OIL MARKET FORECAST – OCTOBER 2020

Summary

This forecast sees a continuing reduction in oil inventories through the remainder of the year, but with higher inventories in 2020 and a larger build in 2021, due mainly to revisions in earlier estimates of supply and an earlier and stronger than expected recovery in the US onshore.

Both the IEA and OPEC have released updated long term oil demand forecasts over the last month and the long term demand section of the report has been updated to include these. This section has also been expanded to look at some of the work that has been done on carbon pricing, in order to try and understand why the long term forecasts are so divergent and what is the most likely path.

The US onshore oil rig count is rising again and some of the early 2021 budget estimates indicate the rebound could be stronger than previously thought.

A few key points:

- Oil inventories will fall to 2019 levels around 2023.
- Under current assumptions, the oil market returns to oversupply in 2021 and then a small supply deficit in 2022, which accelerates into 2023.
- The IEA forecasts for all demand predict lower and later peaks in all scenarios, with 2019 demand levels not returning until 2023.
- The OPEC forecast has 2019 demand levels returning in 2022, forecasts a slightly lower peak demand in 2040 and predicts a moderate decline through 2045.
- Carbon pricing models appear to support continued growth in oil demand for the next one to two decades.
- In the expectation case, a structural supply deficit emerges in 2023 and continues beyond as demand recovers while supply stagnates. The structural supply deficit is exacerbated by higher demand in the OPEC case.

Oil Supply and Demand

The demand estimates from the latest IEA report[i] are slightly higher than last months, they estimate demand at 91.7 MMbbl/day and 97.2 MMbbl/day for 2020 and 2021 respectively. The latest EIA report[ii] is slightly lower than last months, with demand at 92.8 MMbbl/day for 2020 and 99.1 MMbbl/day for 2021 respectively. Neither predict demand returning to 2019 levels until 2022 at the earliest. EIA data from September showed that global oil demand for the month had reached 95.3 MMbbl/day, still short of 2019 annual demand levels.

While demand has been in line with previous estimates, revised data for May, June and July indicates slightly higher supply levels than included in last month's forecast ~ 400,00 bb/day in May and ~ 250,000 bbl/day in June. The latest EIA data for July shows US production continuing to recover to 16.4 MMbbl/day, from 15.6 MMbbl/day in June. US supply is expected to fall in August as a result of hurricane activity in the US Gulf of Mexico, before stabilizing at about 15.6 MMbbl/day through to the end of the year. The US onshore oil rig count appears to have hit bottom is September at 160 units; rigs have been added consistently over the last month, reaching 183 units as of this report.

The latest production updates indicate that supply bottomed out at 87.2 MMbbl/day in June and rebounded in July. Supply is expected to average 91.3 MMbbl/day through the second half of the year against average second half demand of 95.7 MMbbl/day. These production levels leave the market undersupplied through the second half of the year, as the surplus inventories that were accumulated in the first half of the year are worked off. The last month saw Libyan production start to return to the market and there are some indications that Iranian exports are increasing. On the downside, production in Venezuela, in particular, is in very steep decline. WTI continues to bounce around $40 per barrel and as the current supply shortfall is due to extraordinary OPEC+ production curbs, there is no reason to expect a rebound in oil price over the next few months.

Long Term Demand Forecast

Following bp's publication of its revised oil demand forecasts last month, both the IEA[iii] and OPEC[iv] have published revised long-term forecasts. This leaves the EIA as the only major institution yet to publish its post COVID-19 long term forecast. The updates are shown in Figure 1, below. The EIA figures are from their 2019 report with the adjustments described in last month's oil market forecast to adjust for COVID-19.

In the IEA stated policies case, demand recovers to 2019 levels in 2023 and peak demand is shifted down from 106 MMbbl per day to about 104 MMbbl per day in 2030. The IEA had added a stated policy delayed recovery case, where demand reaches 2019 levels in 2027 and flatlines at that level through 2040. Neither IEA forecasts predict demand decline, except for 2020, through the forecast period. The IEA has also adjusted their sustainable policies forecast, which now shows a much steeper dip in demand over the next decade, before reverting to its 2019 path.

OPEC have extended their forecast period from 2040 to 2045 and cut about 1.3 MMbbl/day from their peak demand estimate; this is now 109.2 MMbbl per day in 2040. OPEC sees demand recovering to 2019 levels in 2022, a year ahead of the IEA. OPEC predicts 2040 will be the peak demand year, with demand declining slowly to 109.1 MMbbl per day in 2045.

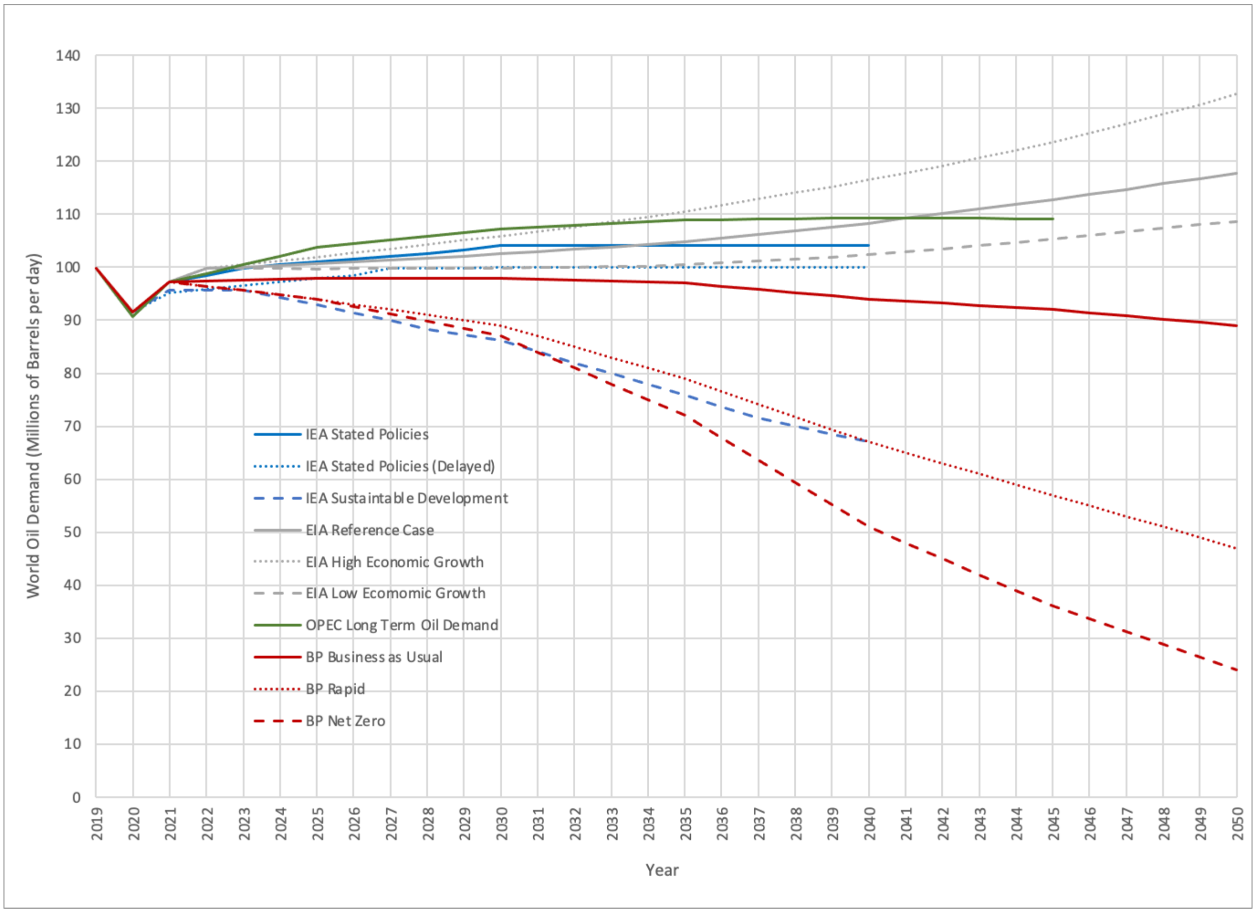

Figure 1 - Comparison of Long-Term Oil Demand Forecasts

The range of forecasts for oil demand in 2050 remains between 25 MMbbl/day and 130 MMbbl/day. The forecasts also bifurcate, with half 'above the line' in that they predict modest demand growth through the next decade or so, and the other half 'below the line' in that they predict an aggressive decline in oil demand from 2019 levels. The next section of this report looks at some of the work that has been done on carbon pricing, to allow the forecasts to be assessed under a more quantitative framework, in order to understand why they are so different and which outcomes are more likely.

The Social Cost of Carbon

William Nordhaus, a Yale professor, who won the Nobel prize in economics in 2018 for his work on climate change, developed a model that quantified the impact of carbon emissions on the world economy. The model is used to calculate the cost to society of carbon emissions in terms of abatement, the cost of reducing carbon emissions, and damages, the cost imposed on society by climate change.

He used this model to estimate the cost of inaction on climate change as well as imposing various climate change policies, expressed as a social cost of carbon, the cost to society of emitting carbon dioxide[v]. He also used the model to calculate an optimized economic path, mixing abatement and damage, that minimized the costs to society of carbon dioxide emissions. He advocates a global carbon tax to reduce carbon dioxide emissions, with his model providing a guide to the level at which the tax should be set, to achieve a given level of warming.

Current climate policies are a patchwork, with some countries such as Sweden, applying an effective carbon tax as high as $127 per ton of carbon dioxide on some sectors of their economy, while 80% of emissions globally are not taxed at all. The result is that the world currently taxes carbon dioxide emissions at an effective rate of $1.70 per ton[vi]. In the NBER paper, William Nordhaus looked at a base case, an optimal case, a 2.5 degree centigrade limit case and the Stern case, which uses a very low discount rate. The two charts below are reproduced from his paper and show annual carbon dioxide emissions reductions and the associated temperature increase.

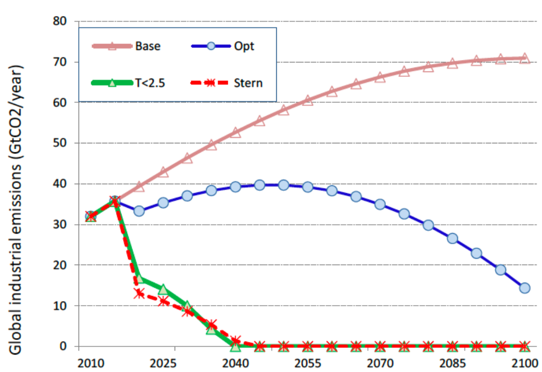

Figure 2 - Global CO2 Emissions from NBER Paper

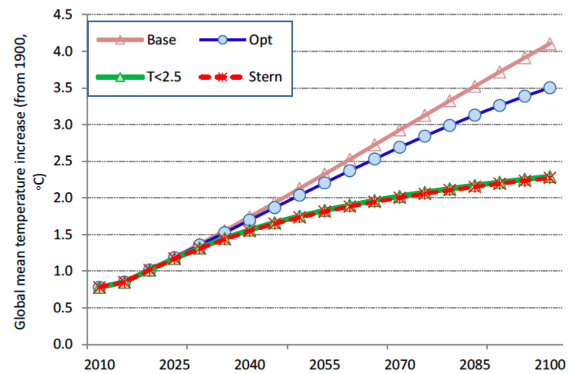

Figure 3 - Temperature Change from NBER Paper

There is no 1.5 degree or 2.0 degree limit case in the paper and looking at the reduction in carbon dioxide emissions required for a 2.5 degree limit, those targets do indeed look practically impossible. In the base case, Figure 3 shows the world would be more than 4 degrees centigrade warmer in 2100 and in the optimal case, it would be about 3.5 degrees warmer. Referring to Figure 2, there is a very substantial decrease in carbon dioxide emissions required to achieve that relatively small difference in outcome.

Figure 4 shows the cost to society of carbon dioxide emissions under the various scenarios using data from the NBER report. Table 1 shows the cost of carbon dioxide emissions on an annualized basis using data taken from the NBER report. There are two conclusions from Figure 4. The first is that the optimal path imposes the lowest costs on society. The second is that the base case imposes significantly lower costs than trying to limit global warming to 2.5 degrees centigrade in 2100.

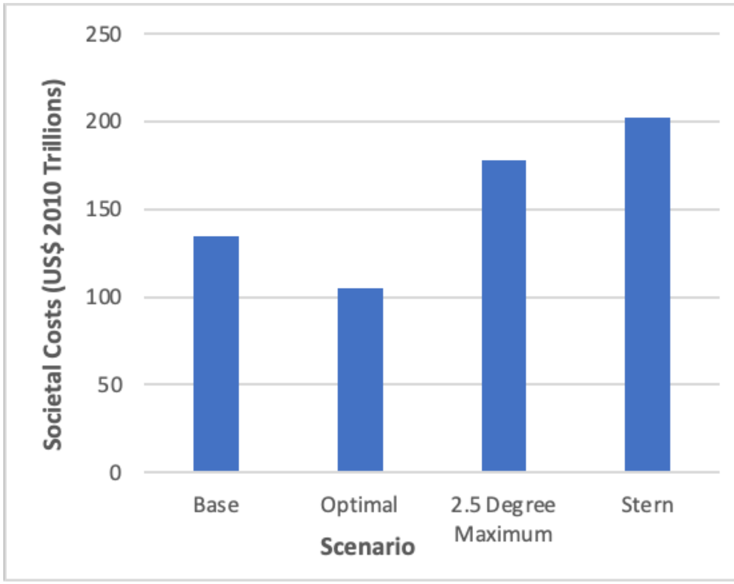

Figure 4 - Societal Cost of Climate Change

From Table 1, we can see that there is no real difference in the annual cost of carbon between base and optimum scenarios. The difference between the two is that there is less damage under the optimal case and more abatement. The real benefits of the optimal case are realized in the second half of the century.

Scenario	2015	2020	2025	2030	2050
Base	30	36	42	50	98
Optimal	30	35	42	49	100
2.5 Degree Maximum	184	229	284	351	1008
Stern Review	257	300	341	382	616

Table 1 - Social Cost of Carbon Annually ($ / Ton)

There are some legitimate criticisms of this approach. After all, none of us live in an economic model, but in a world that will be noticeably warmer. Like all models it is, at best, directionally correct and over long time horizons economics discounts away damage in the distant future. It does, however, provide a tool to estimate the costs and benefits of action, which is a lot better than no tool at all.

What would be the impact of imposing a carbon tax of $50 or $100 per ton on oil demand? Columbia's Center for Global Energy Policy have looked at the impact for energy demand in the United States based on carbon taxes of between $0 and $73 per ton[vii]. Their conclusion was that a tax would result in a substantial reduction in carbon dioxide emissions but would have almost no impact on oil demand. This is because a carbon tax works by eliminating the cheapest emissions first; the Colombia paper found that almost all the reduction in emissions came in the power sector, where renewables and natural gas replaced coal, because those replacement fuels are already economically competitive. A carbon tax of $50 per ton would equate to a $0.44 dollar per gallon tax on gasoline. This is about 20% of the cost of the average 2016 tank of gasoline, which was $2.30, an increase which falls well within the range of fluctuations in gasoline prices driven by the oil price. Table 2 shows the impact on a gallon of gasoline for the carbon taxes shown in Table 1.

Scenario	2020	2025	2030	2050
Base	0.31	0.37	0.44	0.87
Optimal	0.31	0.37	0.43	0.88
2.5 Degree Maximum	2.02	2.50	3.09	8.87
Stern Review	2.64	3.00	3.36	5.42

Table 2 - Additional Tax on Gasoline ($/Gallon)

The Colombia study did not examine the impact of the $2 plus taxes on carbon emissions, but it isn't hard to imagine that doubling, tripling and then quadrupling the cost of gasoline would have a dramatic impact on demand.

Bringing the discussion back to long term oil demand forecasts, this divergence in carbon rates under different scenarios can explain the divergence in forecasts. The 'above the line' forecasts, those that predict demand rising for the next decade or two, follow a base or optimized carbon price path, where abatement of carbon dioxide emissions will be focused on the power sector. The 'below the line' forecasts follow a temperature limited path, where the abatement impact of the mobility sector are dramatic and immediate.

It seems unlikely that society would be willing to accept, or that politicians could be reelected after imposing, the kinds of costs that would be required to achieve the 'below the line' forecasts. It is hard to imagine the US government attempting to impose a $2 per gallon gasoline tax, and increasing it at 10 cents per year. The aggressive bp forecasts and the IEA sustainable development case would restrict temperature rise to 1.5 degree or below 2.0 centigrade, implying even higher gasoline taxes than that. The 'above the line' forecasts reflect not only the economic optimum, but also the political reality, which means that oil demand can be expected to continue to grow for the next ten to twenty years.

Oil Market Balance and Storage

Oil inventories began to draw down in June by an estimated 166 MMbbl. Draws are forecast to continue at an average of roughly 136 MMbbl per month for the second half of 2020, as the OPEC+ supply curbs restrict supply and demand recovers. The latest forecast shows a market that is essentially balanced through 2021 and 2022, before demand outstrips supply again in 2023 and beyond, as demand continues its recovery, but supply stagnates. A supply and demand and surplus forecast is shown in Figure 5, below.

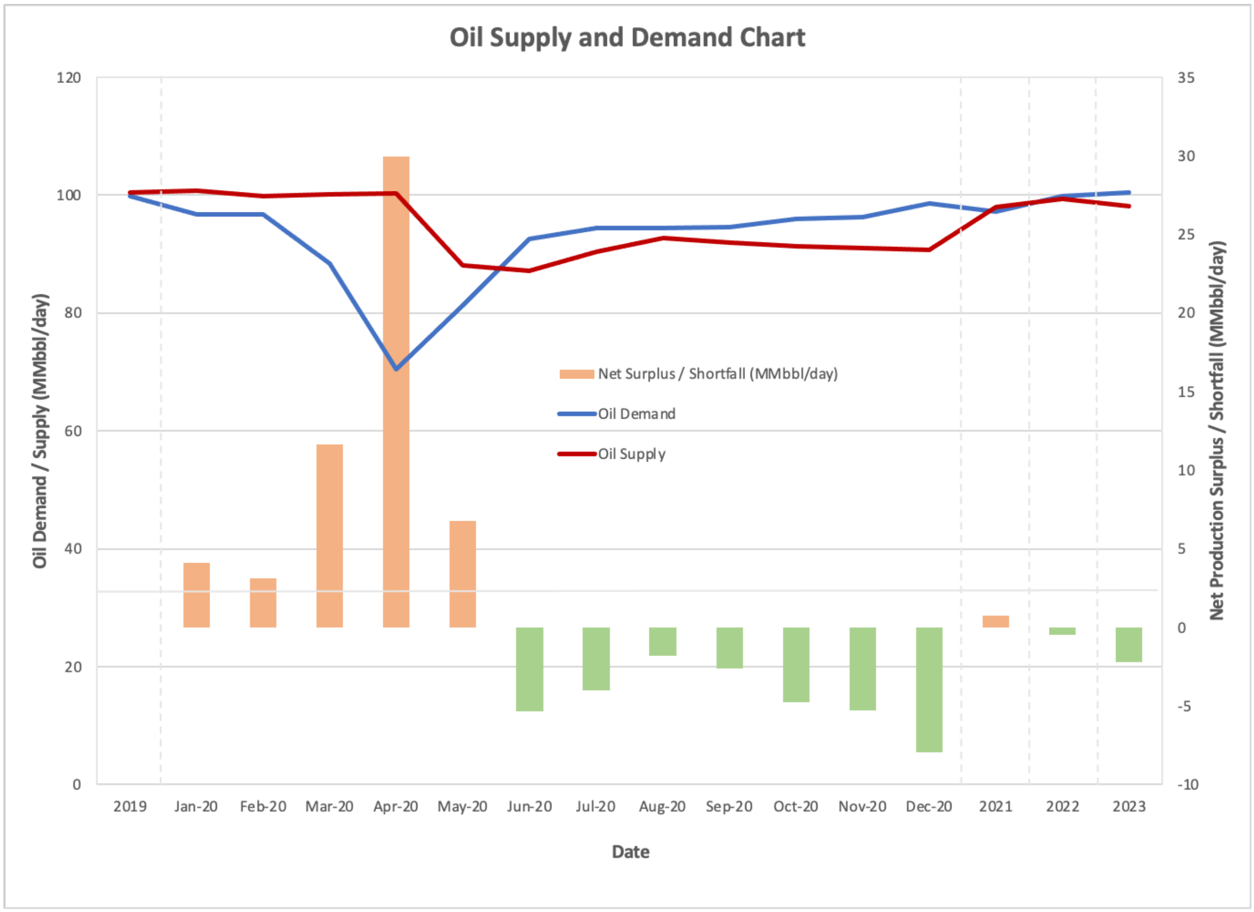

Figure 5 - Supply and Demand and Surplus Forecast

Figure 6 shows global storage capacity and inventories. the global inventories peaked in May at 4.8 billion barrels, a couple of hundred million barrels short of the operational limit on global storage.

The minor month on month changes to the supply and demand mean that global storage, while still declining is now likely to remain above the long term average for the rest of this year. The recovery in US onshore activity, reflected in rising rig counts since the last forecast and higher activity estimates for 2021, is the biggest contributor to increased estimates of 2021 supply. This results in a predicted crude storage build of 284 MMbbl in 2021 as against 77MMbbl in last month's forecast. The net result of this is that global storage levels don't fall below long-term average until 2023, as against 2022 in last month's forecast, something that would be expected to further delay the recovery in crude pricing.

Some of the recent press coverage of OPEC has indicated that they are growing concerned that 2021 may see continued oversupply and are considering measures to extend their production curbs to prevent this. Beyond 2023, the longer term storage picture continues to show a structural supply deficit.

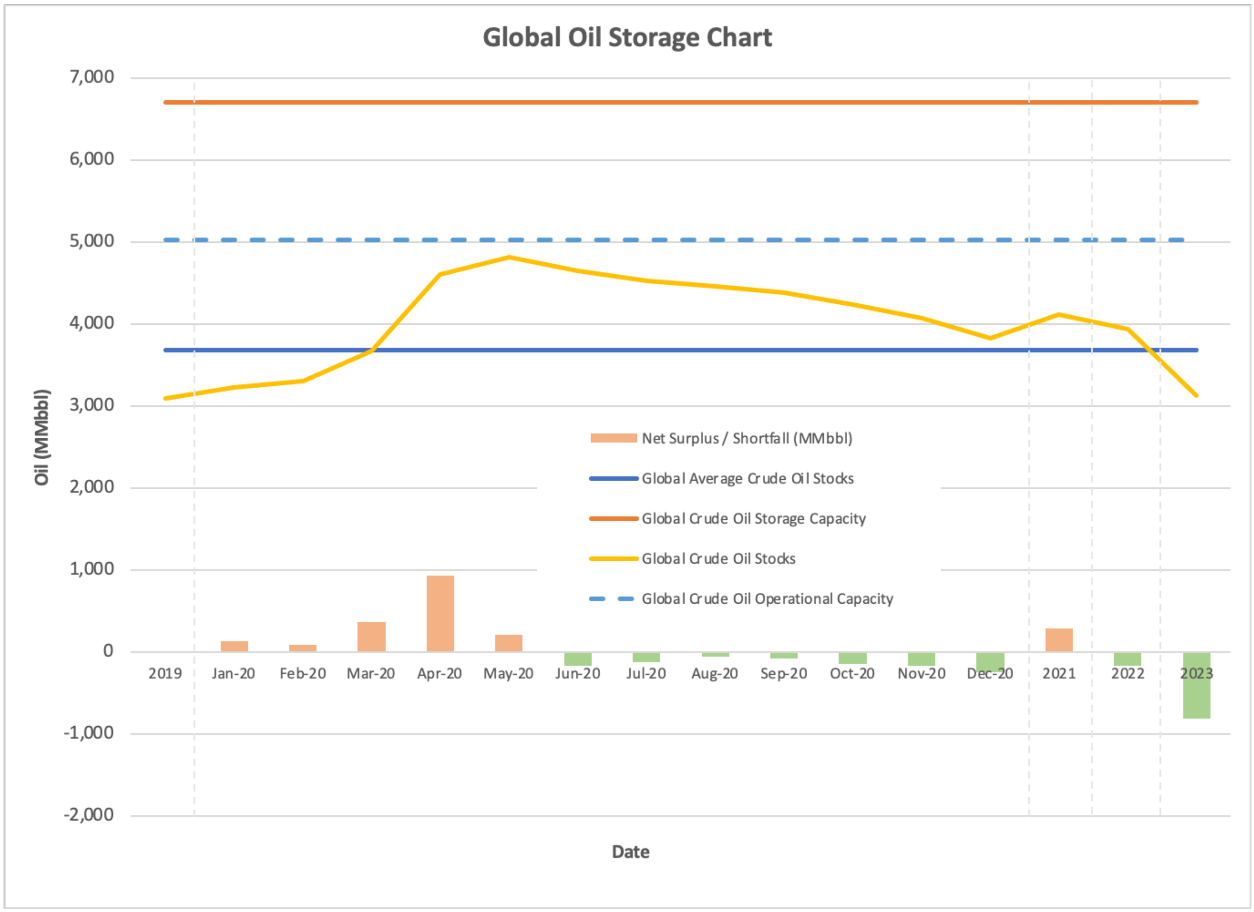

Figure 6 - Global Oil Storage Chart

Impact on US Investment and Oil Production

After a steep decline, the US land oil rig count appears to have bottomed out at around 160 last month and to be rising again to 183 at the time of this report. Historic and forecast rig count for the year is shown in Figure 7. Some early projections of 2021 US land drilling budgets indicated an increase in activity of 15%, which would suggest average 2021 oil land rig counts of 370. The uptick that we have seen over the last month may be the start of that recovery.

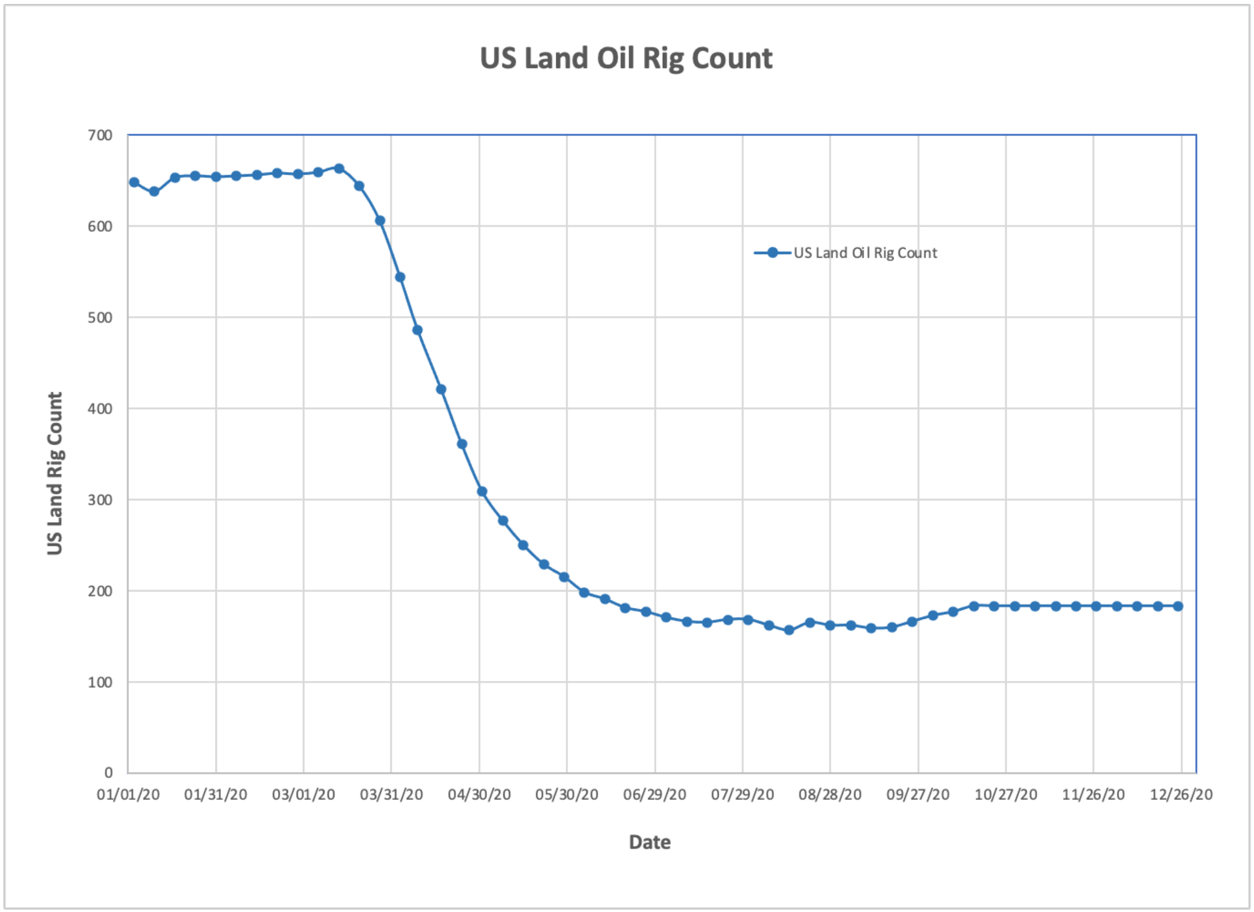

Figure 7 - US Land Oil Rig Count

[i] IEA (2020), Oil Market Report - September 2020, IEA, Paris
[ii] Short Term Energy Outlook (STEO), Octobrer 2020, U.S. Energy Information Administration.
[iii] IEA (2020), World Energy Outlook 2020, IEA, Paris https://www.iea.org/reports/world-energy-outlook-2020
[iv] World Oil Outlook 2045, October 2020, OPEC
[v] "Projections and Uncertainties about climate change in an era of minimal climate policies", National Bureau of Economic Research Working Paper 22933, William D. Nordhaus, September 2017.
[vi] "Climate Change: Our Ultimate Challenge", William Nordhaus, Lecture at the University of Zurich, January 21st, 2020.
[vii] "Energy and Environmental Implications of a Carbon Tax in the United States", Columbia Center on Global Energy Policy, July 2018.