Offshore Energy Update:

By Richard Brakenhoff (independent analyst)

Executive Summary

Oil prices are going through the roof again. Brent oil price up to USD 80 p/b, for the first time since October 2018. Just in line with prices of metals (see my latest publication on commodities), prices rose spectacularly in 2021YTD. I believe that this is due to the impact of COVID-19 on logistics and industrial production, leading to – temporary – scarcity of raw materials. Assuming a return to more 'normal' market conditions in the world in 2022 thanks to the vaccination programs, I expect a downward correction as of 2022.

In this update I will discuss the booming outlook for Offshore Wind. Whereas only 35GW was installed globally at year-end 2020, it could jump to 270GW in 2030 and 2,000GW in 2050. However, there are also risks that this forecast will not materialize, such as for instance rising interest rates, lack of installation vessels and/or staff, negative electricity prices, and scarcity of certain commodities. Besides Offshore Wind, I will discuss the current 'overheated' gas markets in the world, which already led to the bankruptcy of several UK energy companies.

Although all the positive news regarding vaccins pushed up oil prices, I remain conservative with my forecast for 2021-2025. Global oil demand will recover, but there is a clear risk that OPEC+ restores its oil production too quickly. As a result, oversupply could happen and therefore I foresee an average Brent oil price of USD 70 p/b in 2021 (previously USD 63 p/b), gradually going down to USD 58 p/b in 2025.

Just as I stated in my previous updates, the recovery of the Oil Services market will be postponed by at least two years. This could lead to bankruptcies at mainly drilling and offshore shipping companies as they already suffered from extremely weak market conditions between 2015 and 2019. To sum up, I believe market conditions will remain negative until 2022, and then improving again, albeit the heydays of 2014 will not return.

Table 1: Market conditions at different segments of Oil Services market between 2014 and 2024E

	2014	2016	2018	2020	2022E	2024E
Survey/seismic	++/+	--	+	--	0	0/+
Drilling	++	0	--	--	--	-/0
Allround	+	--	-	--	-/0	0/+
Installation	+	+	0	--	-	0
FPSO	+	--	0/+	0	+	++
Shipping	+	--	--	--	--	-/0
Oil Services	++/+	0	-	--	-	0

Source: R. Brakenhoff; Please note: ++ is booming market conditions, + is favourable, 0 is 'normal', - is negative, and -- is very depressed

Table 2: Brent oil price forecasts (2021 - 2025)

USD per barrel	2021E	2022E	2023E	2024E	2025E
Brent	70	70	66	62	58

Source: R. Brakenhoff

Sixth release of Offshore Energy Update

After publishing eightteen Offshore Energy Quarterlies at the Rabobank, this is the sixth release of my Offshore Energy Update since I left Rabobank at the end of February 2020. In this Offshore Energy Update I will give my view on the current and expected developments at the global energy markets, including the necessity to reduce the use of fossil fuels quickly if the world wants to limit global warming to a maximum of 1.5° degrees Celsius in 2100. In addition, I will discuss the current 'overheated' gas market, not only in Europe, but worldwide.

Global oil demand is recovering, but will not yet return to previous height in 2021

At the table below, I have given the latest GDP growth forecast for the major oil consuming countries (source: IMF). These forecasts are from July. Looking at the major oil consuming countries in the world, China (more than 16% of total oil demand in the world) has already recovered, whereas the USA (19%) and the EU (excluding UK: 11%) are recovering rapidly. According to the IEA and U.S. Energy Information Administration global oil demand fell by 9m b/p/d in 2020, but they expect overall demand to recover by 5.0-5.2m b/p/d in 2021 compared to 2020, whereas the global economy will rebound by an estimated 6.0% (source: IMF). For 2022 the U.S. Energy Information Administration expects global oil demand to increase by 3.6m b/p/d (IEA: +3.2m), whereas the global economy could grow by 4.9% (IMF).

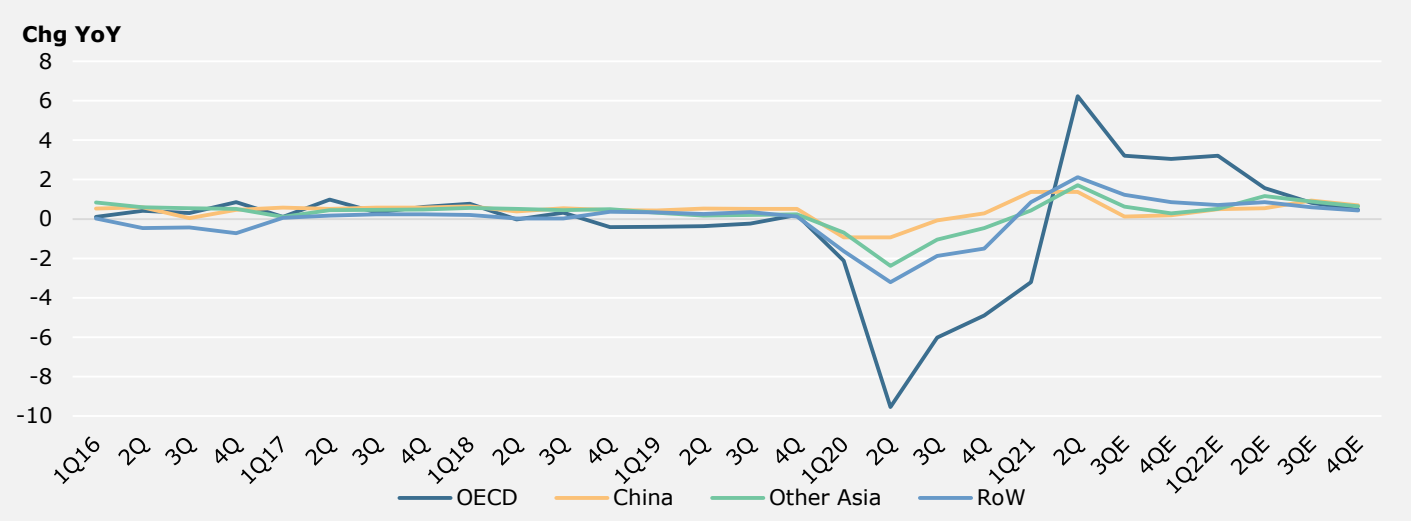
Table 3: Historial and expected GDP growth by country versus oil demand

Country	GDP growth 2009 vs 2008	GDP growth 2020 vs 2019	GDP growth 2021 vs 2020	GDP growth 2022 vs 2021	Oil demand in 2020 (m b/p/d)	As % of total
EU	-4.2%	-6.0%	+4.7%	+4.4%	9.8	11.0%
USA	-2.5%	-3.5%	+7.0%	+4.9%	17.2	19.4%
China	+9.4%	+2.3%	+8.1%	+5.7%	14.5	16.4%
India	+8.5%	-7.3%	+9.5%	+8.5%	4.7	5.3%
Japan	-5.4%	-4.7%	+2.8%	+3.0%	3.3	3.7%
Russia	-7.8%	-3.0%	+4.4%	+3.1%	3.2	3.7%
World	-0.1%	-3.2%	+6.0%	+4.9%	88.5	

Source: IMF (July 2021), BP Statistical Review 2021 Please note: Global liquids demand (incl. biofuels) was approximately 91m b/p/d in 2020

At the next graph I have given an overview of oil demand growth YoY between 1Q16 and 4Q22 according to estimates from the U.S. Energy Information Administration. The strongest drop in demand was at the OECD countries in 2Q20 (OECD countries are for instance USA, Canada, EU, UK, Australia, NZ, Japan, S. Korea). Whereas oil demand growth in China already resumed in 4Q20, it still decreased strongly at the OECD countries and at the rest of the world. Due to the second lockdown, oil demand declined YoY at the OECD countries in 1Q21, which was nearly offset by increased demand in China, rest of Asia, and rest of the world. In 2Q21 oil demand in all regions recovered YoY, but were still well below 2Q19, except for China.

Graph 1: Growth oil demand in OECD countries, China, rest of Asia, and RoW (m b/p/d)



Source: U.S. Energy Information Administration Please note: RoW = rest of the world

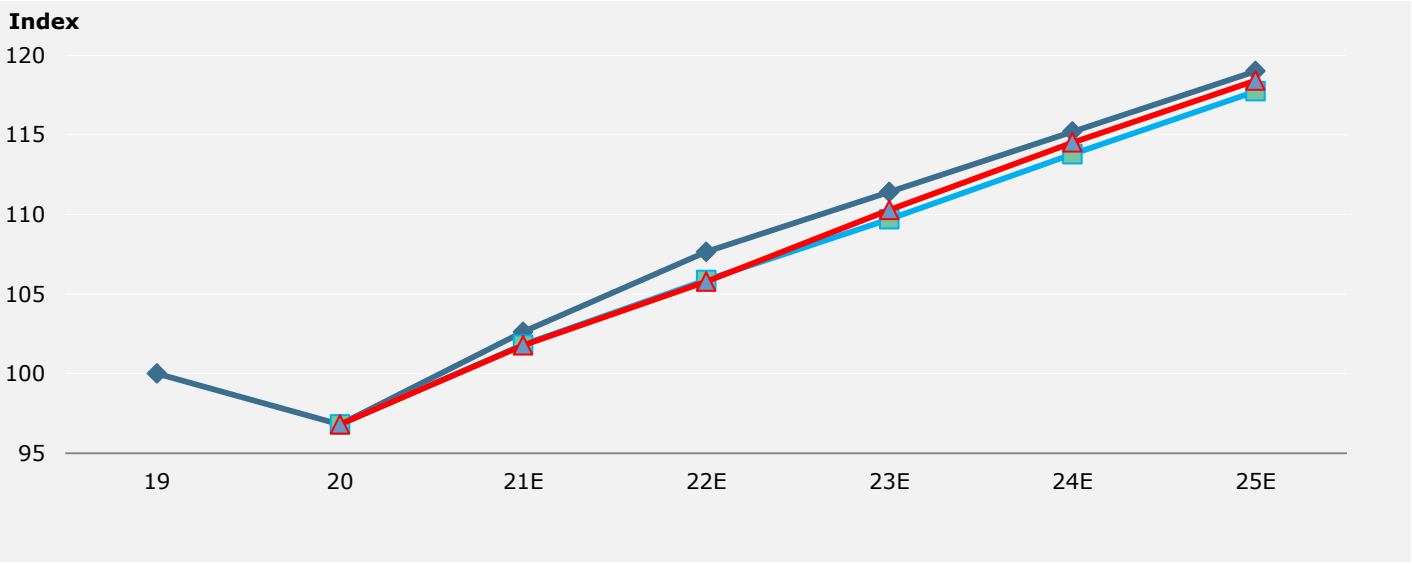
Medium-term global oil demand growth using two scenarios

In its latest economic forecast (July 2021), IMF has become more optimistic again on the short-term global economic recovery. Although the IMF has maintained its global GDP growth forecast for 2021 (+6.0% YoY), it has upped its forecast to +4.9% in 2022 (previously +4.4% forecasted).

In its Global Economic Outlook IMF also presented two downside scenarios: (i) New infection wave in 2H21, leading to cumulative 1.5% less GDP growth in 2022 and 2023 compared to its base case scenario; (ii) New more infectious variants of COVID-19, leading to cumulative 1.7% less GDP growth in 2023. However, even at both downside scenarios, IMF foresees a catch-up effect in 2024 and 2025 (see graph below). As a result, in 2025 the overall size of the global economy will still expand by around 18% in 2025 compared to 2019 (see red and blue lines at the graph below) compared to 19% at IMF's base case scenario.

Also the World Bank raised its 2021 GDP growth forecast strongly in its Global Economic Prospect report issued in June: 5.6% compared to 4.1% forecasted in January. For 2022 and 2023 the World Bank expects more or less similar growth rates compared to the IMF in its base case scenario.

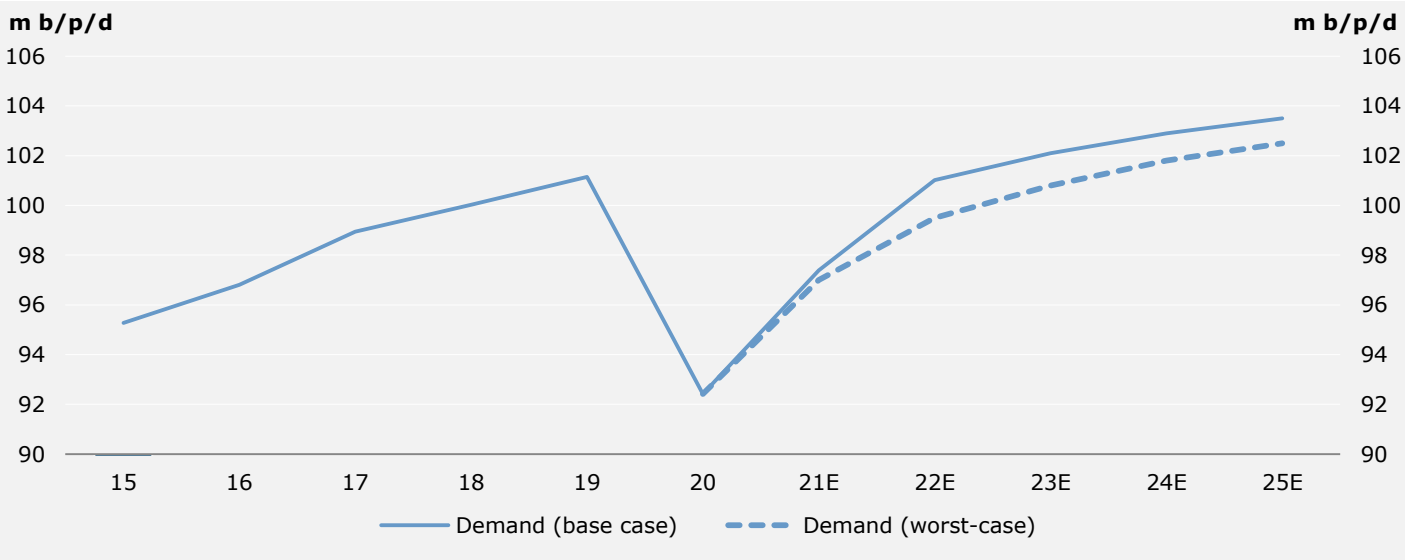
Graph 2: GDP growth forecast 2020-2025E base case versus worst case scenario



Source: IMF World Economic Outlook July 2021 Please note: Index (2019 = 100)

Using IMF's base case scenario, I believe that global oil demand could rise to 103.5m b/p/d in 2025. But if there will be a new wave of infections and/or new COVID-19 versions (IMF's downside scenario), global oil demand will recover less strongly in the coming years. Taking into account the catch-up effect of global GDP growth in the years 2023-2025, I expect that global oil demand will slightly exceed its previous peak (2019) in 2025 (see graph below). This forecast of 102.5m b/p/d in 2025 is a slight downward adjustment compared to my previous update.

Graph 3: Medium-term global oil demand growth in base and worst-case scenario



Source: R. Brakenhoff

Global oil demand continued to exceed supply in 2Q21

At the next table we have summarized the global oil supply and demand growth (declines) in the last four quarters according to the short-term oil market outlook by the U.S. Energy Information Administration. Although the world is gradually recovering from the impact of COVID-19, global oil demand in 2Q21 was still nearly 5m b/p/d lower compared to the pre-COVID-19 level seen in 2Q19. The impact of the oil production cutback by OPEC+ was still clearly visible in 2Q21, leading to an overall market whereby demand continued to exceed supply and therefore declining oil inventory levels (see also next paragraph).

Table 4: Global oil market recovering thanks to OPEC+'s production cutback

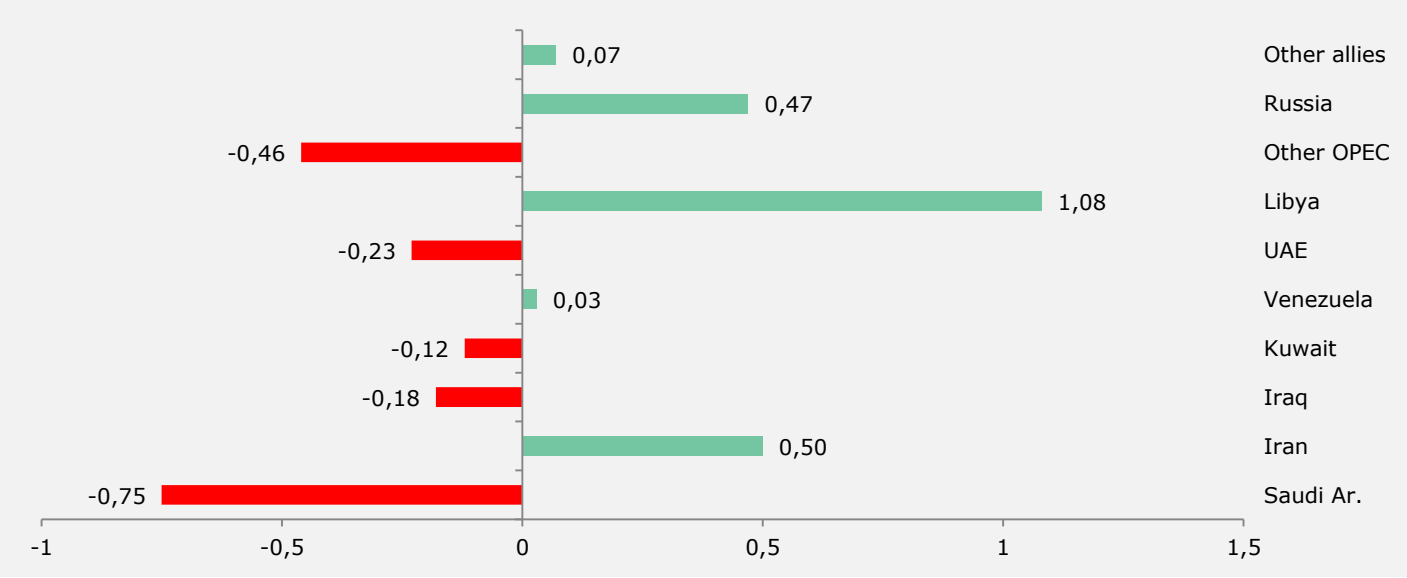
Production (m b/p/d)	3Q20	Change YoY (m b/p/d)	4Q20	Change YoY (m b/p/d)	1Q21	Change YoY (m b/p/d)	2Q21	Change YoY (m b/p/d)
OPEC	23.61	-5.05	24.88	-4.14	25.08	-3.20	25.51	-0.13
USA	18.30	-1.15	18.31	-1.89	17.62	-2.60	19.05	+1.47
Total supply	90.88	-9.22	92.79	-8.84	92.80	-7.91	94.80	+2.36
Total demand	93.37	-9.02	95.39	-6.59	94.66	-0.54	96.49	+11.45
Over/(Under)supply	-2.49		-2.60		-1.86		-1.69	

Source: U.S. Energy Information Administration; Please note: Production figures USA including natural gas liquids (NGL) and condensates

In 2Q21 oil production recovered by 2.4m b/p/d compared to 2Q20, albeit OPEC's oil production still decreased by 0.1m b/p/d (see graph below), whereby the largest drops were registered by Saudi Arabia, UAE, Iraq, and Kuwait. However, oil production in Libya recovered from an extremely low level (civil unrest in 2Q20) and Iran's production went up slightly. OPEC+ (= OPEC and ten allied other countries, such as Russia) increased its production by around

0.4m b/p/d, mainly due to Russia. Besides OPEC+, oil production by the largest producer in the world – the USA – recovered by nearly 1.5m b/p/d.

Graph 4: OPEC+ increased oil production by 0.4m b/p/d YoY in 2Q21

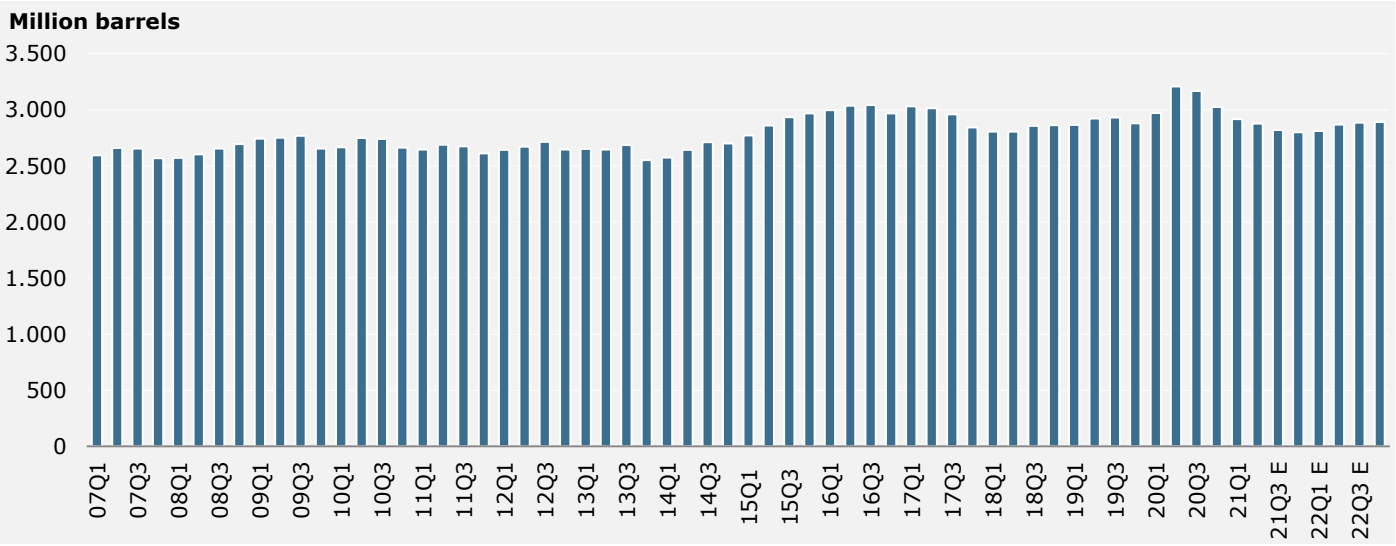


Source: U.S. Energy Information Administration, OPEC, R. Brakenhoff

Commercial oil inventories in OECD countries decreased by 1% QoQ in 2Q21

Whereas the level of commercial inventory of oil in the OECD countries fluctuated in a bandwidth of 2.5-3.0 billion barrels between 1Q07 and 4Q19, it increased by more than 0.2 billion barrels (+8% QoQ) to 3.2 billion barrels in 2Q20. Thanks to ongoing oil production cutbacks in 2Q21, the U.S. Energy Information Administration estimated that commercial oil inventories in the OECD countries decreased by more than 1% QoQ in 2Q21 and will drop by another 2% to 2.8 billion barrels at the end of 4Q21. It is expected that this inventory level will slighly increase again in 2022 due to the dimishing impact of the oil production cutbacks.

Graph 5: Development commercial inventory of oil at the OECD countries (million barrels)



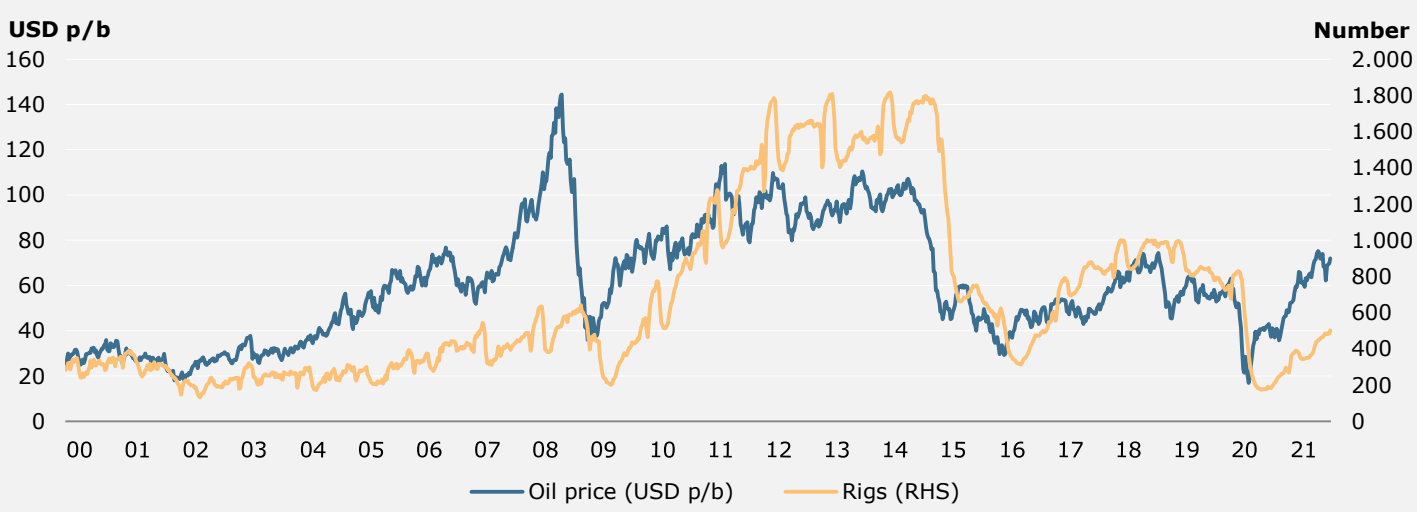
Source: U.S. Energy Information Administration

Also in the USA crude oil inventory level rose spectacularly until June 2020 (+26% compared to year-end 2019). Thanks to sharply lower oil production in the USA (see also below), the inventory level declined by more than 15% by mid September 2021 compared to year-end 2020.

Number of oil drilling rigs in North America nearly doubled in 2021YTD

The sharp fall of the oil price as of July 2014 has led to a significant decrease in the number of operating onshore oil drilling rigs in North America. Whereas the number of rigs peaked at around 1,800 units in October 2014, it plummeted to 312 units in May 2016, which was the lowest number in the last decade. Thanks to the oil price recovery as of 2Q16 the number of drilling rigs recovered to 1,000 onshore drilling rigs in February 2018. It hoovered around 1,000 units until the end of November, but the sharp drop of the oil price during 4Q18 pushed down the number to 877 at the beginning of 2019. Although the North American WTI oil price recovered from USD 45 p/b at the start of 2019 to USD 61 p/b at the end of 2019, the number of onshore oil drilling rigs declined further to 670 units. The outbreak of the Coronavirus has led to a spectacular drop of the US (WTI) oil price in 1H20. As a result, the number of onshore oil drilling rigs dipped at 174 units by mid July 2020, 75% down compared to year-end 2019. Thanks to the recovery of the WTI oil price, the number of oil drilling rigs recovered by 87% to 502 between year-end 2020 and mid September 2021.

Graph 6: Development of number of onshore oil drilling rigs in North America

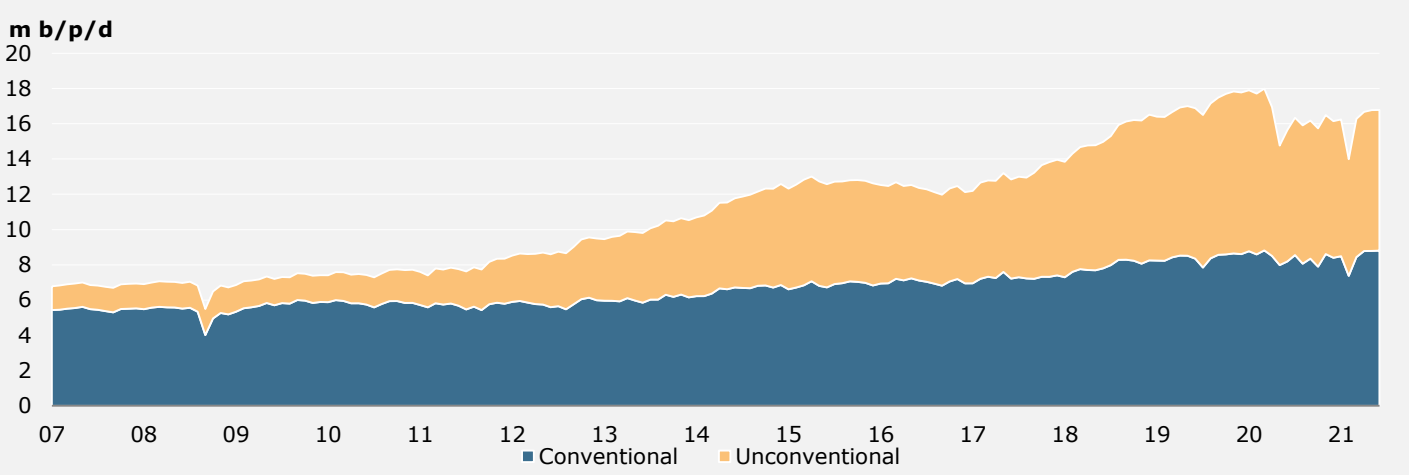


Source: Baker Hughes, Refinitiv

With a certain time lag of around 6-12 months, the sharply lower number of drilling rigs in use resulted in lower oil (and gas) production in North America in the period until 1Q17. However, as of April 2017 unconventional oil production increased YoY again. According to the U.S. Energy Information Administration unconventional oil production rose by more than 11% YoY in 1Q20. However, the developments in April were dramatic with the first ever negative WTI oil price ever. As a result, unconventional oil production plummeted spectacularly, particularly in May (-20% YoY). In both 2Q20 and 3Q20 unconventional oil production declined by 11% YoY, followed by 15% YoY in 4Q20, and even a 19% YoY drop in 1Q21. The latter was partly due to harsh winter weather in February, leading to 28% lower oil production compared to February 2020. According to the latest data, the unconventional oil production recovered by 5% YoY in 2Q21. For September and October 2021 the U.S. Energy Information Administration expects an unconventional oil production of approximately 8.1m b/p/d, which means a growth rate of 3-4% YoY compared to the same months in 2020. If this forecast materialises, unconventional oil production will be 3% higher YoY in 3Q21.

Looking at the development of the number of onshore drilling rigs in the USA, which has increased since August 2020 (+184%), as well as the announced Upstream CAPEX budgets by the US Independent oil companies, I believe that the unconventional oil production will continue to recover in the coming quarters. For 2021 as a whole, the U.S. Energy Information Administration estimates stable production (2020: -0.9m b/p/d), but rising again by 1.4m b/p/d in 2022.

Graph 7: US oil production (including national gas liquids & condensates)

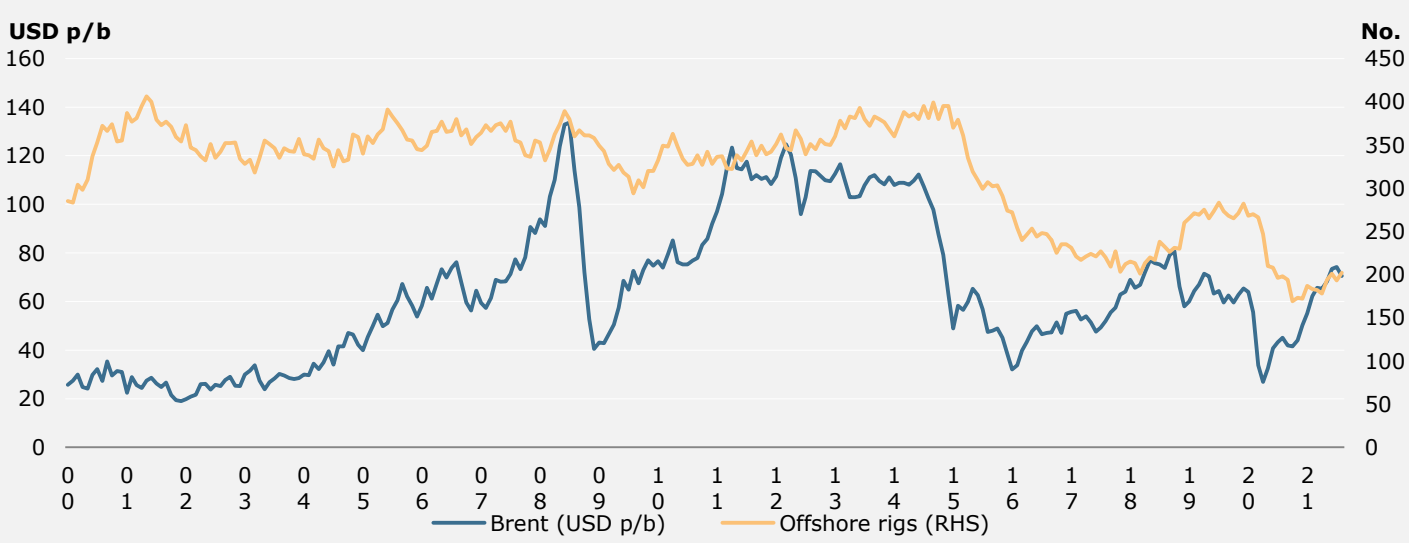


Source: U.S. Energy Information Administration

Number of offshore drilling rigs hardly recovering: Up 2% YoY in August 2021

According to Baker Hughes the number of offshore drilling units (Jack-Ups, Semi-Submersibles, Drillships) rose by 2% YoY globally to 202 units in August 2021. This number was the highest in 2021YTD, but still one of the lowest ever since it was published in early 1982! (see graph below). The largest YoY increases in August were seen in Africa (x8), Europe (+36%), and North America (+7%), but it stabilised in Latin America and declined in Asia (-16%) and Middle East (-18%).

Graph 8: Development number offshore drilling rigs in the world versus Brent oil price

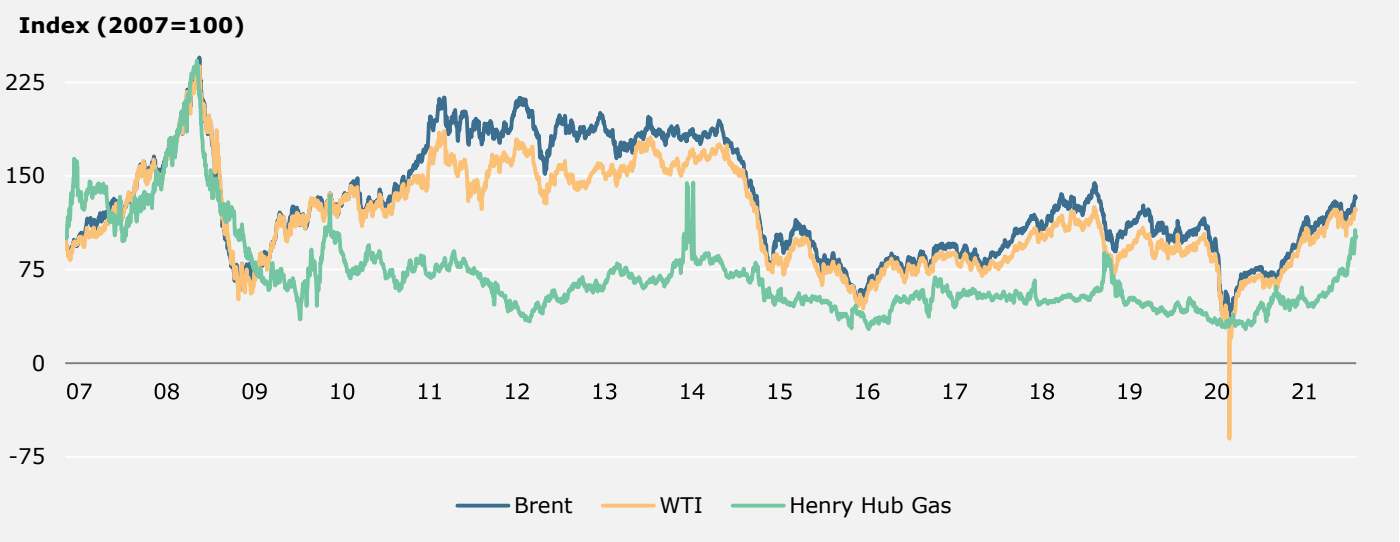


Source: Baker Hughes, Refinitiv

Brent oil price more than doubled YoY in 2Q21; Up 13% compared to 1Q21

In 2Q21 the Brent oil price was on average USD 69.01 p/b, up 107% compared to 2Q20 and up 13% compared to 1Q21. During 2Q21 the oil price climbed from USD 63.51 p/b at the start of the quarter to more than USD 76 p/b at the end of June. Thanks to the strong recovery of the global economy and the successful production cutback by OPEC+ pushed up energy prices. In 2Q21 the average US WTI crude oil price amounted to USD 66.08 p/b, up 136% YoY.

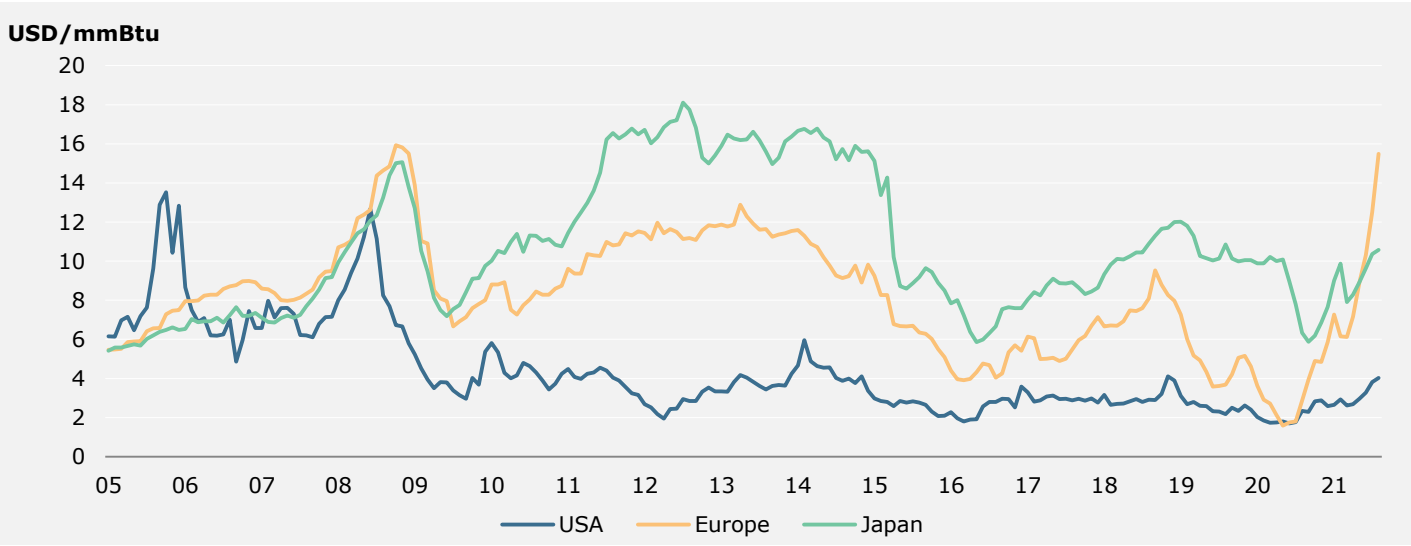
Graph 9: Development of oil and gas prices (Index: 1 January 2007 = 100)



Source: Markets Businessinsider

The price of natural gas in North America (Henry Hub) increased 69% YoY to USD 2.97/mmBtu in 2Q21, but it only slightly went up compared to 1Q21 (+9%). Gas prices in Europe nearly quadrupled YoY in 2Q21 and also climbed by 35% compared to 1Q21. Relatively cold weather in the second quarter, higher oil prices, and the strong economic recovery pushed up the gas price. As of June 2021 the European gas price has been higher compared to the Japanese LNG import price (see graph below), which was the first time since July 2009.

Graph 10: Development of gas prices in Europe, Japan, and North America

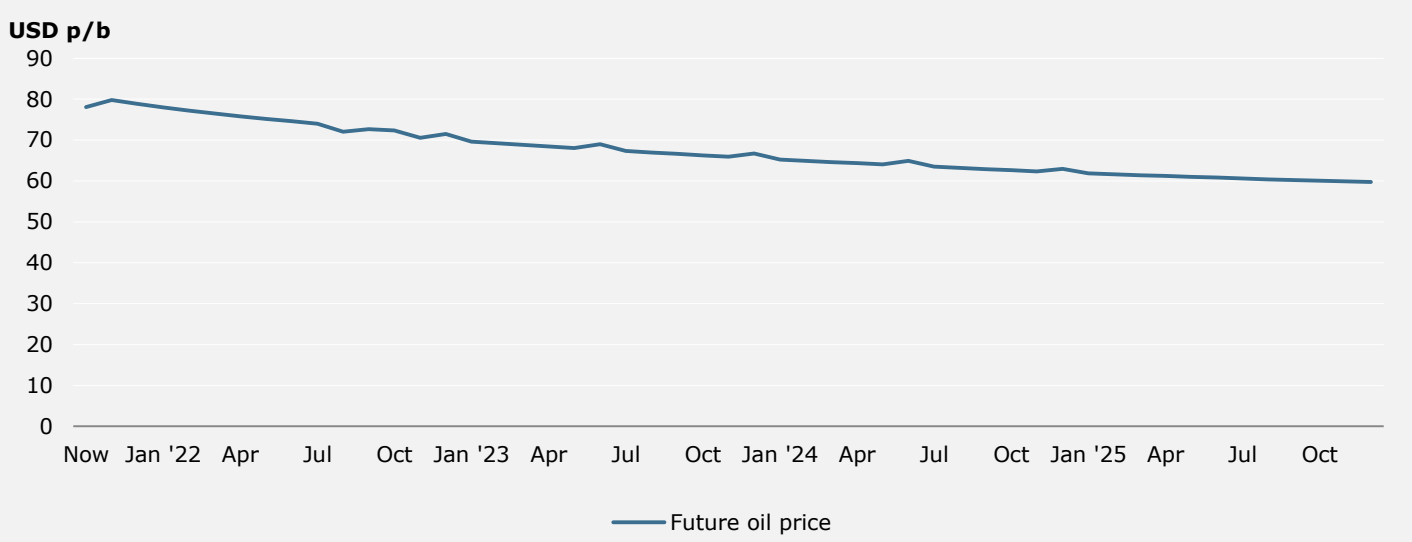


Source: Markets Businessinsider, World Bank

Brent oil futures points towards gradually declining prices in coming years

Oil price futures are often used to forecast oil prices, but they are not always accurate as forecaster. Current Brent oil price (September 27th) was USD 79.35 p/b. The graph below shows Brent oil future prices. Buying a barrel of Brent in December 2021 would currently cost around USD 78.9 p/b. This price is only an indication at the moment, the actual price in December 2021 can be totally different. In the coming years the Brent oil price could go down to approximately USD 60 p/b in December 2025 (see graph below).

Graph 11: Brent oil future prices September 2021 until December 2025

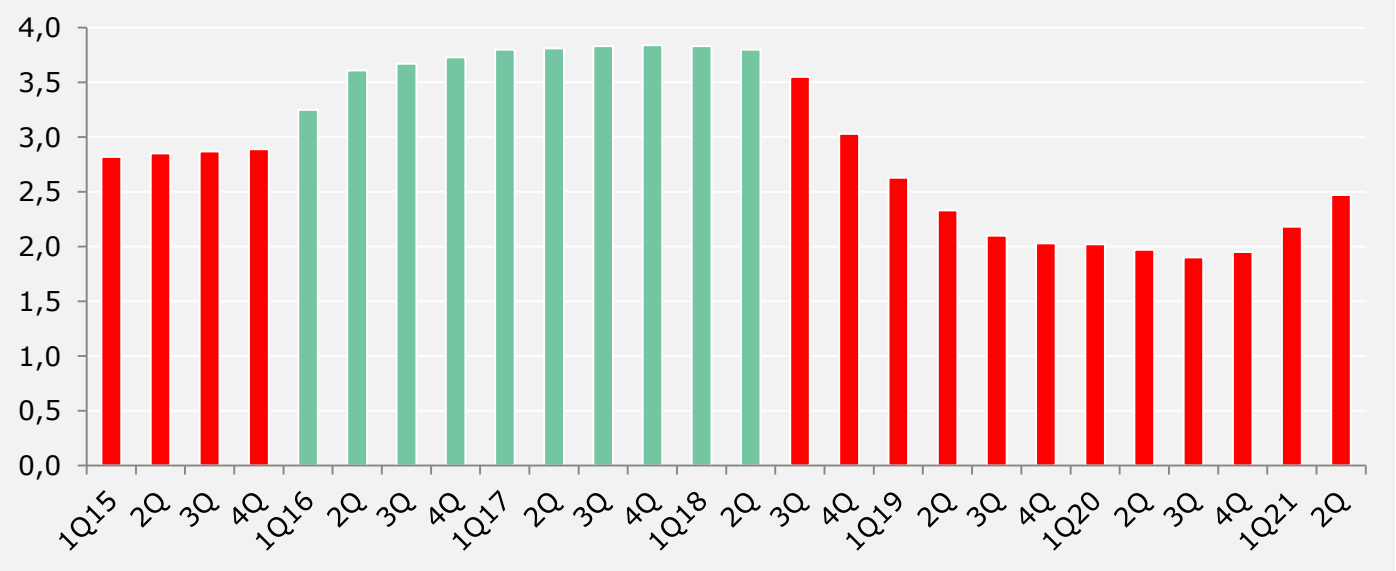


Source: www.barchart.com

Unclear if Iran & USA could reach an agreement

After US president Joe Biden started as new president in January 2021, rumours have started that the USA could rejoin the nuclear agreement between Iran and several countries (China, France, Russia, UK, EU, Germany, and USA (until November 2018), also known as the Joint Comprehensive Plan of Action (JCPOA). To rejoin the JCPOA, president Joe Biden stated that Iran has to resume compliance with the agreement. As a result, new negotiations have started and optimism has increased that both parties could reach a new agreement. On June 18th, Iran elected a new president: Ebrahim Raisi. He is a former judge and known as a hardliner. He is mentioned on the US sanction list due to human rights abuse. If the election of mr. Raisi is positive or negative for the negotiations is unclear. If an agreement is reached, Iran's oil production could increase significantly again. As shown at the graph below Iran's oil production clearly increased in 2016 when the sanctions were temporarily lifted. In May 2018 president Trump decided to withdraw from the JCPOA and reintroduced the sanctions against Iran in November 2018. As a result, Iran's oil production plummeted from 3.8m b/p/d to approximately 2.0-2.5m b/p/d at the moment. To sum up, if the USA rejoins the agreement and lifts the sanctions again, the global oil market would be facing 1.0-1.5m b/p/d of additional oil production at a time of relatively weak oil demand!

Graph 12: Iran's oil production hit since reintroduction sanctions in November 2018 (m b/p/d)

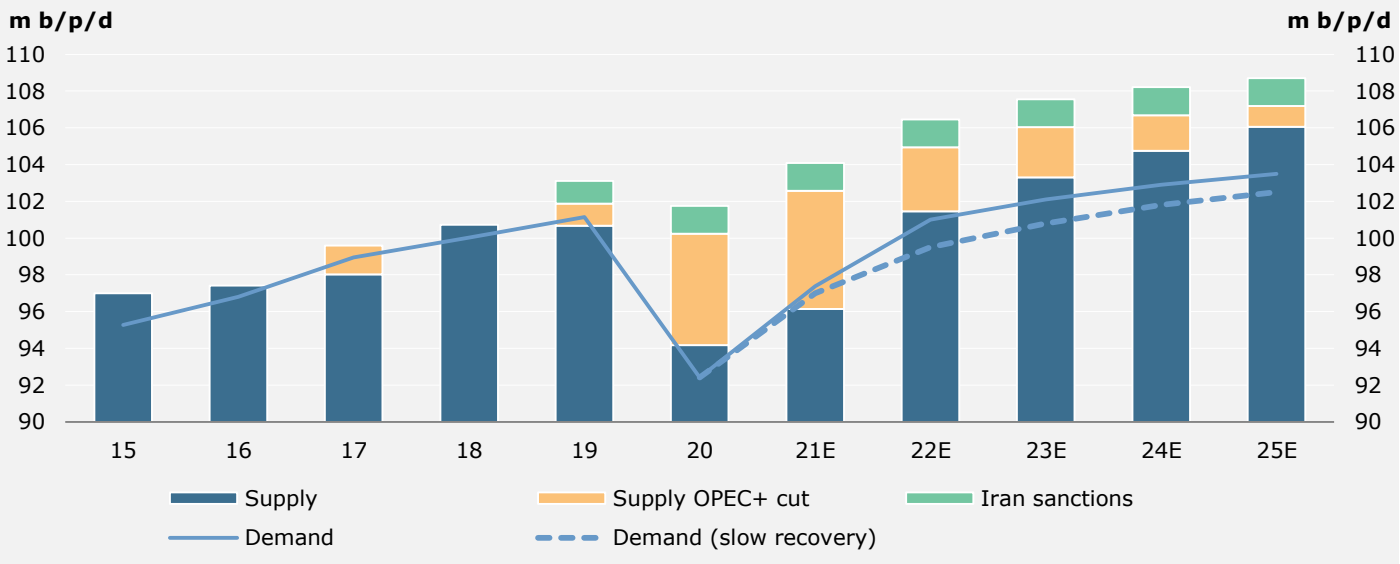


Source: U.S. Energy Information Administration Please note: red bars = sanctions; green bars = sanctions lifted

OPEC+ will raise its production by 2m b/p/d in the coming months

Above I had already discussed the outlook for global oil demand, now I will discuss the oil production outlook. In April 2020 OPEC and its non-OPEC allies (mainly Russia) agreed to cut their oil production by an unprecedented 9.6m b/p/d in May and June 2020 (extended into July), and 7.7m b/p/d in the period August – December 2020. However, the second lockdown at a lot of countries forced OPEC and its allies to keep its production unchanged in January 2021 compared to December 2020. In February and March 2021 Russia and Kazakhstan were allowed to produce slightly more, which was more than offset by a voluntary 1m b/p/d production cutback by Saudi Arabia. This agreement was extended into April 2021. In May, June, and July OPEC and its allies increased its production by 2.1m b/p/d. As of August the OPEC+ members have agreed to raise production by 0.4m b/p/d per month until the end of 2021. Besides higher oil production by OPEC+ in 2022, also production will go up in the USA, Canada, Brazil, Guyana, and Norway. Also in the period 2023-2025 I expect that OPEC+ will restore its oil production further as well as higher production by the above-mentioned countries. If the base case scenario materialises, the graph below shows that the global oil market will be in an equilibrium in 2022, but there is a clear risk of oversupply as of 2023 if OPEC+ restores its production too quickly! This situation would deteriorate if the sanctions against Iran are lifted.

Graph 13: Risk of oversupply remains even with ongoing vaccination programs (m b/p/d)



Source: IEA, U.S. Energy Information Administration, R. Brakenhoff

In the table below I compared several oil price forecasts from market surveyors. The forecast by Bloomberg is the average based on estimates given by commodity analysts. To illustrate the uncertainty level in the market, the oil price forecast for 2022 is on average USD 67 p/b, but it ranges between USD 58 p/b and USD 75 p/b. Regarding the forecast for 2025, the range is huge, i.e. the lowest forecast is USD 55 p/b and the highest is USD 80 p/b.

I foresee an average Brent oil price of USD 70 p/b in 2021 (previously USD 63 p/b), i.e. around USD 77 p/b in 4Q21. Although there are very optimistic GDP forecasts, such as IMF's global GDP outlook, I remain more cautious. Assuming more normalised market conditions in 2022, i.e. diminishing impact of COVID-19, I foresee an average Brent oil price of USD 70 p/b (previously USD 61 p/b). As shown at the graph above, there is a clear risk of oversupply again as of 2023 if the OPEC+ members restore their production too quickly. As a result, I believe that the Brent oil price will slightly decrease in the coming years to USD 58 p/b in 2025 (previously USD 55 p/b).

Table 5: Brent oil price forecasts (2021 - 2025)

USD per barrel	2021E	2022E	2023E	2024E	2025E
IEA Stated Policies Scenario	66	67	69	70	71
U.S. Energy Information Administration	69	66	55	58	61
World Bank	56	60	61	62	63
IMF	65	63	54	53	52
Bloomberg (commodity analysts)	68	67	66	71	69
Rabobank	71	72	74	73	73
Richard Brakenhoff	70	70	66	62	58

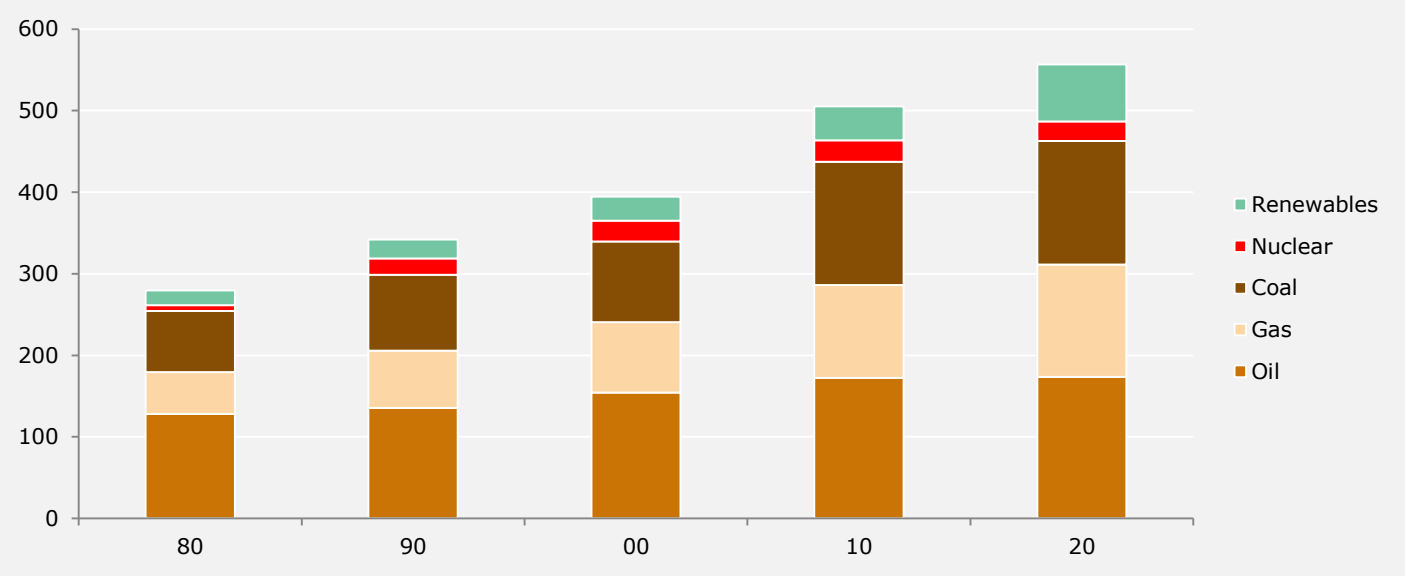
Source: IEA World Energy Outlook 2020, U.S. Energy Information Administration STEO September 2021 and Annual Energy Outlook 2021, World Bank (April 2021), IMF World Economic Outlook April and July 2021, Bloomberg (commodity analysts), Rabobank, R. Brakenhoff

Offshore Wind could grow from 35GW in 2020 to 2,000GW in 2050

Global energy consumption decreased 4.3% in 2020, but renewables up 5.1%

According to BP's Statistical Review 2021 total global energy demand amounted to 557 ExaJoules (EJ) in 2020, down 4.3% compared to 2019. Oil is still by far the largest energy source (31% in 2020), followed by coal (27%) and natural gas (25%). Although the use of fossil fuels declined YoY in 2020, overall these fuels still accounted for 83% of the total energy consumption worldwide (1980: 91%). Although the use of renewable energy (hydro, solar, wind, etc.) increased strongly, particularly in the last decade, the share of renewables in the overall energy consumption was only 12.6% in 2020 (see graph below). Despite lower demand for fossil fuels in 2020 compared to 2019, the use of fossil fuels still rose by a CAGR of 0.6% in the last decade.

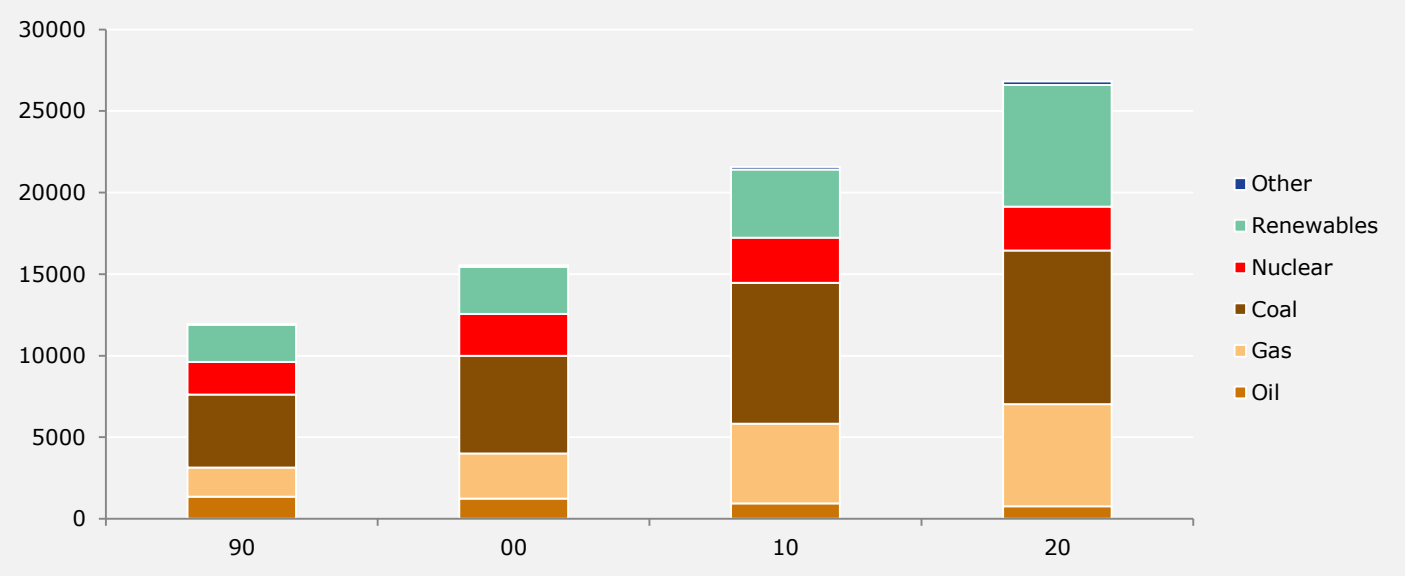
Graph 14: Renewables accounted for 12.6% of total global energy consumption in 2020 (EJ)



Source: BP Statistical Review 2021

Looking at only the production of electricity, the role of renewables is much bigger (see graph below). Thanks to the strong growth in solar and onshore and offshore wind capacity, renewables accounted for nearly 28% of the total electricity production in 2020 (2010: 19.5%), whereas fossil fuels accounted for 61%. The latter consisted mainly out of coal (35% of total) and natural gas (23% of total).

Graph 15: Renewables accounted for 27.8% of global electricity production in 2020 (TWh)

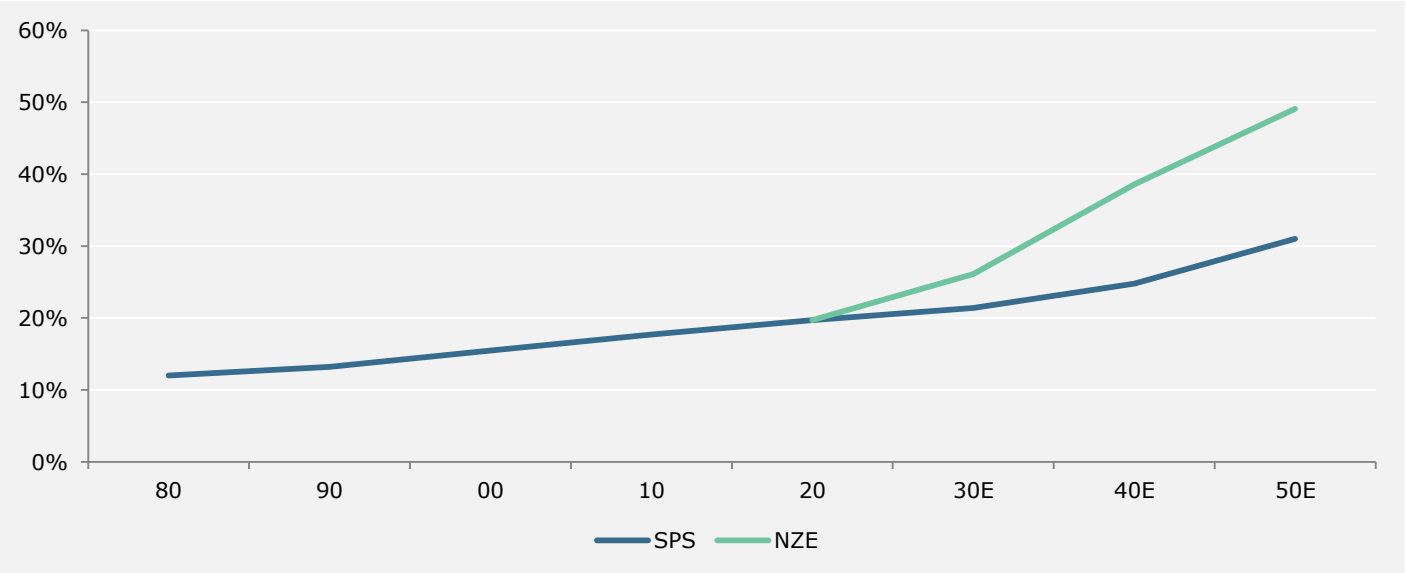


Source: BP Statistical Review 2021

Greening Power supply plays crucial role at net zero emissions scenarios

As discussed in my previous update, the use of electricity has to go up rapidly at the expense of the use of molecules. The main reason is that greening of electrons (electricity) is 'easier' compared to greening the use of molecules. In 2020 the use of electricity accounted for nearly 20% of total global energy demand. This means only a small growth compared to the year 2010 (17.7%) or even the year 1980 (12.0%), see graph below.

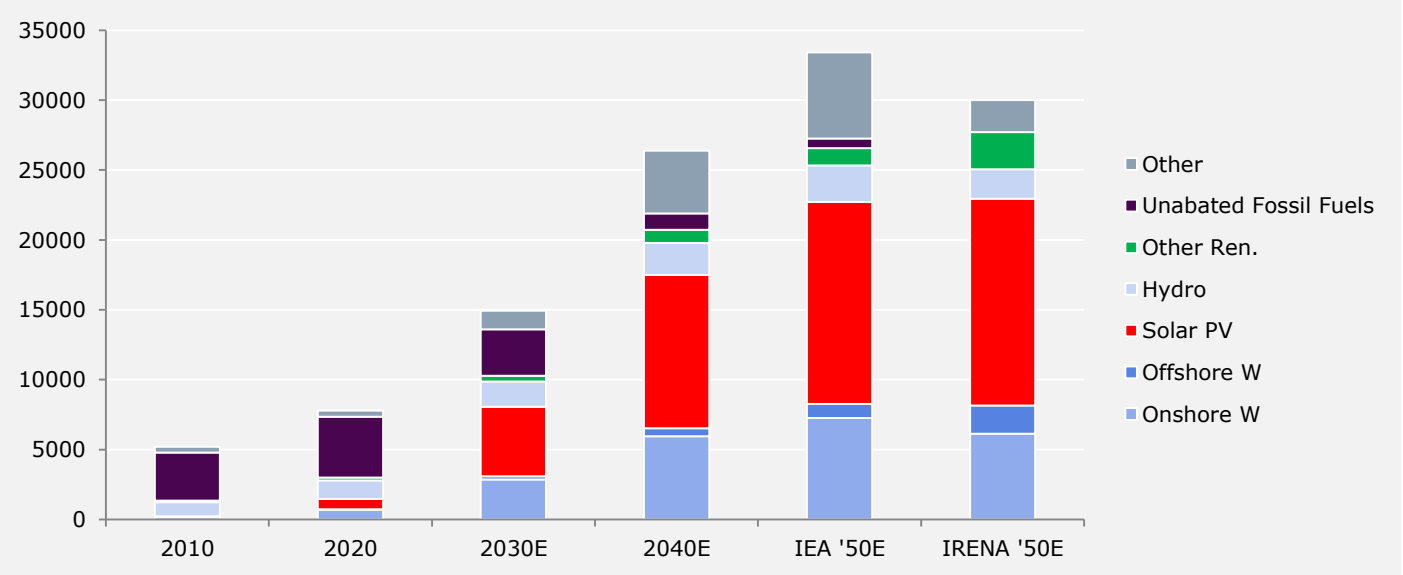
Graph 16: Electricity only accounted for 20% of energy consumption globally in 2020



Source: BP Statistical Review 2021, IEA World Energy Outlook, IEA Net Zero by 2050

At its NZE scenario, the IEA believes that electricity should account for nearly half of total energy demand worldwide in 2050. To achive this 50% in 2050 a lot of renewable energy capacity has to be installed, such as solar PV, onshore and offshore wind, hydroenergy, bioenergy, etc. To comply with the NZE scenario, total global renewable capacity has to jump from nearly 3,000GW in 2020 to more than 26,000GW in 2050, i.e. a CAGR of 7.5% in the period 2020-2050. Particularly solar PV and offshore wind should grow strongly in the period. Also research institute IRENA published a study what should be done globally to keep global warming at 1.5°C or less. IRENA believes that in 2050 2,000GW of Offshore Wind capacity should be installed worldwide (IEA: 1,000GW), see also the graph below. Overall, the scenarios of the IEA and IRENA do not differ too much, albeit the latter believes that energy efficiency should play a bigger role, i.e. overall installed electricity capacity has to be somewhat lower in 2050 compared to IEA's NZE scenario.

Graph 17: Global electricity generation capacity must grow rapidly thanks to renewables



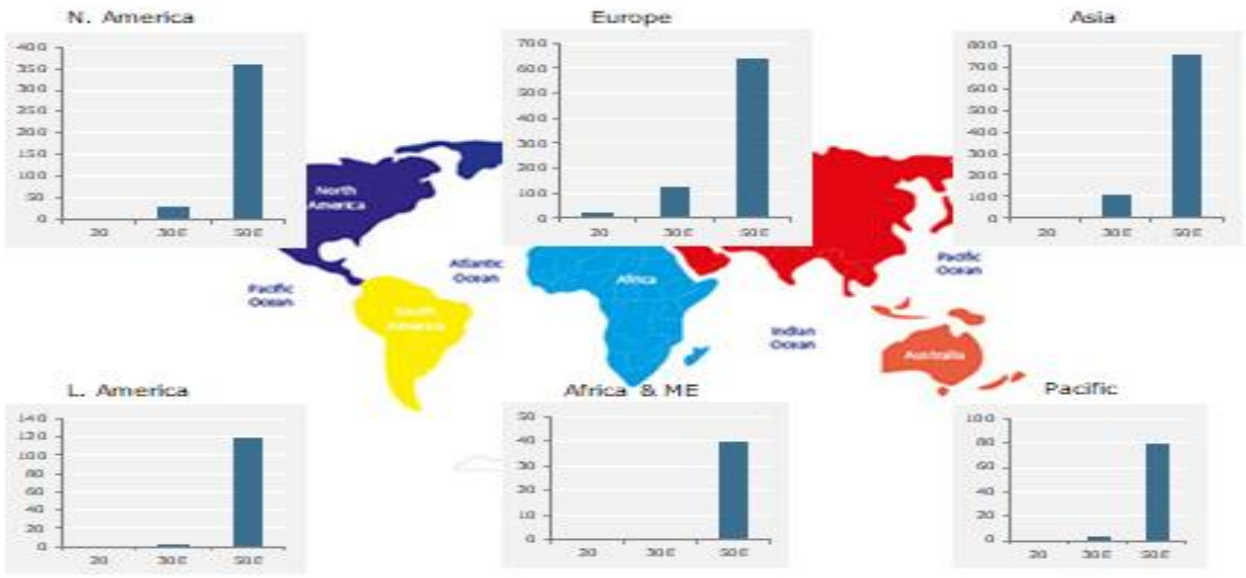
Source: BP Statistical Review 2021, REN21, GWEC, IEA Net Zero by 2050, IRENA World Energy Transitions Outlook

Europe largest Offshore Wind market, but Asia will become larger in 2050

Recently GWEC has released its Global Offshore Wind Report 2021. Besides giving a detailed analysis of the global offshore wind market until 2030, GWEC also gave its view until 2050 (see graph below). Whereas only 35GW of offshore wind was installed worldwide at year-end 2020, it could jump to 270GW in 2030 and 2,000GW in 2050. Whereas Europe has been the largest market for offshore wind, after 2030 Asia (including China) will become the largest market. A new geographical area will be North America, particularly the northeast coast of the USA. Currently non-existent, new areas will be Latin America, Africa & Middle East, and the Pacific in the coming decades.

As said above, the GWEC foresees the global offshore wind capacity to jump to 270GW in 2030, of which floating offshore wind will account for 16.5GW (year-end 2020: 73MW). Whereas the GWEC last year only forecasted a total of 6.5GW of floating wind in 2030, recently launched initiatives have made them more optimistic for the coming decade. According to a report from DNV GL around 250GW of floating offshore wind capacity could be installed in 2050.

Graph 18: Installed offshore wind capacity by region between 2020 and 2050 (GW)

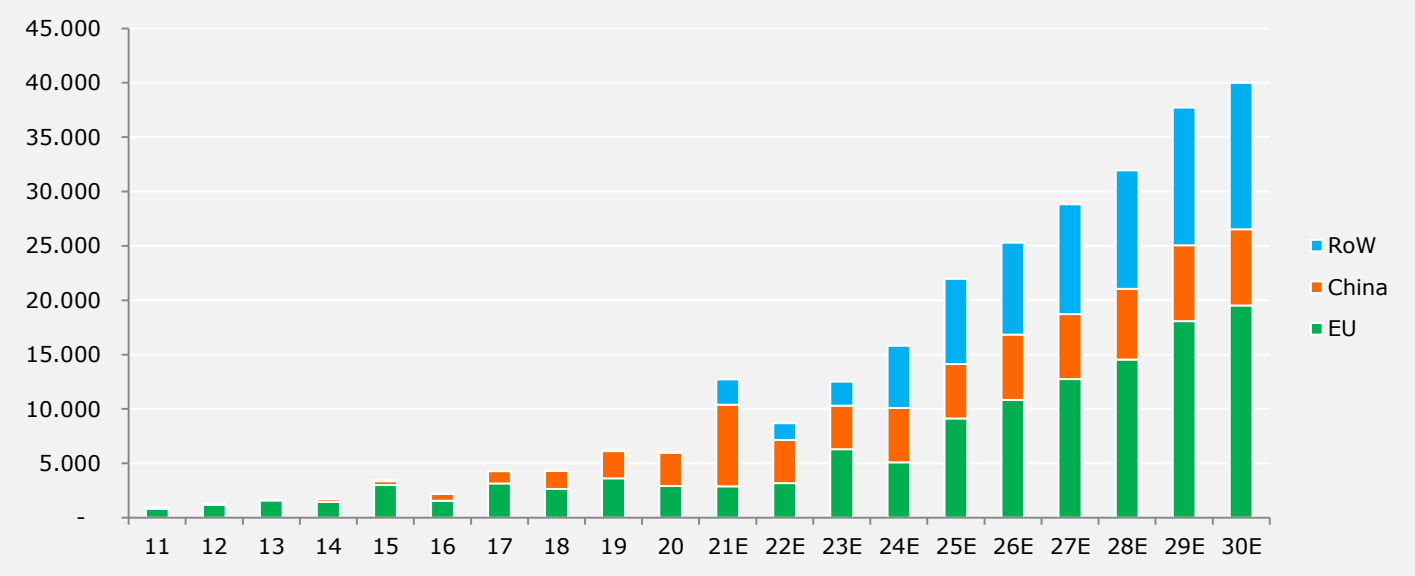


Source: GWEC Global Offshore Wind Report 2021

Annual installations offshore wind should surge more than six-fold until 2030 ...

To achieve 270GW of offshore wind capacity worldwide in 2030, annual installations have to surge more than six-fold from 6.1GW in 2020 to nearly 40GW in 2030 (see graph below). Overall 235GW has to be installed in this decade, of which 102GW in Europe, 99GW in Asia, of which 58GW in China and 41GW in other Asian countries (Taiwan, Japan, South Korea, Vietnam), 29GW in North America, and 5GW in Latin America and the Pacific. Whereas in Europe the average size of an installed offshore wind mill was 5.2MW in the last decade, I believe that the average size will more than double in this decade. In other words, the number of wind mills that have to installed will not surge more than six-fold, but more than three-fold, which is still impressive. This will be challenge, not only to find enough skilled employees, financing, cost inflation, but also the necessary equipment, i.e. vessels with large cranes being able to install these huge wind mills (will be discussed in more details later on).

Graph 19: Yearly global installation of offshore wind capacity until 2030 (MW)

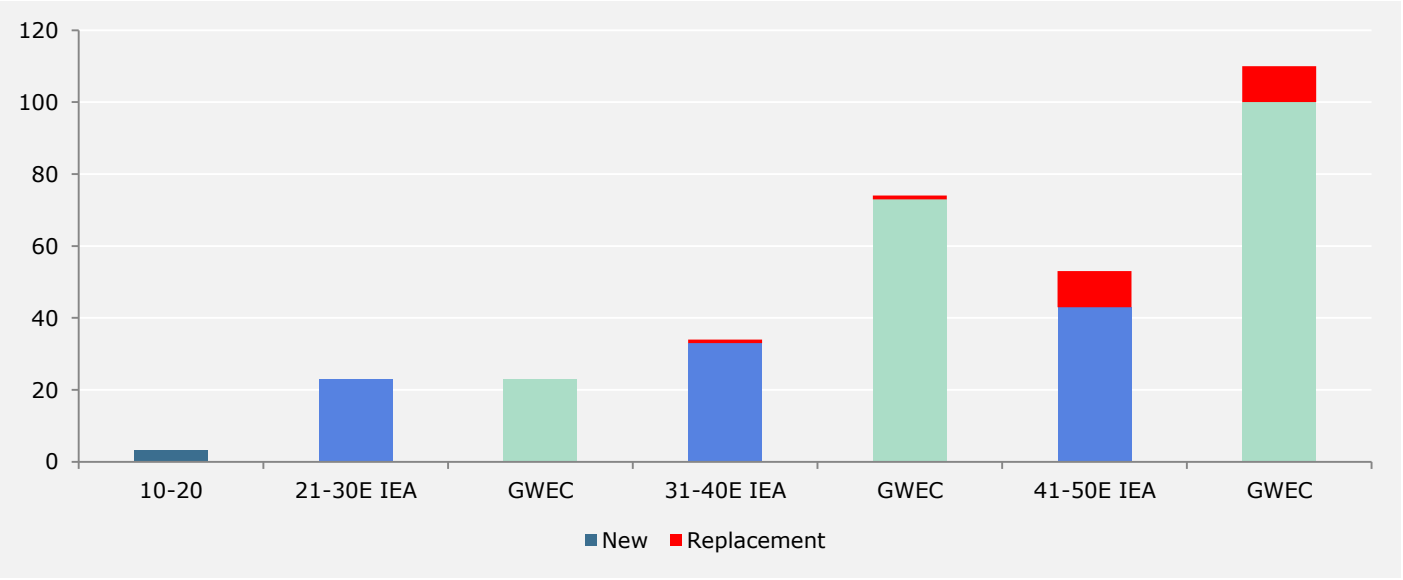


Source: GWEC Global Offshore Wind Report 2021

... Strong growth should continue also beyond 2030 ...

At the graph below I have expressed the average annual offshore wind installations measured in GW in the two decades after 2030 using the scenarios of IEA (1,000GW in 2050) or IRENA/GWEC (2,000GW in 2050). Assuming an economic lifetime of 25 years of offshore wind mills, replacement of old equipment will become larger and larger. In the period 2041-2050 the wind mills installed in the period 2016-2025 have to be replaced, i.e. an estimated total of 95GW or 9.5GW per annum (see red bars at the graph). All told, average annual installations measured in GW should jump from 23GW in the '20s to 34GW (IEA) or 74GW (GWEC) in the '30s and 53GW (IEA) or 110GW (GWEC) in the '40s. Assuming that the average size of an installed offshore wind mill will increase from an estimated 10MW in the '20s to 24MW in the '40s, the number of to be installed wind mills will double in the '30s compared to the '20s, and go up by another 5% in the '40s.

Graph 20: Average annual installations by decade using two scenarios until 2050 (GW)

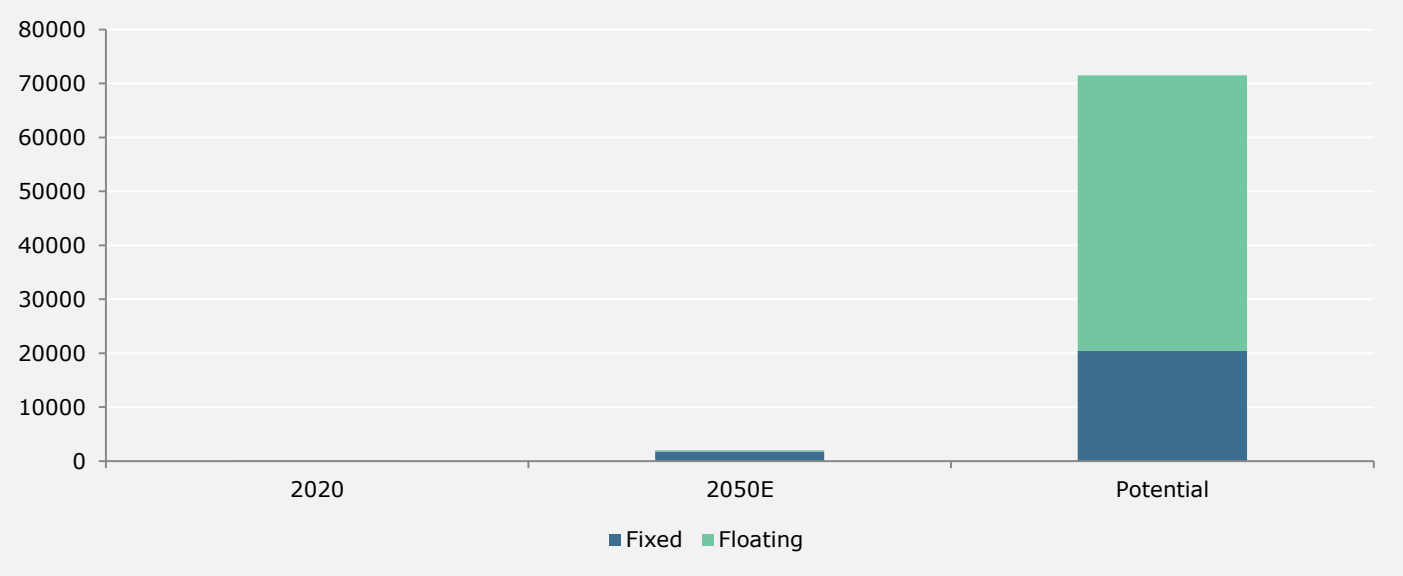


Source: GWEC Global Offshore Wind Report 2021, IEA NZE in 2050, R.Brakenhoff

... Still huge potential of offshore wind capacity available

The forecasted 2,000GW of installed offshore wind capacity in 2050 is already impressive compared to the current situation of only 35GW. However, potentially, the 2,000GW is not the limit. According to the World Bank worldwide there is a potential of approximately 20,000GW of offshore wind with fixed foundations and 51,000GW of floating offshore wind. According to IRENA, offshore wind could account for 10% of the global electricity generation in 2050, but the potential is much bigger! Therefore, I believe that outlook for offshore wind will remain very promising for many decades to come!

Graph 21: Global potential of fixed and floating offshore wind (GW)



Source: GWEC, World Bank

Structurally booming market conditions, but what are the risks?

Above I have described the expected booming market conditions at offshore wind globally, not only until 2030 or 2050, but most likely also beyond 2050. The latter depends on developments on costs, i.e. what kind of renewable energy is most promising. Whereas tidal or marine is hardly existing at the moment, a technologically breakthrough could change this picture completely. However, for the time being, offshore wind will in my view be a booming market worldwide, but what kind of risks are there? Without mentioning all possible risks, hereby several important ones:

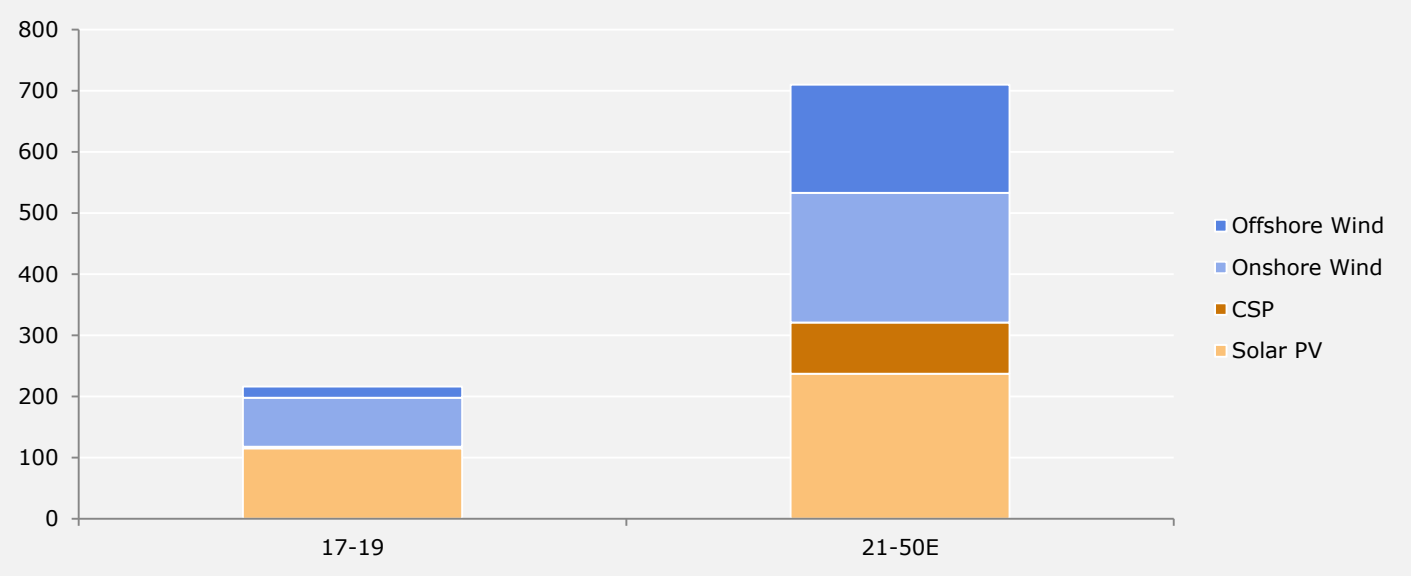
- Finance: Who will finance the necessary huge investments? What will happen if inflation is rising, causing interest rates to climb?
- Availability of commodities: To make the energy transition possible, a lot of commodities like steel, copper, aluminium, etc., will be needed. Will those commodities be available and at what price level?
- Capacity: Are there enough installation vessels available? Skilled staff?
- Electricity prices: Increasing generation of renewable energy, centralized and decentralized, will make electricity markets more volatile as long as sufficient storage systems are not available. The number of hours with negative electricity prices will go up, which could jeopardize profits at (offshore) wind farms as long as minimum prices are not guaranteed by customers of electricity or by governments through subsidy schemes.

These risks will be discussed below.

Annual investments in Solar and Wind energy should more than tripple until 2050

According to IRENA's World energy Transitions Outlook, the average annual amount of investments in solar and wind energy has to jump from USD 216bn in the period 2017-2019 to USD 710bn in the period 2021-2050 (see graph below). Key question is who will finance these investments? Governments, utility companies, oil & gas industry, institutional investors, private investors, banks?!?

Graph 22: Average annual investments in Solar and Wind energy (2021-2050E)

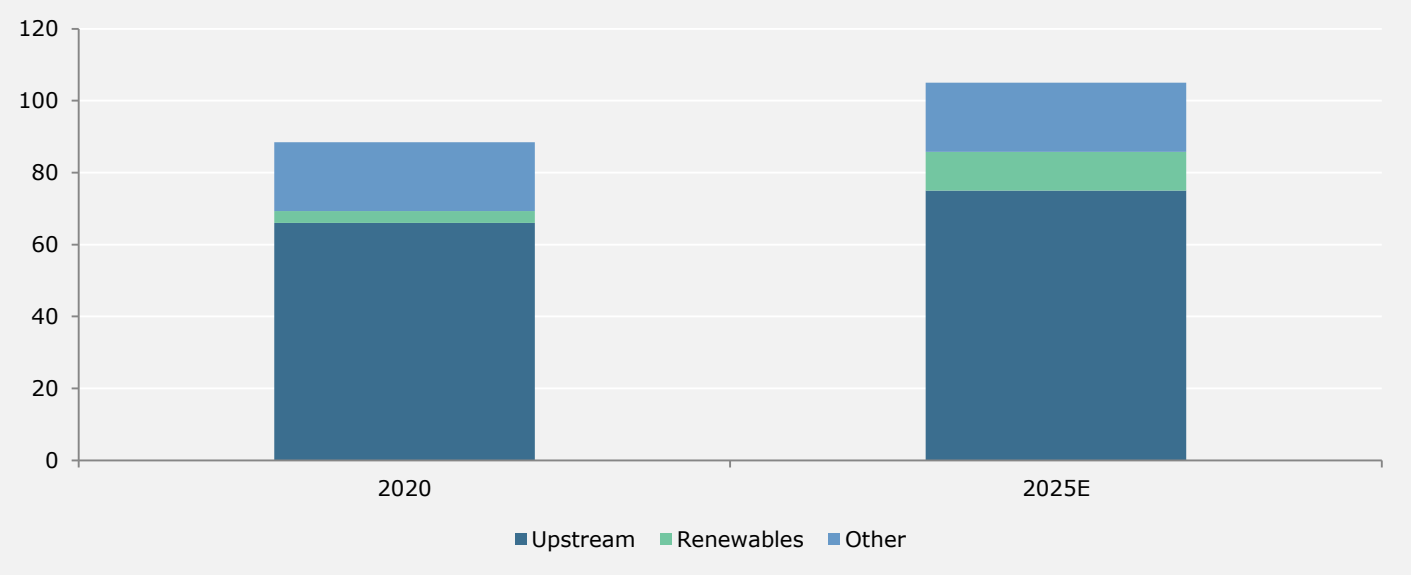


Source: IRENA World Energy Transitions Outlook

Oil Majors should raise green investments, but transformation goes slowly

The Oil Majors (ExxonMobil, Chevron, Shell, BP, Total, Eni, ConocoPhillips) only invested a small part of their CAPEX budget into renewable energy in 2020 (see graph below). My definition of green investments are spending CAPEX on solar, wind, tidal, geothermal, etc., whereas the companies often also refer to investments to reduce flaring or CO_2 emissions at their own Upstream and Downstream activities. Whereas the US Oil Majors hardly announced any plans to switch to renewable energy, the European Oil Majors have launched their (long-term) plans. Particularly BP was very clear what to do by the year 2030 (oil & gas production down 40% compared to 2020; reinvesting into renewable energy). Not being an Oil Major, Norwegian Equinor also has clear renewable energy plans, albeit oil & gas remains very important. According to my estimates, the Oil Majors only will invest around USD 10bn into renewable energy in 2025, which is very low compared to the overall needed investments.

Graph 23: Oil Majors play minor role at global energy transition (USD bn)

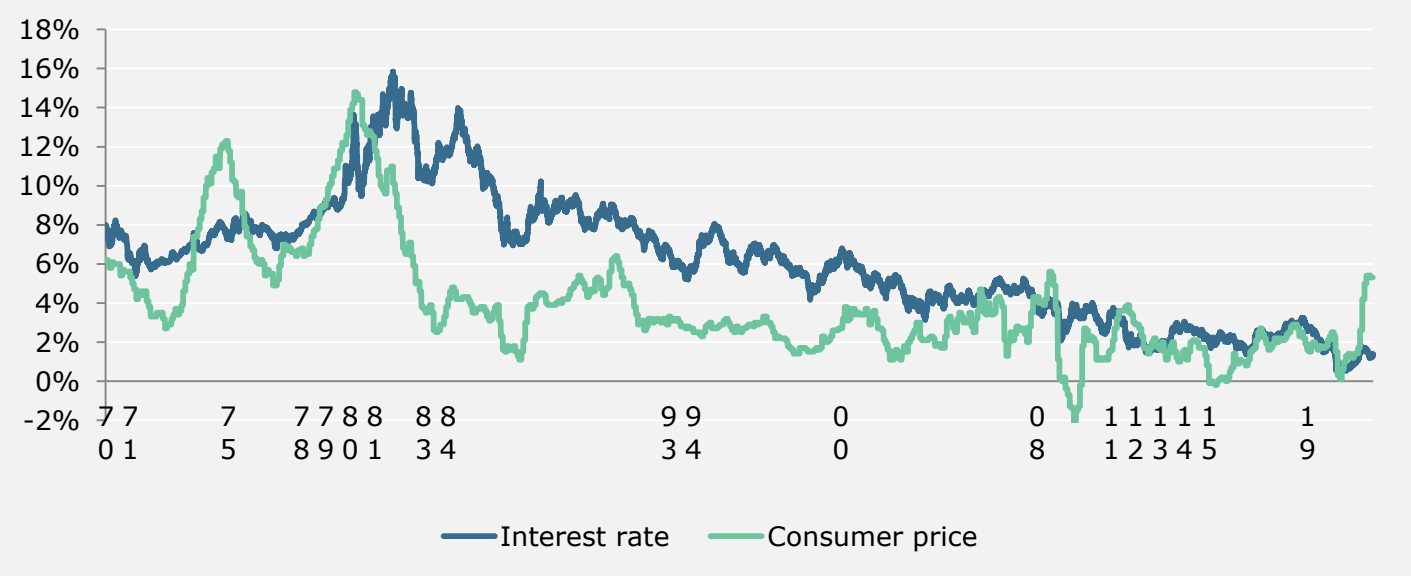


Source: Company reports, R.Brakenhoff

Interest rates on the verge of going up?!?

Before investing in (offshore) wind farms, investors want to realise a return that exceed their WACC. An important part of the WACC is the interest rate. Thanks to exceptionally low governmental interest rates in the last decade, the WACC in general was very low. Interest rates have been kept low by central banks to stimulate their economies. In addition, it was possible as inflation was low (2% is usually the maximum norm, i.e. exceeding this 2% structurally, means that central banks have to raise interest rates to bring inflation down again). The graph below shows consumer price index (inflation) in the USA as of 1970 until August 2021. Furthermore, it also shows the development of the interest rate (10-year US treasury bond yield). The central bank was able to lower their FED Federal Funds Rate strongly in the last decades. However, inflation has stepped up since the beginning of 2021. In August consumer prices were up 5.3% YoY, well above the maximum figure of 2%. If this inflation remains well above 2% structurally, the central bank has to raise its interest rate. So far, economists believe that the inflation is high temporarily due to the impact of COVID-19 and the following strong economic recovery. I believe that there is a clear risk that temporarily could become structurally as I will discuss below.

Graph 24: US Consumer price changes YoY versus 10-Year US treasury bond yield



Source: US Department of Labor, Federal Reserve Economic Data

Commodity prices skyhigh thanks to strong economic recovery

Current inflation is partly fueled by sky-rocketing commodity prices, such as oil & gas prices, but also prices of metals. For the wind industry metals like steel, copper, aluminium, chromium, nickel, zinc, and rare earth metals are very important. Although not every metal is currently trading at historical peak levels (see table below), they all climbed strongly compared to pre-COVID-19 levels (I used year-end 2019 as reference date). Depending on how much of these price increases are actually passed on to the end-users (consumers), it will lead to higher inflation. Futures of commodities point towards some declining prices in the future (coming months), but if this does not materialize it is a risk factor for structurally higher inflation rates and therefore higher interest rates.

Are there enough raw materials avialable? In general: Yes. However, some countries do have a dominant position, like China at steel (>50% global market share), aluminium (55%), zinc (33%), and rare earth metals (60%). At chromium South Africa is important (37%), at copper Chili (28%), and at nickel Indonesia (33%). These countries play a crucial role if there are enough metals available. Political conflicts could jeopardize this situation, such as the world noticed in the '70s and '80s in the previous Century when OPEC used its market power to push up oil prices. All told, high metal prices could also lead to higher CAPEX levels of new (offshore) wind farms and therefore (temporary) postponement of FIDs (final investment decision) for new wind farms!

Table 6: Current major commodity prices versus pre-COVID and previous peak levels

Commodity	Steel (USA) USD/ton	Steel (W. Europe) USD/ton	Copper USD/ton	Aluminium USD/ton
Year-end 2019 (pre-COVID-19)	611	477	6,174	1,810
Current (24 September 2021)	2,078	1,325	9,343	2,913
Record high (previously)	1,203	1,204	10,160	3,340
Record high (date)	Year 2008	Year 2008	Year 2011	Year 2008

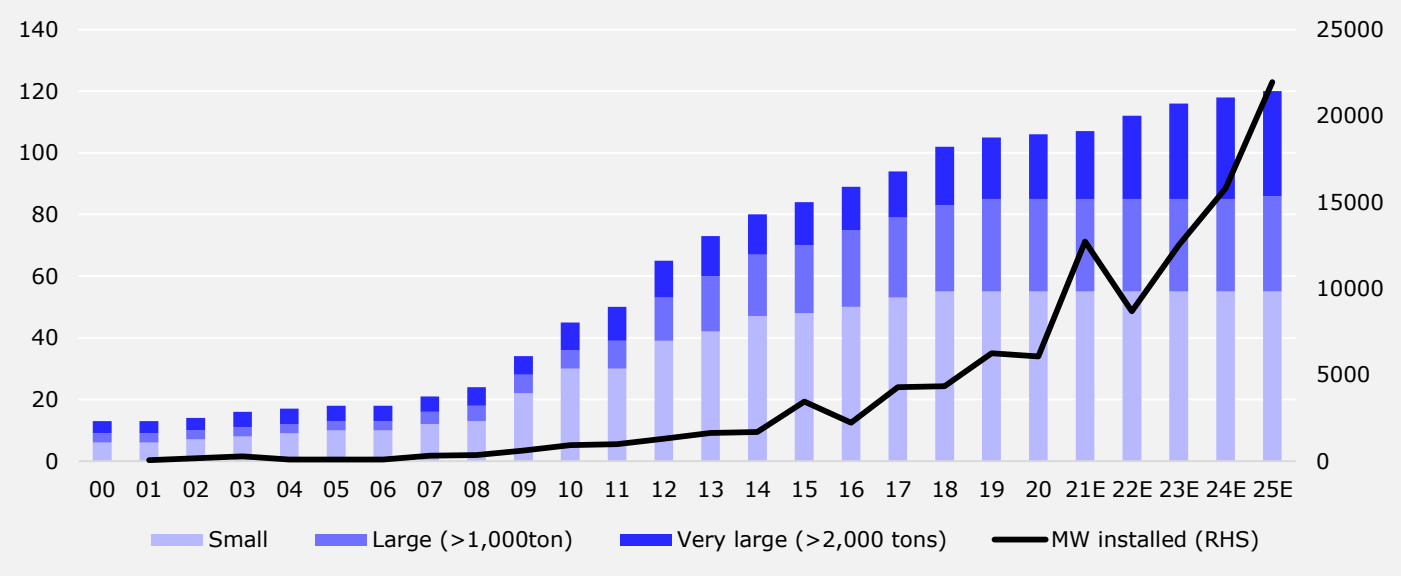
Source: Steel Benchmarker, Markets Businessinsider, R. Brakenhoff

Number of avialable installation vessels could become bottleneck

Looking at the forecasted spectacular growth of offshore wind capacity to be installed worldwide this decade, particularly in the second half of this decade, the number of available installation vessels (for foundations and/or turbines) could become a bottleneck. Particularly as the turbines are becoming larger and larger, and therefore the foundations heavier and heavier, vessels with large cranes are needed. At the graph below I have shown the number of vessels available between the year 2000 and 2020 as well as the foreseen number until 2025. At year-end 2020 more than half of the 106 vessels only had a maximum crane lifting capacity of up to 1,000 tons, which by far is not sufficient to install the current large offshore wind mills of 10MW or more or the huge monopiles. In addition, there were 51 vessels available with cranes capable of lifting 1,000 tons or more, of which 21 vessels could lift 2,000 tons or more. In the coming years 14 vessels will be added to the fleet, of which 13 equiped with cranes capable of lifting 2,000 tons or more. The line at the graph below shows the amount in MW which will be installed offshore per annum historically as well as in the period up to 2025. This amount could jump from 6.1GW in 2020 to 22GW in 2025 and even 40GW in 2030. This forecasted growth will already be a challenge to meet for the sector, particularly in the second half of this decade, but a complicating factor will be the geographical breakdown in growth. Whereas historically the vessels were occupied in Europe (and the Chinese vessels in China), new geographical offshore wind markets arise. For instance, in the USA 29GW of offshore wind capacity is expected to be installed in this decade, but – currently – there is not yet a Jones Act compliant vessel available. In 2023 Dominion Energy will receive the first Jones Act compliant vessel Charybdis. This is not enough, so other installation companies will also sail some vessels to the USA instead of being available in Europe. Sailing vessels from one continent to another is costly, i.e. installation companies will be reluctant to transfer capacity to avoid extra costs. The same picture applies for the markets in the Far East (Taiwan, Japan, Vietnam). Although local companies have ordered several new vessels (Penta-Ocean and CDWE), this will not be enough to cover the foreseen growth, I believe.

Taking into account the revival of ordering of cargo vessels at global shipyards in 2021 YTD, this means that ordering new offshore wind installation vessels will be more difficult with longer delivery times. In addition, new build prices have gone up sharply, partly due to the sharply higher steel prices. All told, I believe that potential bidders for new offshore wind farms have to be very careful, particularly for farms to be constructed in the second half of this decade. Unfortunately, this could clearly lead to delays at the current energy transition process.

Graph 25: Number of installation vessels for Offshore Wind (2000-2025E)

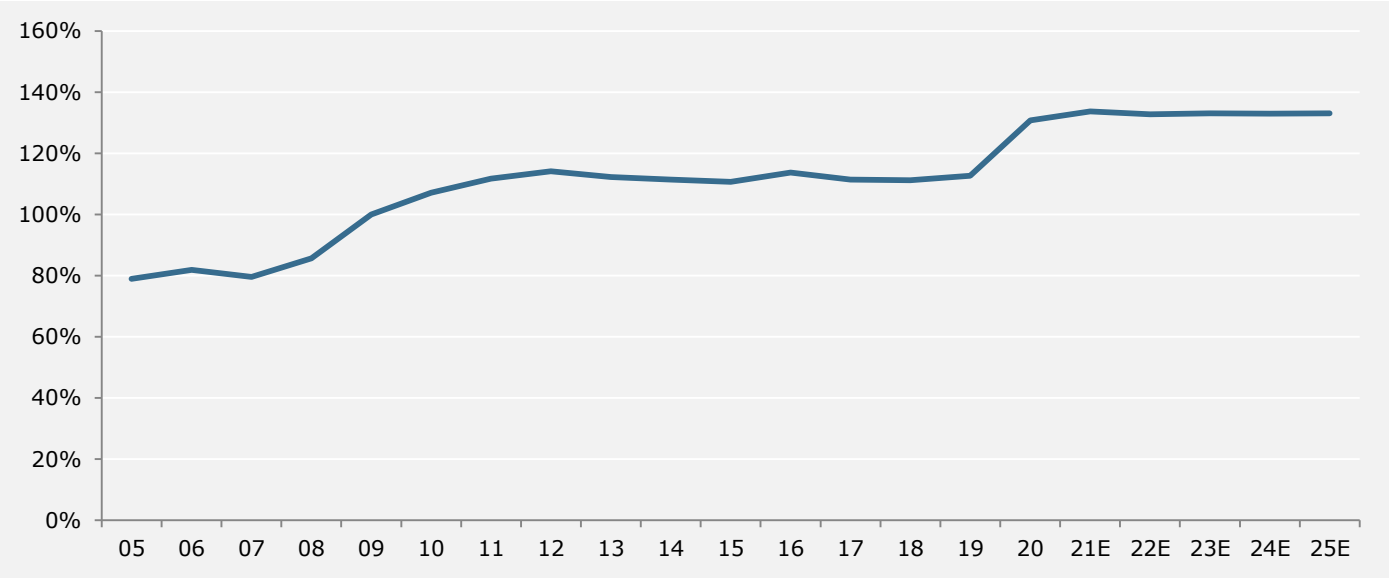


Source: 4COffshore, R.Brakenhoff

Governmental debt level rising, which could jeopardize new investments

To 'survive' the economic impact of COVID-19, governments had to support their economies considerably. At the same time, tax revenues decreased, leading to significant governmental deficits. The graph below illustrates the development of governmental debt at the G20 countries (USA, Canada, Germany, France, etc.) expressed as a percentage of their economies. It is clear that first the global financial crisis in 2008/09 pushed up debt levels, but the upward line was in particular steep in 2020. According to IMF World Economic Outlook this percentage will remain high in the coming years. What will governments do when the COVID-19 pandemic is over? Will they launch budget cuts to improve their financial position? If so, will they skip subsidies on green energy or not? I believe that this risk is low in the short-term, but particularly when interest rates will rise as well, this could be a real risk in the medium- to long-term.

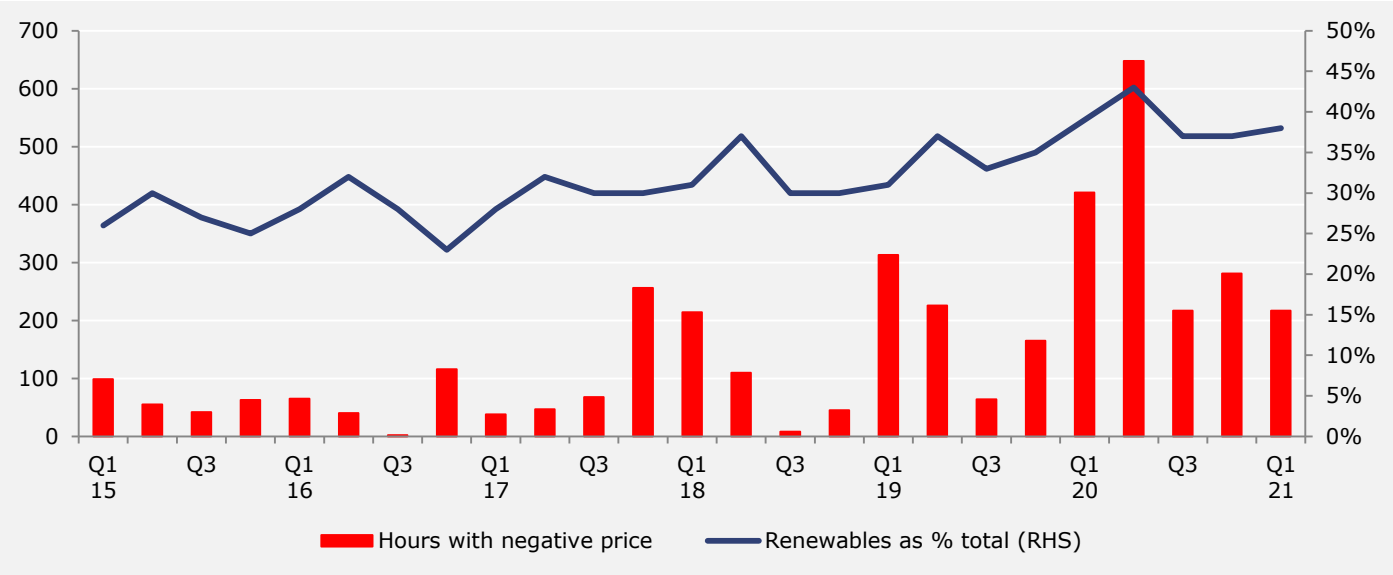
Graph 26: Development governmental debt as % GDP at G20 countries (2005-2025E)



Source: IMF World Economic Outlook Please note: Figures refer to G20 Advanced Economic Countries

A new phenomenon are also negative electricity prices. Historically electricity markets were mainly centralized markets, but the current energy transition is clearly changing this. Utility companies could 'easily' manage the electricity market, but more and more electricity will be generated decentrally. In addition, weather conditions (wind/solar) will have a huge impact on the overall generation capacity. For instance, there is a risk that too much electricity is generated on a sunny and windy Sunday in July or August, leading to negative electricity prices. For utility companies it is becoming more and more difficult to adjust their electricity generation capacity to keep a balanced supply/demand. As long as more and more renewable generation capacity will be installed, whereby a surplus of electricity generation can not be stored and/or transferred into hydrogen, the chance of negative prices will increase. The latter could be an issue for the profitability of a wind farm. When the wind farm operator does not receive subsidies or guaranteed minimum electricity prices, but is dependent on the spot electricity market, the risk profile of a wind farm goes up, making potential investors more reluctant to invest. Building subsidy-free offshore wind farms in the Netherlands is financially very attractive for the Dutch government, but an increasing risk profile could jeopardize the potential development of new offshore wind farms in the coming years, I believe.

Graph 27: Number of hours in EU with negative electricity prices (2015-1Q21)



Source: European Countries

Conclusions outlook offshore wind

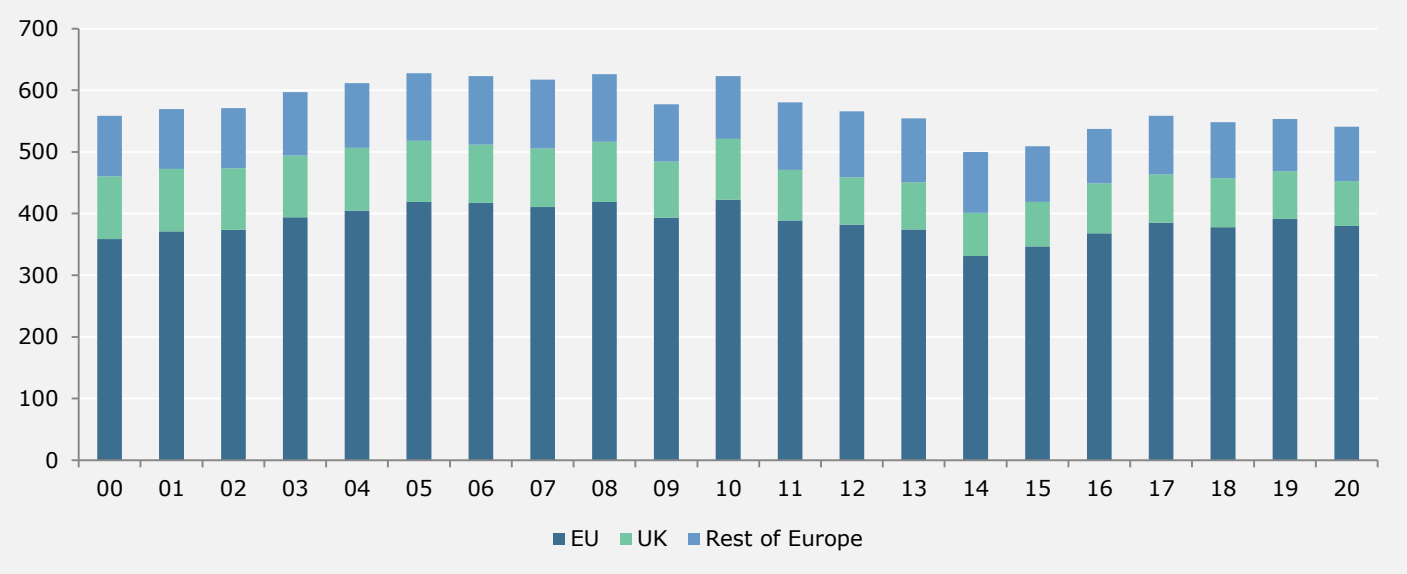
The outlook for Offshore Wind is very promising not only until 2030, but also until 2050 and probably beyond 2050 as well. However, there is not only good news, but there also clearly some risks, such as rising interest rates, shortage of vessels or staff (I did not discuss this, but (maritime) labor markets are very tight), sky-rocketing metal prices, huge governmental financial deficits, and increasing number of hours with negative electricity prices. Fortunately, the world has to go one with the energy transition. Current high prices of oil & gas also stimulates the use of renewable energy. All told, I'm very positive on the outlook for offshore wind. Whenever necessary, governments should help to make the energy transition possible!

European natural gas market extremely tight in 2021

Natural gas consumption structurally going down in Europe ...

As already illustrated at graph 10, European gas prices are sky-rocketing. Before discussing the reasons why, first some information on the European gas market. Although the consumption of natural gas worldwide is structurally still going up, in Europe gas demand already peaked in the year 2005 (in the EU in 2010). Global warming (in Europe) had a clear impact on gas demand, which traditionally peaks in the winterseason.

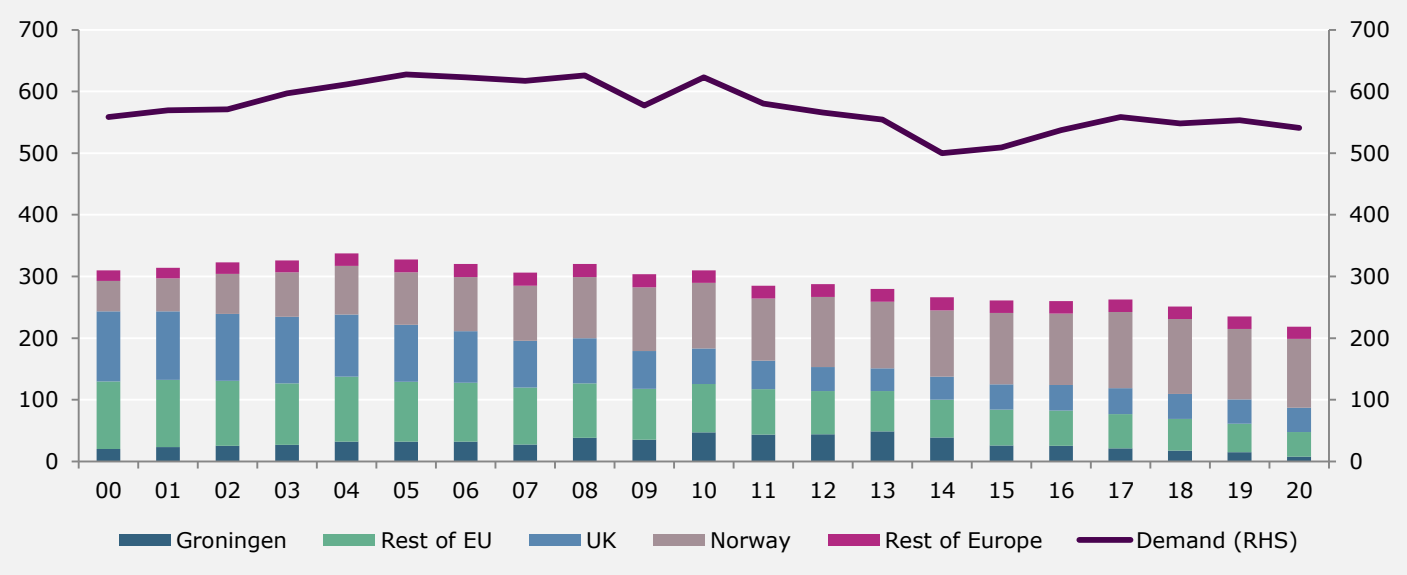
Graph 28: Natural gas demand in Europe between 2000 and 2020 (BCM)



Source: BP Statistical Review 2021 Please note: BCM = billion cubic metres

Also natural gas production in Europe is structurally declining. Peak production was achieved in the year 2004. Particularly the gradual shutdown of the Groningen gasfield in the Netherlands has an impact on Europe's overall production. Whereas Groningen accounted for 48BCM production in 2013, it plummeted to less than 8BCM in 2020 (2022E: nil). At the same time gas production in the other EU countries as well as the UK decreased as well. Only gas production in Norway was relatively stable in the last decade. As the graph below shows, European demand for gas always exceeded production, but the gap peaked in 2020.

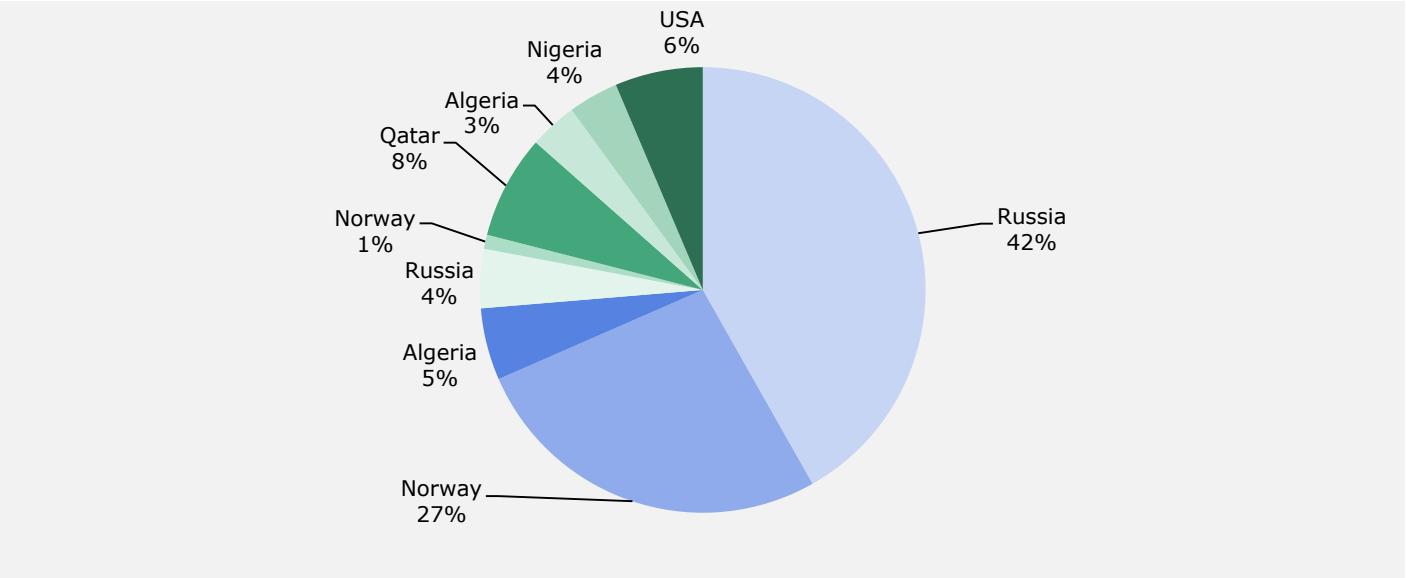
Graph 29: Natural gas production versus demand in Europe between 2000 and 2020 (BCM)



Source: BP Statistical Review 2021 Please note: BCM = billion cubic metres

Contrary to what has been suggested in the media and by former president Trump, Europe has become less dependent on the import of Russian gas in the last two decades. Whereas Russia accounted for 74% of all imports in Europe in the year 2000, it decreased to 46% in the year 2020 (see graph below), which included both imports by pipeline and by LNG. Both Norway and Algeria remained important gas suppliers to the European market, but 'new' suppliers of gas are Qatar and the USA.

Graph 30: European gas imports by pipeline and LNG and by country in 2020

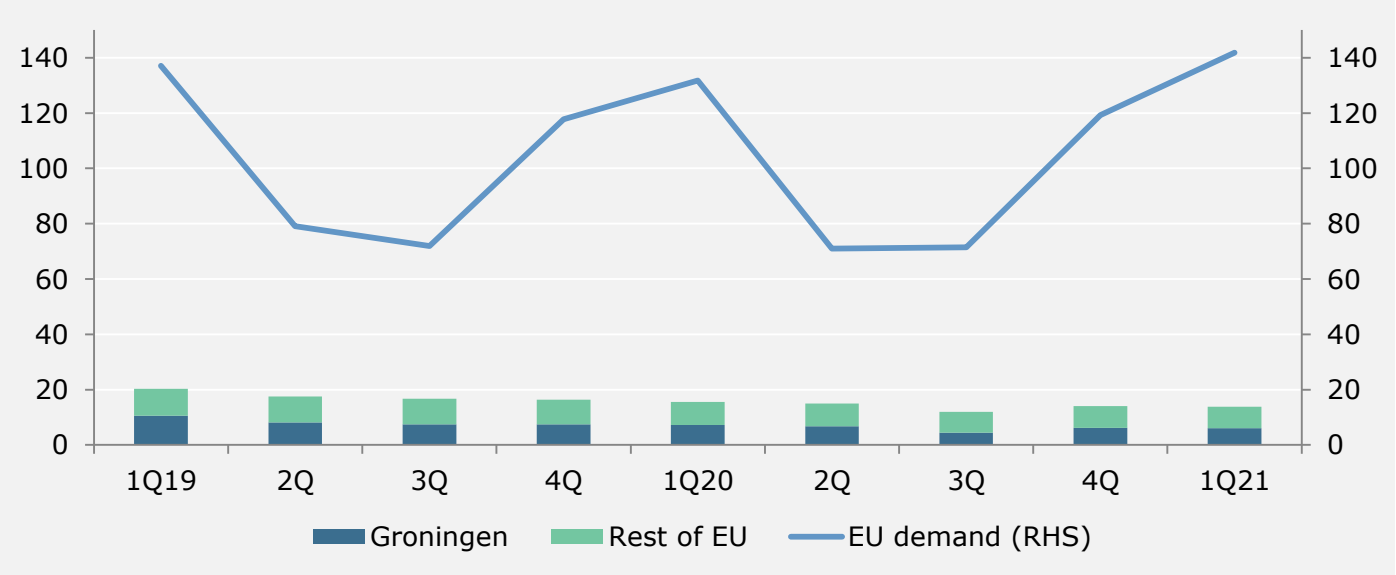


Source: BP Statistical Review 2021 Please note: Blue colour refers to pipeline and green colour to LNG exports to Europe

... But European gas demand rose by 8% YoY in 1Q21 ...

Because of colder than normal winter weather in Northwest Europe, gas demand rose 8% YoY (see graph below). Gas production in Europe dropped by another 11% (Netherlands: -13% YoY), leading to a huge supply/demand imbalance in 1Q21. Data on 2Q21 have not yet been released by the European Commission, but cold weather in Spring (April and May) in combination with a strong recovery of the European economy (GDP: +13.8% YoY) resulted in a further imbalanced market in 2Q21.

Graph 31: Gas demand in Europe climbed 8% YoY in 1Q21, but production fell 11% YoY

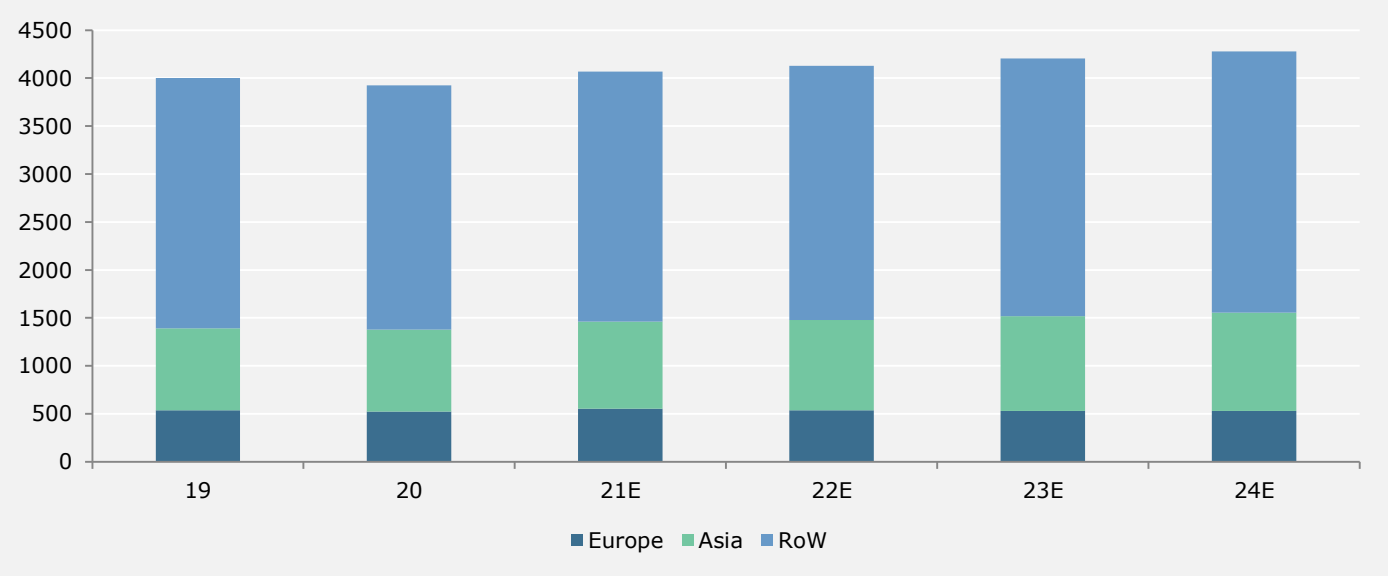


Source: European Commission

... Global gas demand expected to increase 4% YoY in 2021

The strong growth in gas consumption in Europe in 2021 YTD coincided with high demand in Asia thanks to the global economic recovery. In its latest forecast, the IEA foresees gas consumption to go up 6% YoY in both Europe and Asia, leading to an overall increase of 3.6% worldwide, i.e. exceeding the pre-COVID-19 level seen in 2019 by 1.7%. Assuming normal weather conditions and the ongoing energy transition, European gas demand will go down again in the coming years. However, rising demand in Asia, Middle East, and North America will lead to an overall growth of 5% of global gas consumption between 2021 and 2024.

Graph 32: Asia and Europe pushing up gas demand in 2021

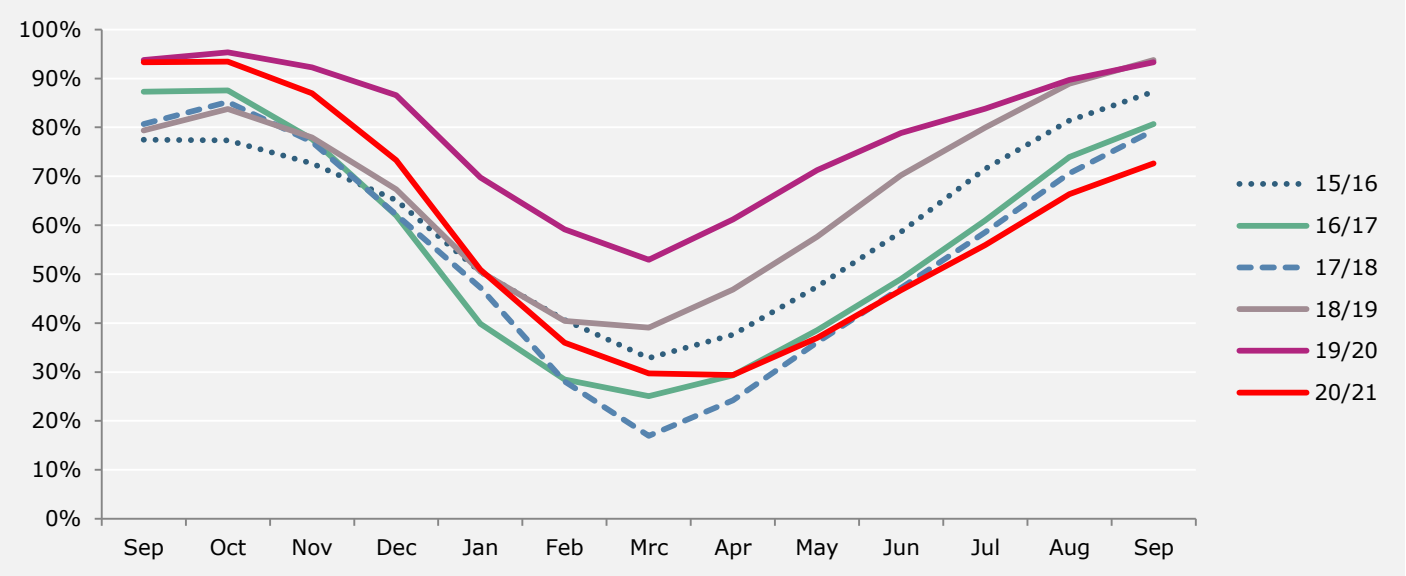


Source: IEA Gas Market Report Q3 2021

Gas storage in Europe at very low level and therefore pushing up gas prices

According to Gas Infrastructure Europe gas storage levels in Europe deteriorated rapidly in 2021 due to the above mentioned economic recovery, cold weather, and lower gas production. Looking at a gas year, which is from October until September, storage levels are high in 4Q to cover high demand in the Winter season, being followed by refilling storage capacity in the Summer season. As shown at the graph below, utility levels of storage capacity dropped to only 73% at the end of September 2021, which is the lowest level seen in the last six seasons. This low level has made the gas market nervous, i.e. is the amount of stored gas enough if cope with a severe winter in 2021/22? As said before, European gas prices sky-rocketed (see graph 10) and taking into account the graph shown below, I'm afraid that the gas price will remain high in 4Q21. Only a mild Winter in Europe in 2022 will bring down prices again.

Graph 33: Gas storage in Europe at lowest level in recent years

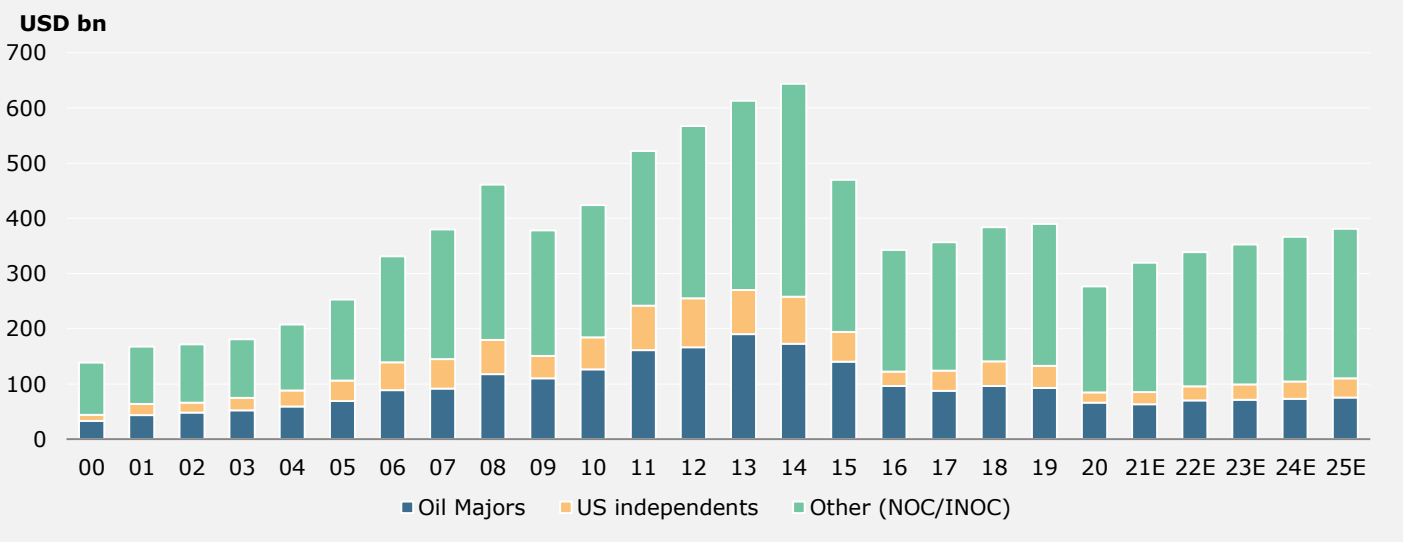


Source: Gas Infrastructure Europe Please note: Gas season is from 1 October until 30 September

Global Upstream E&P CAPEX expected to recover by 15% in 2021

Regarding the outlook for 2021, global Upstream E&P CAPEX spending will likely recover by 15% compared to 2020 (previously +8%), which means a significant upgrade thanks to a stronger than expected CAPEX spending by other large quoted oil companies (see also graph 37). Combining the forecasted Upstream CAPEX budgets for the Oil Majors and US Independents for 2021, the Oil Majors will cut their spending by another 4%, whereas the US Independents will raise their investments by 15%. Overall, Upstream CAPEX spending could recover by 15% YoY, which is still 18% before the pre-COVID-19 level seen in 2019. For 2022 and 2023 Equity Analysts expect that the Oil Majors and US Independents will raise their Upstream E&P CAPEX spending, but in 2023 spending will still be well below the level seen in 2019. Even for 2025 I foresee lower spending compared to 2019 because some Oil Majors are shifting their investments from fossil fuels to renewables and/or restoring balance sheets and/or recovering dividend payments. For the group as a whole (including IOC/NOCs), I expect 4-6% growth per annum in the period 2022-2025, leading to total Upstream CAPEX spending of USD 381bn in 2025 (slightly higher compared to my previous update).

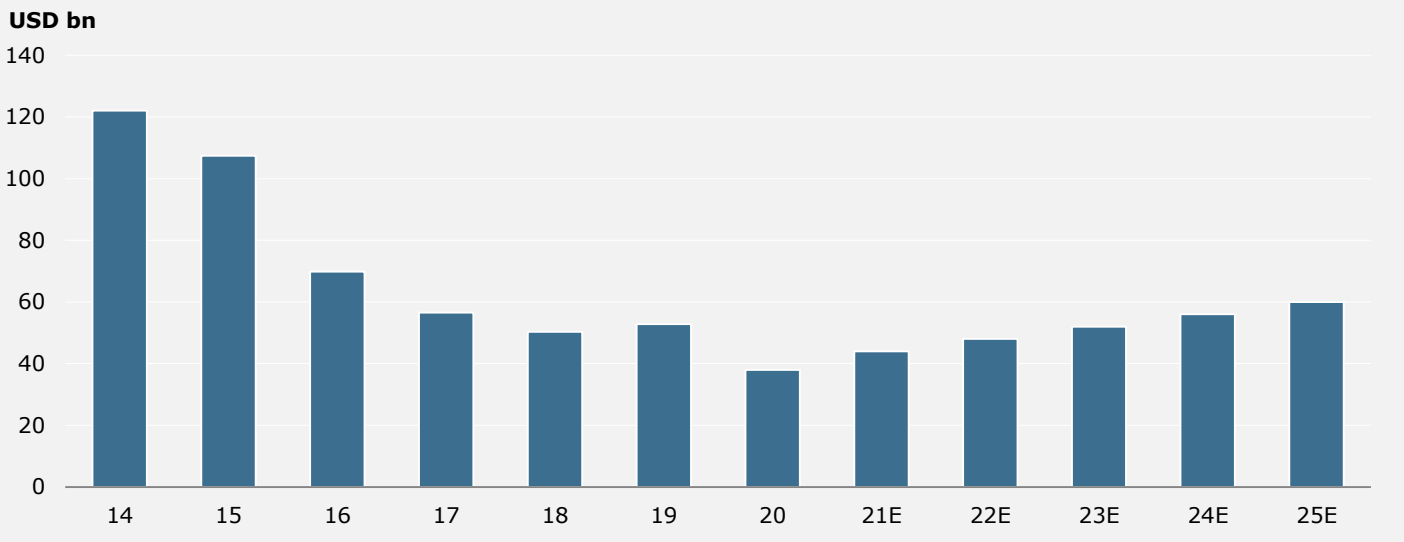
Graph 34: Global Upstream CAPEX spending forecast until 2025



Source: Company websites, IEA, R. Brakenhoff

Regarding Upstream E&P CAPEX spending at Offshore, I believed that the global market had bottomed out in 2018, which was approximately 60% lower compared to the level reported in 2014. However, COVID-19 has resulted in the delay of several offshore projects. All told, I believe that Offshore CAPEX fell by 28% in 2020. Regarding 2021 and beyond, Rystad recently stated that they expect offshore oil & gas CAPEX spending to be slightly higher in 2025 compared to the year 2019. Deepwater areas like Brazil, Guyana, Surinam, etc., are very promising thanks to relatively low break-even prices. All told, conservatively, I expect Offshore CAPEX spending to recover again as of 2021 to USD 60bn in 2025.

Graph 35: Global Offshore Upstream CAPEX spending forecast until 2025



Source: R. Brakenhoff

Earnings development of Oil Majors and US independents in 2Q21

The oil majors' total earnings before exceptional items (ExxonMobil, Shell, BP, Chevron, ConocoPhillips, Total, ENI) climbed from a USD 7.8bn loss in 2Q20 to a USD 22.7bn profit in 2Q21 (see table below) thanks to spectacularly higher oil and gas prices (Brent: +107%; WTI +136% YoY; Henry Hub +69%; European gas price: +384%), and somewhat higher natural gas production (+1.5% YoY), being slightly offset by lower oil production (-2.1%) due to COVID-19 as well as the impact of the oil production cutback by OPEC+ on the Oil Majors. The companies' total E&P net earnings recovered by more than USD 20bn to a USD 17.1bn profit, which was the highest level since 3Q18. The Oil Major's Downstream's earnings recovered further, but still lower compared to pre-COVID-19 levels due to higher input prices and lower demand for oil products. The oil majors' Upstream CAPEX spending decreased by 6% YoY to USD 14.6bn. The oil majors' Cash Flow from Operations quadrupled to nearly USD 50bn in 2Q21. Thanks to this higher level of Cash Flow from Operations in combination with lower overall CAPEX spending and dividend payments (Shell, BP, Total), Cash Flow from Operations was more than sufficient to cover the companies' CAPEX and dividend payments in 2Q21 (it was one of the highest positive results ever!).

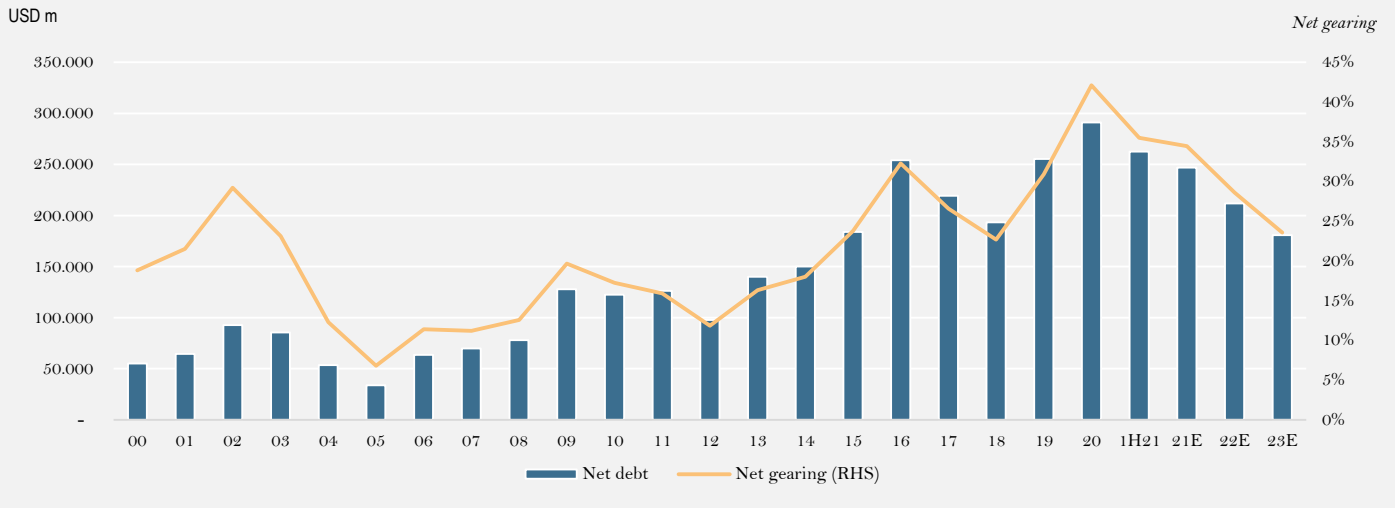
Table 7: Earnings development of Oil Majors in 3Q20, 4Q20, 1Q21, and 2Q21

USD m	3Q20	Change YoY	4Q20	Change YoY	1Q21	Change YoY	2Q21	Change YoY
E&P	-177	n/a	+1,842	-84%	12,471	+105%	17,126	n/a
Downstream	2,755	-61%	-477	n/a	1,442	-70%	3,248	+13%
Total	756	-96%	1,266	-91%	14,630	+37%	22,716	n/a
Upstream CAPEX	12,375	-46%	16,392	-34%	15,296	-30%	14,571	-6%
Cash Flow from Operations	30,464	-37%	28,045	-42%	37,199	+19%	49,709	330%
CF from Operations – CAPEX – Dividend	+4,245	-60%	-2,441	n/a	+14,029	n/a	+23,628	n/a

Source: Company websites Please note: Results E&P, Downstream, and Total are adjusted for exceptional items

Whereas the implementation of IFRS 16 (operational leases included into the balance sheet) as of January 2019 resulted in a significant rise of billions of USD in the net debt level of the Oil Majors, COVID-19 resulted in a further increase in 2020. However, the strong earnings improvement in 1H21 resulted in a strong recovery in the Oil Major's net debt level (down USD 28bn, see graph below). and the company's combined net gearing ratio improved from 42.1% at year-end 2020 to 35.5% on June 30th, 2021.

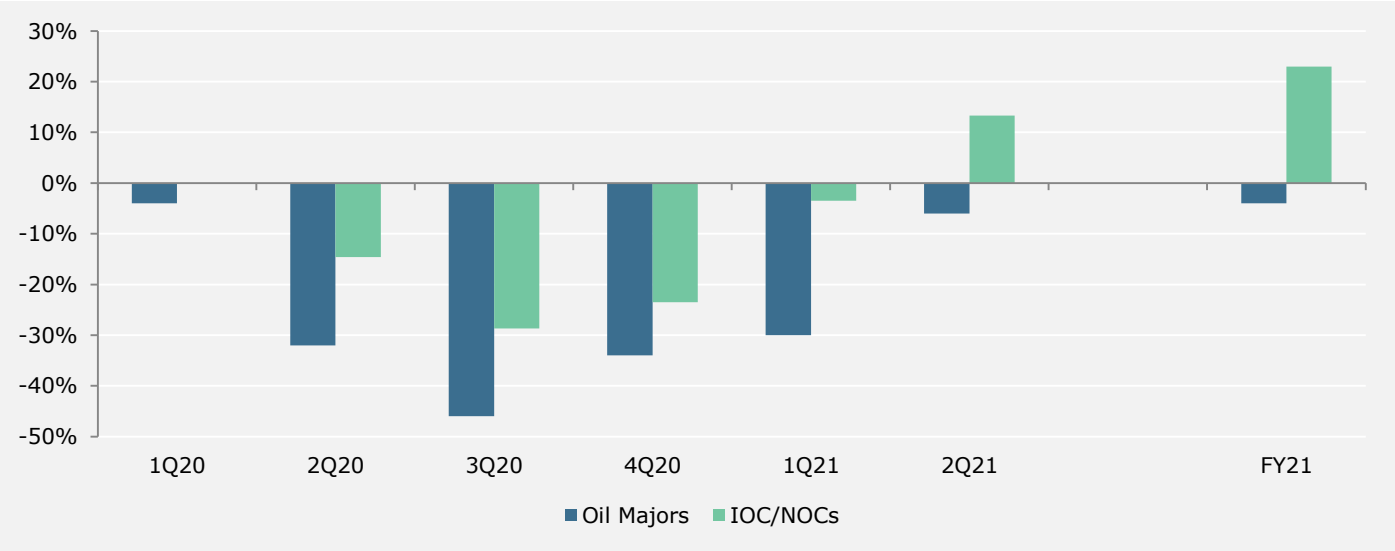
Graph 36: Oil Major's net debt and net gearing improved strongly in 1H21



Source: Company websites, Refinitiv Please note: Jump in net level at year-end 2019 mainly caused by IFRS 16 (operational leases)

Whereas the Oil Majors lowered their Upstream CAPEX spending by 6% YoY in 2Q21, it rose by 13% YoY at the quoted NOCs (as described above the Chinese, Russian oil & gas companies and Saudi Aramco), see graph below. As said earlier, those NOCs will raise their Upstream CAPEX spending significantly again in 2021, whereas the Oil Majors will reduce their Upstream investments even further.

Graph 37: Change YoY Upstream CAPEX Oil Majors compared to other large quoted oil companies



Source: Company websites, R.Brakenhoff

Another group of oil & gas producing companies - the US independents – reported a strong earnings recovery in 2Q21 thanks to recovery of the oil & gas prices, cost cutting programs, and higher production (+9% YoY). The latter was a strong turnaround compared to the previous quarter when production fell 8% YoY. Oil & gas production climbed thanks to the higher prices, but also inflated by mergers & acquisitions. Combining the figures of 15 quoted US oil & gas producing companies' net earnings recovered by more than USD 8bn to a USD 4.1bn profit (adjusted for one-offs). In 2Q21 all the companies reported positive net earnings, whereas they were all loss making in 2Q20. Cash Flow from Operations more than quintupled to USD 12.7bn in 2Q21, which was more or less comparable to levels seen in the quarters in the year 2018. The US independents raised their Upstream CAPEX spending by 58% YoY in 2Q21, which was the first increase YoY since 1Q19. Furthermore, the US independents reported a positive surplus of Cash Flow from Operations minus Upstream CAPEX minus dividends of more than USD 6bn in 2Q21, partly thanks to lower payment of dividends, whereas they realised a deficit of USD 2.7bn in 2Q20.

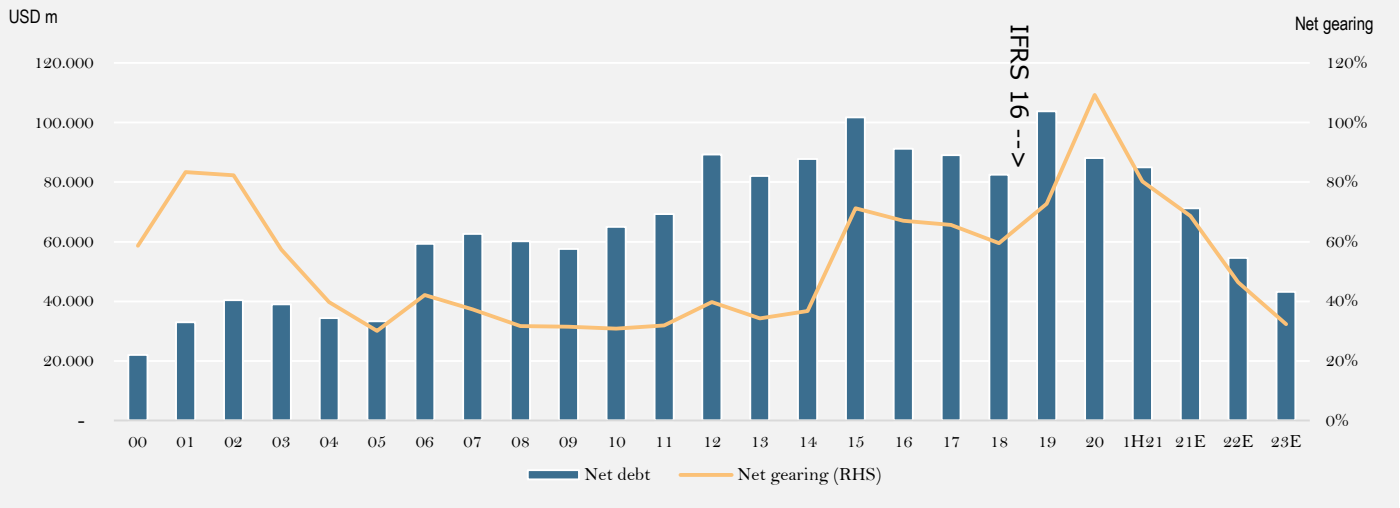
Table 8: Earnings development of US Independents in 3Q20, 4Q20, 1Q21, and 2Q21

USD m	3Q20*	Change YoY	4Q20*	Change YoY	1Q21*	Change YoY	2Q21*	Change YoY
EBIT	+391	-90%	+1,349	-62%	+5,251	+49%	+6,387	n/a
Net profit excluding one-offs	-1,213	n/a	+98	-93%	+3,517	n/a	+4,074	n/a
Oil & Gas production (m b/p/d)	6.2	-3.6%	6.2	-9.1%	6.3	-8.3%	6.8	+9.1%
Upstream CAPEX	2,944	-68%	3,817	-58%	4,751	-44%	5,473	+58%
Cash Flow from Operations	5,193	-51%	6,508	-33%	8,613	-6%	12,744	+556%

Source: Company websites *) Adjusted for Noble Energy (acquired by Chevron)

Looking at the balance sheet, it seemed as if COVID-19 had a positive effect: Combined net debt improved from USD 88bn at year-end 2020 to USD 85bn on June 30th, 2021. However, underlying the improvement was around USD 7bn higher as several US Independents made acquisitions in 1H21. Thanks to the strong earnings improvement, the company's net gearing ratio recovered from to 110% at year-end 2020 to 80% on June 30th, 2021.

Graph 38: US Independents' net gearing recoverd strongly in 1H21

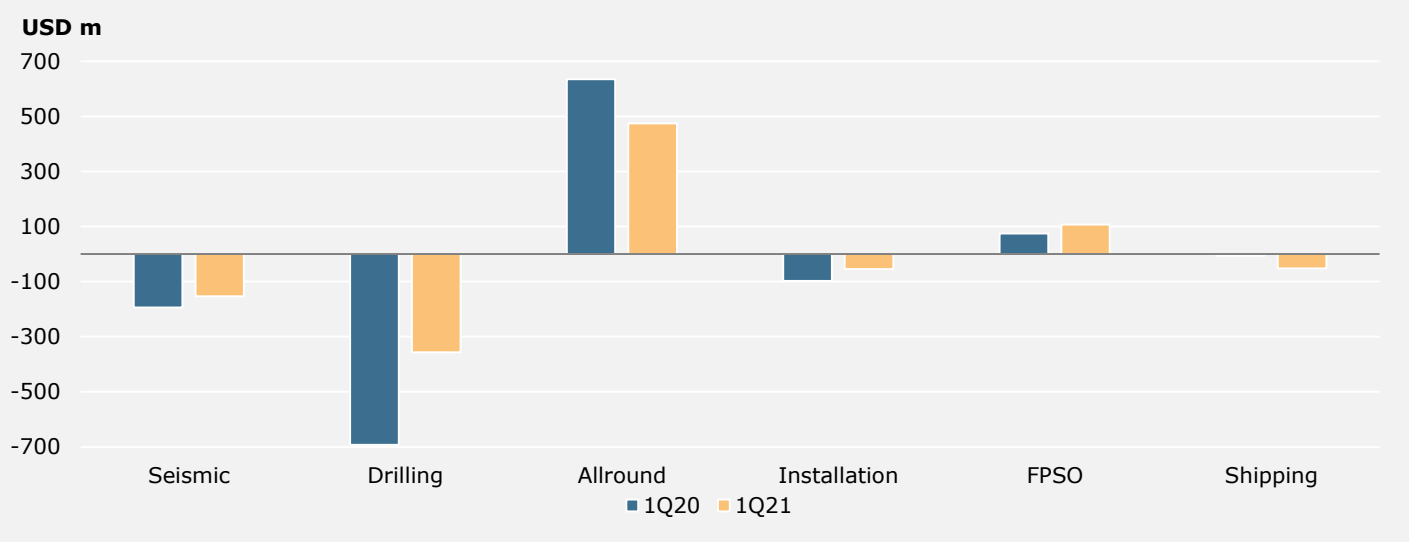


Source: Company websites, Refinitiv, R. Brakenhoff Please note: IFRS 16 = As of 2019 operational leases are included in the net debt figures

Oil Services industry's earnings under severe pressure again

As a few Oil Services companies have not released their 2Q21 results yet, I will focus on 1Q21 and where possible on 2Q21. Net results adjusted for one-offs deteriorated YoY at the allround and shipping companies in 1Q21. Results at seismic and drilling remained very weak (see graph below). The combined order backlog at seismic and drilling declined by 12% and 21% YoY, respectively, whereas it rose by 24% YoY at the Installation companies. In 2Q21 the combined order backlog at seismic recovered by 19% YoY (0% QoQ), but fell 8% YoY at drilling. The latter, however, was up 7% QoQ. The combined order backlog at the Installation companies went up by 22% YoY and even by 3% QoQ.

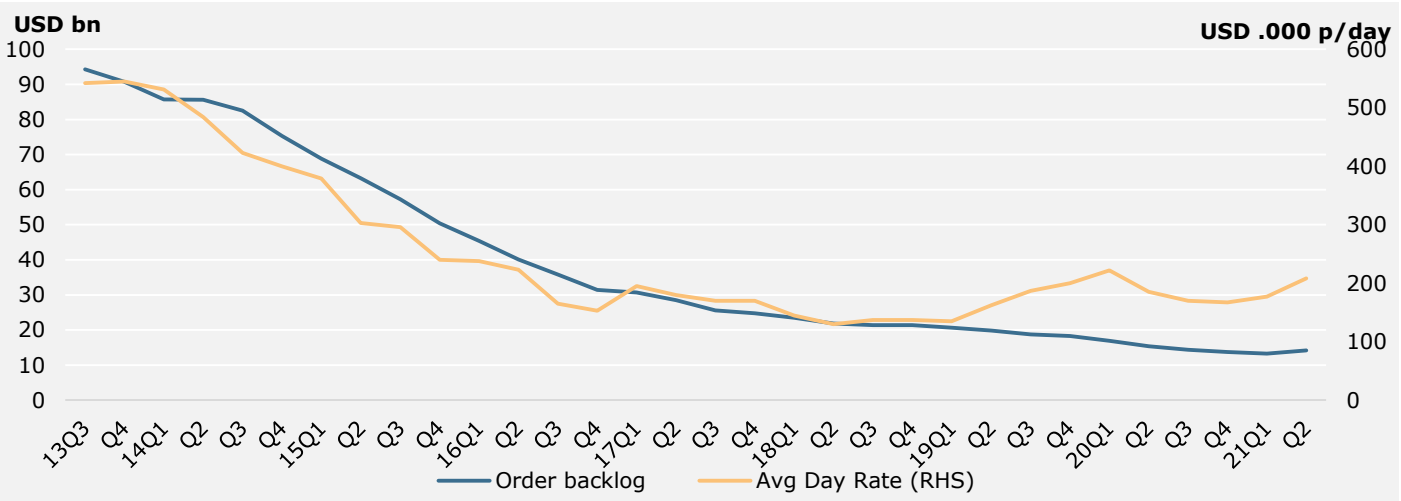
Graph 39: 1Q21 results remained very weak



Source: Company websites

Drilling rates of floaters (semi-submersibles and drillships) used at (ultra-) deepwater recovered in 3Q19, 4Q19, and 1Q20 (January, February), which was for the first time since the start of the crisis at the oil & gas industry (July 2014). However, according to data from Clarkson drilling rates decreased again as of March. Looking at several stock-quoted drilling companies, average drilling rates stabilised QoQ in 2Q21, i.e. in general those rates were higher compared to 2Q20.

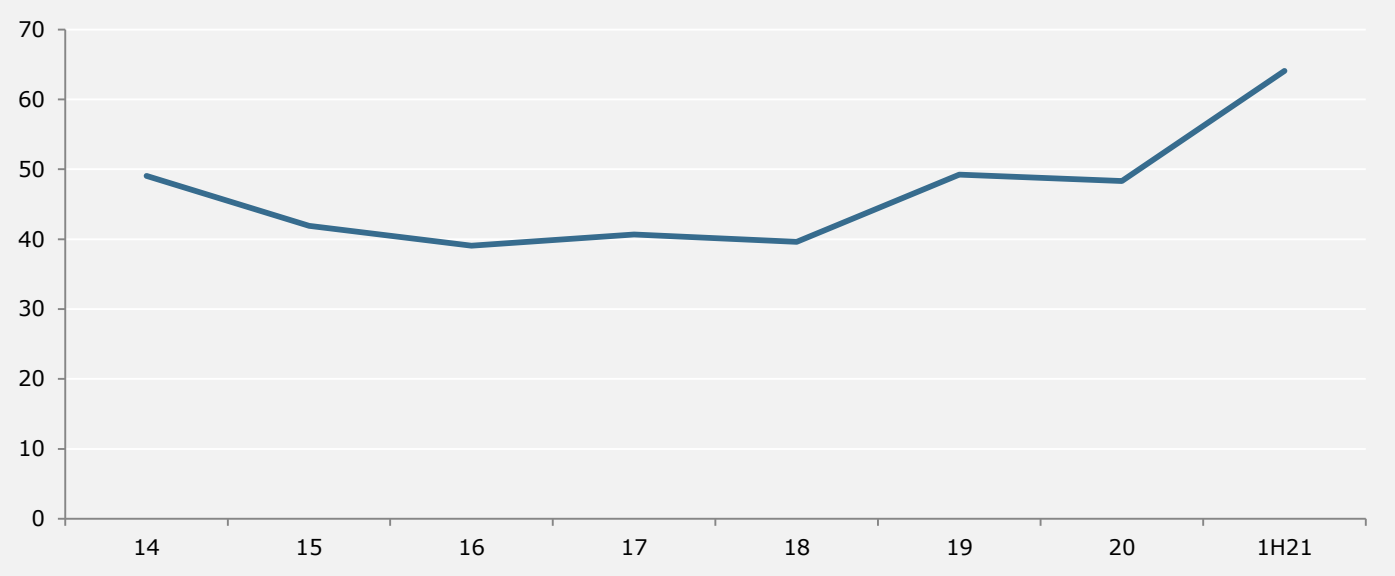
Graph 40: Drilling rates and order backlog recovering from a very low level



Source: Company websites, Clarkson Research

Discussed several times before, the FPSO market is booming. After a temporary dip in the year 2020, the number of FPSOs being ordered amounted to 6 units in 1H21, double the amount of the full-year 2020. Rystad Energy foresees 10 awards in 2021 as a whole compared to 11 units in 2019. As a result, the order backlog of the quoted FPSO player climbed by 27% YoY to USD 64bn on June 30th, 2021 (see graph below).

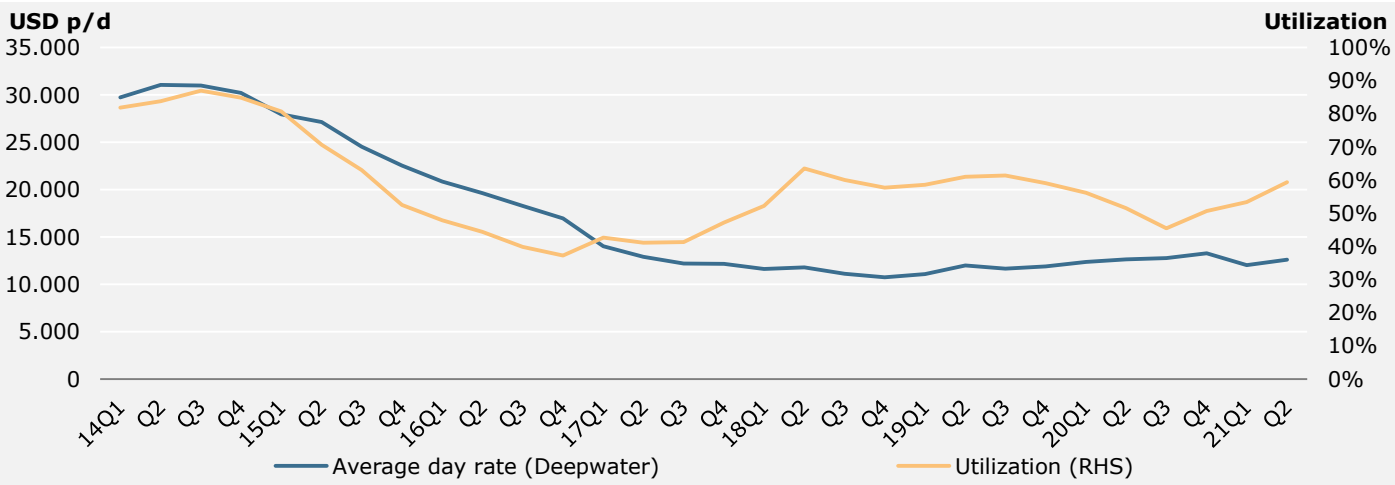
Graph 41: Order backlog FPSO players going through the roof (USD bn)



Source: Company websites

A similar market picture as at Drilling can be seen at Offshore Shipping. Besides mergers and huge cost cutting programs, several companies were forced to financially restructure companies such as Hornbeck Offshore, Tidewater, or Seacor Marine. Also Siem Offshore recently financially restructured the company, i.e. reducing debt by USD 318m in 2Q21 and as a consequence reducing existing shareholders interest to only 4%. Although Offshore shipping companies had – at last - passed the trough in 2019, COVID-19 had changed the situation completely again, albeit shipping and utilization rates are recovering again. Looking at the weak financial situation at several shipping companies after six years of depressed earnings, I believe that several companies will not survive this crisis. The graph below shows the development of Tidewater's average daily shipping rates for its large AHTS and PSV vessels.

Graph 42: Recovery of shipping and utilization rates in 2Q21, but still well below pre-COVID levels



Source: Tidewater Please note: Average shipping rates for large AHTS and PSV vessels

Table 9: Earnings development of Oil Services between 2Q19 and 1Q21

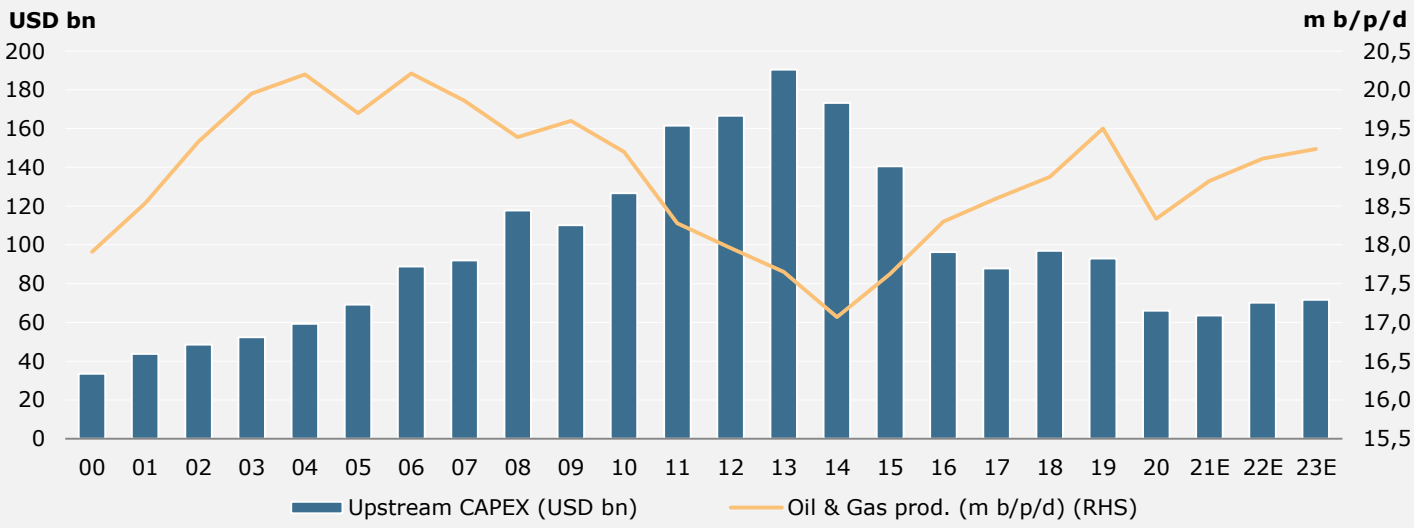
Change YoY	2Q19	3Q19	4Q19	1Q20	2Q20	3Q20	4Q20	1Q21
Sales	+3.1%	-1.9%	-2.0%	-4.8%	-28.2%	-26.4%	-23.9%	+6.9%
EBITDA	-3.2%	-6.7%	-3.1%	-10.7%	-41.4%	-39.1%	-31.2%	+2.7%
EBITDA margin	16.2%	16.8%	16.0%	14.4%	13.7%	14.7%	15.5%	13.0%
Net profit excluding one-offs	-88%	-82%	+29%	-100%	-100%	-100%	-100%	n/a
Equity (USD bn)	190.0		172.1		117.6		109.1	
Net debt (USD bn)	98.1		82.8		81.9		81.5	
Net gearing	51.6%		48.1%		69.7%		74.7%	

Source: Company websites Please note: Not all companies have reported its 2016-1Q21 results due to delays as a result of financial difficulties/Chapter 11

Oil Majors' Upstream CAPEX spending will hardly recover due to energy transition

Thanks to a gradual recovery of global demand for oil & gas as well as oil & gas prices as of 2021, I expect that the Oil Majors will raise their Upstream CAPEX spending again in the coming years, albeit it will remain at a relatively low level compared to the period 2011-2014. Main reason is the structural change in the strategy of several Oil Majors (BP, Shell, Eni, Total), leading to a switch from investments in fossil fuels to renewables. All told, because of divestments and their low Upstream CAPEX spending on the one hand, but less impact of OPEC+ production cutbacks on the other, total oil & gas production by the Oil Majors is expected to recover by 5% to 19.2m b/p/d in 2023 compared to dip of the year 2020.

Graph 43: Upstream CAPEX of Oil Majors recovering as of 2022, but remains relatively low

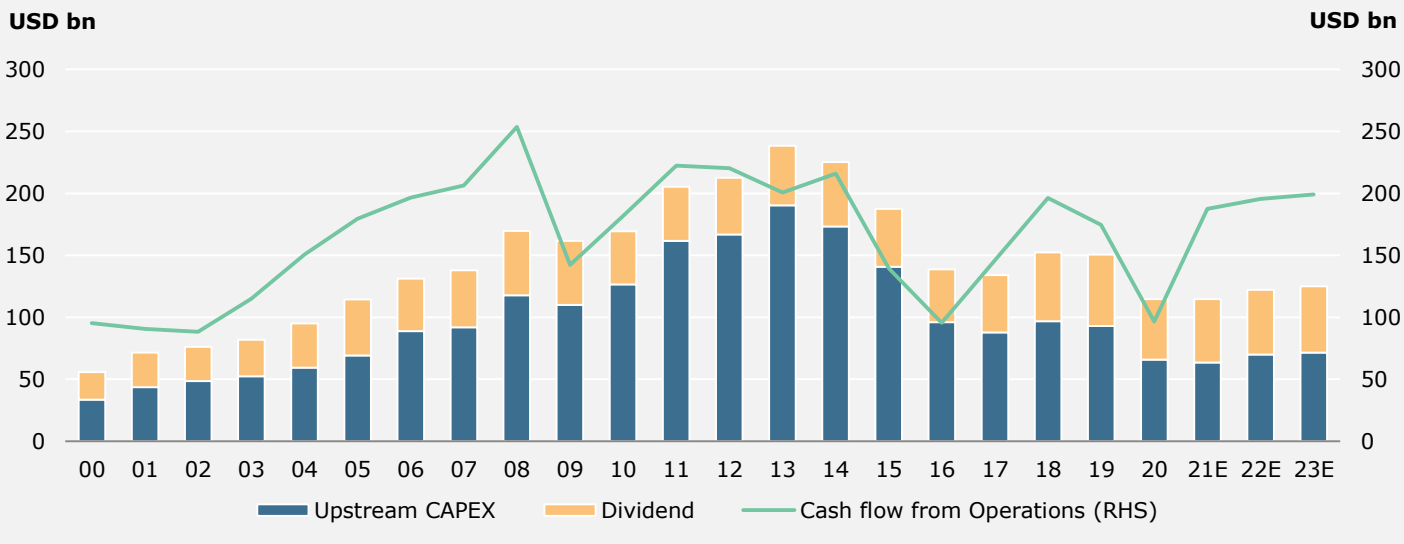


Source: Company websites, R. Brakenhoff

For most of the Oil Majors, maintaining or even gradually raising their dividend payments to their shareholders is one of their top priorities. Only BP was forced to significantly cut its dividend payment in 2010 due to the Macondo disaster in the Gulf of Mexico. However, the severe impact of the Coronavirus resulted in a 66% cut in dividend payments by Shell as of 1Q20, which was the first dividend cut since WW II, and BP's 50% cut in dividend payments as of 2Q20. Because of the sharply lower oil & gas prices in 2015 and 2016, the Oil Majors combined Cash Flow from Operations was not sufficient to cover the CAPEX plans and dividend payments (see graph below). The Oil Majors financed this gap by raising debt, leading to a deterioration of the group's combined net gearing. However, the recovery of the oil & gas prices as of 2Q16 resulted in a surplus again in the period 2017-2019. In 2020 Cash Flow from Operations was not sufficient to cover CAPEX and dividends. Based on Equity Analyst's forecasts and announcements made by the Oil Majors, Cash Flow from Operations will be more than sufficient again

to cover CAPEX spending as well as slightly raising dividend payments in the coming years. In addition, surplus cash flow will be used to finance share buy-back programs again, i.e. returning excess cash to shareholders.

Graph 44: Oil Majors' Cash Flow sufficient to cover CAPEX and dividend payments as of 2021

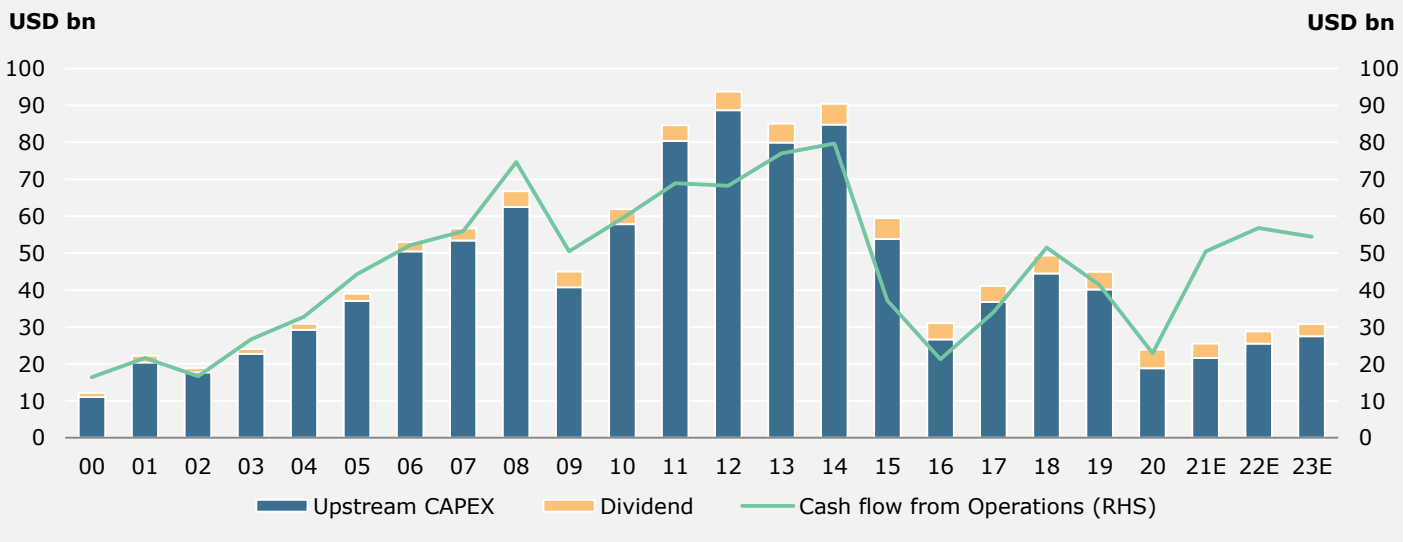


Source: Company websites; R. Brakenhoff

US Independents CAPEX spending remains low due financial constraints

Thanks to the strong recovery of US oil (WTI) and gas (Henry Hub) prices, the US Independents' generation of Cash flow from Operations will strongly rebound in 2021-2023 compared to 2020. However, the height of the cash flow will still be lower compared to the level seen between 2011 and 2014. Taking into account the sharply deteriorated financial position (net gearing peaked at 109% at year-end 2020, improved to 80% on June 30th, 2021), the US Independents do not have the possibility – like the Oil Majors – to raise debt to finance their Upstream CAPEX spending plans. Therefore, I believe that Upstream CAPEX spending will only recover marginally in the coming years, i.e. the height of total spending will be comparable to the years at the beginning of the 21st Century.

Graph 45: US Independents' Upstream CAPEX spending remains low in coming years

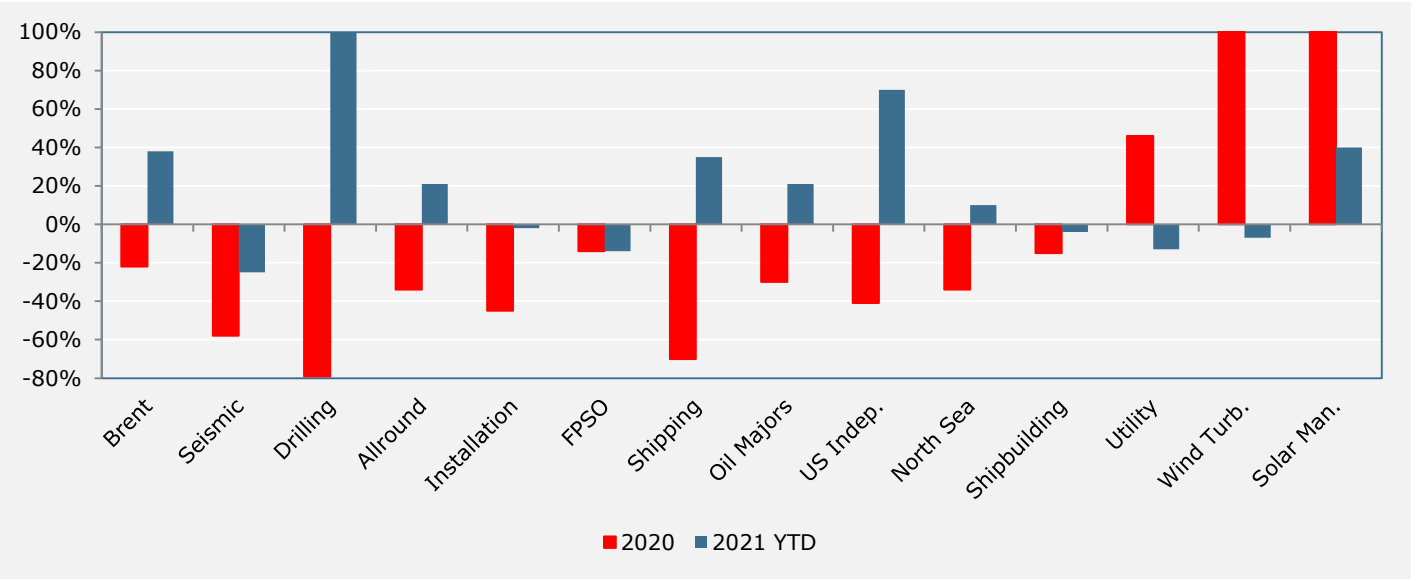


Source: Company websites; Refinitiv consensus estimates

Share prices strongly recovered in 2021YTD

Since the collapse of the oil price started in July 2014, share prices of the Oil Majors, US Independents, Oil Services' companies, and Shipbuilding companies plummeted. However, first signs of a recovery was visible in 2019, resulting in a recovery of share prices of Seismic and FPSO companies. Unfortunately, the Corona pandemic pushed down commodity prices strongly and therefore share prices as well. Some companies filed for Chapter 11 (protection from creditors), such as Valaris, Noble Drilling, Diamond Offshore, McDermott, Hornbeck Offshore, Chesapeake, Superior Energy Services, Whiting, etc. All told, at year-end 2020 the Brent oil price was 'only' 22% lower compared to year-end 2019, which was a strong recovery versus the dip in April 2020. This recovery continued in the first eight months of 2021. In general, the sectors that were hit mostly in 2020, recovered strongly in 2021 such as drilling, shipping, and the US Independents, whereas the 'star' performers of 2020 (Utility companies and Wind Turbine manufacturers) saw slightly declining share prices in 2021YTD.

Graph 46: Development Brent oil prices and share prices in 2020 and 2021YTD



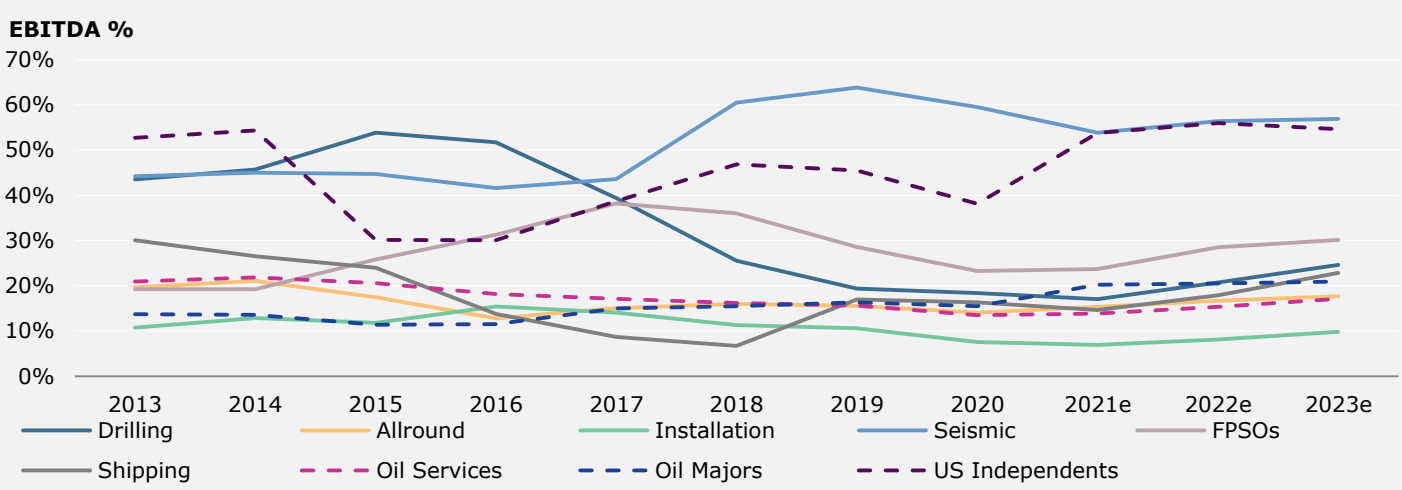
Source: Markets Businessinsider, Marketscreener, R.Brakenhoff Please note: Share prices drilling companies rose more than 100% in 2021YTD, but mainly as Valaris, Noble, and Diamond Offshore went out of Chapter 11

Oil Services market will not recover before 2022

Although the oil price has recovered spectacularly, the year 2021 will also be another difficult year for the Oil Services' industry due to ongoing extra COVID-19 related costs. In addition, currently orders are being carried out often won during the difficult year 2020, i.e. with relatively low margins. Finally, the global oil & gas industry will raise their low Upstream CAPEX spending in 2021, but the level will still be some 18% below the pre-COVID-19 level seen in the year 2019. Positively, the Offshore Services companies benefit from cost savings, mergers, and lower debt levels when emerging from Chapter 11. For 2022 and beyond I am more optimistic as I believe that the global oil & gas industry will further raise their Upstream CAPEX spending. Results of the Oil Services companies will recover, albeit at first mainly thanks to volume growth (no change in my view compared to previous updates). It will take longer before higher prices and profit margins will become visible. In addition, the early cyclical segments (seismic, drilling) of the Oil Services' market should recover first, whereas late cyclical segments (subsea/installation) will follow with a time lag of two years.

The graph below shows the expected EBITDA margin for the different Oil Services sectors and oil & gas companies in the coming years using equity analyst's consensus estimates. No surprise, all sectors suffered from margin pressure in 2020, but severe cost cutting in combination with a gradually recovering global oil & gas market should result in recovering EBITDA margins as of 2022. Whereas the 'peak' year at the industry was the year 2014, for most sectors the year 2020 will be the trough, even more than in the year 2016. However, there are significant differences per sector as the graph below shows.

Graph 47: EBITDA margins of all Oil Services' sectors are expected to recover as of 2022



Source: Markets Businessinsider

Short-term Oil Services market outlook: -

- Oil price positive (2021E: on average USD 70 p/b);
- Global oil consumption could rebound by more than 3 million barrels per day in 2021;
- Upstream CAPEX oil & gas industry recovering by 15% in 2021 following a 29% drop in 2020;
- Offshore CAPEX spending also fell in 2020. Regarding 2021 growth is expected, particularly in Latin America (Brazil, Guyana)
- Severe overcapacity at the oil services industry, particularly at drilling and shipping;
- Offshore wind continues to be a booming market, but order intake remains very irregular. In addition, execution risks are increasing, whereas margins are under pressure

Long-term Oil Services market outlook: +

- Growth of global population (2019-2040E: +19%);
- Rise of GDP per capita (2019-2040E: +57%);
- Structural growth in oil & gas consumption (2019-2040E: +16%);
- Oil price remains relatively satisfactory compared to 2015/2016;
- Growth of oil & gas production in (ultra) deepwater;
- Growth of decommissioning market;
- The offshore wind market remains strong, not only in Western Europe, but also in the rest of the world;
- Global oil & gas consumption could continue to increase in the '20s, despite the substitution of oil & gas by renewable energy