Now to review the 3 financial tenets by which Core has used to build shareholder value over the 24-plus-year history of being a publicly traded company.

During the third quarter of 2019, Core generated over $20 million in free cash, marking the 72nd consecutive quarter of generating positive free cash. Core has no plans to cut our dividend as we review its importance to our investor base, especially our European investor base as being sacrosanct. With the emergence of the international markets pushing Core Lab revenue and operating margin, Core is confident that the company's asset-light model will allow Core's future free cash flow to more than cover the dividend in 2020. And to further bolster free cash flow, the company continues to streamline
absorbed in higher levels of working capital. As we continue to expand the offering and production capabilities of our high-end perforating products, some additional investment in working capital will also be required. For 2019, the company anticipates that its CapEx will be approximately $23 million.

As Dave previously mentioned, the activity associated with projects in the international markets is important for Core Lab. This, combined with our cost reduction actions, will continue to support the expansion of our operating margins and future cash flow to more than cover our dividend over the longer term. Our free cash flow conversion ratio, which is free cash flow divided by income from continuing operations and using a normalized 20% effective tax rate, continues to be one of the highest in the industry at just over 90% for the third quarter of 2019.

We still believe this is an important metric for shareholders when comparing company's financial results, particularly for those shareholders who utilize discounted cash flow models to assess valuations. I will now turn it over to Gwen for an update on our guidance and outlook.

**Gwendolyn Schreffler**

Thank you, Chris. During the third quarter of 2019, the balance of supply and demand for the global crude oil market did not materially change. Although, the disruption of supply from Saudi Arabia temporarily adversely affected production output. While crude oil demand growth has weakened over the past 6 months, crude oil supply growth is predicted to modestly increase from non-OPEC countries, though that growth will likely be offset by declines from OPEC, its aligned countries and more mature hydrocarbon provinces.

Core Lab projects global crude oil inventory levels will continue to decline as potential growth in the world's crude oil production essentially is limited to 4 countries. The anticipated decline in the global crude oil inventories is also expected to result in a reduction in days of consumption of crude oil in inventory over the coming months, which should support a higher crude oil price.

While market concerns exist regarding the balance of crude oil supply and demand, crude oil production additions are limited on a global basis. As Dave mentioned, Core
believes that only the U.S., Norway, Guyana and Brazil can add meaningful crude oil supplies over the next few years.

The decline curve is prevailing in the mature crude oil fields internationally suggesting a supply gap over time. The balancing of crude oil supply and demand supports the crude oil price, which underpins the reinvestment and final investment decision in the international crude oilfield project. These international investments are critical as the decline in production from the mature fields continues and new field development is required to replace current supply. These underlying fundamentals for the crude oil markets drive the international activity levels of Core's clients. Therefore, our outlook on international projects remains positive for Core's Reservoir Description segment.

Turning to the U.S. While U.S. operators continue to focus on generating free cash flow and investment -- return on investment, optimizing well completions remains a significant opportunity to improve the return on investment for the development of their fields while managing their capital budgets. However, as U.S. operators have publicly indicated, they're focus on free cash flow and spending within the 2019 budgets are priorities.

This was apparent during the third quarter 2019 by the notable declines in both the U.S. onshore rig count and completion activity. As a result, Core believes fourth quarter U.S. land activity will continue to decline from which Core's Production Enhancement segment will be most impacted. Core's Reservoir Description segment is also expected to be impacted by the U.S. onshore activity decline, though to a lesser degree. Therefore, considering expected but uncertain level of decline in U.S. land activity, we project consolidated fourth quarter revenue of approximately $161 million to $163 million and operating income of approximately $28 million to $29 million, yielding operating margins of approximately 18%.

The company's EPS for the fourth quarter 2019 using an effective tax rate of 20% is projected to be $0.44 to $0.45. Core Lab is executing cost control actions, announced earlier this year. Further, we will continue to evaluate opportunities to efficiently align the business with market condition. Core Lab's fourth quarter 2019 guidance is based on projections for the underlying operations and excludes gains or losses from foreign exchange. Now I'll pass the discussion over to Larry.

**Lawrence Bruno**
Thanks, Gwen. First, I’d like to thank our global team of employees for providing innovative solutions, integrity and superior service to our clients. The team’s collective dedication to servicing our clients is the foundation of Core Lab’s success. Turning first to Reservoir Description. In the third quarter of 2019, Core Lab, under the direction of Santos Limited, continued work on an extensive laboratory program designed to evaluate conventional cores and reservoir fluids from the shallow-water Dorado discovery, located offshore Western Australia.

More than 700 feet of conventional core were recovered from this high-quality sandstone reservoir. Core Lab utilized its proprietary CAT scan based Digital Rock Characterization technology to determine lithologic characteristics in the intervals of interest. In addition, the Digital Rock Characterization work enables Santos and Core Lab's technical staff to work quickly to select representative rock samples for advanced geological and petrophysical testing. The ongoing physical measurements that are being conducted on these representative samples are crucial for accurate pay zone modeling, downhole log calculation and reserve calculations.

In addition to the reservoir rock characterization programs, subsurface hydrocarbon samples were collected from multiple stratigraphic horizons within the reservoir. Core Lab used its proprietary mercury-free, Pressure-Volume-Temperature or PVT cells to determine the phase behavior relationships of the hydrocarbons under varying conditions.

Core Lab is pleased to be playing a role in evaluating one of the largest hydrocarbon discoveries, offshore Western Australia. Also in the third quarter, Core introduced a new technological offering to meet client needs. During the exploration, appraisal and development phases of oil and gas fields, critical early-time geological, petrophysical and reservoir fluids properties data are required to meet these needs. Core Lab has developed several proprietary technologies to measure, integrate and deliver these large complex data sets.

Core's non-invasive technologies for reservoir optimization, branded as NITRO, includes dual energy computed tomography, micro-CT, high-frequency nuclear magnetic resonance, high-resolution gamma logging and continuous high energy x-ray fluorescence along with other Core Lab proprietary technologies. Core Lab's digital
innovation group integrates results and interpretations from these noninvasive technologies into a comprehensive, web-enabled platform for client access.

This allows Core's clients to gain insight into their core intervals at an accelerated pace, well in advance of results derived from time-honored laboratory analysis. Through this integrated visually interactive platform, key reservoir performance indicators are presented, evaluated and shared within client workgroups. Core Lab has been an industry leader in the digital transformation of the oilfield service space over the past 10 years. NITRO represents the latest cutting-edge innovation in applying digital technologies to evaluate reservoir properties.

Moving now to Production Enhancement. Core's Production Enhancement energetics team partnered with one of the world's largest independent E&P companies to develop a breakthrough perforating solution for their mechanically isolated recompletion programs in both the Eagle Ford and Bakken formations onshore U.S. This technology helped the operator minimize risk, improve recovery from existing wells and optimize their return on investment. In mechanical isolation completions, a liner is run and cemented inside the well's existing perforated casing, isolating old perforations and allowing for new plug-and-perf operations. This approach offers distinct advantages, particularly compared to less reliable diverter products.

To be successful, mechanical isolation relies on the ability of the perforating energetics to effectively penetrate through 2 layers of tubulars, commodity perforating charges, including those that attempt to deliver consistent perforation hole size to a single string of casing, typically produce small and inconsistent hole sizes when shot through two strings of tubulars. These substandard perforations produce inadequate stimulation results. The small inconsistent holes from commodity charges require slow pump rates, yield high perforation friction and increase the time required to stimulated stage.

Core's ReFRAC Perforating Technology is engineered to deliver optimal and consistent hole sizes through both strings of tubulars, regardless of gun position, allowing for new zones within existing laterals to be effectively stimulated. To-date, numerous wells have been successfully completed in both the Eagle Ford and Bakken using Core's proprietary ReFRAC Perforating Technology. The operator has reported the ability to complete double the number of stages per day over conventional perforating techniques.
The E&P company has also seen consistent and reliable frac -- fracs from stage to stage and well to well along with encouraging production results. Core's refrac technology breathes new life into the large fleet of older existing wells that were originally under-stimulated.

High-quality reservoir rock and the intervals between the original stages can now be tapped, increasing oil recovery and significantly without the expense of drilling and completing an additional well. Also in the third quarter of 2019, Core continued its work on a comprehensive completion diagnostics program for LLOG Exploration on its deepwater Buckskin project in the Gulf of Mexico. Core's diagnostics technologies were used to evaluate sand control options for log explorations deepwater completion strategy. The reservoir having multiple pay zones require separate completions across each reservoir horizon, given the multiple pay zones and varying rock properties, LLOG Exploration elected to use an alternative completion approach.

Core utilized its SpectraStim, SpectraScan, PackScan and FLOWPROFILER diagnostic services to provide direct measurements of the completion quality as well as to determine the completion fluid recovery and the oil contribution from each of the completed stages. Core's diagnostic services helped guide LLOG Exploration decision to frac pack the well using a single-stage/multi-trip strategy, as opposed to the more typical multi-stage/single-trip strategy. This approach will allowed for more proppant to be placed in each target zone while minimizing operational risks. Core's diagnostic services confirm that all the frac pack completions were effective and sustainable, providing the operator with confidence to flow the well at a higher rate. The well achieved higher than normal drawdowns with no degradation of flow capacities. Core Lab is pleased to have been able to assist LLOG Exploration on this very significant project.

That concludes our operational review. We appreciate your participation. Chris will now open the call for questions.

**Question-and-Answer Session**

**Operator**

[Operator Instructions]. Our first question is from Byron Pope of Tudor, Pickering, Holt.
how that looks going into Q4, what I would do is model what we're looking at for revenue and then keep a consistent day sales for the receivables but I would expect some improvement in the inventory. So we are targeting and our guys are targeting to reduce inventory from where it is currently. So you should see a nice pick up from working capital in cash flow in Q4.

Scott Gruber

Got it. And then Dave or Larry, as we think about well spacing, parent-child effects, it seems that your thesis around these trends positively impacting energetics and intensity is playing out. Can you also provide some color on the benefit you're seeing on the diagnostic service side? It seems like tracer services were a driver supporting Production Enhancement during the quarter. What are you seeing in terms of the demand from E&Ps for diagnostic services given the focal point on spacing, parent-child, et cetera?

Lawrence Bruno

Yes. So two things on that. One is, I think the -- maybe -- sort of high-level, early-on misconception that they could come up with a specific footage optimum well spacing. I think that's -- people are broadly aware that's not going to happen now. And we've been aware of it for quite some time and our completion diagnostics are that, sort of, that thermometer, if you will, or that analytical device that allows the -- an operator to say for a given rock -- set of rock properties in a different -- in the specific set of reservoir conditions. So pressure, rock hardness, how brittle the rock is and then dialing in also the size of the frac, the intensity of the frac. What makes sense for that particular area around that well and the diagnostics are the way to validate if you've created well interference between the two. So I think the opportunity for more clients to adopt a measured approach using diagnostics bodes well for us.

Secondly, more to come on this pretty soon. We're going to engage -- we're engaged with a number of companies right now, looking at taking a, sort of, multi-company approach to validating a process for finding out optimum well spacing.

One other point here on diagnostics, and that is don't forget, just like the example I gave earlier today, diagnostics also have a role to play in completion in conventional reservoirs, particularly, some nice jobs for us in offshore like the one that I described earlier today for LLOG Exploration where there was a big decisions on frac packing had
Jeff Miller, Chairman, President and Chief Executive Officer

Thank you, Abu and good morning everyone. As the second half of 2019 unfolds US and international markets continue to diverge, international activity growth is gaining momentum across multiple regions meanwhile operators capital discipline ways on North American activity levels. That said, our outstanding employees executed effectively in the 3rd quarter we manage the market dynamics and delivered on our financial results as per expectations.

Let me cover some headline total company revenue was $5.6 billion in operating income was $536 million, representing decreases of 6% and 3% respectively compared to the second quarter of 2019. Our Drilling and Evaluation division revenue was down 4% sequentially but operating income grew 3% quarter-over-quarter. Our international D&E operating margin increased 180 basis points. Overall D&E margin performance was negatively impacted by weaker demand for our services in North America.

Our Completion & Production division revenue declined 8% sequentially driven by lower completions activity in North America land. C&P operating margin was essentially flat compared to the second quarter, supported by strong international activity and the execution of our new playbook in North America.

International revenue was flat sequentially but is up 10% year to date. Lower project management and stimulation activity in the Middle East and Asia offset healthy growth in Latin America and Europe Eurasia in the 3rd quarter. North America revenue decreased 11% sequentially, primarily driven by customer activity declines.

And finally, we generated approximately $530 million of free cash flow.

In the 3rd quarter, a significant improvement over the first half of the year.

In the 3rd quarter, supply and demand uncertainties continue to impact, commodity prices on the one hand Iran sanctions Venezuela production declines and political instability in Latin America and North Africa are constraining supply. On the other hand, there is near-term uncertainty in demand due to ongoing US, China trade tensions and negative economic data out of Asia and Europe. As the US production growth continues to weigh on supply OPEC plus extended its agreement until March 2020 to manage, production and support oil prices.

Even with these cross currents international growth continues at a steady pace. This summer, I spent a month (inaudible) our customers in the Eastern Hemisphere and I'm excited by what I saw, consistently improving markets across Europe, Asia and Australia. This confirms my confidence and Halliburton delivering high single digit.

International revenue growth this year. It is important to note that both of our divisions are meaningfully contributing to our international growth. Our Drilling and Evaluation division traditionally had the most exposure to international markets with about 70% of division revenues coming from outside North America.

The revenue split has generally been the opposite for our Completion & Production division. We are pleased to see the C&P division increasing its participation in the international markets in this cycle. Year-to-date international C&P revenue has grown percent double the international revenue growth rate of D&E.

In today's environment customers aim to squeeze every available barrel from their existing assets. So mature fields development is prominent. We also see increased unconventional activity in several international regions, the technology, mix required for development focused production oriented and unconventional project plays to our C&P portfolio strengths.

With a focus on the international mature fields market, we are growing our production group part of the C&P division that comprises artificial lift specialty chemicals and Well Intervention solutions. Historically, Halliburton primarily participated in the drilling and completion stages of the well's life cycle.

With our expansion into Production Services, we're tapping into a long-term later cycle market with significant growth potential. Our well intervention business helps operators diagnosed field productivity issues and design and deliver immediate impact solutions, leveraging our custom chemistries and tools. This capability is critical for mature fields with rigorous intervention and well surveillance activity increasing, especially in the Middle East, Europe and Asia, we've already executed multiple contract startups in 13 different countries this year.
In Latin America, we recently deployed our spectrum Fusion hybrid coiled tubing service for our customer in Colombia. In a single-trip with the well still producing we provided real-time visualization of the shape and location of old perforations and perform production logging, while maintaining the ability to circulate fluid clean the well as needed.

The customer gathered valuable downhole insights without having to take the well off production. In the last couple of years, we've had a significant uptick and unconventional activity in several Middle Eastern countries as well as in Argentina and Australia. Our Production Enhancement business demonstrated strong international growth year-to-date, benefiting from these developments.

Halliburton leveraged our experience in US shales to provide a customized application of technology logistics management and operational excellence, to maximize asset value for our international customers. In Argentina, Halliburton delivered the highest number of frac stages to date in the 3rd quarter as a result of consistent execution and applying service efficiency best practices in the Vaca mor the shale play.

Our completion tools and cementing businesses also increased international revenue and margins on the back of strong activity recovery in the UK and Norway sectors of the North Sea, IOC activity expansion in Brazil and Mexico and increased demand from Asia and the Middle East.

We grew cementing services as well as installations of casing equipment and intelligent multilateral and core Completion Solutions for customers and all of these markets. For example, this summer, we installed the multilateral completion to increased reservoir exposure and inflow control and an operators mature field in Norway.

This intelligent Completion system allows the operator to manage production from each of the 4 laterals without impacting production from the others in the event of a gas influx or water breakthrough. To be clear, our Drilling and Evaluation businesses are also meaningfully contributing to our international growth. As you know, Halliburton entered this international recovery a much stronger competitor, due in large part to technology investments we have made in key services like drilling LWD, open-hole Wireline and testing.

Recently and operator recognized Halliburton wireline as a benchmark for service quality and execution in an ultra-deepwater exploration campaign in West Africa. Open-hole Wireline data collected at water depth over 10,000 feet help the customer to confirm significant additional reserves and successfully determine fracture and closure pressure in sand and shale formations.

In the Norwegian North Sea and operators adopted, our latest logging, while drilling innovation the EarthStar our ultra-deep resistivity service as a standard in their exploration wells.

The customers target formation has exceedingly complex geometry, making it hard to interpret using conventional methods. The unique 3D and version capability of the EarthStar sensor is the only LWD technology capable of reliably mapping such complex structures. Looking to 2020 I see more international top line and margin growth opportunities for Halliburton coming from mature fields and shallow water markets, Barring a global economic slowdown a broader offshore recovery should add momentum to the international growth going forward.

Offshore rig count increased 19% year-on-year and sanctions FID volumes were up 2% compared to last year led by Guyana, Brazil and Azerbaijan project sanctions.

Recently woodside Energy awarded Halliburton, drilling and completion services for its deepwater field development campaign in offshore Senegal, it's due for the final investment decision in December and work is planned to start in late 2020 or early 2021. The campaign is expected to include 18 wells with up to 8 optional wells over an estimated 3 to 4-year term.

Halliburton was awarded the well construction lower completion, (inaudible) slick line coiled tubing and well testing services. We've also announced several new offshore project wins this year in Latin America and the Middle East.
Our pipeline of projects is strong and I expect Halliburton to outperform the growth in international drilling and completion spending next year. Increasing activity and improving pricing across markets, our ability to compete for a larger share of high margin services and reallocating assets to the markets, where we can earn the highest returns. I believe will improve our international margins going forward.

In North America, the market is very different, customer spending has decreased and is largely concentrated in the first half of the year. The US land rig count declined 11% from the second to the 3rd quarter for the first time and 10 years. And while historically, the 3rd quarter, used to be the busiest in terms of hydraulic fracturing activity in the US stage counts declined every month this quarter. As a result the market for both drilling and completion services in North America softened during the 3rd quarter, impacting service company activity and Halliburton was no exception.

Throughout the 3rd quarter pricing pressures continued as operators tried to lower overall costs in order to meet their cash flow objectives. We are the execution company, so let's talk about how we are proactively executing our North America playbook with a clear purpose to generate returns and free cash flow.

This is what it looks like we are stacking equipment. In the 3rd quarter, we stacked more equipment than we did in the first 6 months of the year. While this impacts our revenues we would rather air on the side of stacking and work for insufficient margins and wear out our equipment.

We're reducing costs. You've seen us do this before we took out $1 billion in 2016. We reorganized and reduced our fixed cost in North America earlier this year. We continue to evaluate the way we work and we'll keep reducing costs in our North American operations. We're aligning with the right customers.

We are, and continue to be aligned with the customer groups that are spending and that value our services. We're deploying technology that lowers our cost and accrues value to Halliburton take integrated well completions for example it is a combination of Wireline and fracturing services. It is one thing to have both product lines and another thing to integrate them technically and culturally and achieved lower cost on location. It takes R&D effort to develop a host of new proprietary technologies that enable this integration Halliburton's integrated well completions offering minimizes non-productive time improves efficiency reduces personnel on location and capital costs for Halliburton.

This technology integration which is hard to duplicate improved customer efficiency, but more importantly, it improves our margins. These actions allow us to maximize our active fleet utilization and protect our margins, our 3rd quarter results demonstrate that our new North America playbook is working and is the right approach for this market.

Looking ahead to the 4th quarter, we see more of the same. We expect customer activity to decline across all basins in North America land impacting both our Drilling and Completion businesses. Feedback from our customers leads us to believe that the rig count and completions activity may be lower than in the 4th quarter of last year. While holidays and potential weather impacts are the usual culprits, other drivers of this continued activity decline, our customers, free cash flow generation commitments and over-supplied gas market and concerns about oil demand softness in 2020.

Given the reduction and cadence in customer spending that we see. We plan to further change the way we deliver our services in order to improve our margins and maximize returns. In the 4th quarter, consistent with our playbook, we plan to undertake further cost reductions by streamlining our operations and corporate functions. We're still finalizing our estimates, but expect to capture approximately $300 million in annualized cost savings over the next few quarters.

Importantly, regardless of the cuts and idling of equipment, the size and scale of our business in North America, give us the ability to drive a sustainable model without sacrificing our leadership position. I believe that the actions we are taking will enable Halliburton to evolve and emerge stronger in the future.

So what changes the narrative for North America going forward. While the cadence of activity will likely remain the same over the near term, there are a few other key trends we're watching closely today that should play out over time and alter the market dynamics in US land.

First attrition. Given demand deceleration, the service industry has adjusted accordingly and cut capital spend this year, there were hardly any new equipment additions and maintenance spending has been severely curtail. All the while service intensity showed no signs of slowing down multi-well pad penetration continued, lateral lengths kept growing...
and proppant loading increased further. The direct result of higher service intensity, especially in terms of hours pump per day is the increase in maintenance frequency. This should accelerate the long-awaited equipment attrition from the market. Both voluntary through stacking and involuntary.

As I said at the beginning of the year, there would be less horsepower available in the market at the end of the year than there was in January. We can now see this happening as service companies are cannibalizing stack equipment for parts rather than paying for replacement components, due to budget constraints. We expect attrition to continue into 2020.

At Halliburton, our size and scale, allow us to flex down with the market and generate sufficient free cash flow to keep our active fleet healthy. We benefit from in-house manufacturing digital preventative maintenance protocols ongoing materials R&D and automation efforts to increase equipment lifespan. These are unique competitive advantages that are hard and expensive to replicate in this market.

Second, some of our customers are changing their buying behavior. They have started contracting for services and integrated packages rather than discretely. This helps tie up multiple services, compresses the learning curve and drives cost savings and efficiencies for both us and our customers. This is similar to how the North Sea is evolved over the last few years. We are currently working on integrated projects with customers in the Bakken and the Permian.

The collaboration has resulted in better performance and help secure longer-term customer commitment. Some companies are increasingly centralizing the management of their procurement activities. This should lead to supplier rationalization and concentration of a larger share of the work with a select number of high-quality, safe and efficient service companies.

We believe that these new customer buying behaviors uniquely position Halliburton to get an outsized share of their stand. Finally one more trend we are watching is the deceleration of incremental US production growth brought amount by capital discipline. The record-breaking 2018 growth will not be replicated in 2019. In fact current projections for 2020 indicate a further decline in production from the current year estimates to maximize production for every capex dollar they spend operators will require technologies that can improve both efficiencies and well productivity instead of counting stages, they want to make every stage count. For this, I believe they will turn to Halliburton.

We bring to the table technologies like automated fracturing in distributed fiber sensing, that are tailor-made for addressing production challenges. While customers are mostly focused on price today early studies confirm our technologies work they are hard to replicate, and we'll be more valuable to Halliburton over time.

Also with declining US incremental contribution to world production, non-US production will be required to fill the gap. This means more growth in International and offshore markets and more opportunities for Halliburton. As the international recovery continues and the North American market matures, our strategy will allow us to thrive in this dynamic environment. I believe that the actions I have described to you today will ensure that Halliburton continues to improve its earnings power and generate strong free cash flow and industry-leading returns in the future.

With that, I'll turn the call over to Lance for a financial update. Lance?

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**Lance Loeffler, Executive Vice President and Chief Financial Officer**

Thank you, Jeff and good morning. Let's begin with an overview of our 3rd quarter results compared to the second quarter of 2019. Total company revenue for the quarter was $5.6 billion and operating income was $536 million representing decreases of 6% and 3% respectively.

North America led to decline as a result of activity and pricing headwinds.

Let me go over the details of our divisional results. In our Completion & Production division, revenue was $3.5 billion, a decrease of $299 million or 8%, while operating income was $446 million, a decrease of $24 million or 5%. These results were primarily driven by lower pressure pumping activity and pricing in North America land, coupled with decreased completion tool sales in Latin America. And reduced stimulation activity in the Middle East Asia. Partially offsetting these declines were increased cementing activity in the Eastern Hemisphere improved completion tool sales.
Thanks, Lance. In summary international growth continues at a steady pace across multiple regions benefitting both our D&E and C&P divisions. Increased activity, pricing improvements, our ability to compete for a larger share of high margin services and reallocation of our assets should lead to higher international margins as we look past this year.

In North America, we expect activity reductions to continue into the 4th quarter. Halliburton has successfully executing our new North America playbook to maximize returns and free cash flow. We stacked additional equipment throughout the quarter, (inaudible) and will continue managing utilization with a focus on returns. We're aligning with the right customers. We're introducing new technologies to improve margins and we will continue to take actions that lowers the overall service delivery cost.

I want to close by thanking our employees for their outstanding focus and dedication to our company and our customers. Your resiliency and hard work are the foundation of our company's strengths and [ph]while together, we can continue delivering on our promise to our shareholders.

And now let's open it up for question.

Questions And Answers

Operator

(Operator Instructions). Our first question comes from James West with Evercore ISI. Your line is open.

James West, Analyst

(inaudible) Lance.

Jeff Miller, Chairman, President and Chief Executive Officer

Good morning, James.

Lance Loeffler, Executive Vice President and Chief Financial Officer

Good morning, James.

James West, Analyst

(technical difficulty) exit rate and how we're going to enter 2020 now that starts to how the [ph]Halliburton starts to shape up?

Lance Loeffler, Executive Vice President and Chief Financial Officer

Yeah, thanks, James, you're a little attractively there at the beginning, but you know as we look at the Q4 activity, obviously we think budget exhaustion etc starts to bring that down. I expect we'll see an uptick as we go into Q1 of 2020 and I think that's a little bit, getting to that cadence of spend. So I think that will be increasing activity certainly in the first half, first quarter and then really first half of 2020 and our playbook will have us ready to take advantage of that.

Okay, great, that's very helpful. And then as we talk about the playbook and think about the playbook. What are you seeing from your competition. Clearly some of these guys can't actually perform at the same levels or will not perform...
Good morning. Jeff, maybe a little bit more color on the international markets and the visibility there. I think there some debate about the pace of growth for 2020 is, I'd love to hear what you're seeing out there and. And the prospects for having similar growth rates in 2020 as you did in 2019. And maybe you could also touch on the growth you saw on C&P versus DNA.

Jeff Miller, Chairman, President and Chief Executive Officer

Yeah, thanks. Angie less clear on (inaudible), We just don't have the visibility on 2020. Yes, at this point because it's still early. That said, I believe, Halliburton outgrows the increase and drilling and completion spend whatever that is internationally. And as I described, I mean, I think we've got a good set of contracts set up for 2020 and technically, we're very well positioned for 2020. And so without trying to put a number on that today we feel Halliburton will be very competitive in that space. And anyway, yes.

Unidentified Participant

Okay. Okay. So maybe on your remarks on the attrition, it'd be great to hear any additional color on attrition and retirement for Halliburton and what you're hearing for the industry as a whole. We had this year and next year and how much supply I think could be pulled out of the market.

Jeff Miller, Chairman, President and Chief Executive Officer

Yeah, I mean it's I've always said, it's hard to see attrition until there's a call on the equipment, but it's pretty clear there is less equipment in the market today. Then there was at the beginning of the year and that amount varies in terms of how people call it. We think it's 15% to 20% easily in the marketplace. But then we watch equipment adds of which there really aren't any. And we know how hard equipment is working. And so, yeah, I really believe we will continue to see that as we go into even 2020 in terms of the attrition happening and on our view of the market is we want to be super careful with our equipment, we want to work it for returns. And when we don't see those returns. We want to send it to the site.

Unidentified Participant

Great, thanks. I'll turn it over.

Jeff Miller, Chairman, President and Chief Executive Officer

Thanks, Angie.

Operator

Our next question comes from Sean [ph]Meakim with JP Morgan. Your line is open.

Unidentified Participant

Thank you. Good morning.

Jeff Miller, Chairman, President and Chief Executive Officer
So I expect, as I look through Q4 and into 2020 and beyond. The value of this suite of technology is going to be very impactful. In fact, I'll just comment here the world oil awards this week actually the best drilling technology was the or star 3D inversion, which is fantastic technology.

So to get back to progression, we kind of see a longer ramp on the recovery of that business, but all of the building blocks are in place and the technical approach is working and I see us winning the kind of contracts that I think are required to earn higher margins.

**Unidentified Participant**

Great, thank you very much.

**Operator**

Our next question comes from Scott Gruber with Citigroup. Your line is open.

**Unidentified Participant**

Hey, guys, good morning.

**Jeff Miller, Chairman, President and Chief Executive Officer**

Morning.

**Lance Loeffler, Executive Vice President and Chief Financial Officer**

Good morning.

**Unidentified Participant**

Staying on D&E margins, I know you guys typically forecast just one quarter ahead. But I was curious about, a bit of color on 1Q, how should we think about margins going into next year, you have a bit more North Sea exposure at this point is that changed the seasonality. We're going to see a little more season seasonal impact on D&E margins, or is there still sufficient underlying profit improvement that you can offset and have more normal seasonal margin performance in 1Q?

**Lance Loeffler, Executive Vice President and Chief Financial Officer**

Yes. Scott, this is Lance, I appreciate the question. I think I think looking ahead, I think there still going to be some seasonality in 1Q. We're still dealing with weather in the Northern hemisphere as we traditionally see it, but I think overall, as you think about where international margins can go based on some of the comments Jeff made prior, I think not only are you seeing the investment in technology come to fruition. And what we expect, but also just generally more activity in the international markets, help improve also seeing better pricing in certain regions around the world that comes because of the tightness of tools, etc, that will drive that. So I think that that there is obviously continued progression of where we see international margins going not just in the fourth quarter, but into next year.
Unidentified Participant

looks like the market is not going to be kind of devoid of pricing, right. So when we think about the -- when you guys think about your business in the US and US frac in particular. Beyond your cost reductions and pricing do you think there is other ways you can drive margin improvement, Jeff.

Jeff Miller, Chairman, President and Chief Executive Officer

Yes, I do. I mean I think strategically -- I mean technology is always an important part of this business and we continue to invest in technology and some of that technology allows us to lower our cost and we don't necessarily spend a lot of time talking about that simply because it's not for sale, I want to keep it and have that benefit accrued to Halliburton.

I talked about one, just this quarter on the call with integrated completions. But that's more complicated to do that meets the eye and it actually drives a lot of cost savings for Halliburton. When we direct our efforts that way, that is part of the sustainable competitive advantage we have around not just cost cutting. Actually, I don't see it as cost cutting and see the playbook actually is strategically driving better efficiency and better margins sort of in the face of where the market is today.

I say all of that and I want to pivot to what I really think the future looks like which over the next few years, the dialog, I believe will be more around. Recovery factors in unconventionals and less about just pure speed and I think in that market some of the things we're doing with Prodigi and a host of things that I think will be quite impactful in the future scenario, which you know the future what a couple of years out. But I'm really excited about that also. And nothing we're doing today. It's in the way of delivering on that future set of technologies.

Unidentified Participant

Okay, that's great color. Then you got -- you had indicated to give us some sense on attrition, say on a general basis it runs may be 15% to 20% per year and then given the dynamics at play in the marketplace with companies not generating enough free cash to put into maintenance. What would be your assessment above and beyond that 15% to 20%. I know you didn't really maybe not kind of want to comment on it, but maybe press you a little bit here and kind of give us your best guess as to what you think it could be given the under-investment in the business.

Unidentified Speaker

Look, I think this is something that accelerates, particularly as we get into 2020, we'll see an uptick in the first half of the year first quarter and I think they'll be stress in the system at that point. In our early is the extent to which there isn't new investment in this business that just continues to wear on equipment. So has to accelerate over time.

Unidentified Participant

All right. Jeff, I'll leave it there. Thanks guys.

Unidentified Speaker

Thank you.

Operator
He will then turn the call over to Andy Hendricks who will share some comments on our operational highlights as well as our outlook. After Andy’s comments, I will provide some closing remarks before turning the call over to questions. Andy? {C: William A (Andy) Hendricks: President and Chief Executive Officer, Patterson-UTI Energy, Inc.: Patterson-UTI Energy.:} Thanks, Mark and good morning. As set forth our earnings press release issued this morning for the third quarter report a net loss of $262 million or $1.31 per share, which included charges totaling $260 million pre-tax or $209 million after tax.

excluding these charges the net loss for the third quarter would have been $52.9 Million or $0.27 per share. I’d like to provide some additional information to help you better understand these charges. They are primarily driven by the current market environment and in particular the fact that we do not have visibility to a major up turn in the near turn. Including our depreciation depletion amortization and impairment expense is a $203 million non-cash charge including $173 million in drilling $20.5 million in pressure pumping $8.4 million in directional drilling and approximately $1.5 million in our other segments.

These impairment charges include the retirement of 36 legacy non-APEX drilling rigs for which there is limited foreseeable opportunity to work at rates and terms, which would justify the activation of the rig’s. Additionally, included in the impairment charge the retirement of approximately 300,000 pressure pumping horsepower. During the third quarter, we took a $17.8 million non-cash goodwill impairment charge, related to all of the goodwill remaining at our current power and Great Plains Oilfield rental business. The profitability and resulting cash flow of these businesses is highly correlated to overall Oilfield service activity and as such I felt the effects of the latest downturn.

Included in the direct operating cost of our directional drilling segment is a $17 million for the right of the inventory. Included in the direct operating cost for our Warrior rig technologies business, which is in our other segments is $12.4 million primarily related to the right of inventory for product lines we no longer intend to support. These product lines generally include hydraulic top drives and first-generation electric top drives. Additionally $2.2 million of severance expenses included in SG&A for our other segments as we have ceased operations in our Calgary location.

Included an interest expense is an $8.2 million -- is an $8.2 million make hold charge incurred in connection with the early repayment of the $30 million series a senior notes due 2020. Excluding these charges the majority of which were non-cash, our adjusted EBITDA for the third quarter would have been $143 million During the third quarter Capital expenditures totaled $68 million a 30% reduction from the second quarter. We now expect full year 2019 CapEx to be approximately $350 million down from our expectation last quarter of $400 million and down from our original budget for the year of $465 million as we have quickly reacted to market conditions to reduce spending. During the third quarter, we reduced our gross debt and pushed our nearest debt maturity to 2022 by using a combination of cash and a new $150 million term loan to repay a $300 million tranches senior notes that would have been due in 2020.

The new $150 million term loan has current pricing of libor plus 1 underneath, which is currently 2.95% and gives us the ability to continue to reduce debt without prepayment penalty. Our liquidity position remains strong with $165 million of cash on the balance sheet at the end of the quarter and $600 million available undrawn revolving line of credit, which matures in 2024. At September 30th, 2019, our outstanding gross dead balance was $975 million. A $150 million reduction from the end of the prior quarter.

Our net debt to capital ratio was 21.6% at September 30th, 2019. During the third quarter, we repurchased 8.2 million shares of our common stock in the open market for $75 million. Through the first three quarters of 2019 we repurchased a total of 20 million shares in the open market or 9.4% of the shares outstanding at the beginning of the year at an aggregate cost of $225 million. Our remaining share purchase authorization is $175 million.

In addition to the share repurchases We also paid 7.8 million in dividends during the quarter and have paid $24.7 million through the first three quarters of this year. Turning to the fourth quarter, we expect Depreciation, depletion amortization and impairment expense to be $188 million. SG&A to be $31 million and our effective tax rate to be approximately 20%, but that I'll now turn the call over to Andy Hendrix. {C: William A (Andy) Hendricks: President and Chief Executive Officer, Patterson-UTI Energy, Inc.: Patterson-UTI Energy.:} Thanks, Andy.
Before, we get into through our third quarter results. I wanted to give everyone an overview of what we're seeing in the market. It's been a challenging year with the overall decrease in US industry Rig count and the third quarter was the quarter with the fastest declined during the year. For Patterson-UTI, the decrease in our Rig count was in line with our expectation while the decrease in pressure pumping activity was greater than we expected.

But WTI in the low to mid-50s. Operator activity continues to be motivated by staying within budget and therefore operators that outspent their budget in the first half of the year are slowing activity in the back half of the year. Both drilling and pressure pumping activity are expected to decline further in the fourth quarter, but recent customer conversations suggest that our drilling rig activity will bottom in the fourth quarter and then a modest increase in late December and early January. At this point, there's limited visibility into how 2020 activity will shape up and we will know more later in the years operators work on their budgets.

As I physics with customers the way many of them describe their drilling and completion programs going forward is steady. And at Patterson-UTI we are adjusting our business accordingly. In contract drilling our recount during the third quarter average 242 rigs in line with our expectation. Average rigs revenue per day for the third quarter increased to $24,240 from $24,200 in the second quarter.

The third quarter had a lot of cross currents that affected average daily revenue, including higher than expected early termination revenue and increased proportion of rigs on standby, which is diluted to the average, and improving rig mix, and some pressure on leading-edge day rates. When excluding the impact from rigs on standby and early determinations from both the second and third quarters, average daily revenue increased $160 sequentially in the third quarter due primarily to more favorable Rig mix. Average Rig operating cost per day during the third quarter increased to $1440 due primarily to lower fixed costs absorption related to the steep drop in the Rig count during the third quarter. As well as increases in items such as workers comp and medical insurance, which we assume will not recur in the fourth quarter.

At September 30th, we had term contracts for drilling rigs providing for approximately $645 million of featured daily drilling revenue. Based on contracts currently in place, we expect an average of 73 rigs operating under term contracts during the fourth quarter and an average of 55 rigs operating under term contracts during the 12 months ending September 30, 2020. we have retired 36 non-APEX Rigs. Given current market conditions and our customer strong preference for super Speck Rigs, we believe these Rigs have limited commercial opportunity going forward. Our current Rig Fleet of 216 Rigs includes a 198 Apex Rigs of which we consider 150 to be super Speck. Turning now to our contract drilling Outlook. We expect our Rig count to average 126 rigs in the fourth quarter, essentially in line with our current rig count. We expect that our recount stabilizes and your current levels and bottoms in the fourth quarter with some increase in the first quarter is operator budgets reset in 2020.

Average rig revenue per day for the fourth quarter is expected to be $23,500. Approximately $280 per day of the decrease in the fourth quarter average revenue per day is related to to an assumed decrease in early termination revenues. With the expectation of rigs going back to work, we are going to have to carry some additional labor expense in the fourth quarter as we have employees ready to go to work when these rigs are reactivated. Despite these higher labor costs, we expect our fourth quarter average rig operating cost per day to decrease approximately $200.

At some of the items that affected the third quarter are not assumed to repeat the fourth quarter. Turning out pressure pumping, gross margin of $32.3 million in revenues of $209 million was lower than we expected as activity fell more than expected during the quarter. We reduced our active spread count and ended the quarter with 14 active spreads. Activity continues to decrease and we eye to build an additional spread early in the fourth quarter.

Lower activity level levels are negatively impacting pricing such that we believe industry pricing for spot work, is that an unsustainably low level. With the reduced activity and increased white space in the calendar for active spreads, we expect fourth quarter pressure and pumping margin to be approximately $8 million with revenues were approximately a $150 million. We have been in continue to reduce operating locations in order to scale the business for current market conditions. We are seeing an increase in the number of operators looking for fraks spread and early 2020, but it is unclear whether this work will materialize and if the pricing on the work would be economic.
We will continue to evaluate the economics of working versus ailing spreads on a spread by spread basis. The pressure pumping market is over supplied and it has been since the end of 2017. Improvements and completion efficiency have exacerbated the problem of all the additional horsepower added to the market over the past two years. The Patterson UTI, we remain capital discipline and focus on things within our control.

During the third quarter, we undertook a thorough process to evaluate the economic opportunity for our fleet and decided to permanently retire 300,000 horsepower a pressure pumping equipment. We concluded that in the current market the cost to reactivate this equipment would be prohibitive and with oversupplied market conditions, the best course of action would be to rationalize this equipment. Any components from this equipment with remaining value will be used as parts to support our active equipment. We believe that this equipment rationalization will optimize our fleet in a manner that is capital efficient.

More importantly, we believe that equipment rationalization provides a path to improving utilization in returns for the entire industry. Our remaining fleet of 1.3 million Frac horsepower is more than capable of undertaking today's most challenging completion jobs in an efficient manner. We believe that the right down or retirement of horsepower by number of companies in the industry along with the queue for stabilization in the rig count and expected slight increase in the rig count in early 2020 is positive for pressure pumping market over the long term. Turning out of directional drilling, excluding $17 million of write-os, third quarter gross margin with $7.8 million with revenues of $47 million.

For the fourth quarter we expect, directional drilling revenues of $39 million with a gross profit margin of $8 million. Outside of unusual items percent margin in this business has improved steadily over the last year. Within our directional drilling segment I would like to call out the success of superior QC, our real-time data analytics and survey correction business. The market for survey correction is increased despite the following rig count in 2019 as customer adoption of this technology has increased.

This month superior QC passed a major milestone with remote data analytics services on more than 100 Riggs. Over the past year superior QC is provided survey correction for nearly 1400 wells and more than 25 million feet of wellbore. The technology behind Superior QC survey correction software is being incorporated into our forthcoming bit guidance and drilling automation offerings. Leveraging this technology to help Patterson UTI further differentiate itself from other peers without similar technology offerings.

Turning now to our other operations which includes our rental technology and EMP businesses. In our warrior rig technologies business, we made the decision during the third quarter to transition away from our engineering and manufacturing efforts in Calgary. This decision resulted in a $12.4 million charge and direct operating costs as well as a $2.2 million of severance expense in SG&A Excluding these charges the gross profit margin for our other operations during the third quarter with $6.4 million on revenues $25.7 million for the fourth quarter, we expect operational results similar to the third quarter. With that, I will now turn the call back to Mark for his concluding remarks.

Mark S Siegel, Chairman, Patterson-UTI Energy, Inc. President, Remy Investors and Consultants Inc.

Thanks Andy. Even in a down Market, our drilling franchise remains strong because of our high quality Rig fleet and operational expertise. In pressure pumping, we note that unsustainably low pricing levels are leading to horsepower attrition and industry including ourselves are retiring equipment. We believe this attrition will help correct the oversupply market, which is currently leading to low utilization levels.

That said Patterson UTI has a strong financial position, which is allow us to focus on debt reduction and share buybacks. During the third quarter, we re-purchased an additional 8.2 million shares. Since the beginning of 2018, we have repurchased more than 29 million shares or 13% of the shares outstanding at the end of 2017. Including dividends, we have returned more than $430 million of cash to shareholders since the beginning of 2018.

I would also like to call out the during the third quarter, we published our corporate sustainability report. I am proud of the initiatives we have pursued some of which are highlighted in our report, which can be found in the sustainability
section of our website. I am also pleased to announce today the company declared a quarterly dividend at quarterly cash dividend is common stock of $0.04 per share to be paid on December 19th, 2019 to holders of record on December 5, 2019. With that said, we both like to commend and thank the hard-working men and women who make up this company.

we appreciate your continuing -- efforts. Operator, we would now like to open the call for questions. (Question And Answer)

Operator

As a reminder, [Operator Instructions] Your first question comes from Sean Meakim with JPMorgan your line is open

Sean Meakim

Thanks. Hey good morning.

Unidentified Speaker,

Morning Sean

Sean Meakim

Andy could you may be give us your take on your customers expected actions in the first half of next year for both pumping and drilling activity. It seems to me they definitely use Frac Crews to moderate their spend as needed. But the rig count decline seems to indicate sustainably lower activity. I'm concerned that perhaps Their shareholder base won't take too kindly upon rig editions early in the year, even if maybe there's a little more flexibility run the frackers.

Just how do you think about those two dynamics giving you guys are important competitors in both of those markets?

Unidentified Speaker,

Yeah, it's hard to know exactly what's going to happen throughout 2020 so far. Our customers are still obviously have a ways to go to before they work out their budgets for 2020. The most visibility we have at this is what we've been discussing in that we've already been in discussions, we've operators who want to put rigs up towards the end of December and into early Q1. So, we have some visibility on some increase in the rig activity into Q1 as we also mention there's some customers that are looking at putting out as well, but it's just not clear if for us it makes economic sense, so I think there's still some moving pieces to go to fully understand this.

As we work through the rest you for but we certainly don't have full visibility on 2020. But we agree with you that over the last two years, operators have used all the completion services to moderate their budgets more than they have the rig count. But, if we have the opportunity to put some rigs back to work it under good terms. We're certainly going to take it towards the end of this year in early next year.

Sean Meakim

Right. I appreciate that. That's totally fair. And in the prepared comments, the attrition obviously for your own fleet, but for a lot of your peers, so we are seeing that horsepower attrition, but it's not clear how much of that is the incremental horsepower, right? So maybe a lot being fenced is not necessarily going to be the first that would come off the fence if there's an improvement in activity.
Could you maybe give us a sense of your confidence level with respect to a supply driven solution to the underutilization in the market heading into next year.

Unidentified Speaker,

Yeah, in our particular case, the 300,000 horsepower that we're retiring will be gone. We may use some of the components of that, if some of the components on some of those whether it's pump systems, blenders have low hours then we may use the components, but in essence that horsepower in that equipment will be gone and won't return incomplete back to the market by any means, will continue to rationalize systems like that and I think, others will do the same. Our pressure pumping activity is going to slow down in the fourth quarter with more chunks of what I would consider white space in the calendar than we've seen in the past and some of this has to do with seasonality some of this has to do with budgets, we're going to change some of the labor force there because we may have an opportunity to put some of this equipment back to work early in Q1 and we'll just continue to monitor that as we work our way through the fourth quarter.

But in terms of I'd also like to point out CapEx spend will come down in the fourth quarter because it's based on the maintenance CapEx on the equipment is based on the hours we put on the equipment. So we see that moderating in the fourth quarter as well on pressure pumping.

Analyst

So get used to put a finer point on it. Do you think that's the supplies I can fix the underutilization? Or how much is really still rely on demand to help you get there?

Unidentified Speaker,

I think that the supply-side can and will fix the utilization, there's various industry reports about what utilization is today, let's say it's in that 60% range plus or minus that's well below the 80% range that the industry needs to be healthy and we haven't seen 80% since the end of 2017 in terms of industry utilization.

And so, the markets been challenged for a long period of time, but I think with the retirements you're seeing from us and retirements of equipment, you'll see from others and continued rationalization of equipment. I think, that the supply side will work this out doesn't happen overnight, it's not going to happen in a couple of quarters, but the supply side will work this out.

Analyst

I appreciate that feedback. Thanks, Annie.

Operator

Your next question comes from Praveen Nara with Raymond James your line is open.

AdkinsNarra

Hey, good morning, guys, I guess thinking about that kind of demarcation line on the 300,000 retirement. How do you think of the CapEx that was needed to be spent to bring that back to reactivate that and what was considered too much.
Your next question comes from James West with Evercore ISI Your line is open.

**James West**

Hey, good morning gentlemen.

**Unidentified Speaker,**

Good morning, James. Mark, want to applaud you guys on taking the appropriate actions removing iron from the market you guys have always done the best thing for your shareholders and you're doing it once again.

**Unidentified Speaker,**

Thank you.

**Analyst**

Sure. As you reviewed your horsepower during the quarter and decided to retire the 300,000. Is there additional horsepower that maybe is on that kind of edge where it may be retired going forward or was this a complete thorough review you're done for now and you won't reassessed any time in the near term?

**Unidentified Speaker,**

This was a very thorough review both in the drilling side and the pressure pumping and directional drilling across the board based on current market conditions where our share price trades, valuations that are put on the company from outside versus inside.

And so, We think that we've done a good job in taking the writedowns on everything that we need to write down over any near-term period. I think that taking 300,000 is a good number for us and I'm very encouraged. What I've seen and heard about other companies retiring equipment as well.

**Analyst**

Alright.

Okay makes sense. And then on the contract drilling side. I know you're talking to customers about but then up some Rigs late this year, early next year could you maybe, I know you want to quantify exactly but give us some idea is it a handful of Rigs? Is it a nice step up in Rig activity? If everything comes through I know, this is just conversations not contracts yet, but you're kind of what's your sense of the magnitude of the potential Improvement in the Raquel?

**Unidentified Speaker,**

I guess if I had to qualify what the increase looks like today, a handful or modest increase is the visibility that we have today, but there could be upside on that. I think we just don't know what all the operators intend to do yet, some of them are working through their budgets trying to quantify what they spent this year and what they may start with next year that could cause more discussions on rigs going up other than what we know today.
Yes, kind of give it qualitatively, the numbers in the range of a few thousand dollars per day. On average across our entire fleet. I give a lot of credit to the people in our drilling business, they've done a great job of providing and celery equipment to operators that we get to charge for. We have a great drill pipe rental business along with other components and so all that adds up into that number.

**Analyst**

Okay, and if you don't mind sharing outside of the drill pipe rentals just what the other big components of that might be.

**Unidentified Speaker,**

It's a variety of things. It could be charges for extra personnel on location. The drilling intensity has gone up so much over the last few years that the number of people that we provide to operators to actually operate the rig, whether it's during the drilling operations is sell for the rig move, is actually gone up and we appreciate that customer support us in terms of adding the extra staff on those rigs.

**Analyst**

Okay. Thank you that helps to clarify quite a bit and then sticking on the theme of land drilling, but shifting over to the technology side. Your strategy has been to control both the full spectrum of hardware to include the directional piece and now to layer there's some software investments. On top of that, could you remind us what at a high level how you came to that strategy of wanting to control both sides and then on the software side, if you could remind us how much you've invested so far and the extent to which you can scale that modest investment across the fleet versus how much more investment we might see going forward.

**Unidentified Speaker,**

Yes, we're really excited about the technology programs that we have in place across Patterson UTI in the various businesses and our ability to link these together over time to add value to the customers wells.

And, the exciting part for us in terms of return on capital for shareholders, we don't need to build $25 million rigs right now or add large fracs spreads, but we can invest in technology, which is a capital light investment and a great example of that is the cortex operating system for the drilling rig. The investment in round numbers to engineer that system is in the $2 to $3 million range. And so, that's the project to deploy that is an individual cost per rig but a relatively low cost per rigged to put that out. So, these numbers aren't big by any means.

They fall off in the rounding of the capital budget. In fact, some of the -- a lot of the engineering costs are in the OpEx because their labor, so we don't capitalize those projects are just part of OpEx for the company. So very excited about the potential that this brings because it's going to improve the overall value, we can provide to the customers and as we start to roll these things out from moving from field test to more commercial type products, we'll be looking to monetize these in different ways and day rates than we currently do with large assets and excited about potential brings in the future. Again, It's has the ability to improve the relative return on capital profile of the company.

**Analyst**

Okay. Thanks Andy. That's all for me.
Unidentified Speaker,

I think it's hard to know what it looks like. On pressure pumping, Q4 is a good example where margins are going to come down, revenues going to come down.

It's a blocky quarter with some of our spreads don't work the full quarter and maintenance CapEx is a function of the amount of hours that we put on equipment. So, it's really going to depend on what schedule start to look like in 2020 and things like that on the pressure pumping side on the drilling side, it's just too early to know what the rig counts going to look like what kind of increase we're going to see, in Q1 or Q2, we just don't have that level of visibility.

Analyst

Okay. Got you.

Analyst

Got you. Thanks appreciate that. That's for me.

Operator

Your next question comes from Taylor Zurcher with Tutor Pickering.

Your line is open.

Taylor Zurcher

Hey, good morning. What kind of pressure pumping for Q4 just giving the magnitude of the sequential revenue decline. Can you help us think about how much white space you actually have on the calendar for the 13 or 14 spreads you have out there and then moving into Q1 remind us of those active spreads you have right now.

How many are position in the Northeast today? I don't think we've just kind of working backwards on your questions. I don't think we can call that in a while where our horsepower is and how much it's in each location. In terms of the white space in the calendar, the best way I can describe it is to tell you that we've got some blocky chunks. It's much greater than it has been and it's A combination of going into seasonality in the fourth quarter along with some of the operators trying to contain their budgets.

And then what happens in 2020 after that is still a bit of a question mark. The last two years in the industry, we've seen operators react in different ways. Two years ago operators reacted by slowing down hard in the fourth quarter, this year they started slowing down in the third quarter and too early to know what 2020 is going to shape up to be.

Analyst

Okay, follow up on the rig side.

You talked about that potentially a handful of rig reactivations late this year or early next year, clearly some element of pricing pressure embedded in there. But, as we think about conceivably these are new term contracts or maybe in the spot market, but what sort of term do you think you'd get for these incremental Rigs that might go out there that will too well type program six months or there any operators out there that might actually want to contract an incremental Rig for a full year?
decisions that could be favorable for Rig count in the first quarter but we just don't know yet.

**Analyst**

Got it. Just some clarification question. So if I'm not wrong you will be left with about 1.3 million horsepower, which if I'm not mistaken is around 23-24 fleet, was is the 13 that are working today.

If I just do some back of the envelope math. It's implies that net affluence, you're EBITDA when about like from 5 million in 3Q to call it break even in 4Q Could you help I just think about just the decline, is that more because of just white space or is that something to do with pricing?

**Unidentified Speaker,**

So there's a mixture of things that are happening. So first off in terms of the number of spreads size for us in terms of horsepower per spread has been increasing as we've done more the deep delaware work and, getting some steadier work in that area. So that's raised the amount of horsepower per spread and that can fluctuate depending on what's happening between Texas and North East and Midcontinent.

Then as well with the blockiness that we have in the fourth quarter and the white space that we have in the calendar that certainly pulling down margins while we're still carrying personnel, so the fourth quarter just has various moving parts in there that make it more challenging with the seasonality and the budget constraints that some operators have and us trying to manage the spreads and manage the personnel.

**Analyst**

Got it. But so I guess, I was going with that is let's say if I understand the white space and December basically shuts down, but if I think about first quarter, and I'm not trying to ask you for like a number but just directionally it should be I don't know somewhere between third quarter and fourth quarter. If I think about first quarter just directionally.

Is that fair way of thinking? On a profitability per fleet basis. Yeah. I mean profitability per fleets come down in the fourth quarter, but the spread aren't all operating for the entire fourth quarter, and that's so that's driving a lot of that challenge there on the profitability per spread on average. Then first quarter has the potential to be better, the exit directionally from December to January should see some improvement, but it's too early to know what that level of improvement is going to be.

**Analyst**

Okay, that's all I had. Thank you.

**Unidentified Speaker,**

Thanks.

**Operator**

Your next question comes from John Watson with Simmons Energy.

Your line is open.
as well as we reactivate Rig.
So it really depends on how your modeling and what you consider steady versus reactivation period.

**Analyst**
Okay, understood. Thanks guys. I'll turn it back.

**Operator**
Your next question comes from McCarthy with Corp Capital. Your line is open.

**Analyst**
Thanks and good morning. A couple of questions, first of all for the capacity that you're retiring horsepower.
When was the last time that capacity actually worked or didn't work at all in the last three years or so.

**Unidentified Speaker,**
For us that particular horsepower did not work in the last three years and in the markets has been so oversupplied. We just haven't needed it. And that's certainly came into play in the consideration for determining what horsepower retired and which horsepower stayed on our active list.
But yeah, so in the last three years that 300,000 for the most part is not worked.

**Analyst**
And what would you say was the kind of average age of that equipment and how does that compare to the compared to the rest of the fleet?

**Unidentified Speaker,**
Without getting into discussions about, the age of the fleet certainly that equipment would have been older, and on average probably was three to four years older on average than the current state of the fleet.

**Analyst**
Fair enough. And then in terms of getting efficiencies, could you give us any guidance on what you've seen in terms of footage drilled per day or days per well.

**Unidentified Speaker,**
So, I think efficiencies continue improve in the Delaware in terms how fast we're drilling the wells but the laterals also increase so I think we've been seeing a trend where we've had more operators set up more pads with longer laterals and
things are kind of leveling off. It's hard to see the needle moving significantly over the next year or two to improve efficiencies from where they are we intend to try to do that with some of the technology that we're going to introduce but it's not just about improving how fast we drill and days per well, but also improving the quality of the well bore and repeatability, when you get a good well you want to be able to do that over and over and not have the statistical tale where you sometimes get a slower well occasionally in your database. So, just thinking about the efficiencies, I think that the industry overall is done a great job to improve them and it's going to be a little bit more challenging to improve the needle over the next couple of years.

That's all for me. Thank you very much.

Unidentified Speaker,

Thanks,

Operator

[Operator Instructions] . Your next question comes from Blake Gendron with Wolf Research your line is open.

Analyst

Yeah, thanks. Good morning. Thanks for fitting me in here. We don't have great visibility into what's being scrap versus put on the Block for sale, I'm not insinuating the in the year end the horse in the market for horsepower trying to sell horsepower, but of the deals that come across your desk.

Could you just characterize at a high level, how much of it you think will never come back, never be sold regardless of price versus the assets that are for sale that are viable in the current market.

Unidentified Speaker,

So when I think about the 300,000 horsepower that we're retiring that's going away. That's going to be parted out, cut up, etcetera. And it's going away and I many other companies are in a similar situation to us where they've got horsepower that they haven't worked in a while and there's no reason why that horsepower should ever come back to the market.

So, will rationalize some of that horsepower if we've got some lower components on some of it will use some of those components on our active fleet because that just makes sense. But, the 300,000 we're retiring you won't see that back and I suspect that similar with other companies as well. And that's why I'm actually positive on the long-term and pressure pumping. I know that's hard to have that kind of visibility today, but I do think as we discussed earlier that the demand side is going to rationalize or the sorry.

The supply side is going to rationalize over time to move that industry utilization number up from where it is today. Because we've just been over supply for too long.

Analyst

Now that's definitely fair. I jumping over to drilling real quick.

It's our view that the drawdown, especially outside of the Permian probably unsustainable for a lot of folks next year. Even with a modest increase in the rate count. Is this something that operators were even talking about? Or, the instances where you have frac fleets that are following your own rigs. Any sort of change in the Cadence and drilling
a number of risks and uncertainties that could cause actual results to differ materially from our expectations.

Please see our news release and other regulatory filings for more information on forward-looking statements and these risk factors. Kevin will begin today's call with opening comments; Cary will then discuss our third quarter financial results, followed by Kevin's operational update and outlook. Additionally, Shuja will comment on Precision's technology strategy and progress on key initiatives today.

With that, I'll turn it over to you, Kevin.

**Kevin A. Neveu, President, Chief Executive Officer and Director**

Thank you, Dustin, and good afternoon. So before Carey provides our third quarter financial update, I'd like to make a couple of opening comments. First off, I am pleased with our strong third quarter financial and operating results. We will have much more on that in a few moments. I'm also sure that everyone on this call today recognizes that investor interest in our sector is at an all-time low. Macroeconomic concerns, political uncertainty and E&P capital exhaustion are contributing to this loss of investor interest in our sector.

Precision share price with that matter effectively the entire industry is hovering near multi-decade lows. This is deeply troubling for our industry, for our management team and for our Board. You can't imagine, how frustrated I am, as an investor as a Director, and as a senior executive. While the share price is disappointing, these macro challenges are not new to the Precision organization. Precision was founded in the depths of the 1980s drilling recession. At similar time period, characterized by political uncertainty, macroeconomic concerns and weak rig demand.

Precision's business systems and our processes, the firm's competitive strategy and core competencies were developed and built to create value at the challenged Era. Those systems and processes in the mindset of our people, but they are refined over numerous cycles over the last three decades and remains a core DNA of Precision today. And while some firms are just now adjusting to the second half slow down, our deeply experienced team is managing our business in a constrained mode since November 2014, and we continue to manage optimize every business within our control.

And the results have been remarkable. Strong EBITDA growth, G&A cost reductions, Strong cash management, strong operating cash flows and debt reduction all ahead of the plan. We are returning capital to shareholders, we achieved record market share in all geographies and we have first mover status on drilling automation technology. So yes, while we are deeply frustrated with the share price, I know there is the power of strategy continue to execute, the strong results will follow, the share price will respond to reflect the true value of Precision growing.

So now Carey over to you to brief the summary of the third quarter.

**Carey T. Ford, Senior Vice President and Chief Financial Officer**

Thank you, Kevin. In addition to reviewing the third quarter results, I'll provide an update on our 2019 capital plan and management of our capital structure. Precision's strong 2019 financial performance continued in the third quarter with adjusted EBITDA of $98 million, 21% higher than the third quarter of 2018. The increase in adjusted EBITDA for last year is primarily the result of higher international activity levels, higher dayrates in the US, lower G&A costs and benefit from non-recurring items, offset by lower North American drilling activity.

Additionally, the quarter benefited from the impact of IFRS 16 and lower share based incentive compensation. In the quarter, we recognized a CAD2 million share-based compensation expense compared to CAD8 million in Q3 of 2018. In the US, drilling activity for precision decreased 6% from Q3 2018, margins were up $1,357 per day. Positively impacted by higher day rates, partially offset by higher operating costs. Sequentially [ph]dayrates and margins, net of turnkey and IBC decreased $218 and increased $106 respectively.
We expect margins to be down for $400 to $800 per day in the fourth quarter. In Canada, drilling activity for Precision increased 20% -- decreased 20% from Q3 2018, while were down CAD702 per day from the prior-year. Net of shortfall payments, margins were lower by CAD688 per day. Margins were negatively impacted by fixed cost spread across lower activity levels in the timing of certification costs. Last quarter, we gave guidance for Q3 margins to be down CAD250 to CAD750 per day year-over-year, and we expect a similar year-over-year trajectory in Q4.

Internationally, drilling activity for Precision was 12% higher than Q3 2018. International average day rates were up $1,226 as a result of recontracting rigs at higher rates and the start-up of our six Kuwait new build rig at the beginning of the quarter. In our C&P division adjusted EBITDA this quarter was CAD4.6 million, essentially flat with the prior year despite of 15% decrease in revenue. The increase in profit margin is a direct result of business improvement initiatives and acted over the past several quarters, and improved well service pricing. Of note, year-to-date, C&P adjusted EBITDA of CAD18 million is more than double the EBITDA of the same period in 2018.

Capital expenditures for the quarter -- for the corporation were CAD24 million. For 2019 our capital plan is CAD144 million and the plan is comprised of CAD31 million for sustaining infrastructure and CAD113 million for upgrade and expansion. Capital expenditure plan has been front-end loaded as we delivered a US new build rig early in Q1 and SCR AC ST-1500 conversion delivered in the second quarter and the six new build rig delivered quiet.

We expect capital expenditures for the remainder of the year to primarily consist of maintenance expenditures. Our capital expenditure guidance for 2020 remains CAD60 million to CAD80 million and is expected to be primarily comprised of maintenance and upgrade capital expenditures. We've continued to build our contract book signing six term contracts during the quarter and as of October 23, we had an average of 55 contracts in hand for the fourth quarter at an average of 29 contracts for the full year 2020. As of September 30, 2019 our long-term debt position net of cash is CAD1.4 billion. We had CAD94 million of cash in the balance sheet and our total liquidity position was approximately CAD800 million.

During the nine months in 2019, we've made open market purchases dollar in US $59 million and year-to-date have called $50 million of our outstanding 2021 notes. Our year-to-date 2019 debt reductions totaled CAD146 million. In the third quarter the TSX approved our application to the implement a Normal Course Issuer Bid and as of today we have purchasing Approximately 3% of our outstanding shares using approximately CAD12 million in cash. We continue to place the highest priority on debt reduction as the best avenue for creating shareholder value and will only continue the share repurchase plan, if we are meeting our debt reduction target. For 2019 we plan to meet or exceed our CAD200 million debt reduction target, and for 2020, we plan to reduce debt by CAD100 million to CAD115 million.

As of September 30, our ratio of net debt to trailing 12-month EBITDA sits at 3.4 times, and we continue to work toward our longer-term target ratio of two times. Our average cash interest cost is 6.7% and with the 2019 targeted debt reduction, we expect run rate interest expense will be just under CAD100 million to exit the year assuming today's US dollar Canadian dollar exchange rate. Our earliest debt maturity is $116 million due to December 2021 and we expect to retire these notes with cash before the end of 2020. The next debt maturity is not due until December 2023.

For 2019, we expect depreciation to be approximately CAD330 million in SG&A to be under CAD100 million prior to share-based compensation expense. This guidance is down from guidance of CAD110 million that we provided earlier in 2019. The result -- the reduction in SG&A guidance is a result of aggressive cost management of our fixed cost. We would expect cash taxes to remain low and our effective tax rate to be in the 20% to 25% range for the year.

I will now turn the call back over to Kevin for further discussion of the business and outlook.

Kevin A. Neveu, President, Chief Executive Officer and Director
Thank you, Carey. I’ll begin with an update on our technology initiatives. As we mentioned on our press release during the third quarter, we achieved a step change in customer acceptance of our PAC automation technology. In a moment, I’ll turn the call over to Shuja Goraya, Precision’s Chief Technology Officer to provide a detailed update. But first in my insights, this synchronizes very well with our data analytics initiative. We will be spending a lot more time on this in make decisions is maturing, very quickly. And there is a huge appetite for high fidelity data and relevant real time.

Prior technology updates, we’ve been discussing field level resistance to change as a primary obstacle. I believe we’ve reached a tipping point in acceptance as that field resistance is quickly transitioning to active field support. To quote for drilling engineer on the recent multi-well pad drilled with PAC, automation has significantly improved the operational performance and safety for the organization. It has consistently delivered top quartile connection performance we were only scratching the surface of the systems future capabilities.

So I’m hearing more and more of these customer testimonials, as we continue on this path of commercialization. By the end of this month, Precision will have drilled 1,000 wells utilizing process automation controls.

The efficiency gains from the cost savings for our customers are becoming inarguable. So Shuja please share your thoughts to our listeners.

**Shuja Goraya, Chief Technology Officer**

Thank you, Kevin, and good afternoon everyone. In the last time I spoke with you, it was a year ago. LIBOR say we, along with our customers have learned a lot in these 12 months. Looking back two of our key learnings are: One, the best way to improve drilling performance is using the ingenuity of our best sellers supported by the vital sites and replicating it with consistency of Precisions PAC system.

Secondly, automation starts to deliver measurable customer value, when system utilization process 70% mark. Q3 was that tipping point for Precision. We now have, every one of these PAC systems well above that threshold. And actually, most of them are running consistently above 90% utilization. As a result, every single sequence we have automated so far is delivering 25% to 35% performance improvement with a corresponding reduction in cost for our customers.

We have systematically applied all of these in many other learnings to our PAC service delivery process. And as a result, in Q3 we doubled the number of our tax-paying customers. You can imagine, in this environment where every dollar is highly scrutinized. this is a great testament to the value of these systems. The value of these systems are delivering to our customers. One thing for sure, the adoption journey was not a straight line. We had customers who experimented with shutting down the system for one section, one well, even multiple wells to validate the performance gains and every single one of them is back to fully utilized in the system.

In last few quarters, we have made a point to see as many of the Precision's customers as possible. In their drive to lower cost and industrialized performance, there are two major themes: One, access to and reliance on real-time data to make decisions is maturing, very quickly. And there is a huge appetite for high fidelity data and relevant real time insights, this synchronizes very well with our data analytics initiative. We will be spending a lot more time on this in the coming year.

Secondly, there is no shortage of record wells in best practices. The real challenge is consistently repeating these record performance data[ph]. In my opinion, more and more operators are realizing that the most efficient path to this performance consistency is through process automation control. Let me give you a really good example on delivering this type of performance.

Just this month, one of our IOC customers who is heavy user of Precision's PAC systems mobilized a third PAC enabled rig from another basin, instead of using one of the local rigs. Since day one, by leveraging PAC system this rig is delivering performance at par with the best performing rigs in the field. With quite literally zero learning is required, I believe we now have quite successfully cross the hurdles of platform hardening, field buying and required digital competencies. All our efforts are now focused on expanding the current scope of automated activities.

This is where apps will play a major role and we currently have 15 different apps in various stages of field hardening and commercialization. I’m highly confident that Precision’s technology strategy is perfectly aligned with our customers’ those of improving well construction quality and cost. In this capital constrained environment, we have the
ideal solution for our customers.

Now I will hand the call back to Kevin.

**Kevin A. Neveu, President, Chief Executive Officer and Director**

Thank you, Shuja. So I'll remind the listeners that we see our automation technology as a key element of our competitive strategy. We believe PAC will drive drilling rig market share gains while enhancing our revenue and margin growth as we continue to roll this technology across our highly standardized super triple rig fleet. So, now turning to our regional update. I'll begin with the domestic United States. We're currently, our activity is in the mid '60s down a handful of rigs in the low '70s reported in July. And while this is slightly lower than we expected, when we provided guidance on our second quarter call it should not be a surprise in light of the subdued customer tone around cash flow management and budget exhaustion.

We expect our rig count will range in the low to mid-60s for the balance of the year. As our customers reload spending with 2020 budgets, we have several projected rig activations, the (inaudible) activity to low '70s really next year. Now I also know there's a lot of concern and interest around leading edge rates and pricing, so since the end of the second quarter we concluded eight term contracts, which includes two this month.

For the Precision ST 1,500 rigs those rigs were and remain in the mid '20. On the smaller Precision ST 1200 rigs, the rates are a little lower in the CAD20,000 per day range. Turning to Precision's well to well rigs. Those are the rigs that don't have locked in contracts. Pricing remains in the low '20s for Precisions ST 1,500 and the high-teens for Precision ST 1,200. As we look around the market, the Permian, the DJ Basin in the Marcellus are Precision strongest regions where we have 51 active rigs today.

Our weakest regions or the SCOOP

in the Bakken with one active rig each, and the balance of our activity is in Texas and Louisiana spread between the Haynesville, Eagle Ford and Gulf Coast areas with 12 rigs running.

Looking forward, we believe contract activity -- contracting activity and rate realization will approve quickly with our budget or our customers finalized and begin to execute their 2020 joint budgets. We do expect intensified customer focus on efficiency, technology, rig and crew performance. We also note that our customers are planning to smooth out drilling projects over the course of the year, and this is also intended to drive efficiency by reducing stops sales costs. And this aligns very well with the capabilities of Precision's super triple pad rigs of improving performance of our crews in the efficiency gains achievable Precision's automation technologies.

Turning to Canada. The political and regulatory uncertainty created a high sense of anxiety for many. For Precision, our scale and our strong market positioning remains our key differentiator. Our Canadian market share for most of the third quarter was sitting in the 30% range, primarily due to our large share of super triple pad rigs and the operational excellence of our skilled rig personnel deliver.

Today, we have 52 rigs running. It's a peak for the fall 2019 season with slightly over 30% market share. Our rig mix remained strong with our 22 of our super triples currently drilling on pads targeting natural gas liquids. And I'll point out that this NGLs drilling program is a key stable wedge of business for Precision.

Looking forward in Canada. We expect the Precisions winter 2020 activity levels will be aligned with 2019 picking the low to mid-60s, demand remains firm for our super triple rigs in the Montney and Deep Basin. These rigs are largely committed for the winter season and we expect day rates will be generally in line with 2019. Our automation PAC systems are on track to achieve full commercialization further enhancing the revenue opportunity and competitive advantage of those rigs.

In our heavy oil segment Precision's super single rigs have a strong market position and we expect winter 2020 activity and pricing of all also be a lot of 2019. However, pricing pressure will remain intense on the shallower rigs in the Cardium, the Viking and so (inaudible) Bakken regions. While precisions super single rigs will continue to be
competitive in these areas, we do expect pricing pressure to be intense.

So turning back to the issues impacting Canadian drilling activity. We firmly believe that the Alberta government must act immediately and remove the production curtailments entirely for all conventional oil producers. We think this is a critically important step for our customers and it should lead to stronger utilization and importantly jobs in the services industry.

The emergency of this request cannot be overstated. As our customers are now in the throes of planning for 2020, the time to act is now. I'm also encouraged by the federal government's post election reaffirmation and commitment to proceed with the Trans Mountain pipeline expansion. This is certainly an encouraging stats following the heated election. Both of these regulatory actions proved constructed catalysts for our energy industry activity, and we will certainly encourage investment in industry absolutely encouraged the government of Alberta to act on the oil curtailment reduction and the federal government to proceed Trans Mountain.

So turning to our international operations. As Carey mentioned, things are progressing nicely with the six-rig in Kuwait operating for the fourth quarter. We've achieved our desired scale of Gulf region, and this will allow us to continue to grow top line and bottom line with minimal fixed cost impacts. Currently, we are seeing increased bidding activity in Kuwait, Saudi Arabia, Kurdistan and even Latin America. Some of these may be opportunities to activate our idle rigs in the region and others may involve deploying idle North American rigs.

We expect development of these tenders later this year or early 2020 as the national oil companies transition into 2020 budget spendings. Moving to Precisions Completion & Production Group, they continued the strong operating financial momentum we reported earlier this year. I'm going to complement our team for the excellent execution during the quarter, but from a Canadian perspective, the industries marketable rig fleet will continue to suffer attrition as a current market rates do not support economic reinvestment the assets. The well service industry remains very challenged. This is a business where scale matters and for Precision. We remain in a very strong position.

So turning back to our uses of free cash flow, Carey mentioned our debt reduction and capital spending for 2020, I'll reiterate curious comments the debt reduction will be our top priority. Maintenance capital will be adjusted to match activity levels and other uses of cash including expansion and upgrade capital and share buybacks will remain discretionary will be prioritized behind debt repayment. There is no doubt, the debt reduction will create shareholder value and this will lead to a significantly improved share price.

With our relatively new and standardized fleet of super triple rigs enhanced with PAC our intense focus on cost control, our intense focus on cash management, we fully expect to meet or exceed our short-term and long-term debt reduction targets as we have over the past several years. So I'll close out by taking the Precision employees for the hard work and a strong results they delivered during the third quarter.

I will now turn the call back to the operator for questions.

Questions And Answers

Operator

Thank you. (Operator Instructions)

(Operator Instructions)

Our first question comes from Kurt Hallead of RBC. Your line is open.

Kurt Hallead, Analyst

Hey, good afternoon.
Kurt, to answer that question by telling you that our goal for the year was to be commercial fully commercial which really means we're being paid for every system and earning the expected returns by the end of the year. We didn't make that claim on this call. But expect some news from us shortly on that. Okay.

And then we'll provide kind of forward-looking guidance, we'll talk more about the next steps in the technology. And I think, I think we'll be able to provide concrete details where the technologies are today and where it's going.

**Kurt Hallead, Analyst**

Okay, all right, Kevin. Thank you.

**Kevin A. Neveu, President, Chief Executive Officer and Director**

I can tell you that we are very close to, we're very encouraged and we're happy.

**Kurt Hallead, Analyst**

That's great. Thanks, Kevin.

**Kevin A. Neveu, President, Chief Executive Officer and Director**

Great, thank you.

**Operator**

Thank you.

Our next question comes from James West with Evercore ISI. Your line is open.

**James West, Analyst**

Hey, good morning guys.

**Unidentified Speaker**

Hi James.

**James West, Analyst**

Kevin, you mentioned, you thought your US rig count in the low '60s could go to the, maybe the low '70s here is budgets reloaded are you having that, is that a kind of a [ph] that call or you having that number of conversations are active dialogs that suggest that that's, it's something that's more likely to happen.

**Kevin A. Neveu, President, Chief Executive Officer and Director**

So I'd say ultimately we didn't confirm that we have signed contracts to take us there, because there's still a lot of moving pieces. Not many of our clients have announced, our 2020 budget yet, and I think there still I think they're
But there is all we have a high degree of ongoing conversations with customers of a multiple -- in a number of basins, number of opportunities, there is lot of anticipation right now around our automation controls. So short of some further dislocation or uncertainty in the marketplace. I think we’ll see the rig count industry wide move up a little bit, I think will benefit well and we’ll gain some market share again kind of driven by technology and efficiency.

**James West, Analyst**

Okay, got it. And then on [ph] to that automation controls. I think the number was a double of customers rate of number of systems quarter-over-quarter, and being driven by the field now, what do you think spurred this, this change, this the resistance to switch or switched to being resistance to a pull from the field level.

**Kevin A. Neveu, President, Chief Executive Officer and Director**

On Shuja's comments earlier he commented that at 70%. It's a bit of a break-even for our customers. We crossed over that threshold on every single rig during the quarter. In fact, your comment of the most of the rigs are running over 90%. I can tell you the debt level (inaudible) money on this. And it's clear and it's apparent and, and you know the the field. The field is getting and is moving forward.

Shuja also talked about some rigs where they would turn off for a section of the well or for a well those decisions were being made at the field.

**James West, Analyst**

Okay.

**Kevin A. Neveu, President, Chief Executive Officer and Director**

And that's turned for us now, so we feel quite good about our positioning and it's moving forward. Well, the technology is an arguable works and I'm pleased.

**Connor Lynagh, Analyst**

Okay.

**Unidentified Participant**

Good to hear. Thanks again.

**Unidentified Speaker**

Thank you.

**Operator**

Thank you. Our next question comes from Sean Meakim with JP Morgan. Your line is open.
Sean Meakim, Analyst

Thanks. Hey, guys. So, Kevin. In Canada, you're calling for a flattish activity and pricing recently the high spec super triples. It's pretty consolidated market and where historically pretty low levels of activity, just I was curious if you could walk us through what you would perceive to be the flex points that could cause a significant deviation from that level and either direction.

Kevin A. Neveu, President, Chief Executive Officer and Director

It's a good question, really good question. I would say capital market's reaction to Q3 disclosure by E&P companies could have an impact. If for whatever reason, the capital markets seller on the further on the E&P companies in Q3 that could be a negative driver in activity. If our customers continue to show good efficiency and continue returning value to shareholders. I think that supports more positive view. So I think it really does depend on how good our customers are at delivering efficiency with our capital and showing their investors, they can return capital.

Sean Meakim, Analyst

Got it. I appreciate that feedback.

Kevin A. Neveu, President, Chief Executive Officer and Director

And then obviously, obviously the macro events can go either direction. You know if for whatever reason the WTI price firm is up into the high '50s, low '60s. That's very positive. If we see production flattening or declining in the Permian with the reduced activity that's a positive. So there is things that are going to happen that on the edge can make a big difference for demand for super triple rigs.

Sean Meakim, Analyst

All right. That's fair. So in the US, one of the large service companies indicated a desire to become more asset light in North America historically you've had a constructive partnership in product lines like directional drilling with the same service company, have you seen much of a shift in terms of kind of go-to-market strategy there. And does that create opportunities for you. Can we just -- I mean explore a little bit about how that could unfold over time. And in fact Precision.

Kevin A. Neveu, President, Chief Executive Officer and Director

Yeah, Sean. I would say that the success we're having automation right now is gathering attention from the integrated service companies in general. And I think they will view our platform for technology delivery as a favorable platform. So I think that may create some opportunities. But if we do create those opportunities will be (inaudible) declarable accomplished.

Sean Meakim, Analyst

Okay, fair enough. Thank you.
Connor Lynagh, Analyst

Okay, that's fair. Maybe one last one here. We've seen some of your competition announced rig retirements and just broadly across the service industry that seems to be at the end of this quarter, how do you feel about your asset base. Is there anything in there that you view as sort of non-core or we're not competitive in the current market.

Kevin A. Neveu, President, Chief Executive Officer and Director

So over the past seven years we've decommissioned about 200 rigs across our fleet. We have 22 rigs that are held for sale right now that we will either sell or decommission by the end of the year. And if you look at our utilization rates in both the US and Canada, there right at the top of the industry in terms of our utilization percentage. So we think the fleet we have is well reflected on our balance sheet, and as obviously evident by the customer demand.

Connor Lynagh, Analyst

All right, thanks a lot.

Kevin A. Neveu, President, Chief Executive Officer and Director

Thank you.

Carey T. Ford, Senior Vice President and Chief Financial Officer

Thank you.

Operator

Our next question comes from Taylor Zurcher of Tudor Pickering Holt. Your line is open.

Taylor Zurcher, Analyst

Hey, good afternoon and thanks.

Carey T. Ford, Senior Vice President and Chief Financial Officer

Hi, Taylor.

Taylor Zurcher, Analyst

If my numbers are correct on the CapEx budget, it looks like you bought it about 5 million for Q4 and 2020 is still 60 to 80 million. So it's obviously a lot of maintenance and some upgrade in there. Could you help us parse, how much of that is maintenance. How much is upgrade in 2019. It looks like you're spending around 30 million in maintenance. So it seems like there is a decent wage and there
So John in Q2, we said that we would get a full quarter of EBITDA from the new rig in Q3. So we wouldn't expect to see an uplift in Q4, that's our sixth rig deployed to that country for the same customer and it's the same redesign, we didn't have any start-up cost in the quarter that we are unique to that start-up.

Unidentified Participant

Got it. Okay, thanks guys. I'll turn it back.

Operator

Thank you. Our next question comes from Ian Gillies of GMP, your line is open.

Ian Gillies, Analyst

Good afternoon, everyone.

Unidentified Speaker

Hi, Ian.

Unidentified Participant

With respect to growth in the US rig count, as you head into the early part of next year. I mean, do you expect that will be continued market share capture, do you think it's part of a broader rig count recovery?

Unidentified Speaker

I think there is a rig count recovery. I'm not sure I'd call it broader, but there will be a rig count recovery in next year and I think it's going to be driven by our customers trying to drive to more smooth loading over the course of the year. And the point is a rapid activity up in the first half and rapid down the second half is very expensive way to drill wells if you can level it out during the year that saves our customers' money along with Pat operations and technology and things like that so I think you'll see the rig count tick-up from the trough of 2019 into whatever the level is going to be in 2020. So whether that's 30 or 40 rigs up, it's hard to say, I would bet that every single rig added is a super-spec or our precision super triple type rig.

We've done quite well during the upticks in grabbing market share in those high-spec rigs. So I think our gains will come through a slight uplift in the industry and some market share traction we think we'll gain.

Unidentified Participant

Okay. Deleveraging is obviously been an important part of the story over the last number of years. I mean, when you look at Q3 actuals. I mean you provided some context around what Q4, it looks like, I mean does that give you any pause or you may or may not be able to meet that 100, 150 million debt reduction targeted in 2020 based on what you've seen so far and whether you risk it say maybe it doesn't recover in 2020.

Unidentified Speaker
with the private operators would obviously highlight acute distress and I'm surprised, we haven't seen more things happened today, does that in line with your views?

**Unidentified Speaker**

Yeah sort of had in my mind that by the end of Q3 or Q4 2019, the business would have been through the ringer who (inaudible) to narrow some of that bid-ask spread, I don't think it has and I still think that enough of the rigs are controlled by companies like Precision that are probably doing -- we're doing a very good job, I think that we are doing an okay job. And it's not strategic in their business yet, but it will become strategic if it stays in this position. So you can look at the active industry right now, I think you -- probably 40%, 45% of the active service rigs are owned by drilling contractors.

**Analyst**

Okay, just in terms of the

**Kevin A. Neveu, President, Chief Executive Officer and Director**

So if I point out, John, I think the industrial logic and the economic logic is getting closer and closer to making sense. I do expect that some things are emerging in 2020 in that space.

**Unidentified Participant**

It was just takes longer than you would logically think for that are actually happen.

**Kevin A. Neveu, President, Chief Executive Officer and Director**

It does

**Unidentified Participant**

Kevin in terms of the CapEx guidance that you gave for 2020 would incremental inflation or deflation of those numbers just largely go in line with the number of drilling days that you actually get. And is there anything that would push it meaningfully above that in any scenario that you could foresee being logical.

**Carey T. Ford, Senior Vice President and Chief Financial Officer**

If we're in an activity range that looks plus or minus 10% or 15% from this year. That's probably a pretty good range, but if we have a higher demand scenario that will probably trigger some more SCR at AC conversions and the upgrade piece could creep up. But again, we don't know if we would need. We would need the right contracts for there has been that money.

**Kevin A. Neveu, President, Chief Executive Officer and Director**

And it's difficult to come up with any scenario where we wouldn't pay down debt first.
1. **Preliminary Views.** Note, these are my first thoughts on the projected election results. I will want to think about overnight.

2. My first qualifier is that these are before hearing the speeches from the Liberals, Conservatives, NDP and Bloc.

3. My three key takeaways or concerns are as follows. (i) My key takeaway is that I think the election results are a modest negative to the oil and gas sector. Under the status quo of a Liberal majority, capital providers (debt and equity) were not attracted to the Cdn oil and gas sector. A Liberal minority (albeit a strong minority) means that the Liberals are likely to make some concessions to the Bloc and NDP (both are tougher on the oil and gas sector and climate change) that will inevitably have some modest added costs or impact on the oil and gas sector. If the status quo wasn’t attracting capital, how can a minority that will see some gives (even if modest) be viewed as more attractive – it can’t. (ii) The biggest immediate question post this election is TMX. The oil patch will be looking for clear indications that this project is moving ahead to full construction. There is no political reason why the Liberals can’t do so now. So if they don’t, it means at least another delay, but also raises the question on how truly committed the Liberals are to getting TMX done. (iii) The off script comment by the Liberal candidate that no new pipelines will be approved under Bill C-69 confirms what the oilpatch believes but no what the Liberals have had as an official line on Bill C-69.

4. As of 941 pm MT, it is looking clearly like a strong Liberal minority and, most significantly, it is looking like the Liberals can govern with either the support of the Bloc or NDP. Greens cannot be a swing factor for the Liberals.

5. It may be hard to believe but it may well be a very significant win for the Liberals. Not so much for it being a Liberal minority, but, most importantly, it’s a stronger than expected # of seats (ie. close to a majority) and therefore looking like they have enough seats to theoretically give it options on how to survive a confidence vote (either formally or informally or on a confidence vote by vote basis) by either the NDP or Bloc Quebecois. Ie. they will have options and not be beholden to one party to survive any confidence vote. I have to believe the Liberals will look at this as being a great opportunity to manage parliament without a formal arrangement with any party, rather just manage on a day to day basis recognizing that they will need to get support on confidence vote items as they come up. Again, the qualifier is that I havent’ heard the speeches yet on the positions of the leaders.

6. Importantly, the other big win for the Liberals is that I think the likelihood of any of the other parties wanting to try to force another quick election. It’s close enough to the majority number that the likelihood of any party wanting a quick next election is very low ie. its setting up for a multi year minority or until the Liberals think they can go back and win a majority. I say this because the Conservatives and NDP and Green all did a little less than they had hoped in the past few days, and the Bloc ha done as good or even better than they expected. I just don’t see the motivation or desire for any of the parties to want to force another election. Plus I still believe the Liberals want some time/distances between the controversies before going back. Recall the two Harper minority governments lasted 2 yrs 207 days, and 2 yrs 142 days.

7. There are 338 seats up for grabs, and 170 are needed for a majority. Here are the seat projections per CBC as of 9:41 pm MT.
8. Here are my initial thoughts on impact on oil and gas sector

- Important to differentiate from likely direct impact (ie. TMX, taxes, emissions) vs impact of capital allocation to the oil and gas sector.

- Direct impacts are likely modestly worse under any of the Liberal options. It would have been worse if the Liberals had a weak majority and felt more vulnerable ie. they would give more to the supporting party. Rather, I think the Liberals will make some concessions to the Bloc and NDP and, in effect, could advance some of the issues they really want to advance under the cover of a minority. I think that some of the likely items in a Liberal minority are as follows:

  o TMX. This will be the first key test to watch as the timing is now. The oilpatch will be watching if this clearly starts to move on full on construction. In theory, there is no political reason for them not to give a clear commitment to start construction ASAP assuming the Liberals truly want to build TMX. There isn’t a confidence vote on a green light to TMX. Plus the Liberals have seen the Singh comments that he wouldn’t stand in the way of TMX. If the oilpatch doesn’t’ see a clear commitment to start construction ASAP, then, at a minimum, it would point to missing another construction season and a revised in service from their current target of mid 2022 likely then assumed to be mid 2023. But it will also raise questions if the Liberals are using the election results as cover for another delaying tactic on TMX full construction. And if so, there would be questions on how truly committed they are to TMX.

  o No future oil pipelines from Bill C-69. This bill is already law, but as we saw when the Liberal candidate went off script, the Liberals know that it means no future pipelines. This has not been the public position of the Liberals, but this off script comment just confirms what the oil patch believes on C-69 – it means no more pipelines will be ever approved. Refer to our Oct 19 tweet [LINK] on the off script comments.

  o Increased emissions reduction/targets. This is an area that the Liberals could use the election results as cover and move more aggressively on reducing emissions by using the Bloc or NDP as a reason to push ahead increased/faster emissions reductions targets. At a minimum, this will add costs to the oil and gas sector with increasing push on capturing methane emissions. This is not a huge cost and one that is going to happen inevitably. It may just be accelerated.

  o Increasing push to renewables. I look at this as another area like emissions as an area that the Liberals could move more aggressively as it keeps the Bloc and NDP satisfied.

  o Increased taxes on the rich. Somewhere in the equation of reducing taxes for the most taxpayers has to lead to increased taxes on the rich, which ultimately impacts available capital for investing in the oil and gas sector. It could also include changes to capital gains taxes ie. make it less attractive for investing in stocks.

  o Increased corporate taxes by reducing what was referred to in the campaign as loopholes. Again, the math of reducing taxes for most has to be increasing corporate taxes in one way or another. The specific worry will be items like CDE, CCA, CEE, or anything that is considered a handout to the oil and gas sector.

  o Lower C$. I would expect markets to assume the likely scenario is increased net spending and govt debt. In theory , a lower C$ benefits the oil patch by making higher C$ on oil and gas revenues that are driven from base US$ reference prices such as WTI or HH. But offsetting that is that a lower C$ will
make it more expensive on a C$ basis for any imports or items that are quoted in US$ ie. steel fabricated items from Asia, Wisconsin frack sand, certain pipeline tariffs, certain rail costs, etc.

- I am sure there are others, but these are a first cut.

The bigger issue is that I don’t see how the election results will attract more capital (debt or equity) to the oil patch. Rather I think it will likely be viewed as slightly or modestly worse. Liberal minority, even if no formal support is needed or arranged from either the NDP or Bloc, is not going to attract more capital back to the Cdn oil and gas sector. While I think it is better than a weak minority situation, it isn’t status quo, and status quo wasn’t attracting capital. Rather its likely to be viewed slightly or modestly worse by capital providers who believe the Liberals are likely to give some modest concessions to the Bloc and NDP. This may not get the attention tonight but ultimately it is the most important question as more than internally generated oil and gas cash flow is needed if the oil and gas sector is going to grow at any strong rate. The Cdn oil and gas sector has not been able to attract any significant outside capital, either debt or equity, despite the Cdn oil and gas sector is proving resilient and doing well with modest growth. If the Liberals majority status quo wasn’t providing the environment for capital providers to be positive about oil and gas, how can a minority (even if a strong minority) that has to lead to some concessions to the Bloc and NDP be viewed as a better environment for the oil and gas sector? It can’t.

- The reality is that part of the fight of capital is not coming back regardless because the move of some of the capital is structural ie. some capital providers no longer investing in fossil fuels.

- But a big part is the potential for better relative returns from Cdn oil and gas sector vs other oil and gas regions ie. US shale. The question becomes “is this Liberal minority, even without needing formal NDP or Bloc support, going to provide a different fiscal/view for capital providers to believe the Cdn oil and gas sector can outperform ie. will it be a better environment? Unfortunately, no matter the option to survive confidence votes, I think the the answer must be no, it isn’t better, more likely modestly worse.

- Plus we won’t be the only ones to believe this scenario also gives the Liberals the cover to act more aggressively on actions they really wanted to take and say it was needed because of the NDP and/or the Bloc.

9. As an aside, I think that the Conservatives are going to have some navel gazing. They need to take a hard look at their lack of success in Ontario and Quebec and determine if they want to make changes to try to do more in Ontario and Quebec. And one item that I believe they will have to give on is climate change. I just think it is hard for them to gain enough seats in Ontario and Quebec without being somewhat more progressive on climate change in particular. It is one of the top issues for the electorate and only increasing in priority.

10. Please look at these as my PRELIMINARY VIEWS on the election results.

Dan T

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From: Dan Tsubouchi  
Sent: October 24, 2019 8:24 PM  
To: Reports <Reports@safgroup.ca>  
Cc: Nemo <nemo@safgroup.ca>  
Subject: Alberta Budget - Oil & Gas Should Be Pleased

1. Please note that my initial comments/highlights on the Alberta budget are only on items that are linked to oil and gas. There is no way I could have gone thru the 200+ page fiscal plan and written up personal, push down to municipalities, cost controls, education, etc. That requires a team of people divvying it up. Rather I just went thru the budget speech and the fiscal plan looking to select out items directly relevant to oil and gas.

2. I have not seen any of the economist or accounting firm analysis of the budget from those who spent all day in the budget lockup.

3. Overall, the oil and gas sector has to be pleased with the budget. (i) lower corporate income tax. (ii) also doing the enhanced capital cost allowance. (iii) they didn’t announce a crude by rail deal but are providing for it so it should get done. (iv) allocating money for their fight back awareness program. (v) continuing on its AER review.

4. Corporate income tax cut. "Making Alberta the best place to do business through the Job Creation Tax Cut. The general corporate income tax (CIT) rate dropped from 12 per cent to 11 per cent on July 1, 2019, and will decrease three more times by a single percentage point on January 1 in each of the next three years till it reaches 8 per cent in 2022"

<table>
<thead>
<tr>
<th>Scheduled Reductions to Alberta's General Corporate Income Tax Rate</th>
<th>Tax rate</th>
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<tbody>
<tr>
<td>General rate reduction schedule</td>
<td></td>
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<tr>
<td>July 1, 2015 to June 30, 2019</td>
<td>12%</td>
</tr>
<tr>
<td>July 1, 2019</td>
<td>11%</td>
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<tr>
<td>January 1, 2020</td>
<td>10%</td>
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<tr>
<td>January 1, 2021</td>
<td>9%</td>
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<tr>
<td>January 1, 2022</td>
<td>8%</td>
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5. Dividend tax credit. "The dividend tax credit rate for dividends paid out of income taxed at the general corporate income tax rate (eligible dividends) will be adjusted on January 1, 2021 and then again on January 1, 2022, corresponding with the legislated reductions to the general corporate income tax rate. These adjustments will ensure that the combined corporate and personal income tax paid on dividend income approximately equals the individual’s personal tax rate.”

6. Enhanced Capital Cost Allowances. “To further improve Alberta’s competitiveness and encourage investment, Alberta also paralleled federal measures to enhance the capital cost allowance (CCA) regime. These measures allow corporations to claim the costs of new capital assets more quickly for tax purposes, improving a company’s cash flow and making it more attractive for them to invest in new assets. Corporations will be able to immediately claim the full costs of manufacturing and processing equipment, along with clean energy generation equipment. Corporations will also be eligible to claim up to three times the normal first-year cost allowance related to other capital investments. The resource sector will be able to claim a first year deduction of one-and-a-half times the amount of qualifying development expenses they would otherwise be able to claim. Consistent with the federal announcement, these measures begin to phase out in 2023 and will be completely phased out by 2027.”

7. Ending Crude by rail program. “We are ending this costly, interventionist and unnecessary approach to market access. The fiscal plan reflects a provision of $1.5 billion in 2019-20 to extricate taxpayers from the crude-by-rail program hastily put in place in the final 30 days of the last government’s mandate.” Good one pager on this is attached.
8. Budget assumptions on oil and gas prices.

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<tbody>
<tr>
<td>WTI Oil (US$/bbl)</td>
<td>53.69</td>
<td>62.77</td>
<td>57.00</td>
<td>58.00</td>
<td>62.00</td>
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<td>Light-Heavy Differential (US$/bbl)</td>
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<td>23.31</td>
<td>14.20</td>
<td>18.40</td>
<td>21.00</td>
<td>17.10</td>
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<tr>
<td>WCS@ Hardisty (Cdn$/bbl)</td>
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<td>51.65</td>
<td>66.60</td>
<td>52.10</td>
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<td>Natural Gas (Cdn$/GJ)</td>
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<td>1.34</td>
<td>1.30</td>
<td>1.60</td>
<td>1.90</td>
<td>2.00</td>
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<tr>
<td>Conventional Crude Oil Production (000s barrels/day)</td>
<td>456</td>
<td>489</td>
<td>490</td>
<td>501</td>
<td>509</td>
<td>511</td>
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<tr>
<td>Raw Bitumen Production (000s barrels/day)</td>
<td>2,804</td>
<td>3,008</td>
<td>3,108</td>
<td>3,266</td>
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<tr>
<td>Exchange Rate (US$/Cdn$)</td>
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<td>76.30</td>
<td>75.00</td>
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<td>Interest Rate (10-year Canada bonds, %)</td>
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<td>1.50</td>
<td>1.90</td>
<td>2.10</td>
<td>2.20</td>
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9. $3.5b Heartland Petrochemical Complex. “Budget 2019 also honours the current agreements under the Petrochemicals Diversification Program. This program provides royalty credits to companies in exchange for building facilities that turn propane, ethane and methane into products such as plastics, fabric and fertilizers or prepare feedstocks for such products. Government will extend the royalty credit model to incent future projects.” “Capacity expansions will boost investment and expand the province’s manufacturing base in the coming years. Construction of the $3.5 billion Heartland Petrochemical Complex has ramped up this year, with capital spending projected to reach $1.1 billion in 2019 and $1.3 billion in 2020 and 2021. This facility, the first integrated propane dehydrogenation and polypropylene facility in Canada, is scheduled to begin operations in late 2021 and will process about 22,000 bpd of propane into value-added plastic products. Construction is scheduled to start later this year on a second major petrochemical project that is expected to be in service by mid-2023.”

10. Increasing oil pipelines and crude by rail volumes. “In 2020, pipeline debottlenecking and rising rail shipments will boost crude oil production by around 178,000 bpd.” “Enbridge’s Line 3 is expected to add pipeline capacity starting in early 2021, but the differential will continue to reflect higher-cost rail until the fourth quarter of 2022. This is when the Trans Mountain Expansion (TMX) pipeline is expected to come online, followed by Keystone XL in early 2023. The differential is forecast to average US$17.10/bbl in 2022-23.”

11. Natural gas pipelines and diffs. “TC Energy’s expansion of its NGTL system. Abundant natural gas supply means prices in Alberta are expected to improve only modestly. The Alberta reference price for natural gas is forecast to rise gradually from $1.30/GJ in 2019-20 to $2.00/GJ in 2022-23, but remain low by historical norms”

12. Modest increases in oil and gas capex assumed every year. +4.5% in 2020, +7.7% from 2021 to 2023. “Oil and gas investment is expected to turn a corner in 2020 and pick up over the medium term. It is forecast to rebound by 4.5 per cent in 2020 as producers slowly ramp up drilling and production ahead of Enbridge’s Line 3 coming online. As market access and prices improve, oil and gas investment is forecast to accelerate and grow at an average of 7.7 per cent from 2021 to 2023. Growing bitumen production will boost demand for condensate. In addition, conventional investment will stand to benefit from infrastructure expansions in liquids-rich gas regions and also support higher drilling for condensate. Even with the strong growth, energy investment is forecast to be roughly half of pre-recession levels by the end of the forecast period”
13. Renewable projects update. “The province is also attracting investment into renewable energy. Encouraged by Alberta’s unregulated electricity market, Perimeter Solar’s $200 million solar power project is set to start construction this year and be completed in September 2020. This project comes on the heels of Greengate Power’s $500 million solar power project in southern Alberta that received regulatory approval in the summer. The project is scheduled to start construction next year, with full commercial operations targeted for 2021. This facility will be the largest solar energy project in Canada. BHE Canada, a subsidiary of Berkshire Hathaway Energy, is also set to break ground on a $200 million new wind farm in southeast Alberta in 2020. The Rattlesnake Ridge Wind is expected to begin generating energy for Alberta’s grid in December 2021.”

14. No pipeline risk scenario. In the risks section, they run a scenario of no new pipelines. “The no market access scenario assumes all three pipeline projects are permanently cancelled. Without sufficient pipeline access, the light-heavy differential remains above US$20/bbl, reflecting higher rail costs. Further, cancelling the TMX pipeline eliminates access to the U.S. West Coast and Asian markets. Under this scenario, production is expected to be 120,000 bpd lower between 2019 and 2023, and around 250,000 by 2025, compared with the baseline. This drags down investment and employment. Real GDP is estimated to be 3 per cent lower by 2023. Lost resource revenues and income taxes are estimated at over $5 billion between 2019 and 2023.”

15. AER review and expected cost savings. “A $500,000 review of the AER will identify changes and enhancements to its mandate, governance and operations so Alberta remains a predictable place to invest and a world leader in responsible resource development. We expect to achieve a leaner regulator that more efficiently manages industry investments. Total cumulative savings are expected to be $147 million over four years compared to 2018-19.”

16. Fight back strategy. “Budget 2019 includes $30 million a year to establish the Canadian Energy Centre corporation to move Alberta from a reactive, defensive approach, to a proactive and assertive strategy in defending our critical energy industry”

17. “Technology Innovation and Emissions Reduction (TIER). The Government of Alberta is committed to reducing emissions through the TIER system. This realistic plan will not overregulate or slow our economy, and keeps the focus on large industrial emitters while covering over 48 per cent of emissions from the Alberta economy. Regulated facilities will have options, including reducing their emissions, submitting emission offsets or emission reductions credits, or paying directly into the TIER fund”.

18. Attached is the highlighted budget speech and fiscal plan. The fiscal plan is the key document with all the tax detail.

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Argentines Voting in an Election That Has Macri on the Back Foot
2019-10-27 15:01:36.994 GMT

By Patrick Gillespie
(Bloomberg) -- Argentines are voting for their next president today in an election where they may favor opposition candidate Alberto Fernandez. The question is by how much. President Mauricio Macri has been on a campaign blitz in recent weeks as he seeks to regain enough support to push the election to a run-off next month. Fernandez trounced Macri by 16 percentage points in an Aug. 11 primary vote, effectively a giant opinion poll on the presidential ballot.
Official results are expected from around 9 p.m. Local media reported today a court ruled the results can only start to be released after the count reaches 10% in the four top districts. Almost 34 million people are eligible to vote. The election also picks some governors -- including the influential Buenos Aires province, the country’s most populous -- and local deputies.
The election comes against the backdrop of an economic and currency crisis, with concern over the cost of living and access to social services. The government is seeking to re profile more than $100 billion in debt and the chances of a sovereign default are rising.
It also comes as political risk has spread across Latin America in recent weeks, with mass unrest in Chile and Ecuador and a disputed presidential election in Bolivia.
Argentines Eye Swing From Free Market to Protectionist Policies
Accountant Rosanna Carrizo, 43, cast her vote in Buenos Aires and said the main issues for her were crime and the economy.
"I have confidence in his government, he needs another term, he can’t resolve things in so little time, so I trust giving him another term," she said of Macri.
Macri inherited an economy damaged by years of “Peronism” under left-wing predecessor Cristina Fernandez de Kirchner. Peronism is a political movement that traditionally favored workers over business owners and its rhetoric is rooted in protest, anti-elitism and centered around national industry.
“We can turn this election around,” Macri told supporters in Cordoba province on Thursday. “Let’s not fall again for listening to those that have destroyed Argentina.”
Macri enacted market-friendly reforms and enjoyed strong support from the U.S. But for many Argentines he failed to deliver on his promises. Inflation is over 50%, unemployment
In early 2018, the country fell into a currency crisis and then recession. Argentina suffered a historic drought, crushing its main engine for growth, commodity exports. Global market sell-offs, zigzagging policies and poor communication also caused the downturn, which ended in a record $56 billion bailout by the International Monetary Fund.

For an outright win today, the frontrunner needs 45% of votes, or at least 40% with a 10 percentage point lead over the second place contender. If not, the top two candidates would head to a runoff on Nov. 24.

Fernandez, 60, who has never served in senior office, could avoid a run-off if voters cast ballots in a similar breakdown to the primary. He has yet to provide specifics of his economic plans but he’s promised to boost salaries, make loans accessible and do away with austerity, on top of lowering interest rates and inflation -- without saying how he would fund it.

He also suggested he would tackle Argentina’s debt problem by adopting a strategy similar to that of Uruguay, which successfully extended its bond maturities in 2003.

Macri Supporters Pray for a Miracle Before Sunday Argentine Vote

“We know what we have to do for Argentina to stand up,” Fernandez said in the beach-side city of Mar del Plata in his last campaign stop. “We are the essence itself of what the Argentine people want.”

If Fernandez wins it will raise questions about the role of his running mate Kirchner, who governed between 2007 and 2015. Her interventions in the economy included implementing price controls and printing money. Kirchner had taken over from her late husband Nestor Kirchner.

Hugo Colosimo, a 59 year-old worker in the information technology sector, said he had always voted for Peronist candidates and would back Fernandez.

"He’s the only who can do what I believe in," he said. "I never would've voted for Macri, he’s the worst thing that could have happened to this country. It’s a government that doesn’t govern for the people, they’re just rich businessmen that govern for themselves."

Argentines Pull Dollar Deposits From Banks Before Election

The prospect of swing back to a leftist government has sparked months of market volatility. Fernandez’s strong showing in the primary set off a slide in the peso which saw Macri reimpose capital controls and unilaterally extend maturities on local government debt.

Macri’s path to a runoff requires an increase in total
turnout, with the extra voters supporting him and some Fernandez backers switching sides. While it’s a long shot he has drawn sizable crowds in recent weeks, crossing the country trying to keep his election hopes alive.

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To contact the editors responsible for this story: Juan Pablo Spinetto at jspinetto@bloomberg.net
Rosalind Mathieson
IFIC Monthly Investment Fund Statistics – September 2019
Mutual Fund and Exchange-Traded Fund Assets and Sales

October 24, 2019 (Toronto) – The Investment Funds Institute of Canada (IFIC) today announced investment fund net sales and net assets for September 2019.

Mutual fund assets totalled $1.58 trillion at the end of September 2019. Assets increased by $10.8 billion or 0.7% compared to August 2019. Mutual funds recorded net sales of $1.3 billion in September 2019.

ETF assets totalled $187.9 billion at the end of September 2019. Assets increased by $1.9 billion or 1.0% compared to August 2019. ETFs recorded net sales of $0.6 billion in September 2019.

### Mutual Fund Net Sales/Net Redemptions ($ Millions)*

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### Mutual Fund Net Assets ($ Billions)*

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### ETF Net Sales/Net Redemptions ($ Millions)*

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### ETF Net Assets ($ Billion)*

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<td>186.0</td>
<td>163.3</td>
<td>156.6</td>
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* Please see below for important information regarding this data.

IFIC ETF data is complemented with data from Morningstar Canada Inc.

IFIC makes every effort to verify the accuracy, currency and completeness of the information; however, IFIC does not guarantee, warrant, represent or undertake that the information provided is correct, accurate or current.

* Important Information Regarding Investment Fund Data:
1. Mutual fund data is adjusted to remove double counting arising from mutual funds that invest in other mutual funds.
2. ETF data is not adjusted to remove double counting arising from ETFs that invest in other ETFs.
3. The Balanced Funds category includes funds that invest directly in a mix of stocks and bonds or obtain exposure through investing in other funds.
4. Mutual fund data reflects the investment activity of Canadian retail investors.
5. ETF data reflects the investment activity of Canadian retail and institutional investors.

**About IFIC**

The Investment Funds Institute of Canada is the voice of Canada’s investment funds industry. IFIC brings together 150 organizations, including fund managers, distributors and industry service organizations, to foster a strong, stable investment sector where investors can realize their financial goals. By connecting Canada’s savers to Canada’s economy, our industry contributes significantly to Canadian economic growth and job creation. To learn more about IFIC, please visit [www.ific.ca](http://www.ific.ca).

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Cognizant’s Jobs of the Future Index posts stronger Q3 growth after a relatively flat Q2

The end of the third quarter saw the US unemployment rate reach its lowest point since December of 1969, while at the same time employers have continued to add more jobs (at an approximate rate of 161,000 per month in 2019) to the labor market, particularly in the ever expanding healthcare sector. This strong overall labor market is reflected in Cognizant’s third quarter Jobs of the Future (CJoF) Index, which showed the demand for digitally enabled jobs expand at a faster rate over the year compared with a relatively flat Q2. This steady but moderate growth in the CJoF is a further indication of the current tight state of the labor market, where unemployment is largely frictional, while also providing evidence of the increasing demand for digitally enabled skills in the labor market.

The CJoF Index specifically tracks demand for 50 digitally enabled jobs of the future identified by Cognizant’s Center for the Future of Work, capturing the quarterly fluctuations in postings for these jobs. In the third quarter, the CJoF Index rose by a moderate 12.8 percent over the year, from an index figure of 1.47 in Q3 2018 to 1.65 in Q3 2019. This was a deceleration from the over-the-year rise of 37 percent recorded in the CJoF Index in Q3 2018 (from 1.07 in Q3 2017).

The CJoF Index also posted stronger quarterly growth, with the overall index increasing by 10 percent, from 1.50 in Q2 to 1.65 in Q3. This follows an almost flat second quarter growth, with the CJoF rising by only 2 percent above Q1.

In addition to total job openings, the CJoF Index monitors trends in eight families of jobs of the future. These eight families are Algorithms, Automation and AI; Customer Experience; Environment; Fitness and Wellness; Healthcare; Legal and Financial Services; Transport; and Work Culture. After a strong first half of 2019, the third quarter saw continued moderate growth in most job families compared with the prior quarter. Several of the families, especially the Healthcare family, also posted robust growth compared with the third quarter of 2018.
Healthcare, Work Culture, Environmental, and Algorithms, Automation, & AI families passed Fitness and Wellness family, as the families with the fastest growth, year on year

The Healthcare family—which includes biostatisticians (+29 percent), biomedical equipment technicians (+16 percent), health technicians (+15 percent), biomedical engineers (+15 percent), registered nurses (+12 percent) and genetic counselors (+10 percent)—registered the faster over-the-year growth. Two occupations, physicians (+211 percent) and health information directors (+120 percent), realized exponential growth over the year. It is important to note that while these occupations experienced large percent increases, the absolute number of jobs added was relatively small, with physicians’ postings up by 1,516 and health information directors up by an added 324 positions. Interestingly, the postings for physicians overall decreased by approximately 6.7 percent over the year whereas those for physicians with digitally enabled skills rose by 211 percent. Illustrated differently, the share of new physician postings requiring such skills increased from 0.7 percent of the total in Q3 2018 to 2.4 percent in Q3 2019.

The steady and continued growth in Healthcare jobs mirrors the rising demand for healthcare services as Baby Boomers continue to age. Currently, the healthcare sector is the largest employer in the United States, surpassing the retail sector last year. The healthcare sector also represents a large and growing portion of the US GDP, with the Centers for Medicare and Medicaid Services (CMS) predicting that healthcare spending will account for nearly 20 percent of overall GDP by 2025. As the number of jobs in healthcare continue to grow, many of these new positions will require familiarity with the latest digital innovations in the field. As indicated by the large percent increase in postings for physicians and health information directors with digitally enabled skills, the shift
includes implementing digital record keeping for healthcare management and the use of more sophisticated digital technology by practitioners to diagnose and treat patients.

The index growth for the **Healthcare** family surpassed that of the previous frontrunner, **Fitness and Wellness**, now placing fifth in over-the-year increases. The **Work Culture** family index registered the second highest over-the-year growth (+31 percent) in Q3, with increases in postings for all jobs in the family. Career counselors (+601 openings) experienced the largest numeric and percent increase over the year, followed by training and development specialists (+592 openings) and industrial-organization psychologists (+55 openings).

The **Environmental** family index registered the third highest over-the-year growth (+23 percent), with increases in postings for all jobs in the family, except solar engineers (-5 openings). The proxy job tidewater architect (+194 openings) posted the largest numeric gain over the year, demonstrating an increased focus on mitigating future climate change impacts to coastal urban areas.

After several fairly strong quarters of over-the-year growth, job openings in the **Fitness and Wellness** family advanced by a moderate 13 percent, from approximately 1,250 job postings in 3Q 2018 to more than 1,400 in 3Q 2019.

The **Algorithms, Automation, and AI** family maintained a steady 13 percent annual growth, improving from a relativity modest Q2 growth of 9 percent, but not reaching the high level of growth seen in Q1 of this year. This sustained growth illustrates that while the volume of postings within the family continues to expand, the rate of growth has stabilized.

The **Transport** and **Customer Experience** families maintained a similar level of modest over-the-year growth compared with the last quarter. The only family to see a contraction in the year-on-year postings growth was the
Legal and Financial Services family. Both risk managers/analysts (-12 percent) and personal financial advisors (-29 percent) declined in postings compared with last year. The only occupation in this family to see over-the-year growth was attorneys (+21 percent).

Overall, the quickest growing job families in 3Q were the following:

Healthcare
(+35 percent)

Work Culture
(+31 percent)

Environmental
(+26 percent)

Algorithms, Automation, and AI
(+13 percent)

Fitness and Wellness
(+13 percent)

Trailing behind in jobs growth were these families:

Transport
(+7 percent)

Customer Experience
(+3 percent)

Only one family saw negative growth over the year:

Legal and Financial Services
(-5 percent)

Which jobs grew the most over the year?

Compared with the third quarter of 2018, 40 of the 50 jobs covered in the CJoF Index realized an increase in openings. Ten occupations—technology consultants (-1,759 openings), personal financial advisors (-354 openings), risk
Jobs of the Future Index registered over-the-year declines in the number of job openings in Q3. For the second quarter in a row, technology consultants saw the largest drop, in both percentage (-34 percent) and numeric (-1,759 openings) terms, going from approximately 5,100 openings in Q3 2018 to 3,300 in Q3 2019. This may reflect a rebalancing in the resourcing of digital transformation programs, as companies increase their reliance on in-house talent development and ecosystems of partners and suppliers.

The fastest growing jobs over the year in the third quarter of 2019 in the CJoF Index were:

- Career Counselors (+237 percent)
- Physicians (+211 percent)
- Health Information Manager (+121 percent)
- Home Health Aide (+71 percent)
- Industrial-Organizational Psychologist (+68 percent)

Jobs that posted the largest percent decreases over the year in the CJoF Index in the period were:

- Technology Consultant (-34 percent)
- Personal Financial Advisor (-29 percent)
- Personal Care Aide (-17 percent)
- Sales Engineer (-15 percent)
- Security Intelligence Analyst (-11 percent)

While percent change shows the momentum growth in jobs, the numeric increase is also a key indicator of the overall demand for these new skill sets. On this measure, software developers/engineers remained the occupation with the largest number of job postings in the CJoF Index, with an impressive jump of 37,455 in new postings over the year. This increase was followed by several other technology-focused positions, including business intelligence architects/developers (+3,148 openings), the proxy job cyber calamity forecasters (+1,595 openings) and physicians (+1,516 openings). While these job categories, with the exception of physicians, did not chalk up the fastest growth in percentage
terms, the numeric increases underscore the ongoing search among employers for technical talent as they accelerate their data analytics and customer experience initiatives.

All proxy jobs, except fitness commitment counselors, landed into the top half of the index in numeric growth: cyber calamity forecasters (+1,595 openings), masters of edge computing (+289 openings), AR journey builders (+260 openings) and tidewater architects (+194 openings), further emphasizing the growth in data-driven hiring. In fact, of the ten jobs with the largest numeric change over the year, half are located in the Algorithm, Automation, and AI family.

**Index registers over-the-quarter growth of 10 percent**

Overall, the CJoF Index posted a relatively strong quarterly increase (+10 percent, the strongest quarterly growth since Q2 of 2018), rising from 1.50 in Q2 2019 to 1.65 in Q3 2019. The CJoF Index outperformed the All Burning Glass Jobs Index (+8 percent), increasing from 1.35 in Q2 2019 to 1.46 currently. The Proxy Job Index showed modest growth over the quarter with an increase of approximately 5 percent, increasing from 1.39 in Q2 2019 to 1.45 currently. The Burning Glass Jobs Index reflects all job openings in the US.

The Q3 increases were higher across all families when compared with their quarterly increases in Q2 of 2019, with the exception of the Environmental and Fitness and Wellness families, both of which saw small declines in quarterly jobs postings after leading the pack in quarterly growth in Q2 2019.

The Healthcare family realized the largest quarterly gain in job postings gain in Q3 (+21 percent), followed by Algorithms, Automation, and AI (+11 percent) and Work Culture (+9 percent). Three job families exhibited moderate growth over the quarter:
Transport (+3 percent), Legal and Financial Services (+2 percent), and Customer Experience (+1 percent). After two quarters of decline, the Transport family saw its first quarter-on-quarter growth of 2019 (+3 percent).

The Environmental family, after six quarters of consecutive job quarterly growth, saw its first decrease (-1 percent) since Q4 2017. The Fitness and Wellness family also experienced a slight decrease in postings (-3 percent) compared with last quarter.
Dan Tsubouchi @Energy_Tidbits · 32m
Trump press conference re Syria #Oil, said multiple times plans to “keep the oil”, not make Iraq mistake when US did not “keep the oil”, wants to get US co’s like Exxon to go fix Syria oil to increase oil production. Syria oil now ~25,000 b/d, was 380,000 b/d pre civil war #OOTT

Dan Tsubouchi @Energy_Tidbits · 1h
With Trudeau saying TMX going ahead, focus moves to construction status. See Trans Mountain’s “Construction in all Communities” updates each section of TMX pipeline/facilities. Pipeline construction portion is still in “work will commence” status. #OOTT

All Communities
Find out if your community is affected by construction
transmountain.com

Dan Tsubouchi @Energy_Tidbits · Oct 26
Denmark is not anti #NatGas pipelines thru territorial water, approved Poland’s Baltic Pipe runs near Bornholm, close to Nord Stream 2 route. NS2 delay forcing Gazprom/Ukraine gas transit extension, maybe NS2 approval soon after extension? Hmm! presse.ens.dk/presse/releases/...
Dan Tsubouchi @Energy_Tidbits - Oct 26
Syria #Oil doesn’t impact oil prices. TASS: Russia Defense Ministry “US smuggles Syrian oil”, mthly rev >$30mm, cost $30/b, means ~26,000 b/d ie. in line with what most expect. Prior to civil war, Syria was ~380,000 b/d w/ exports ~150,000 b/d. #OOTT tass.com/defense/1085449

Dan Tsubouchi @Energy_Tidbits - Oct 25
Precision Q3 call, growth in Persian Gulf and Latin America “may involve deploying idle North American rigs”. Not a vote of confidence for US #Oil rigs to go back to prior levels. May not be material # of rigs, but less rigs = less wells drilled = less oil potential. #OOTT

Dan Tsubouchi @Energy_Tidbits - Oct 25
Thx Bloomberg, great graphics show #LNG cargoes slowly floating around the world looking for a home, hoping winter comes hard/soon to Asia. Longer LNG tanker voyages and LNG tanker clusters off East Asia, Europe. Qatar cluster loaded, waiting to move.

Show this thread
... and with Europe storage being almost full in Sept, it meant that there were a lot of LNG cargos in Sept slowly floating around the world (and most likely towards Asia) looking for a home and hoping winter comes hard and soon to Asia.

![Figure 7: Europe Gas Storage Utilization](image)

Source: Bloomberg

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Key reason why LNG weak in Sept. China Sept LNG imports 8.2 bcf/d, +16.7% YoY & +1.2 bcf/d YoY. Relatively weak YoY growth vs China's big YoY % and bcf/d growth in 2018. Not enough to provide strong support to LNG prices given global LNG exports in Sept +5.0 bcf/d YoY ...

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<td>33.4</td>
<td>7.6</td>
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<td>4.9</td>
<td>37.4</td>
<td>7.3</td>
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<td>36.8</td>
<td>7.0</td>
<td>25.3</td>
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<td>2.5</td>
<td>5.5</td>
<td>93.0</td>
<td>7.1</td>
<td>29.6</td>
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<tr>
<td>Nov</td>
<td>4.3</td>
<td>6.5</td>
<td>52.6</td>
<td>9.6</td>
<td>47.5</td>
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<tr>
<td>Dec</td>
<td>5.8</td>
<td>7.8</td>
<td>34.8</td>
<td>9.7</td>
<td>25.0</td>
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Source: Bloomberg, LNG World News

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Core Labs view on US oil growth results in non-OPEC growth +1.3 mmb/d in 2020, very low and bullish for Oil relative to IEA +2.3 mmb/d, EIA +2.19 mmb/d and OPEC +2.2 mmb/d. Will be more on Core Labs in Sunday's SAF Oct 27 Energy Tidbits memo, #OOTT
Another lower US #Oil growth rate view. Core Labs call "The U.S. which is estimated now to be up 700,000 barrels a day in 2020. By the way, we'll take the under on that" "Remember that the decline curve always wins and it never sleeps" See SAF's Oct 27, 2019 Energy Tidbits #OOTT

Excerpt From SAF Group 2020 Energy Market Outlook Oct 7, 2019
SAF Group 2020 Energy Market Outlook
Support For Better Prices And Better Sentiment For Oil & Gas Is Coming Sooner Than Expected

Math Says Permian Growth Forecasts Have To Be Lowered

All The Inputs To The Permian Oil Growth Formula Are Worse Today Vs A Year Ago

1. Thank you to the Raymond James oil research team for providing their drill down analysis on Permian and US shale plays. We have used a number of their drill down data to support our views.
2. We believe the math says it is inevitable for agencies and analysts to lower their Permian growth forecasts.
3. The formulas and the inputs therein to estimate oil supply growth are unchanged. Oil growth depends on 4 factors:
   1. Existing production less annual declines in starting point, how much new production needs to be added every year to stay flat.
   2. Capital required (production cash flow - less costs + debt + equity). To fund drilling and completion of new wells and for completion of the inventory of DUCs.
   3. To add oil production based on the well productivity rates.
4. The inputs and the inputs therein to estimate oil supply growth are unchanged. Oil growth depends on 4 factors:
   1. Existing production less annual declines in starting point, how much new production needs to be added every year to stay flat.
   2. Capital required (production cash flow - less costs + debt + equity). To fund drilling and completion of new wells and for completion of the inventory of DUCs.
   3. To add oil production based on the well productivity rates.
   4. Note we haven't gone into a number of more detailed items that are making this challenge tougher such as higher water cuts.
Finally, Some Visibility That India Is Moving Towards Its Target For Natural Gas To Be 15% Of Its Energy Mix By 2030

Blog Summary

Finally, Some Visibility That India Is Moving Towards Its Target For Natural Gas To Be 15% Of Its Energy Mix By 2030

Posted: Wednesday October 23, 2019 3:45am MT

It's taking longer than expected, but we are finally getting visibility that India is investing significantly towards its goal to have natural gas be 15% of its energy mix by 2030. Earlier in Oct, India's Oil Minister Dharmendra Pradhan said that there are $93 billion of natural gas infrastructure and LNG import terminals that are "under execution." He said "I am not talking about potential investment. This number relates to the projects that are under execution." Natural gas consumption in India is only now back to 2011 levels of 6.6 bcf/d and represents only 6.2% of its energy mix. If India hits its 15% target of its energy mix by 2030, it would add natural gas demand, on average, of ~1 bcf/d per year. At the same time, India's domestic natural gas production peaked in 2010 at 4.6 bcf/d, but has been flat from 2014 to 2018 at ~3.7 bcf/d, which means the gap will be LNG. The most important factor driving the expectation for natural gas consumption growth is likely price. Asian LNG landed prices are down about 50% YOY and, more significantly, the expectation is for future Asian LNG prices to be at lower levels than prior cycles. India, by itself, may not be a LNG global game changer, but it is another positive support for why we believe LNG markets will stabilize sooner than expected in 2022/2023. We see similar trends in Asian LNG landed prices being lower than prior cycles in a rebalanced market and ~1 bcf/d, which means that low capital costs will be critical for future LNG projects. We believe that BOC LNG is a potential project in NE Canada. Please note: the SA Group. ca/research/article...
Dan Tsubouchi @Energy_Tidbits · Oct 23

Why OPEC+ must, at a minimum, extend the cuts at Dec meeting? Q1/20 oil demand is seasonally lower QoQ vs Q4/19: EIA -0.58 mmb/d, IEA -1.40 mmb/d, OPEC -1.21 mmb/d. Need markets to look thru typical OECD early yr inventory builds especially with weaker economic outlooks. #OOTT

Dan Tsubouchi @Energy_Tidbits · Oct 22

Morneau on BNN “Trans Mountain pipeline and the expansion, there’s a purpose behind what we set out to do and we’re going to push forward to that continuing objective”. Why not be precise, say push to hit mid 2022 target? Risk for more delays? #OOTT bnnbloomberg.ca/video/morneau-...
Dan Tsubouchi @Energy_Tidbits · Oct 22
Another short term forecast calling for a cold start to the theoretical start to winter #NatGas storage injection season. May not drive up HH gas price, but should help support prices to start Nov weather.com/forecast/natio...

October Could End With Widespread Cold in a Large Part of the U.S.

Dan Tsubouchi @Energy_Tidbits · Oct 22
TMX aside, if a strong Liberal majority wasn't attracting capital providers (debt, equity) to Cdn oil and gas, why would a strong minority that has to make some concessions to Bloc/NDP be viewed as more attractive to capital providers for Cdn oil and gas? It can't. #OOTT

Dan Tsubouchi @Energy_Tidbits · Oct 21
CBC just called Liberal minority. Its still early (825pm MT) but it could be each of Bloc or NDP with swing votes for Liberals. #OOTT

Dan Tsubouchi @Energy_Tidbits · Oct 21
For those tracking +/- vs 2015, here are 2015 seats by province. Its still early in Atlantic reporting, but looks like tracking to overall prediction of Liberals losing majority. Liberals won all 32 Atlantic seats in 2015, as of 6:55pm MT, leading/elected in 25 seats. #OOTT

Canada Federal 2015 Election Results by Province

<table>
<thead>
<tr>
<th>Province</th>
<th>Seats</th>
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<tbody>
<tr>
<td>BC</td>
<td>4</td>
</tr>
<tr>
<td>AB</td>
<td>6</td>
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<td>SK</td>
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<tr>
<td>NT</td>
<td>1</td>
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<tr>
<td>NU</td>
<td>1</td>
</tr>
<tr>
<td>Total</td>
<td>184</td>
</tr>
</tbody>
</table>

Liberal: 124 seats
Conservative: 49 seats
New Democratic: 10 seats
Bloc Quebecois: 19 seats
Green: 4 seats
Independent and Non-Affiliation: 10 seats

Dan Tsubouchi @Energy_Tidbits · Oct 21
Another call for lower US growth. Halliburton sees “deceleration of incremental US production growth”. Fits SAF key outlook theme - all of the inputs to calculate US oil shale growth are worse today, growth forecasts have to be lowered. #ODTT safgroup.ca/research/trend...

Dan Tsubouchi @Energy_Tidbits · Oct 21
... agree because Saudi has different view today than when cranked up oil volumes in 2015 to crash US shale. Al Falih on CNBC July 3 said Permian plateau is “in a year or two years or four years” ie US growth will end naturally. see SAF July 3 blog safgroup.ca/research/artic...

Dan Tsubouchi @Energy_Tidbits · Oct 21
Good food for thought @JLeeEnergy piece “Saudi Arabia’s Best Bet Is to Crash the Price of Oil” ie. like done in prior cycles, crank up volumes like 1986 or 2015, regain market share to hit others harder. Concludes he doubts they do so ... #ODTT

Analysis | Saudi Arabia’s Best Bet Is to Crash the Price...
Market management just isn’t working. Instead of supporting oil prices, the kingdom’s output cuts are ...
  washingtonpost.com
Dan Tsubouchi @Energy_Tidbits · Oct 21
Japan Sept LNG imports in Sept 10.30 bcf/d, +2.6% YoY, LNG spot prices down ~40% in 2019, yet -2.6% is best monthly YoY increase in 2019 says non-peak demand is flat at best from higher relative coal imports and return of nuclear power. customs.go.jp/toukei/shinbun...

Dan Tsubouchi @Energy_Tidbits · Oct 20
It may not drive up HH #NatGas prices, but should provide some near term price support if Nov starts off cold and avoid weekly gas storage injections to start Nov. cpc.ncep.noaa.gov/products/predi...
NDP Poised To Be Kingmaker Tomorrow, Singh Signaled Would Not Stop TMX

Welcome to new Energy Tidbits memo readers. We are continuing to add new readers to our Energy Tidbits memo and energy blogs. The focus and concept for the memo was set in 1989 with input from Pills, who were looking for research that's positive and negative that helps them shape their investment theses to the energy space, and not focusing on day-to-day trading. Our priority was and still is not just report on events, but interpret and point out implications therefore. The best example is our review of investor days, conferences and earnings calls focusing on sector developments that are relevant to the sector and not just a specific company results/pedance. Our target is to write 40 or 50 weekends per year and to send out by noon mountain time.

This week's memo highlights
1. NDP poised to be kingmaker in tomorrow's election. Singh signaled he wouldn't stop TMX (Click Here)