Assessment on the oil and gas industry

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Global oil market – biggest problem: refining

Several countries have approved measures to mitigate the strong rise in fuel prices. Brazil is in line with this trend and analyzing different options. The government has zeroed federal taxes for diesel and liquefied petroleum gas (LPG) and Congress is on the verge of passing the fuel amendment and Bill 18, which will reduce the *ICMS* taxation (Sales and Services Tax) on fuels. The ICMS tax is one of the main components of the gasoline and diesel final price (Slides 9 and 10).

Another measure would be the creation of a fuel price stabilization fund (Slides 11 to 14). The cost of undertaking this measure would be higher. The annual cost for adjusting fuel prices, according to a moving 12-month window, instead of on a monthly basis, would have reached 45.4 billion in 2021 alone.

Crude oil prices have nearly peaked at an all-time high. The prices of oil products have risen even more and still are at unprecedented high levels. What is behind this strong peak in liquid fuels?

Our strategy to answer this question was (i) to start from the assumption that pre-Covid and pre-war expectations did not signal an oil market squeeze and (ii) to see what has changed since then. The market's susceptibility to a squeeze is two-fold – excess of demand and lack of supply. Demand-wise, the perspective is that of less oil consumption in 2022, compared to what was expected before the crisis, or for that matter, even in early 2021 (Slide 19).

On the supply side, the change in production expectation was concentrated in the US and Russia (Slide 19). That is actually less of a concern because (i) US shale production can be ramped-up (in fact, it is what we have been seeing on the margin) and (ii) Russia will manage to find end consumers for its oil and will not have to reduce production (Slides 22 and 26).

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Global oil market – biggest problem: refining

Thus, in our view, there was no structural change to the crude oil market after the pandemic and the War. If there was no market unbalance before the crises, nor any perspective of it being so, then it should not be the case now. Nowadays, crude oil inventory is compatible with pre-2014 levels (Slide 17).

There was a clear change in the refining market:

i. the US refining capacity has dwindled by more than 10% (Slide 36)

ii. Russia is not able to reallocate its European-bound oil products exports (Slides 41-43)

iii. China has sharply reduced its oil products exports to the world (Slides 39-40) and

iv. refining and transportation costs for oil products went up (Slide 35).

These are structural changes and differ from the scenario before the pandemic and War. Combined with the empirical observation that the crack spread (difference between the refined byproduct and crude oil prices, Slide 34) has reached historical highs, we conclude that the choke point is in the byproducts market rather than the crude oil market.

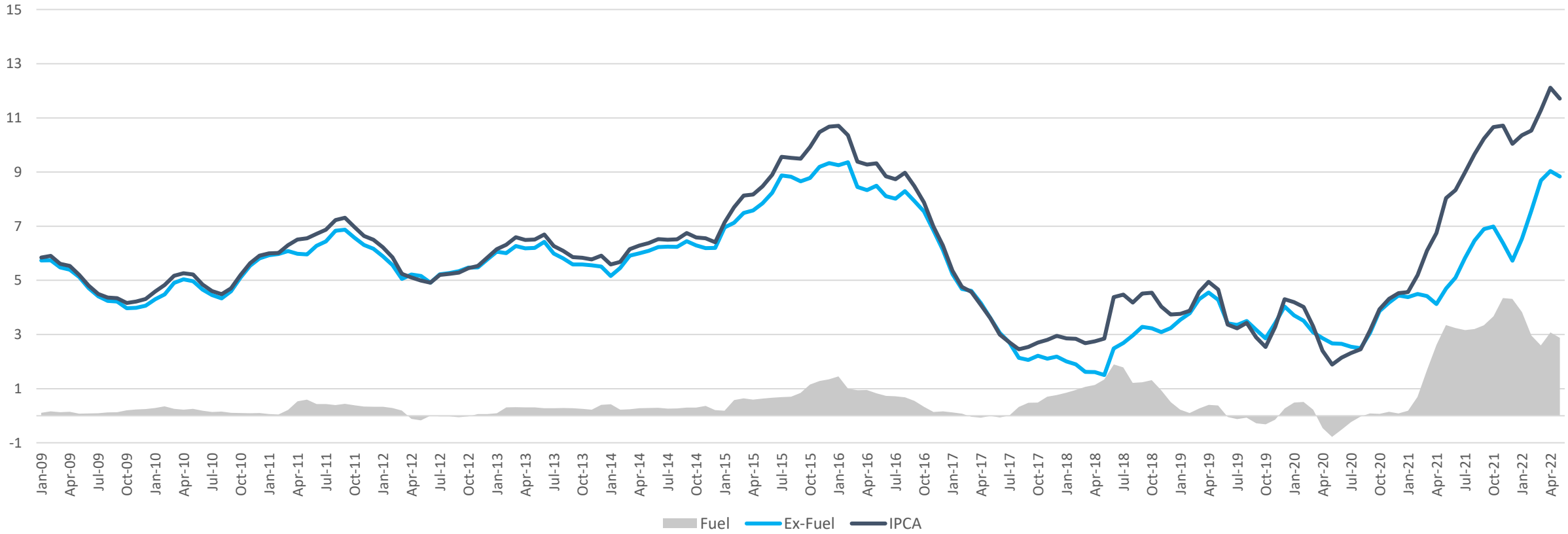
The greatest short-term risk is the all-out ban on Russian refined oil products by Europe. Given this market's very low price elasticity, its price would have to rise plenty for demand to cool off enough, given the supply restrictions (Slide 45).

Brazil – bids to mitigate impact on inflation

Fuels account for 43% of the 2021 *IPCA* inflation

- The Diesel/Gasoline barrel price has increased 83%/65% since early this year due to the Russia-Ukraine conflict escalation.
- This increase has been pushing energy inflation all over the world. In Brazil, specifically, fuel inflation has contributed 4.3pp to the IPCA, coming from 10% in 2021, despite its weight on the index being close to 6% early that year. This is the highest fuel inflation since, at least, the early 2000s.

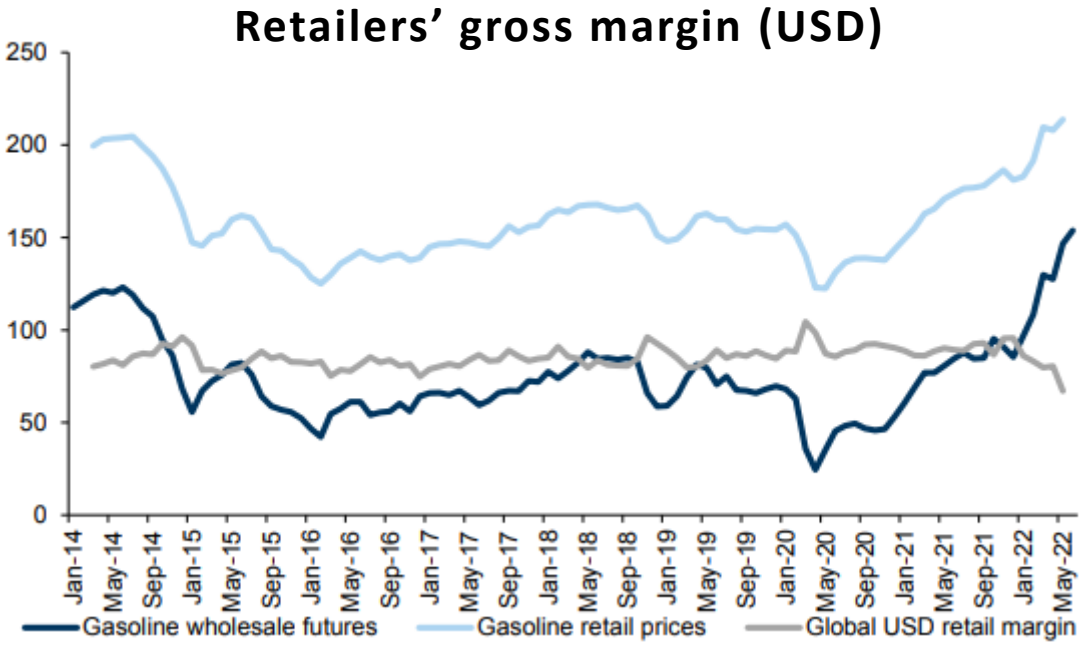
Contribution to the IPCA inflation – fuel and others (p.p.)



Source: IBGE (Brazilian Institute of Geography and Statistics), Mar Asset Management

Brazil is not alone in taking mitigation measures

- Several countries have taken measures to mitigate the rise of oil products. The IMF estimates total subsidies for the industry to rise from US$0.3 to US$6.8 trillion this year. In the US, eight states representing 9% of global gasoline demand have already announced or contemplated tax breaks for gasoline. Cutting taxes has been the norm.
- The difference between retail and wholesale gasoline prices shed $10 in the global market as a reflection of such measures.



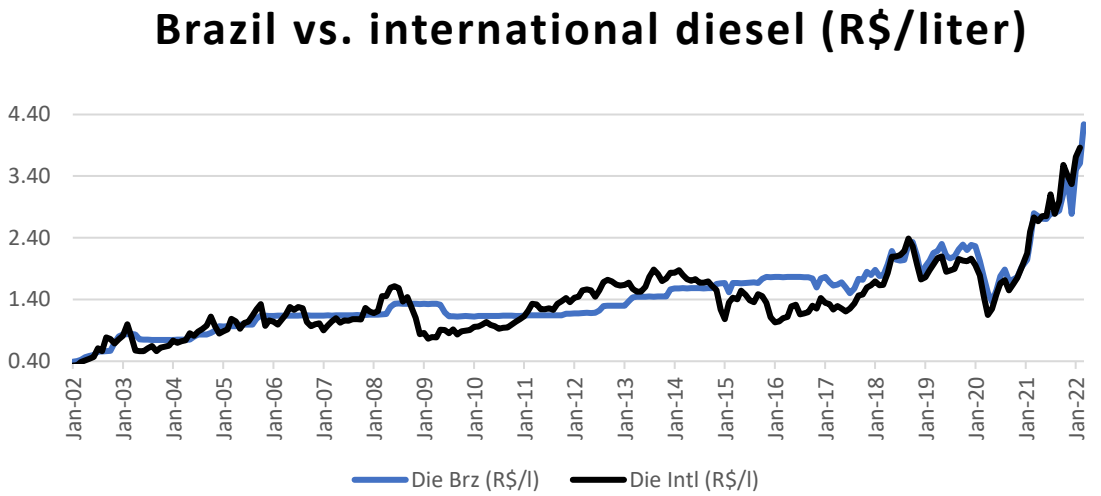
Country	Announced or taken measures
UK	Price cap on household energy contracts. GBP 200 discount on electricity bills for all households to be repaid over five years and GBP 150 rebate on council tax bill for 80% household in England.
Bulgaria	Froze regulated electricity and heating prices till March 2022.
Denmark	Subsidies worth $299 mn to be paid to 419k hardest-hit households
France	Capped increase on regulated electricity costs at 4% this year. EUR 4.5 bn tax relief including allowance for commuters.
Germany	Wants to introduce temporary rebate for petrol and diesel worth EUR 6.6 bn over three months
Greece	Spent EUR 2.5 bn in power and gas bill subsidies since Sep'21. Detailed additional EUR 1.1 bn , including fuel rebate for low-income households.
Italy	Package worth EUR 4.4 bn to curb energy and fuel prices. This is on top of EUR 16 bn budgeted since July 2021 to ease electricity and gas bills
Netherlands	Cut energy taxes for 8 mn households.
Norway	Subsidizing energy bills since December and covers 80% of the portion above a certain rate.
Poland	Announced tax cuts on energy, petrol and basic food items. Extended regulated gas prices for households and institutions such as schools and hospitals until 2027.
Spain	Reduced VAT on energy bills to 10% and extended lower rates until end-June 2022.
Sweden	Compensate households worst hit by electricity costs by setting aside $636 mn.
Slovenia	Introduced cap on fuel prices with max. price of diesel at EUR 1.54/liter
Portugal	Govt. to cover 30% of the increase in bills of companies whose gas costs are equal to 2% of their turnover and their bills doubled over a year ago
California	California proposed giving out $400 per vehicle upto two vehicles to all residents. Free public transportation for three months.
Connecticut	Connecticut suspended gas tax for three months for April-June
Georgia	Georgia gas tax suspended for March 18 - May 31.
Maryland	Maryland's gas tax holiday lasted March 18 - April 16.
New York	New York's gas tax holiday will begin from June 1 and last through end 2022.
West Virgina, Ohio, West Virginia - USA	In process of deciding if they will suspend their state gas tax
New Zealand	Reduced fuel taxes by 25 New Zealand cents for three months beginning March 14.
South Korea	Govt. expanded fuel tax cuts from 20% to 30% from early May to end July. The government had cut fuel taxes by 20% in November 2021 and kept it in place till April but extended it till end-July in March.
Japan	The govt raised cap for gasoline subsidies to the maximum figure of $0.19 for seven days from April 21.
India	The govt cut taxes in November 2021 to contain resentment over rising fuel prices. The govt. announced in May 2022 a cut in excise duty on petrol by INR 8 ($0.10) per liter and INR 6 ($0.08) per liter on diesel.

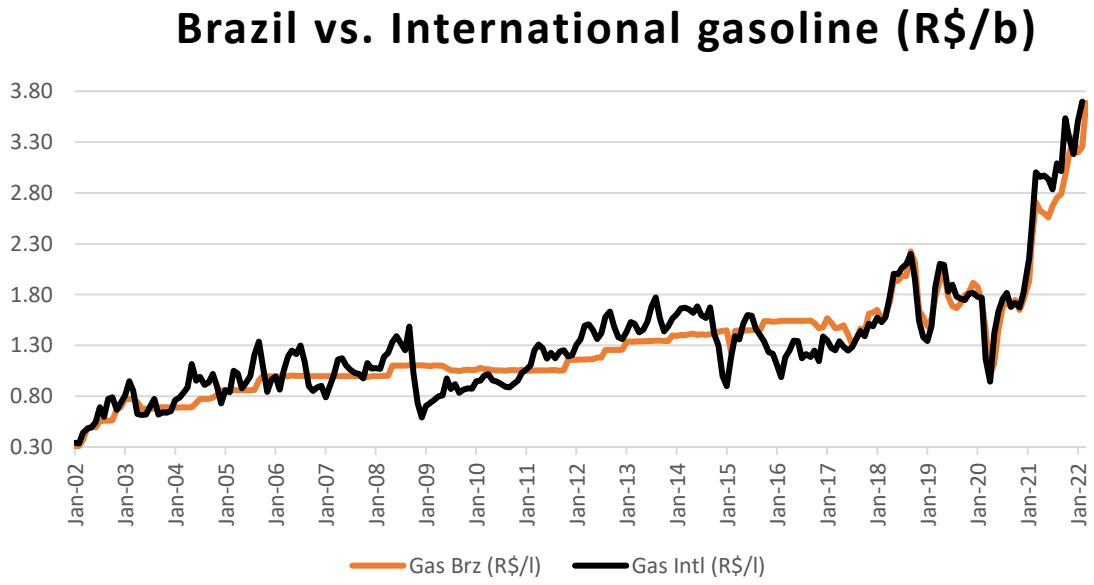
Source: JP Morgan, Goldman Sachs, Mar Asset Management

Brief hisitory of refining price policy

These past decades Petrobras has adopted different fuel pricing mechanisms in Brazil:

1) 2002/2008 – With Lula, prices leaned towards a "nil all" parity, and from his 2nd term on, prices stood still for a long time;
2) 2008/2010 – International prices fell alongside the crisis, and they remained virtually flat, while Brazil was operating at a premium;
3) 2010/2014 - The Brent rose from $40/b to $120/b, and Dilma decided to subsidize fuel. Petrobras suffered a US$40 bi. loss;
4) 2014/2016 - International prices started dropping steeply in Oct. 2024, and Brazil operated at a premium for almost two whole years;
5) 2016/2018 - Mr. Parente announced IPP (imports parity price) in Jul. 2017 with daily price-setting. In May, the company decided on a 30-cent diesel subsidy following a Nationwide strike by truck drivers.
6) 2019/presente – With Ivan Monteiro, Castelo Branco, Silva and Luna, and lastly José Mauro Coelho, prices in Brazil trailed international parity; however, with some unscheduled price adjustments.





Fonte: Bloomberg, Petrobrás, Mar Asset Management

Proposals to reduce taxes move forward in Congress

- In the beginning of the year, the government zeroed federal tax rates on diesel. Besides this, Congress is working towards passing two other bills aimed at reducing the gasoline's end price by means of tax reduction:
  - ***ICMS* for fuel, communication, and energy (*PLP*, bill of supplementary law 18/22):** Classifies fuel, electric power, and public transportation as essential goods, which imposes a 17% ICMS-rate cap on these groups, the goal of which is to tackle inflation via fare/tax exemption.
  - **(Constitutional Amendment Bill) *PEC* (PEC 16/22):** it provides for the R$29.6 bi. Transfer as compensation for States to zero their respective *ICMS* rates on diesel, natural, and cooking gases, with payments carried out in 5 monthly installments, proportional to each federal entity, by year's end. Because there is a transfer limit, the Bill is not mandatory, i.e., states are not obliged to sign up.

Impact of Anounced Measures				
		Impact on Iten (%)	Impact on CPI (bps)	Fiscal Impact 2022 (R$bi)
PLP18/2022			**-259**	**61**
	Electricity	-17,2%	-85	21
Elect. Without TUST and TUSD from tax base		*-8,9%*	*-44*	
	Telecom	-11,3%	-46	4
	Gas	-18,3%	-123	27
	Diesel	-	-	5
	Ethanol	-5,9%	-5	3
	LPG	-	-	0
	PL1280/2022	2,5%	-12	0
PEC			**-22**	**23**
	Diesel	-10,1%	-3	18
	GLP	12,2%	-17	4
	Etanol	-2,7%	-2	1
Total			**-293**	**84**

Fonte: BTG Pactual, Mar Asset Management

Refining and ICMS make up most of fuel costs

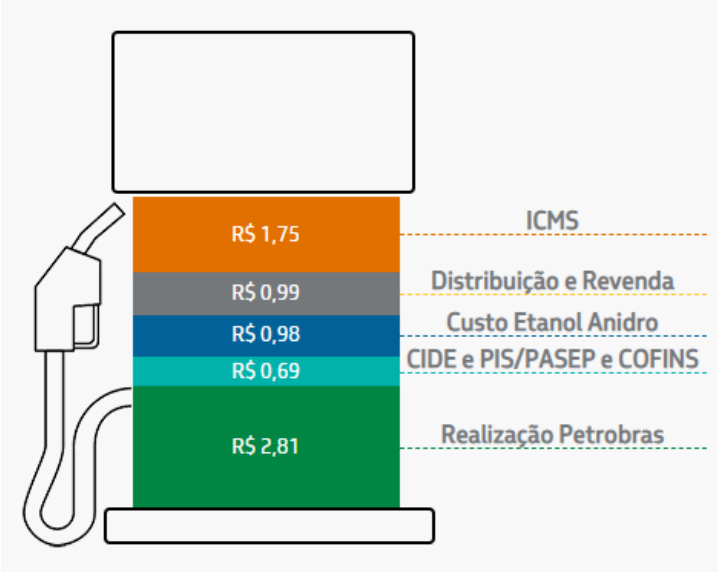
- Federal taxes account for 9% of gasoline's final price and were brought down to nil for diesel and cooking gas early this year. The *ICMS* levy on fuel largely affects fuel prices.
- Zero-rate *PIS/COFINS/CIDE** for diesel, gasoline, and LPG would have a yearly impact of R$21.5, R$32.1, and R$5.9 billion, respectively, on the public budget. Diesel and LPG have already been zeroed.

Total fuel consumption in 2021

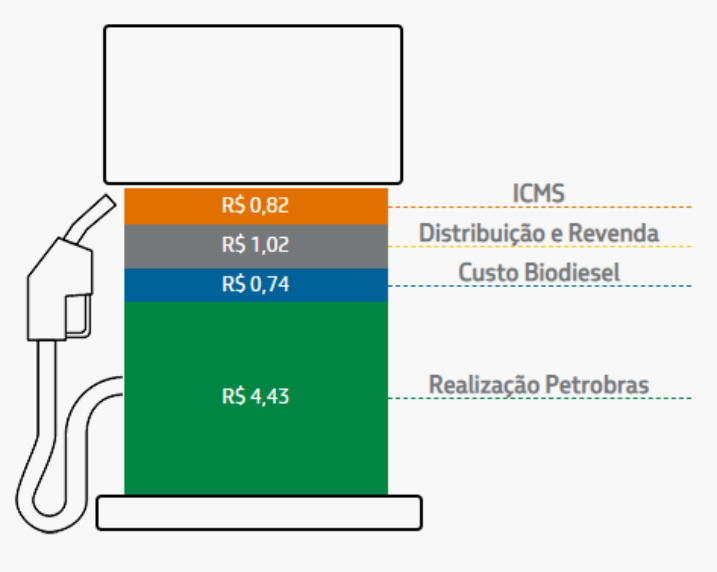
	Liters (bn)	Average price	Consumption (R$ bn)	PIS/COFINs/ CIDE	Petrobrás
Diesel	62.1	3.9	239.1	21.5	117.2
Gasoline	39.3	5.8	229.2	32.1	71.0
GLP-13	13.5	15.0	202.5	6.1	95.2

Composition of final sales price for fuel in Brazil (R$ liter, R$ unit)

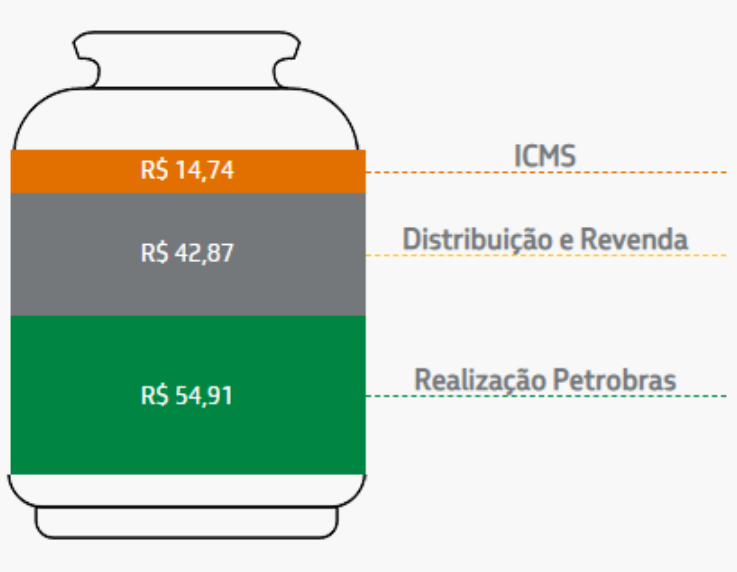
Regular gasoline



Diesel S-10



Cooking gas (LPG)



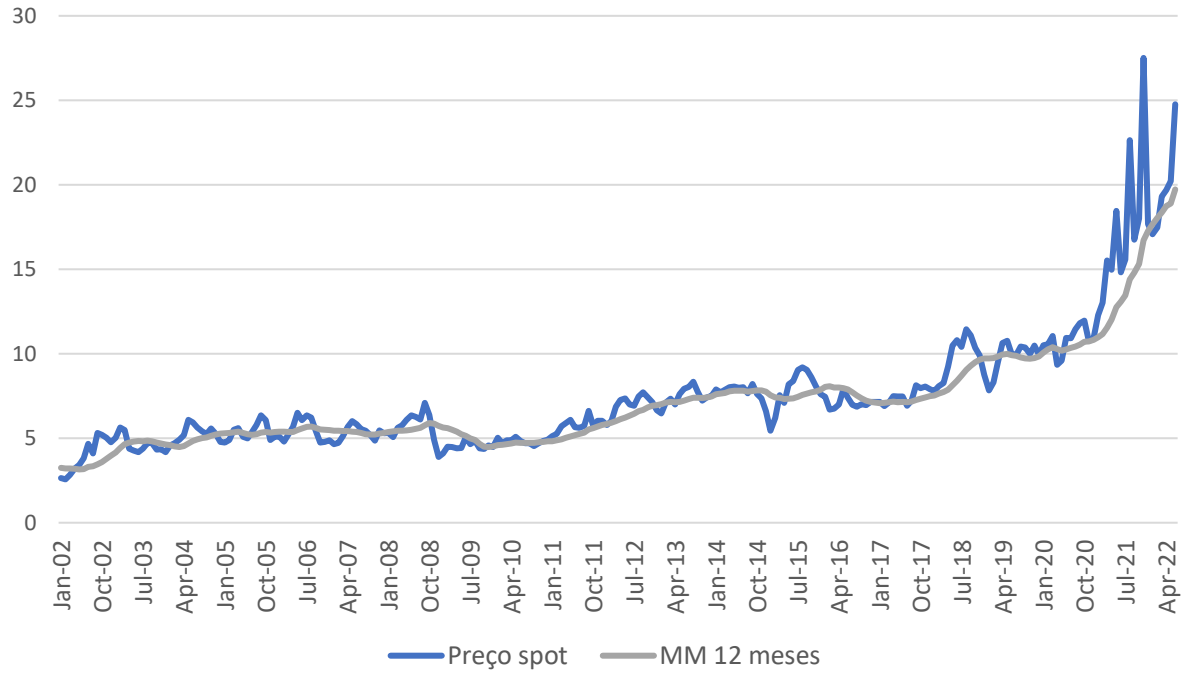
**PIS* (compulsory payroll-deductible Social Contribution Tax), *COFINS* (compulsory Contribution to Social Security Financing paid for by private companies), *CIDE* (Contribution for Intervention in the Economic Domain to be invested in the oil sector and transportation infrastructure).

Source: Petrobrás, ANP (National Oil Agency), Mar Asset Management

Stabilization fund would impose relevant costs

- Should the government have decided on volatility reduction with fuel prices in line with a moving average, costs would have skyrocketed throughout recent years. That is because there is a historical trend of price increases for fuels measured in BRL.
- We simulated the probable cost of such a fund based on (i) the 2022 consumption level and (ii) the scenario where fuel prices in R$ showed volatility from past years. The cost to adjust fuel, according to a 12-mo. moving window would have reached 45.4 bn. in 2021. Volatility reduction, however, would have been quite relevant. Regarding the median, this strategy would reduce yearly fuel price volatility by 50.1% compared to a monthly pricing regime.

Gasoline price in the international market in BRL (R$/gallon)



Annual costs of policies to cool gasoline and diesel prices (R$, billion)

	Annual cost			Volatility reduction of gasoline (%)		
	MM 12 mo.	MM 6 mo.	MM 3 mo.	MM 12 mo.	MM 6 mo.	MM 3 mo.
2005	4.7	2.4	0.5	-88.2%	-62.9%	-25.9%
2006	-0.6	-2.6	-0.4	-82.5%	-66.3%	-16.3%
2007	-2.7	1.3	1.3	-79.0%	-48.3%	-11.7%
2008	13.8	3.9	-1.1	-78.2%	-54.7%	-38.8%
2009	-25.7	-9.8	-1.8	77.9%	46.0%	-24.2%
2010	6.7	3.4	1.6	-57.1%	-41.7%	-30.5%
2011	20.2	10.3	4.1	-16.4%	8.1%	-4.4%
2012	16.9	6.7	2.0	-32.3%	-10.8%	-3.0%
2013	6.5	2.7	1.5	-70.6%	-39.1%	-8.2%
2014	1.3	0.1	-0.4	-82.1%	-70.3%	-46.1%
2015	5.2	2.9	0.8	-84.1%	-38.3%	-7.3%
2016	-13.8	-5.9	-1.5	11.5%	29.0%	-24.5%
2017	8.4	5.3	2.2	-70.1%	-49.7%	-21.8%
2018	28.6	10.9	3.3	-34.2%	-10.9%	-1.5%
2019	-0.1	0.5	0.8	-89.3%	-57.5%	-15.0%
2020	7.0	3.2	1.0	-69.5%	-55.1%	-21.1%
2021	45.4	22.9	9.5	-50.1%	-35.4%	-25.3%
2022*	24.9	9.0	3.4	-49.6%	-35.7%	-8.8%
Total/median	**146.7**	**67.3**	**14.0**	**-69.8%**	**-40.4%**	**-18.7%**

* Based on the assumption of fuel prices and exchange rate stability for the remainder of the year.

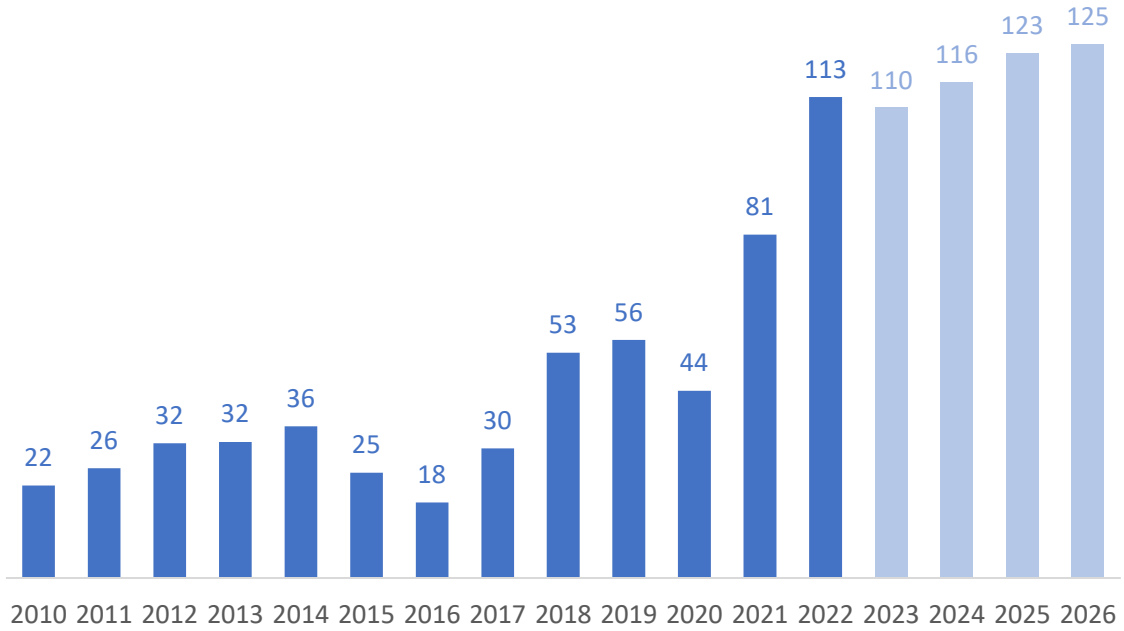
Source: Fred, BCB (Brazilian Central Bank), Mar Asset Management

Source of financing: Revenue with Royalties and SP*

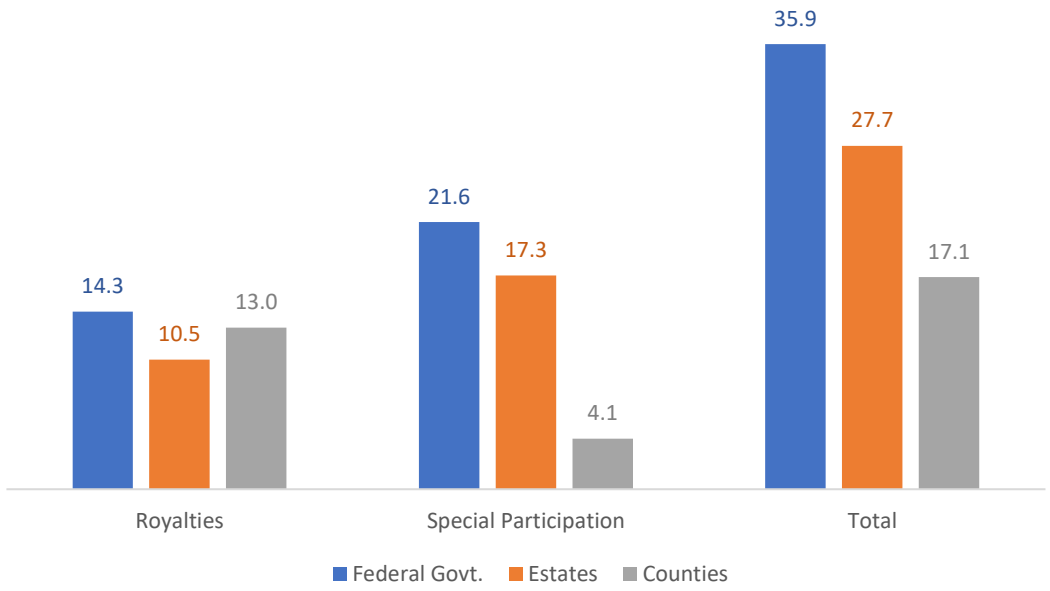
- Revenue expectation for Royalties and Special Participation (SP) from oil production is R$113 billion in 2022. The amount is proportional to the oil price in USD, which is rather pro-cyclical. The 2022 levy will be twice more significant than in 2019.
- Royalties and SP are shared among states and municipalities, with the Federal Government raking in the most significant piece of the pie. A big part of these revenues is "attached" to a specific end on a non-discretionary basis. For example, SP revenue is allocated to the Social Fund, and the rest is allocated to the *MME* (Ministry of Mines and Energy) and the *MMA* (Ministry of Environment). Any policy designed to cool fuel prices would require a change in the law regulating revenue sharing.

*Special Participation is a progressive tax (from 10% to 40%) applied over the operating income from oil and gas production.

Royalties and SP payment (R$, bi.)



Royalties and Special Participation sharing among federal entities in 2021 (R$, bi.)



Source: ANP (National Oil Agency), Mar Asset Management

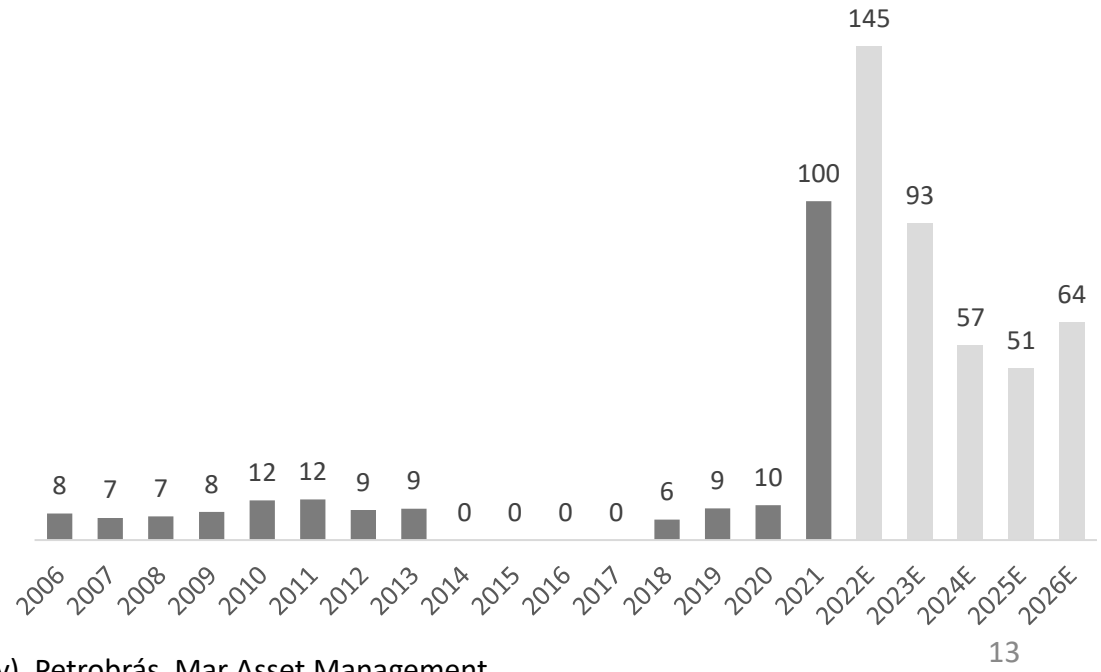
Source of financing 2: imports, exports and dividends

- An alternative financing source for a stabilization fund, proposed by the bill PL 1472/21, is the creation of an import tariff. We simulated a tax revenue, considering the 2021 total exports (483 mi. barrels). With a 15% rate, oil price at US$100, and exchange rate at USDBRL 5.00, this new duty would generate R$36 bi. A year.
- Another proposed solution is using dividends paid by Petrobras and the Federal Government. With the oil price hike, budget cutbacks, and selling off assets, dividends paid by the company have leaped in 2021. The expectation is for them to remain high in the following years. The Federal Government directly holds 28.7% of this cash flow. In 2022, for instance, our projection shows an approximate 42 bi. transfer in Petrobras dividends to the central government's bankroll.

Simulation for import duty revenue (R$, bi.)

Tax rates \ Oil price (US$/barrel)	50	75	100	125	150	175
2.5%	3	5	6	8	9	11
5.0%	6	9	12	15	18	21
7.5%	9	14	18	23	27	32
10.0%	12	18	24	30	36	42
12.5%	15	23	30	38	45	53
15.0%	18	27	36	45	54	63
17.5%	21	32	42	53	63	74
20.0%	24	36	48	60	72	85
22.5%	27	41	54	68	82	95
25.0%	30	45	60	75	91	106

Total dividends paid by Petrobrás to share-holders (R$, bi.)



Source: ANP (National Oil Company), Petrobrás, Mar Asset Management

Comparing measures of price reduction

- Since all of the abovementioned measures are in the form of incentives, their social cost is directly proportional to their impact on the final fuel price. Besides the magnitude and type of fuel, their difference pertains to the source of financing. A fixed crack spread would lower fiscal impact because Petrobras would cover most of the social cost.

- The company, the most favored by high oil prices, would collaborate with state and federal governments towards ameliorating the fuel price shock in the international market while maintaining the refining industry's profit margin close to normal levels, as shown in the previous slide. Depending on the financing source of a new stabilization fund, the company would also bear the lion's share of the cost (e.g., oil export tariff).

Measures to tame price increase

	PLP (bill of law) 18	Fuel *PEC* (Const. Amend.)	Stab. Fund	Fix. Crack Spread
Impact on diesel price	-	-11.7%	-11.3%[1]	-18%
Impact on gasoline price	-18%	-	-5.0%[1]	-
Impact on LPG	-	-12.2%	-	-
Fiscal cost/2022	25[2]	31.6	37.4	11.5

[1] Average discount in the first semester of 2022
[2] Only impact from gasoline

	Fixed refining margin	Temer administration	Stabilization fund	Fuel Const. Amend. (*PEC* 16/2022)
Proposal	15 USD/barrel fixed refining margin in Brazil and subsidies for importers and private refineries to avoid risk.	Direct subsidies and tax breaks for diesel	Creation of a fund to mitigate fuel price volatility	Wipe out ICMS rates on Diesel, cooking and natural gases. The Federal government will transfer the program's cost to the states.
Pros	Significant diesel price reduction, fiscal cost lower than the other proposed actions, does not pose a shortage problem.	Controlled fiscal impact	Reduces price volatility to consumers but does not alter the trend.	Significant price reduction
Cons	Freezing margins of an industry is always a delicate intervention. Additional increases to international refining margins can lead to extra fiscal costs.	Small reduction in the amount given fiscal cost.	Elevated fiscal cost in periods of swift price hikes.	Complex structure of transfers to states and high fiscal cost

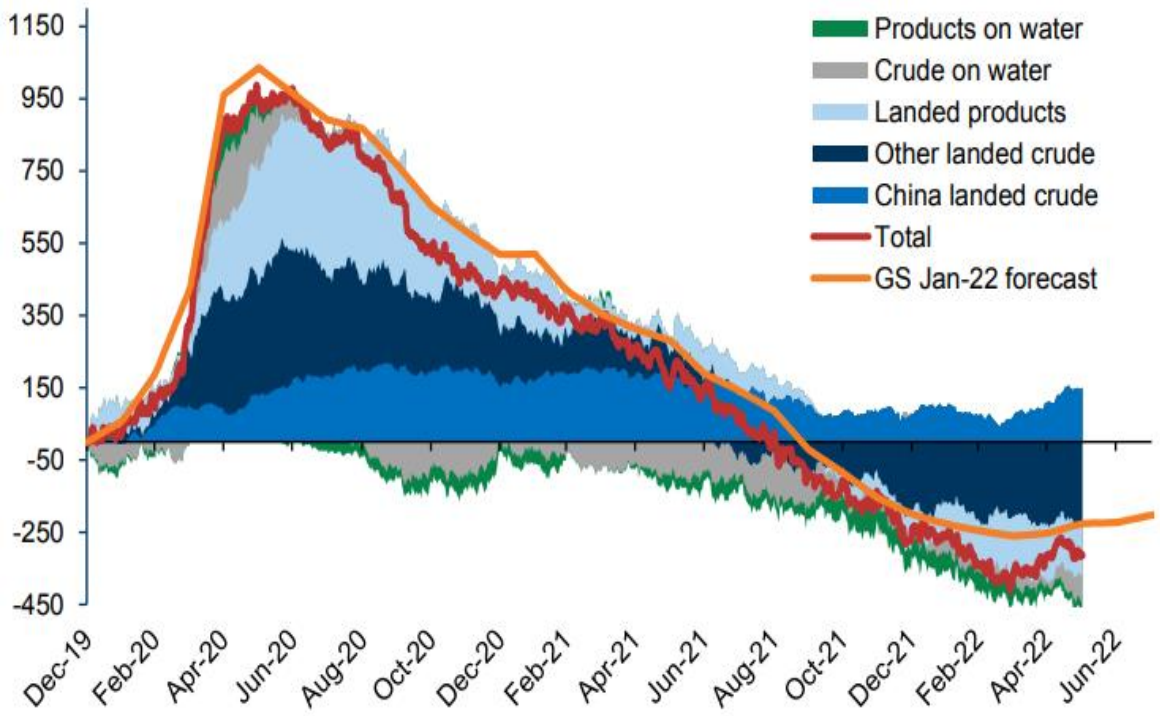
Source: Mar Asset Management

Crude oil global market

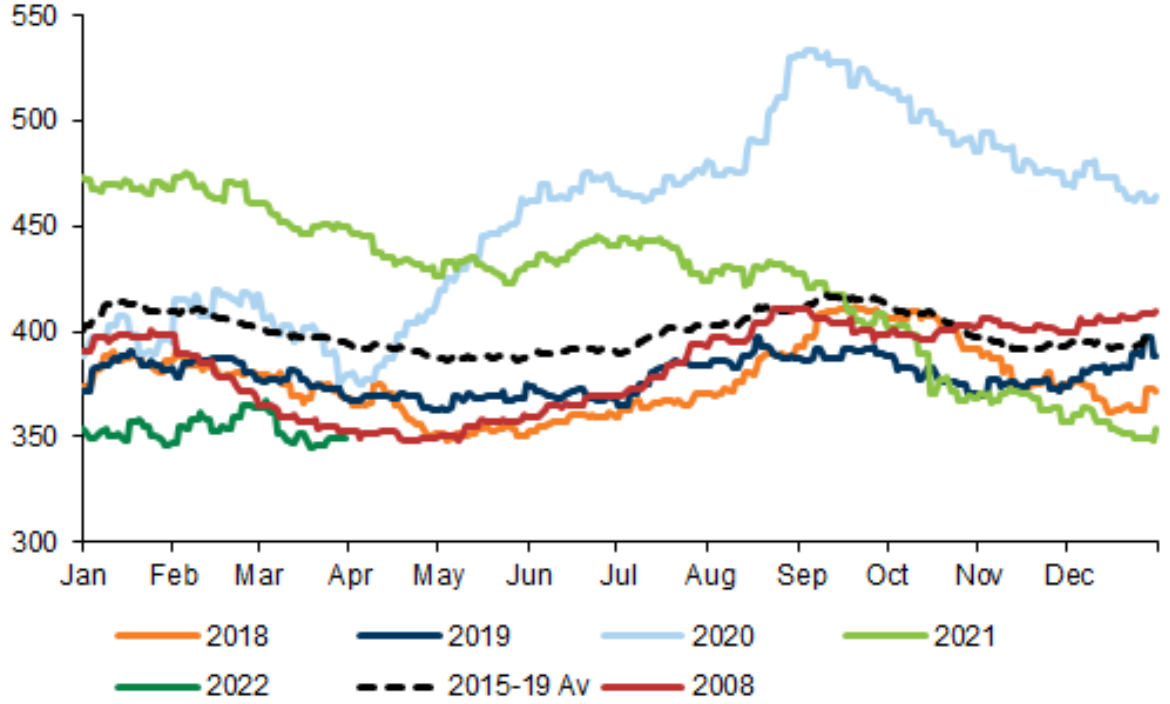
Oil inventory dropping since April 2020

- The global oil stock is below pre-crisis levels and showed quite negative dynamics from mid-2020 to March 2022. In absolute numbers, oil inventories are not well below the 2008 and 2018 figures, which reached historic lows. Furthermore, the first trimester seems to have broken with the seasonal pattern, and inventories remained relatively stable.

Global oil stock (mb vs. Dec. 2019)



Straight-run global stock (mb)



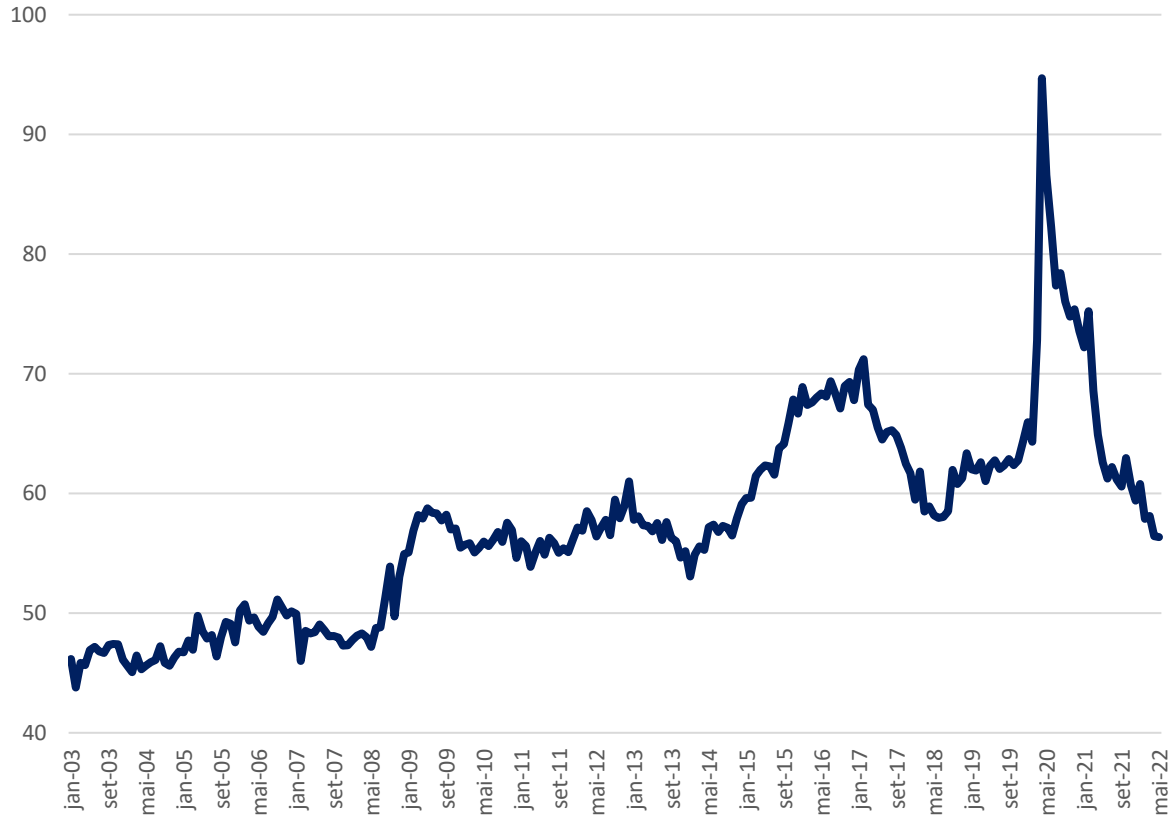
Fonte: Goldman Sachs, Mar Asset Management

Are oil inventories really that low?

- Despite declining, oil inventories are far from historical lows. The OECD's commercial stocks, for one, can currently suffice 57 days of consumption – the same level as mid-2018 and above many points throughout the last decades.

OECD oil stock
(days of comsumption)

US oil stock
(days of comsumption)

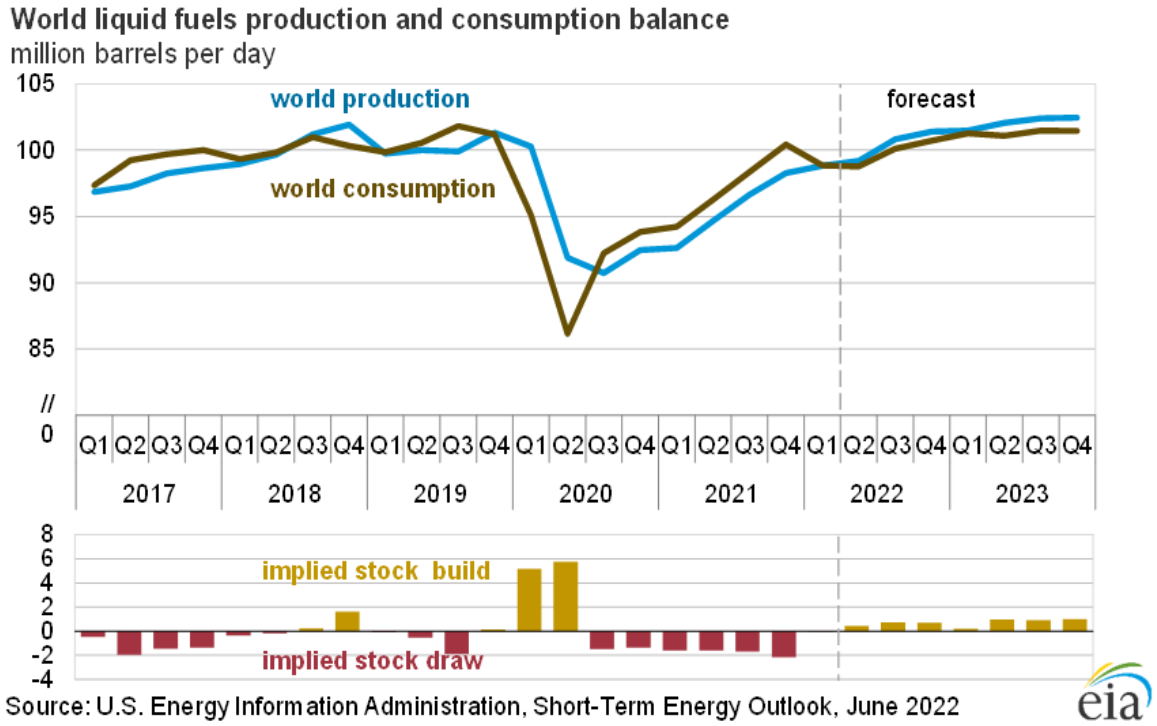


Source: EIA, Mar Asset Management

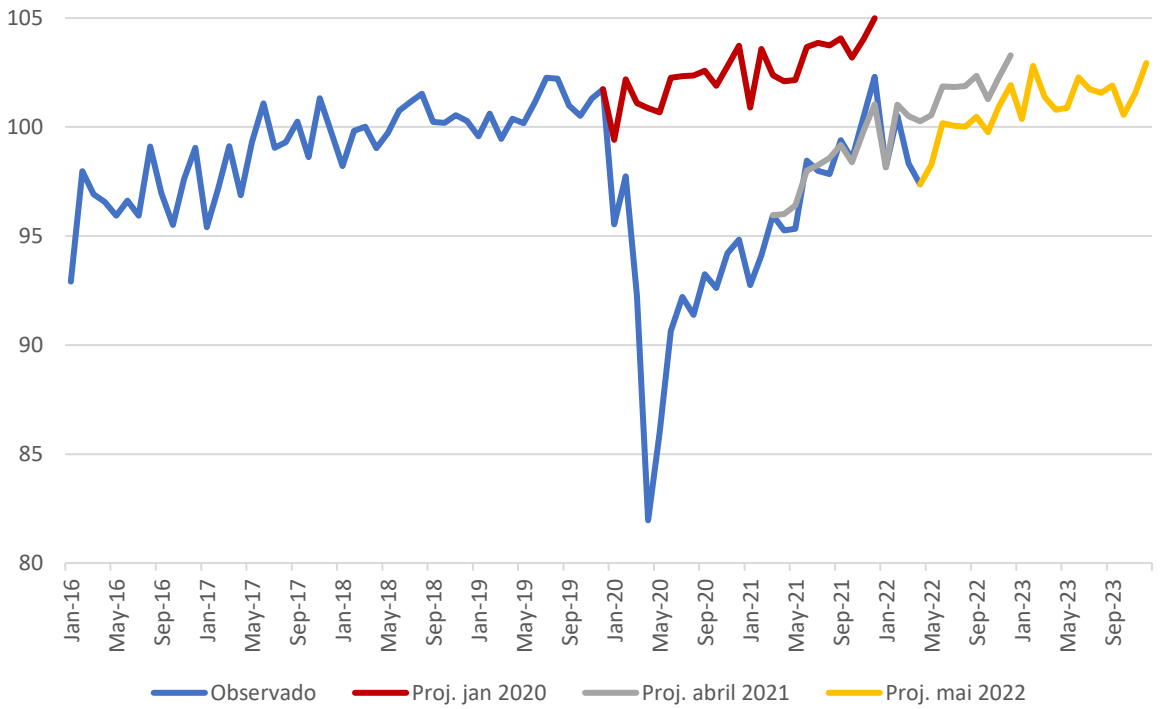
Consumption did not recover as expected for 2021

- During the pandemic, oil and byproducts consumption retracted by more than 15%. Their consumption has recovered since then but has not yet returned to the IEA's 2021-projected level. Unless there has been relevant destruction of production capacity, it might sound strange at first to experience a global risk of shortage.

World production and consumption of liquid fuels (mb/d)



World liquid fuels consumption – projected x observed (mb/d)

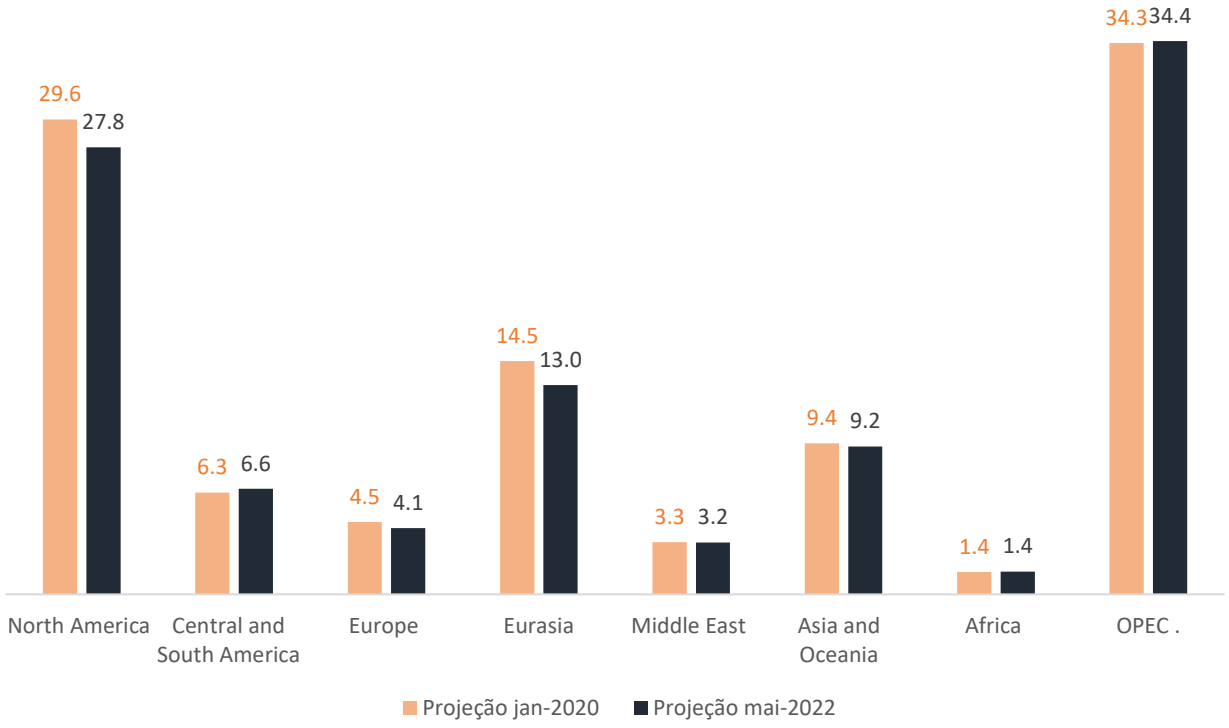


Source: EIA, Mar Asset Management

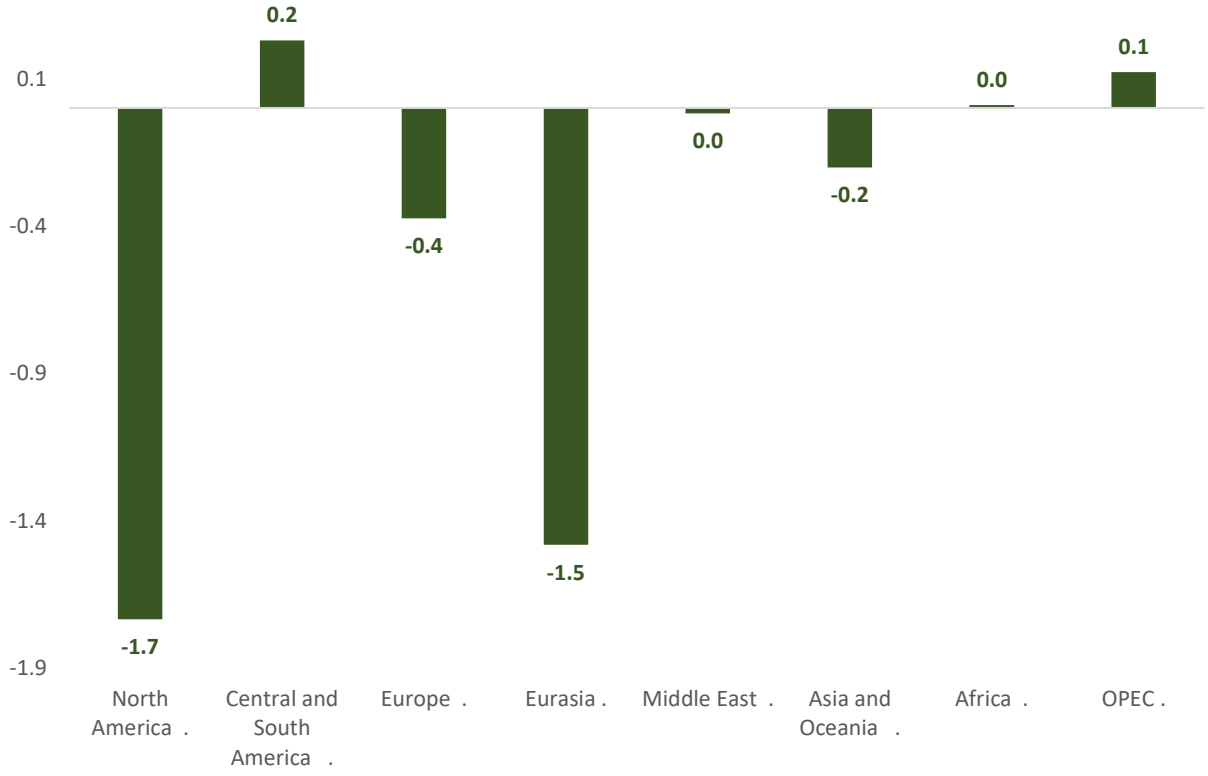
US and Russia reduced expected production for 2022

- In comparison to the pre-crisis, expectation for total oil production has been reduced, mainly due to US and Russia production reviews. Both countries should produce about 2.7 mbd less than expected before the crisis. Output in other ex-OPEC countries has also been downgraded. At first, the rest of the world would not manage to offset a potential more significant drop in Russia's production.

Oil production projection in 2022 carried out in Jan. 2020 and May. 2022 (mb/d)



Expected production reduction by continent confronted with projection from Jan. 2020 (mb/d)

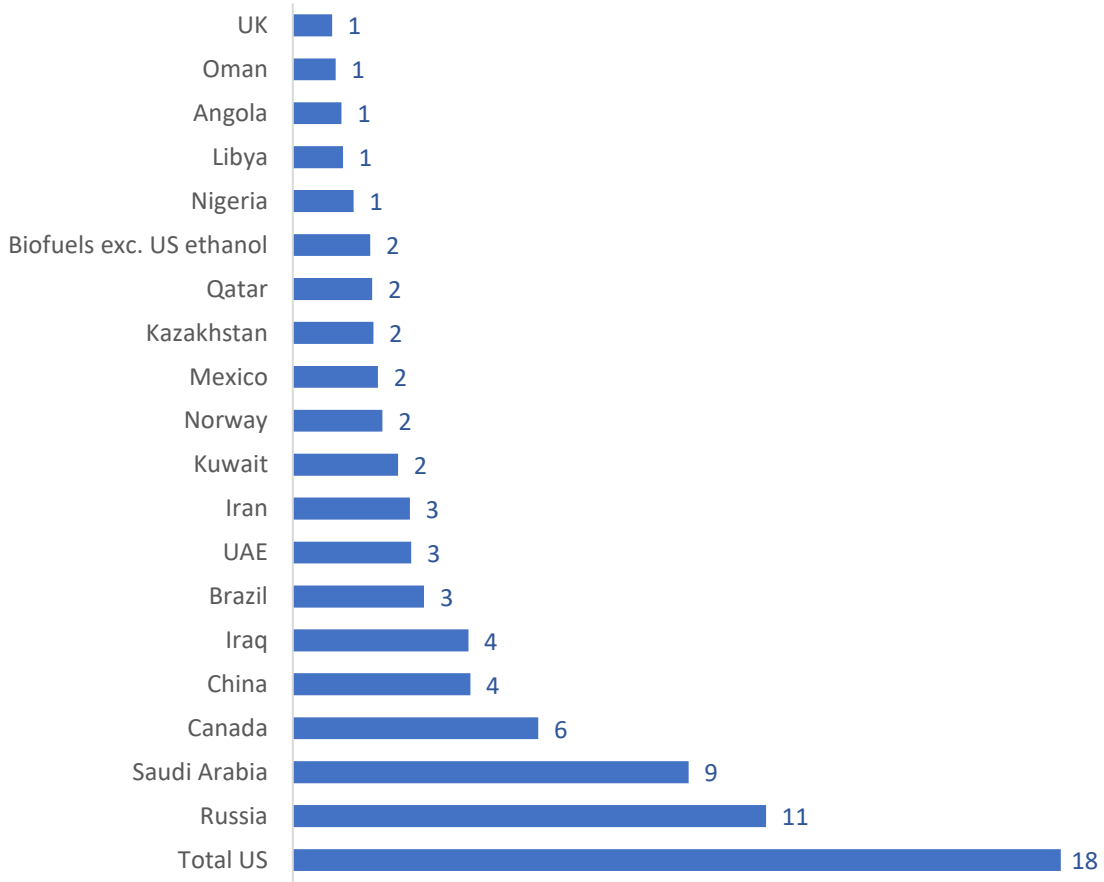


Fonte: IEA, Mar Asset Management

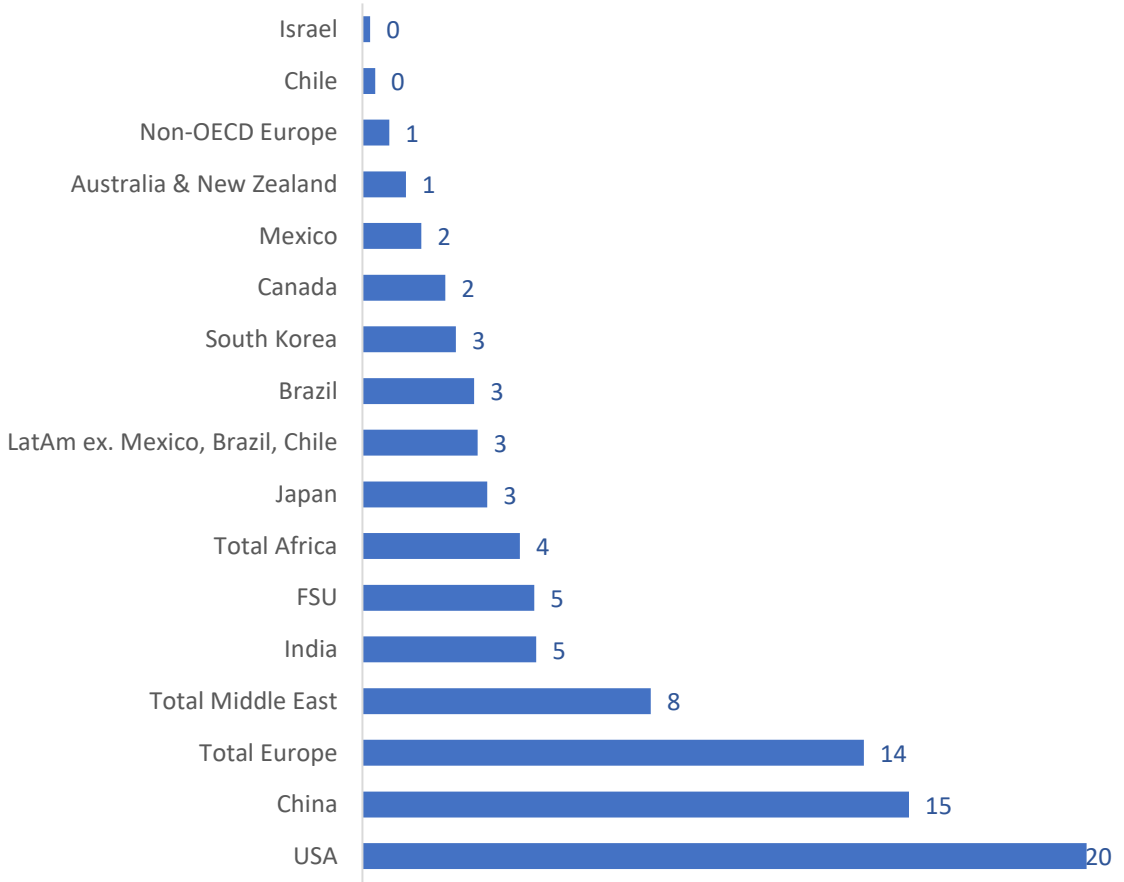
Russia is the second major oil producer in the world

- The US is the major oil producer and its primary consumer. Nowadays, production is diversified, with OPEC accounting for 40% of the total output. Besides the US, China and Europe are the world's largest oil consumers.

Major oil producers (mb/d, mi.)



Demand for oil (mb/d, mi.)

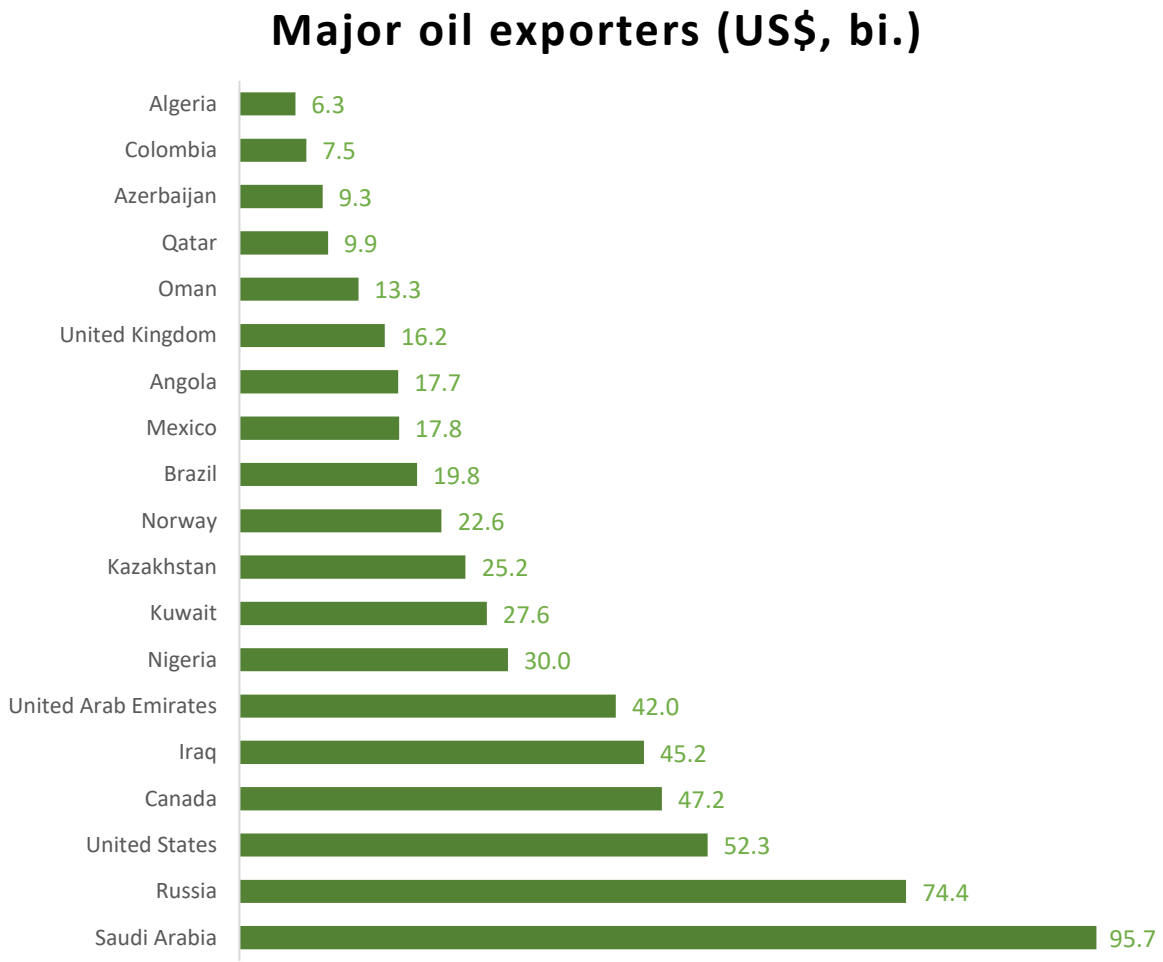


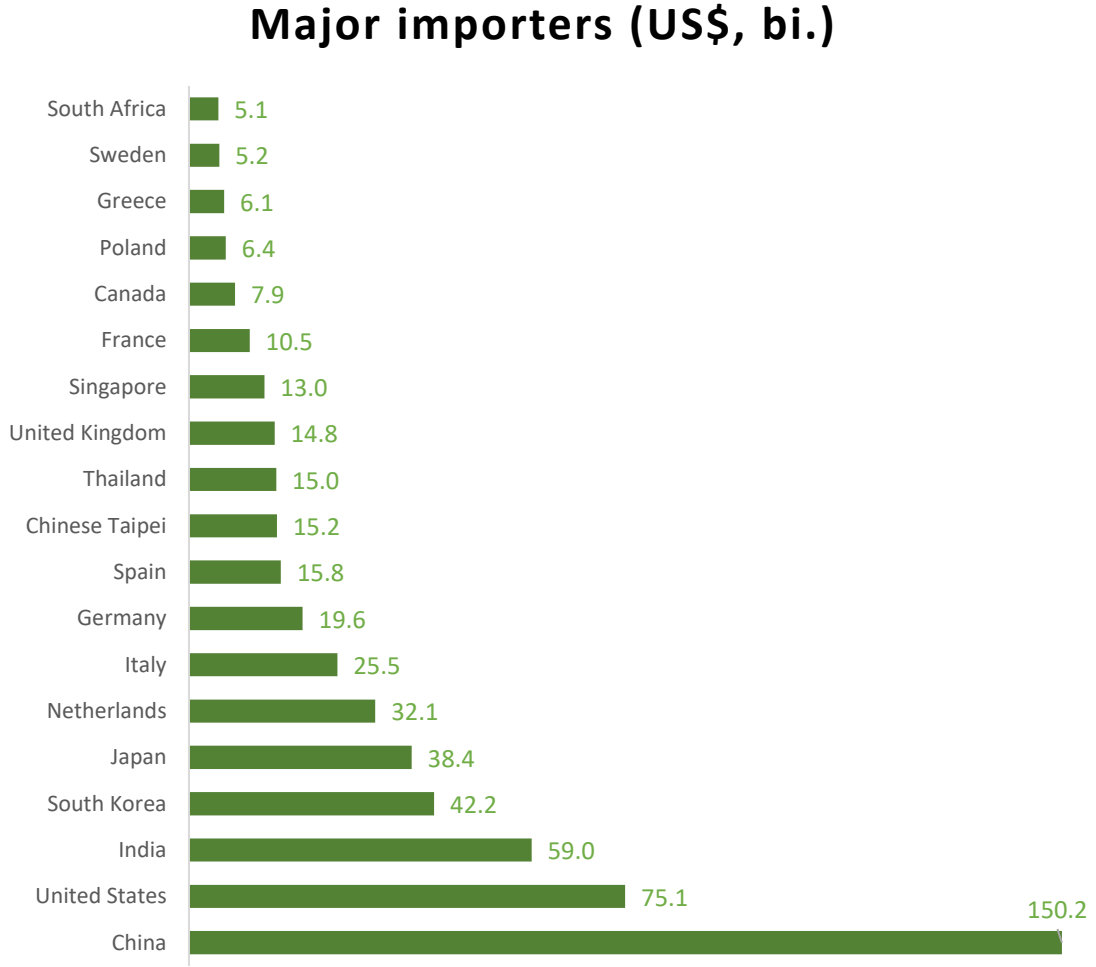
mar asset management

Source: Goldman Sachs, Mar Asset Management

Russia is the second major exporter in the world

- Russia is the second major oil exporter in the world. The country is responsible for 11.6% of oil shipping in the world trade. The major importers are China, the US, and India.





Source: OEC, Mar Asset Management

mar asset management

EU importing will decrease in the rest of the year

- Most of this supply tends to be redirected to countries friendlier to Russia. China and India have already scaled their imports, and Turkey should follow suit.

- These three countries should increase their import volume to approximately 1.0 mbd, according to JP Morgan's calculations.

Exhibit 6: India and China spare storage capacities

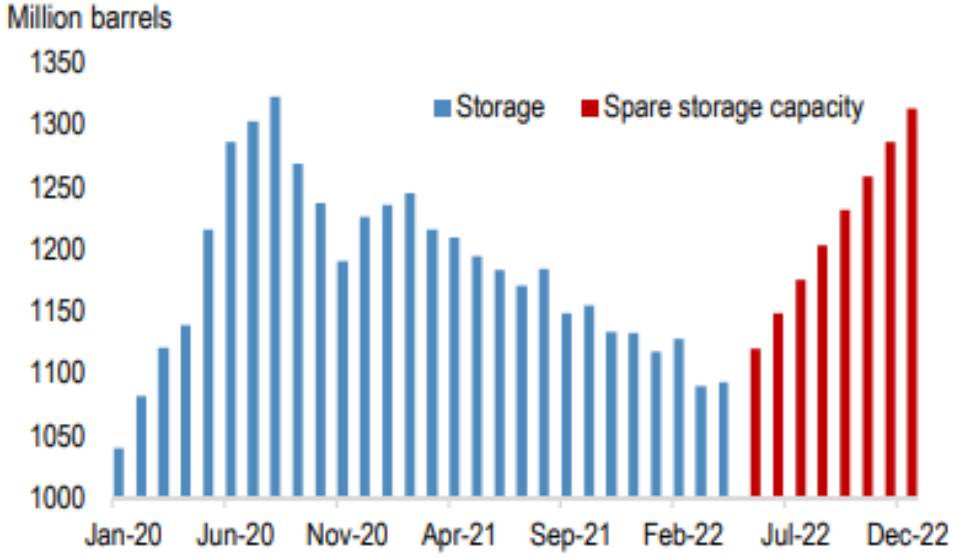


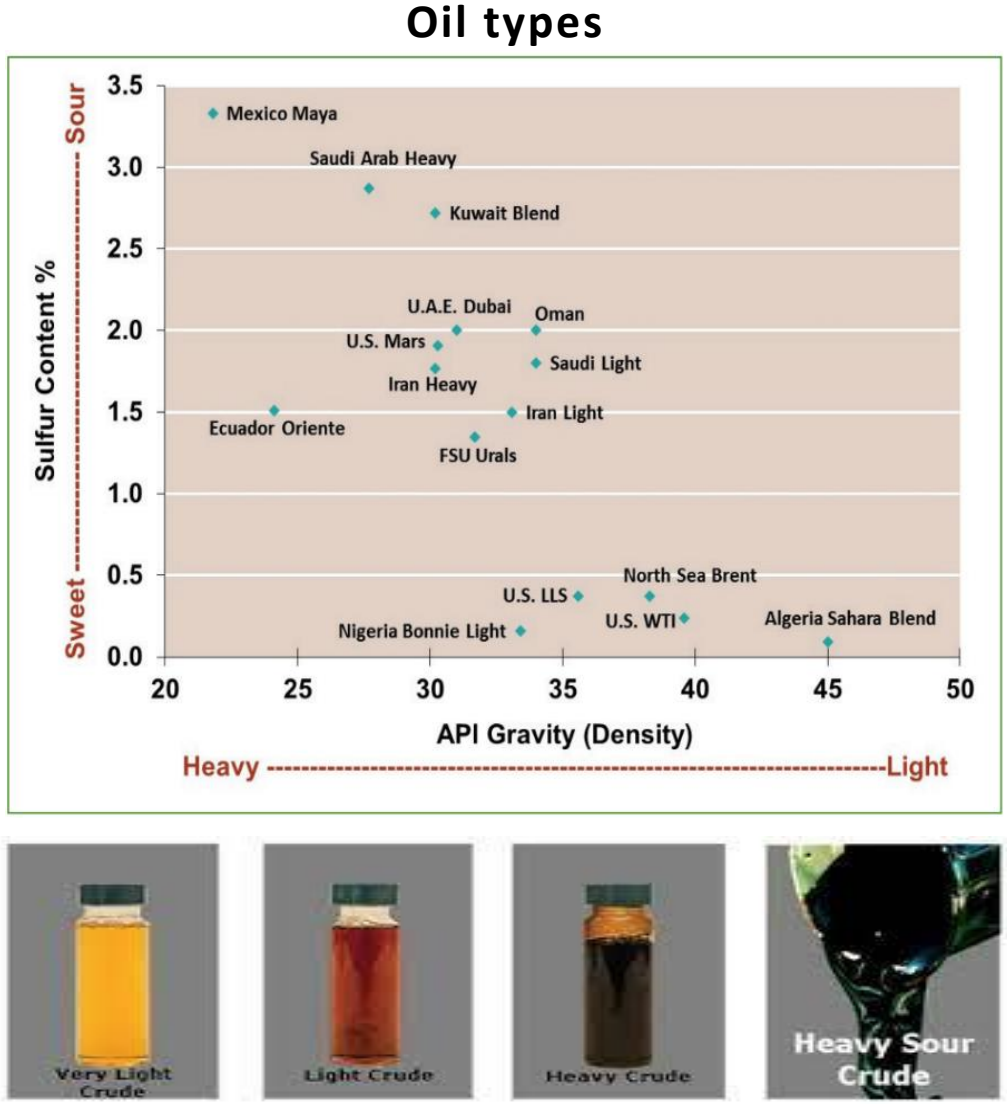
Exhibit 5: European total oil imports and commitments of reduction in Russian imports

Countries	Stance on Oil Ban	Announcement Date	Oil Import (2019)	Oil Import (2021)	Proposed Timeline	Reduction in Russian Imports end 2022 (kb
Germany	Yes	25-Mar	758	701	Cut imports by half by midsummer and end it by year end 2022	701
USA	Yes	8-Mar	520	672	Bans any new oil purchases	672
Poland	Yes	30-Mar	484	446	End oil imports by the end of 2022	446
Finland	Yes	11-Mar	247	227	No timeline proposed	-
UK	Yes	8-Mar	206	137	Phase out oil and oil products import by the end of 2022	137
Lithuania	Yes	16-Mar	146	124	Imports already cut to zero	124
Slovakia	Yes	10-Mar	105	109	No timeline proposed	-
Spain	Yes	8-Mar	51	81	No timeline proposed. Will coordinate with the EU	-
Canada	Yes	28-Feb	25	6	Bans import of Russian oil	6
Estonia	Yes	22-Feb	11	13	Imports already cut to zero	13
Latvia	Yes	24-Mar	7	7	Imports already cut to zero	7
Belgium	Undecided		336	245		
France	Undecided		269	204		
Turkey	Undecided		214	182		
Italy	Undecided		179	164		
Sweden	Undecided		176	67		
Romania	Undecided		92	74		
Czechia	Undecided		81	61		
Portugal	Undecided		60	11		
Denmark	Undecided		34	35		
Norway	Undecided		19	17		
Croatia	Undecided		14	8		
Ireland	Undecided		14	8		
Malta	Undecided		8	5		
Slovenia	Undecided		6	10		
Austria	Undecided		6	16		
Cyprus	Undecided		0	1		
North Macedonia	Undecided		0	0		
Georgia	Undecided		0	4		
Serbia	Undecided		0	15		
Moldova	Undecided		0	0		
Albania	Undecided		0	0		
Montenegro	Undecided		0	0		
Netherlands	No	8-Mar	931	477		
Greece	No	8-Mar	154	166		
Hungary	No	8-Mar	102	86		
Bulgaria	No	8-Mar	92	11		
Total Volume			**5347**	**4391**		
Total Volume Yes			**2560**	**2524**		**2106**
Total Volume Undecided			**1507**	**1128**		
Total Volume No			**1280**	**739**		
Total Volume Yes as % of Total Russian Imports			**48%**	**57%**		**48%**

Fonte: Kpler, JP Morgan, Mar Asset Management

Oil is not an uniform commodity

- Oil types are described as light or crude, depending on its density, and sweet or sour, depending on its sulfur content.
- Crude oil's physical characteristics determine how refineries process it. Less dense crude oils (lighter but with higher API gravity) usually come with higher light hydrocarbon content. Refineries can produce high-value products from light crude oil with simple distillation, such as gasoline, oil, diesel, and jet fuel.
- When refineries employ simple distillation on denser crude oils (heavier, with less API), they produce low-value products. Heavy crude oil requires incremental and more expensive processing to produce high-value products.
- The general economy or a refinery's viability depends on three key elements interacting: the choice of crude oil to be used (crude slate), the complexity of the refining equipment (refinery's setting), and the desired type and quality of the products (product's slate).

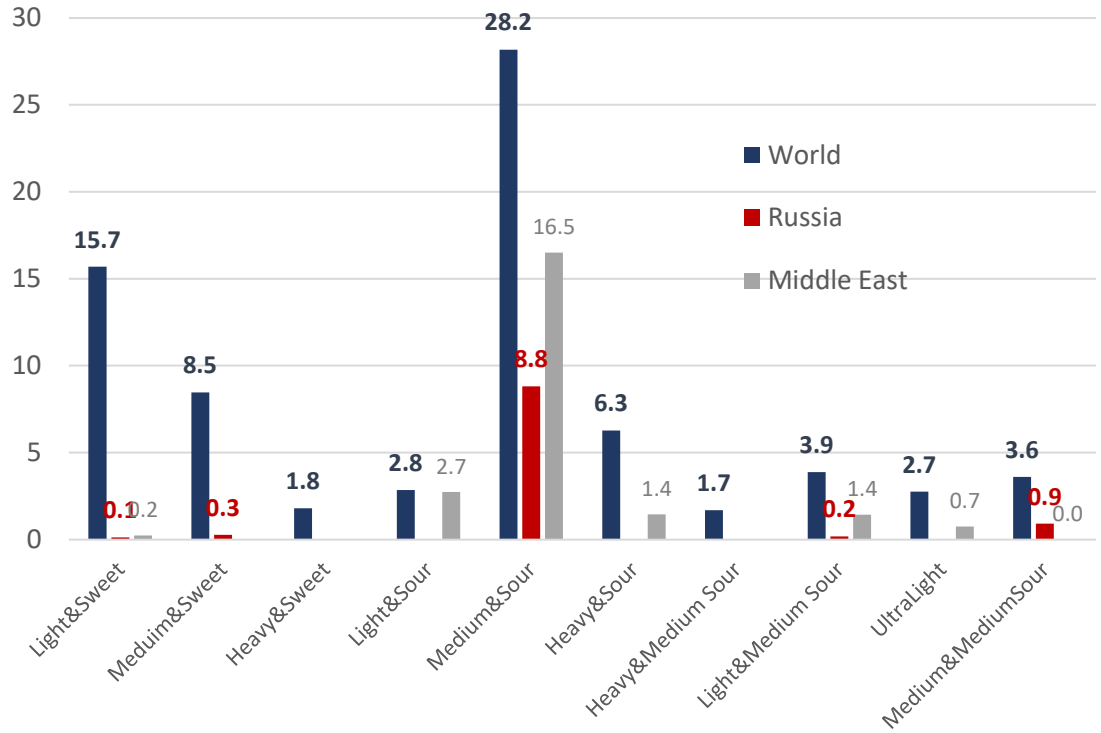


Source: Mar Asset Management

Russia's oil is the most common type in the world

- Russian benchmark oil is *Medium & Sour*, the most common worldwide. Notedly, the most common among exporters. At first glance, it would not be troublesome to rearrange global exports as an adjustment to the embargo. China, for instance, imports more than 5 mbd of this oil, with 3.3 mbd coming from other locations besides Russia. China alone could absorb all oil from Russia, currently exported to countries that vowed to back the embargo. India is also less hostile towards Russia, which could significantly bolster imports.

World production by oil type (mbd, 2020)



Oil imports *Medium & Sour* by country

Country	Russia	Ex-Russia M&S
Asia	**2.4**	**9.2**
China	1.7	3.3
South Korea	0.4	1.2
Japan	0.1	1.8
Thailand	0.1	0.4
Turkey	0.1	0.2
India	0.0	2.3
Europe	**2.3**	**2.3**
Netherlands	0.7	0.3
Germany	0.5	0.5
Poland	0.3	0.1
Italy	0.3	0.7
Belarus	0.3	0.1
Finland	0.2	0.0
United Kingdon	0.0	0.6
North America		
United States	0.1	6.8
Total	**4.6**	**18.6**

Source: World Energy Review, OEC, Mar Asset Management

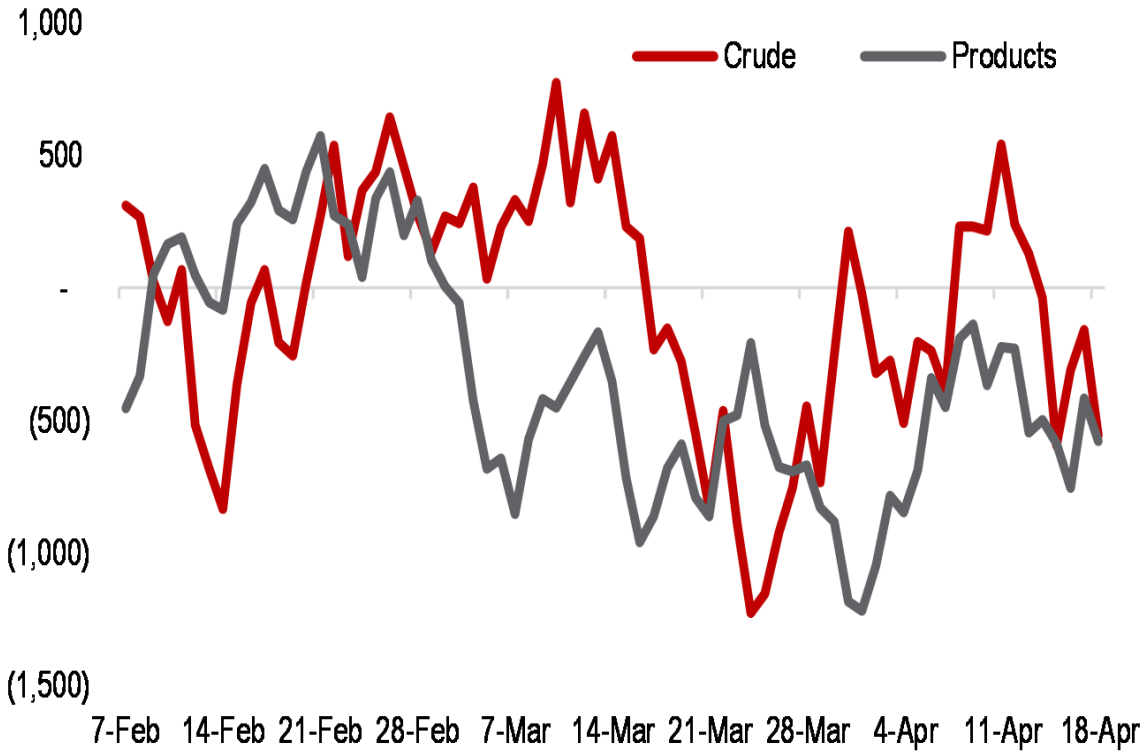
Russian exports were little affected so far

- Crude oil shipping in May surpassed the pre-conflict months. Decreasing exports to the US and UE were swiftly compensated by increasing shipping to China, India, and other countries. The war dealt its most significant blow to oil byproduct exports.

Russian oil exports (kb/d)

Russian seaborne crude and products flows (kbd)	2019	2020	2021	Jan-22	Feb-22	Mar-22	Apr-22	May-22	YTD 2022	Mar vs Feb	Apr vs Feb	May vs Feb	2022 YTD vs 2021 % Change
Crude	**3176**	**2658**	**2807**	**3075**	**2830**	**3118**	**3544**	**3222**	**3158**	**287**	**713**	**391**	**12%**
US	76	30	106	24	101	23	0	0	29	-78	-101	-101	-72%
UK	4	3	0	0	0	0	0	0	0	0	0	0	-
China	728	815	720	863	713	950	902	913	868	237	189	200	21%
India	45	16	34	0	0	339	822	495	331	339	822	495	888%
Turkey	247	90	106	179	94	239	263	157	186	145	168	62	75%
EU	1620	1210	1345	1478	1429	978	961	963	1162	-452	-468	-467	-14%
Germany	*60*	*45*	*81*	*94*	*90*	*45*	*0*	*0*	*46*	-45	-90	-90	*-44%*
France	*72*	*31*	*58*	*71*	*52*	*47*	*24*	*64*	*52*	-5	-28	*12*	*-11%*
Italy	*238*	*169*	*142*	*117*	*102*	*232*	*294*	*377*	*224*	130	192	*275*	*59%*
Spain	*27*	*20*	*47*	*47*	*78*	*0*	*47*	*0*	*35*	-78	-31	*-78*	*-26%*
Netherlands	*269*	*286*	*363*	*407*	*279*	*308*	*169*	*236*	*280*	28	-110	*-43*	*-23%*
Baltic States	*157*	*116*	*124*	*141*	*133*	*46*	*0*	*0*	*64*	-87	-133	*-133*	*-48%*
Rest of EU	*797*	*543*	*531*	*601*	*694*	*299*	*426*	*286*	*461*	-395	-269	*-409*	*-13%*
FSO	334	296	301	327	347	335	317	310	327	-12	-30	-37	9%
RoW	*457*	*494*	*497*	*531*	*493*	*590*	*597*	*695*	*581*	97	103	*202*	*17%*
Products	**2461**	**2417**	**2536**	**2687**	**2935**	**2287**	**2409**	**2249**	**2514**	**-648**	**-527**	**-686**	**-1%**
US	290	339	323	361	463	103	0	0	186	-360	-463	-463	-43%
UK	140	108	133	149	184	95	41	40	102	-88	-143	-143	-24%
China	33	40	47	78	90	72	51	44	67	-18	-39	-47	42%
India	12	20	53	40	121	84	65	18	65	-38	-57	-104	23%
Turkey	129	123	130	88	129	144	151	61	115	15	23	-68	-12%
EU	1211	1225	1284	1439	1506	1359	1365	1165	1367	-148	-141	-342	6%
Germany	*133*	*143*	*151*	*119*	*98*	*176*	*87*	*82*	*112*	*78*	*-12*	*-17*	*-26%*
France	*108*	*151*	*180*	*195*	*224*	*144*	*160*	*165*	*177*	*-80*	*-64*	*-59*	*-1%*
Italy	*60*	*72*	*60*	*71*	*94*	*55*	*12*	*41*	*55*	*-39*	*-81*	*-53*	*-9%*
Spain	*75*	*71*	*100*	*115*	*96*	*14*	*17*	*0*	*49*	*-82*	*-79*	*-96*	*-51%*
Netherlands	*362*	*247*	*279*	*293*	*223*	*300*	*455*	*359*	*326*	*77*	*232*	*136*	*17%*
Baltic States	*65*	*98*	*99*	*129*	*136*	*173*	*150*	*101*	*138*	*36*	*14*	*-35*	*39%*
Rest of EU	*407*	*442*	*414*	*517*	*635*	*497*	*484*	*418*	*510*	*-138*	*-150*	*-216*	*23%*
RoW	647	562	565	532	442	430	*736*	*922*	*612*	*-12*	*294*	*480*	*8%*

Russian export losses (kb/d)

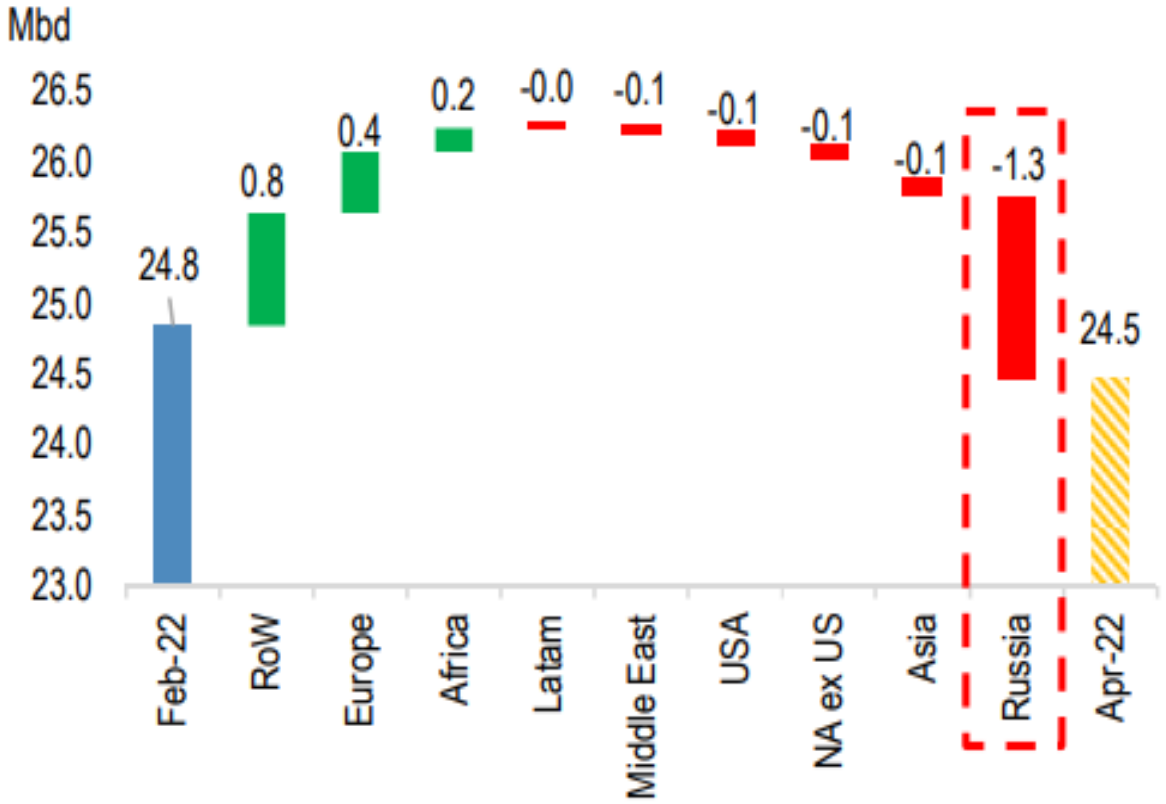


Source: JP Morgan, Kpler, Mar Asset Management

The global oil market's musical chairs game

- Oil exports from Russia have changed destination. Larger shipments to friendlier countries made up for the decreasing exports to Europe and other countries adverse to Russia.

Source of crude oil exports to UE, UK, US, Japan and South Korea (kb/d)



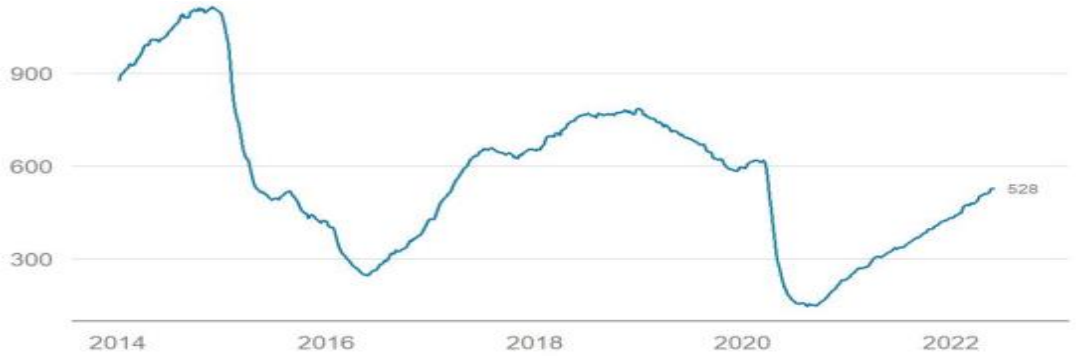
Source of oil exports to India, China Turkey, Vietnam, Egypt, Mid. East and Malaysia (mb/d)

Source: JP Morgan, Kpler, Mar Asset Management

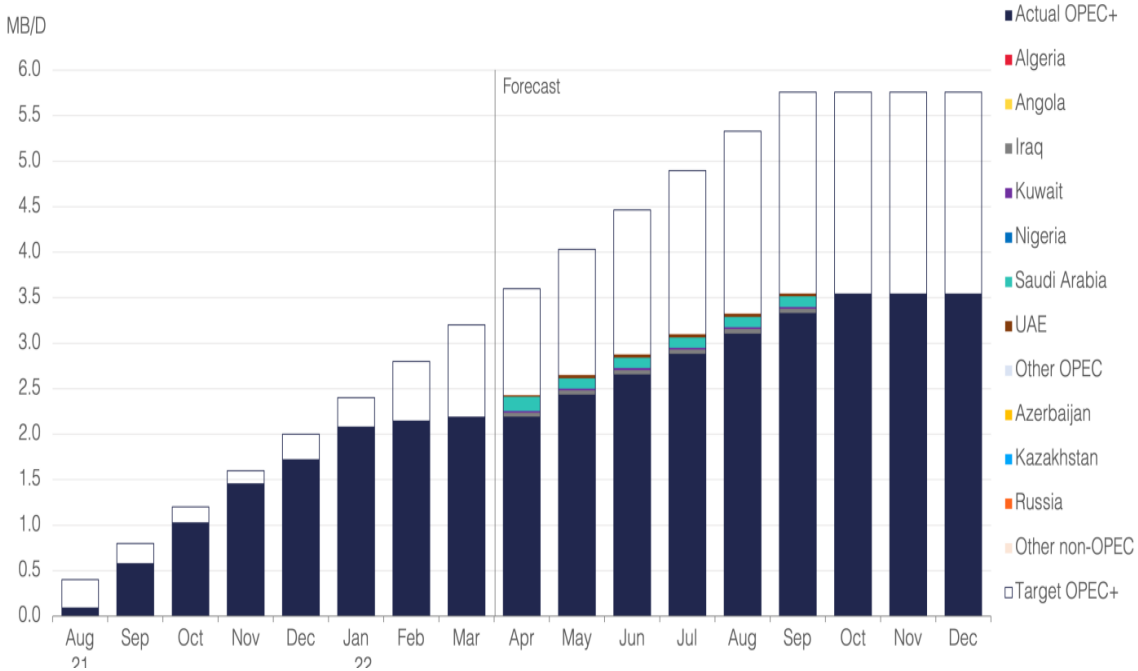
OPEC, the US and SPR will increase oil supply

- OPEC+ is increasing production, and the US is releasing its emergency stockpile, thus reducing pressure on the crude oil market. OPEC+'s current agreement is to increase oil production by 1.3 mbd between April and September 2022.
- Emergency stockpiles should augment supply to a level similar to this until October of this year.
- The US rig count is close to its pre-crisis level.

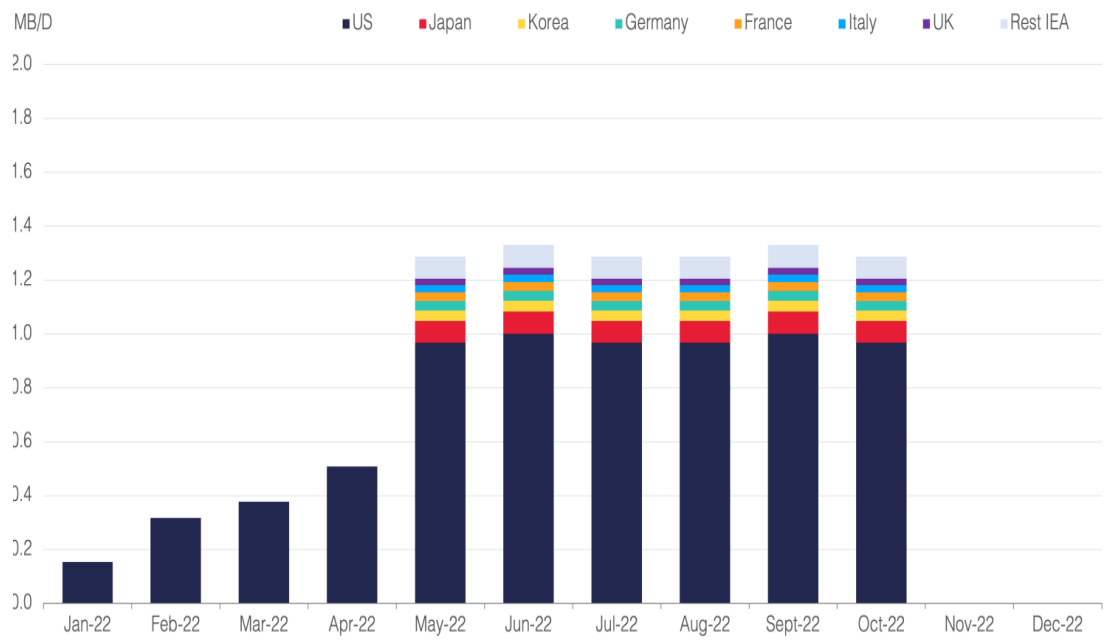
US Rig Count (dwells)



Expected production growth for OPEC+



Emergency stockpile release by IEA

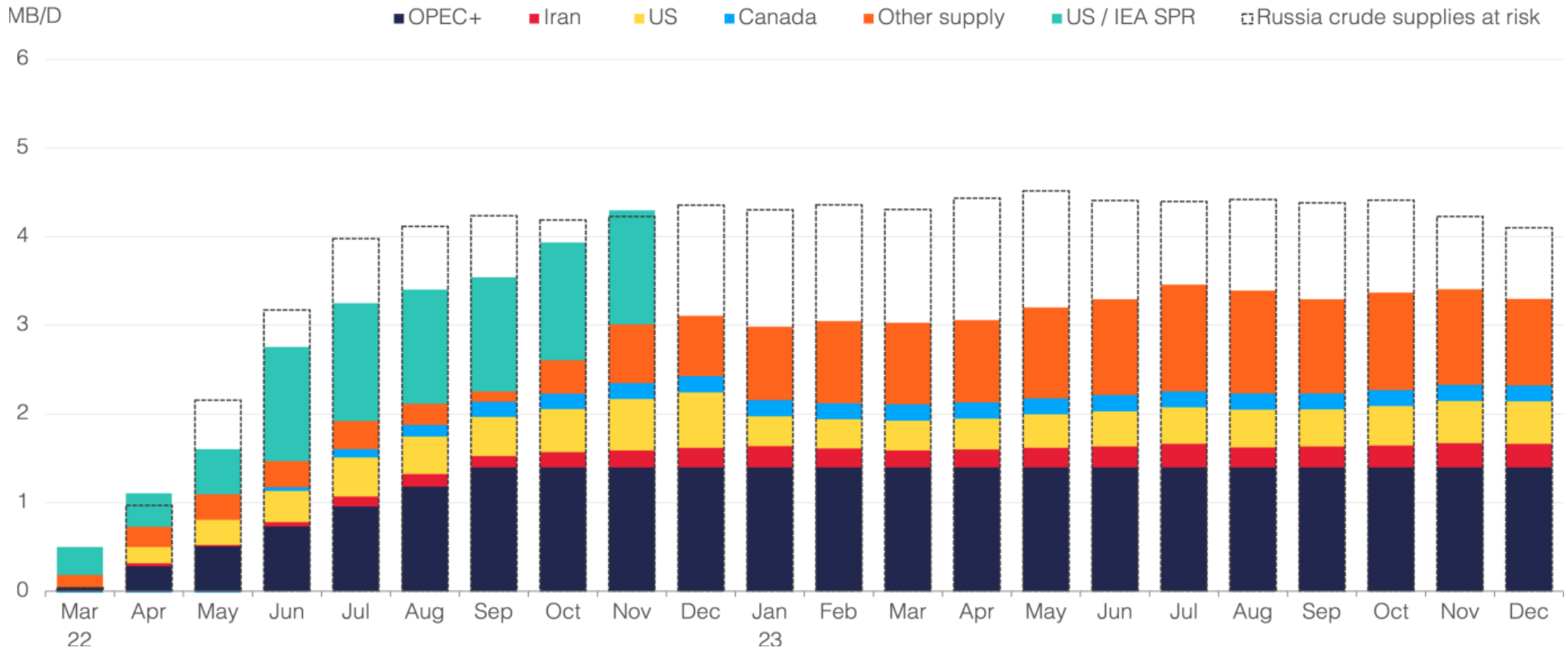


Source: OIES, Mar Asset Management

What is the expected oil market's shape?

- OPEC's increased production, released emergency stockpile, and slowed global demand should maintain the oil market at a balance point for the remainder of the year. Nonetheless, the scenario is quite uncertain, for it depends on the production increase coming into effect and the war remaining as is so as not to affect the Russian oil supply.

Increased crude oil production expected by 2023's end (mbd)



Source: OIES, Mar Asset Management

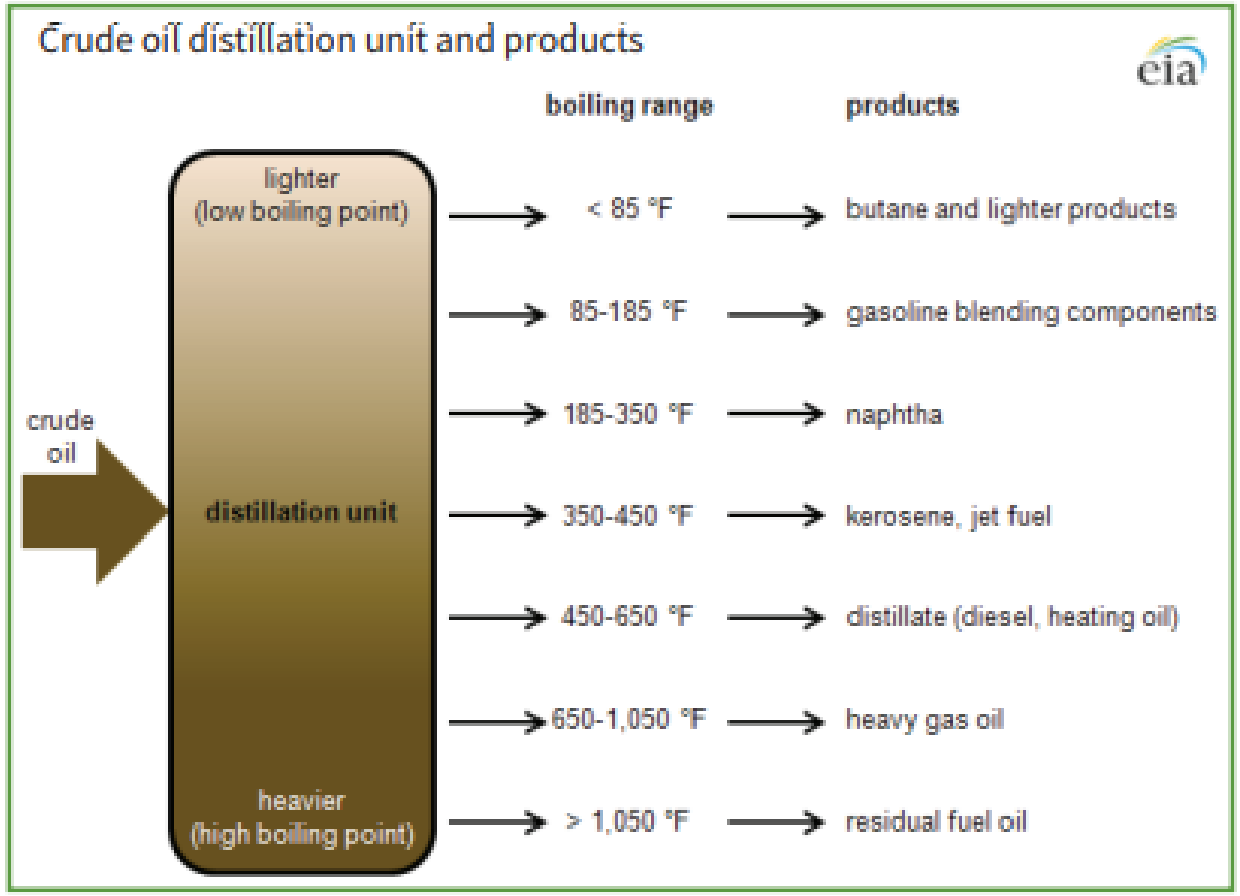
Global oil products market

Refineries do not make all products

Some facts on oil refining

- Crude oil is processed through distillers, where crude oil is heated and broken into lighter and heavier components.
- Distillation occurs in a fractionating column, by which different temperatures throughout the tower set the liquid mix apart into its components.
- Most refineries in the US have limited capacity to switch from gasoline to diesel production.
- This capacity varies according to the refinery and is estimated to be in the 6-8% range.
- The cost of shipping crude oil abroad is usually around a dollar/barrel.

Diagram of a Basic Distillation Unit

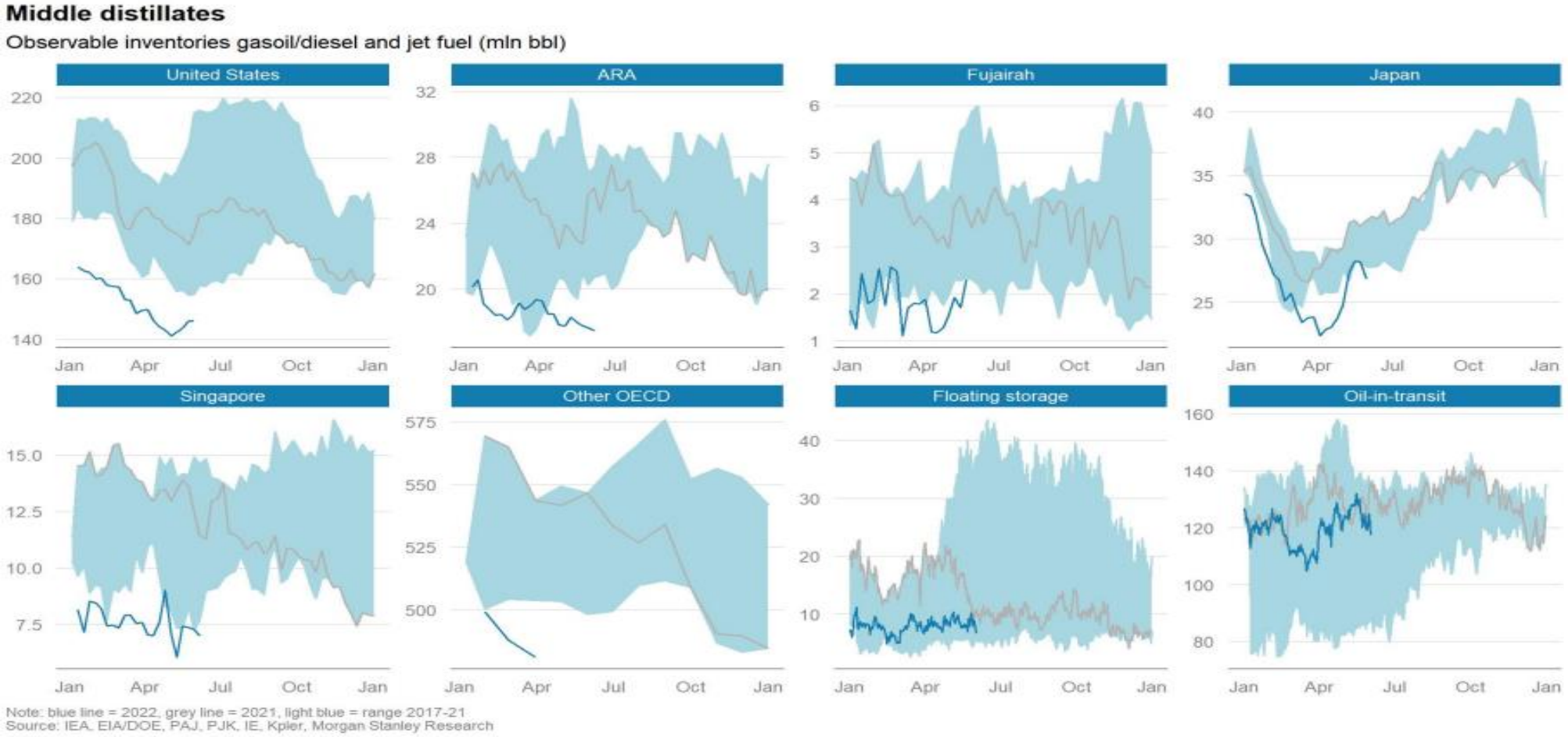


Source: Federal Energy Regulatory Commission, Marathon, Mar Asset Management

Oil products inventory levels is the biggest concern

- Oil products inventory levels are quite low in almost all countries/regions. These last weeks have seen a rise in US and Japan stocks but a fall in Europe (ARA).

Oil products stock in diferente regions (mb)

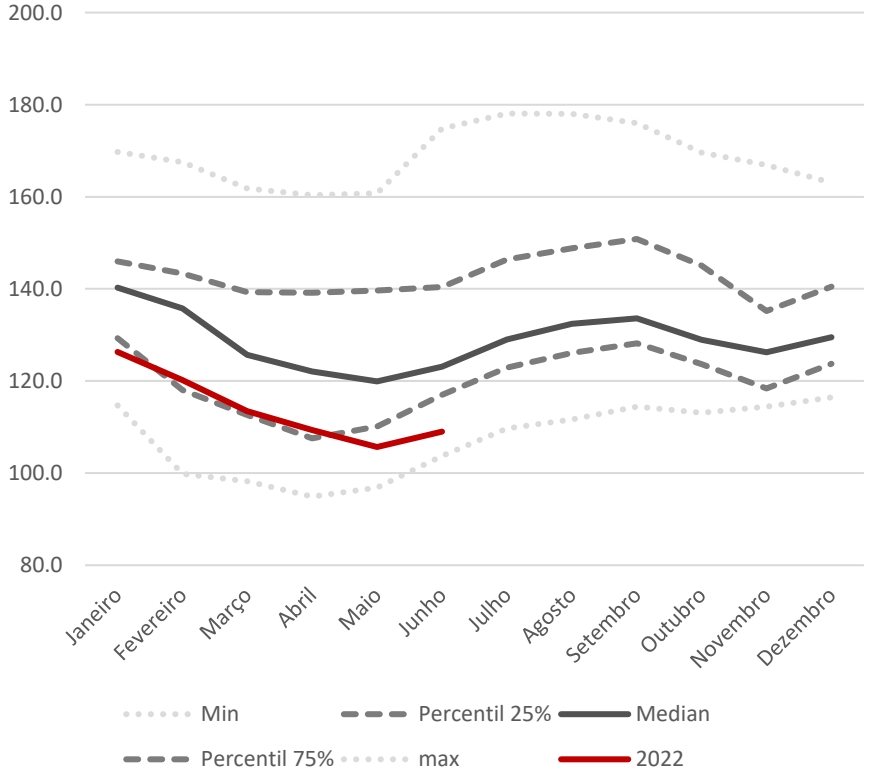


Source: Morgan Stanley, Mar Asset Management

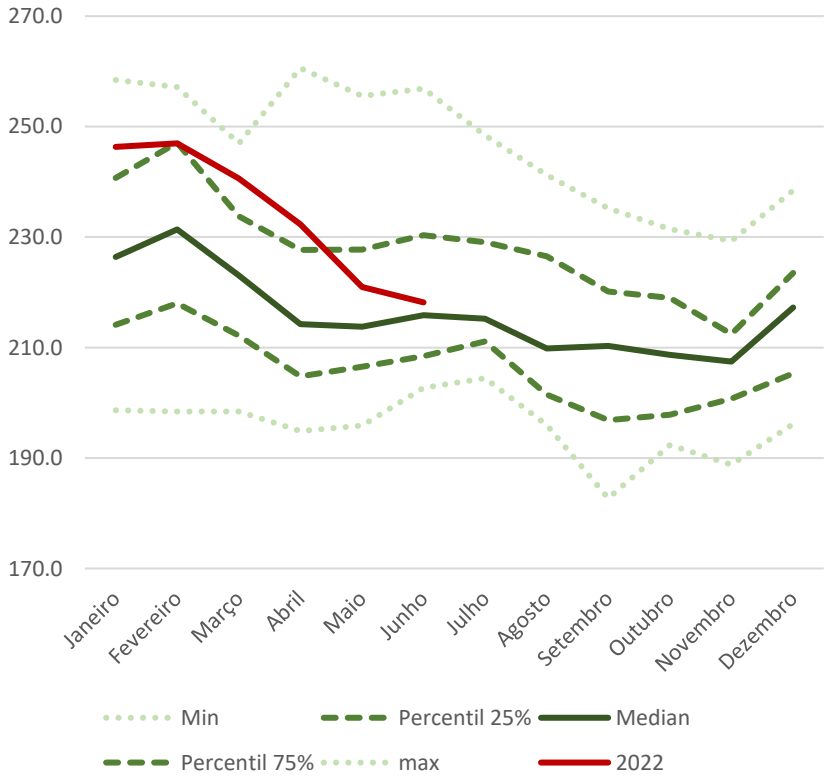
US diesel and jet fuel inventory close to minimum levels

- Diesel and Jet Fuel stock are below the 25th percentile compared to the last two decades. Up until April, it seemed as if the diesel stock reduction would follow the seasonal pattern. More recently, though, inventories kept dropping, despite the seasonal pattern pointing to an increase. Gasoline stocks still seem to hold out at comfortable levels.

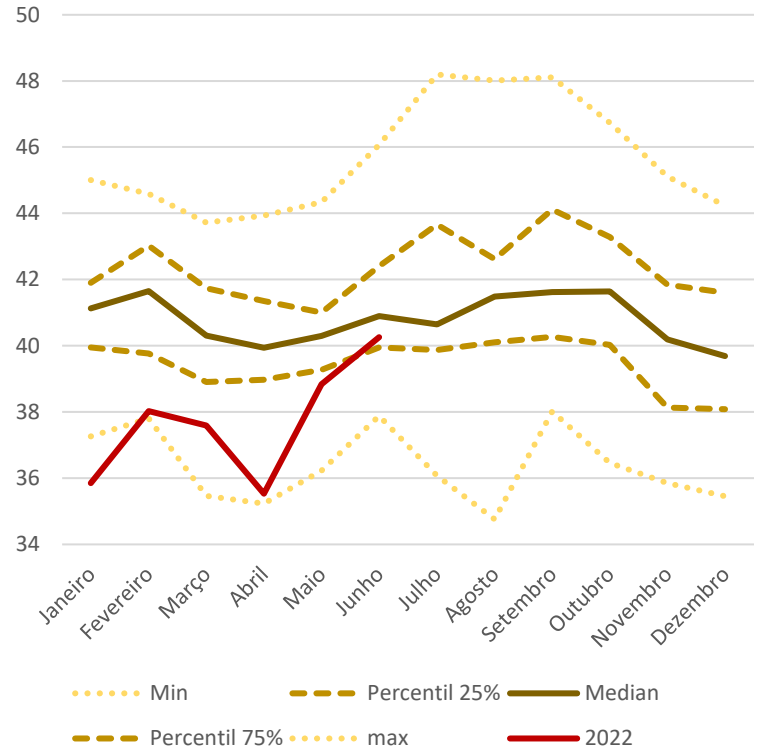
US diesel stock (mi. barrels)



US gasoline stock (mi. barrels)



US jet fuel stock (mi. barrels)

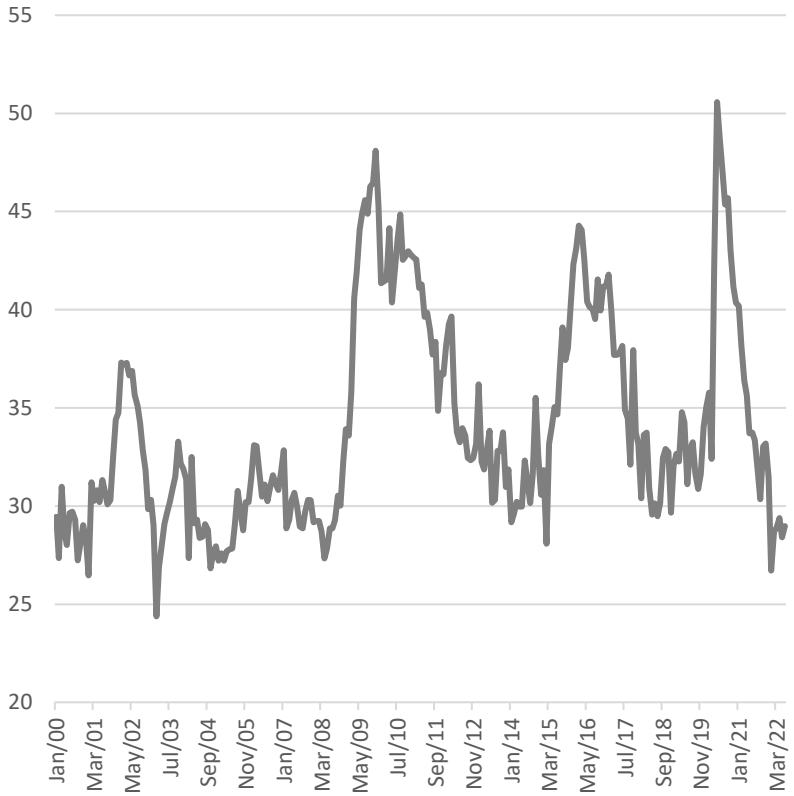


Source: EIA, Mar Asset Management

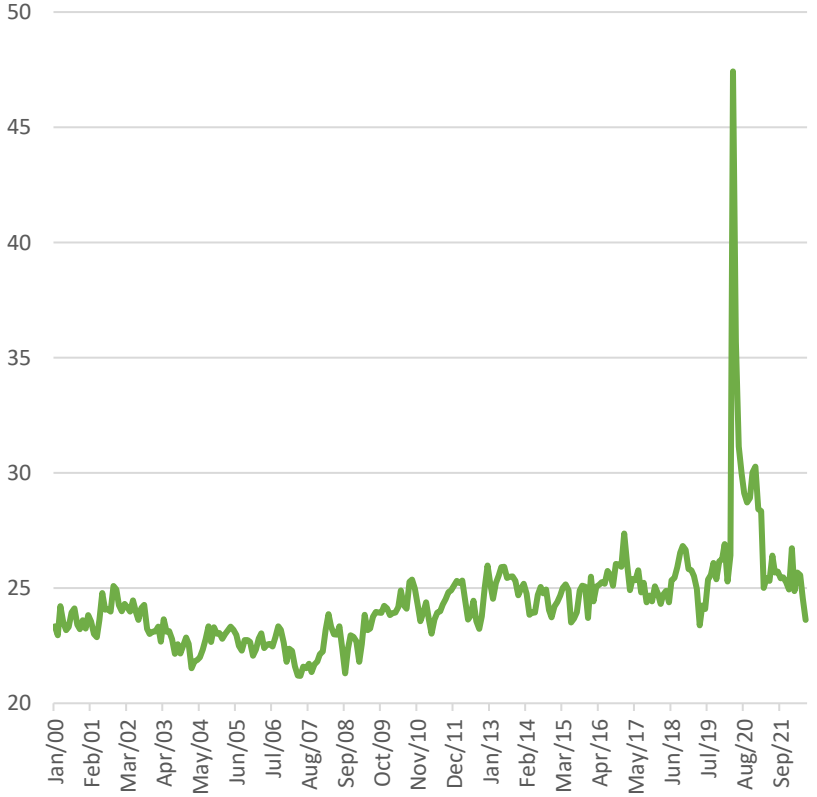
Consumption normalization leads to the same conclusion

- When we analyze stock levels as a proportion of consumption with seasonal pattern adjustment, we come to similar conclusions for diesel and gasoline. Gasoline inventories, for example, are enough to cover 25 days of consumption, above the pre-Covid crisis average.

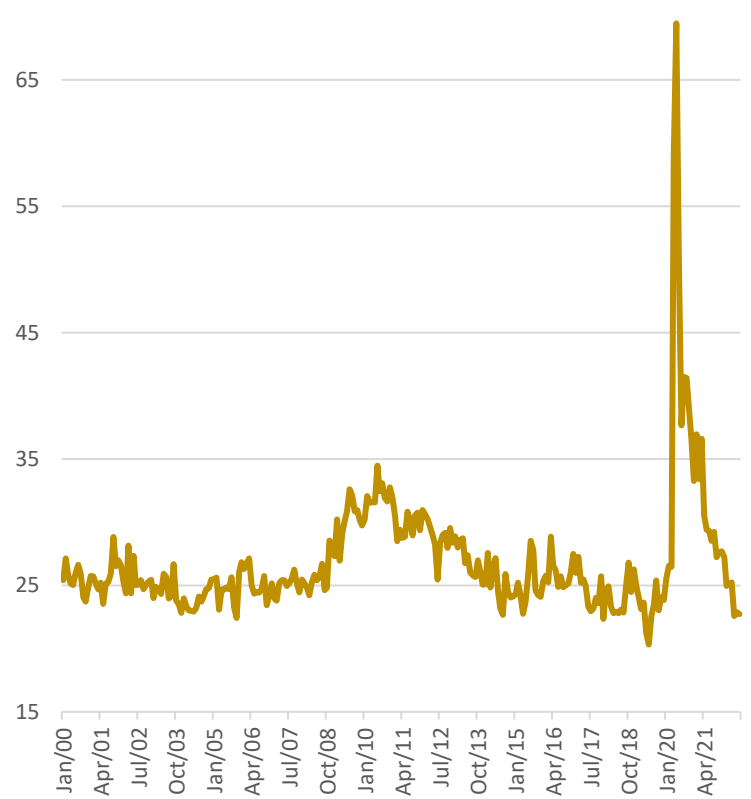
Diesel stock/consumption (days of consumption, seasonal adjustment)



Gasoline stock/consumption (days of consumption, seasonal adjustment)



Jet fuel stock/consumption (days of consumption, seasonal adjustment)

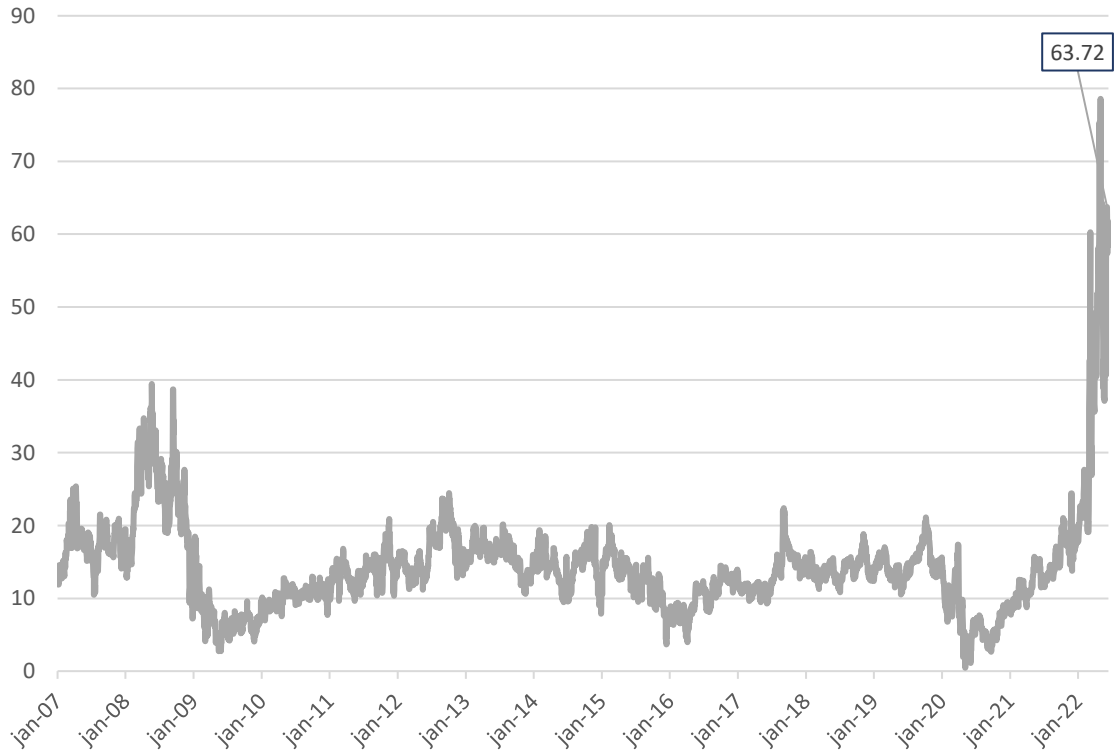


Source: EIA, Mar Asset Management

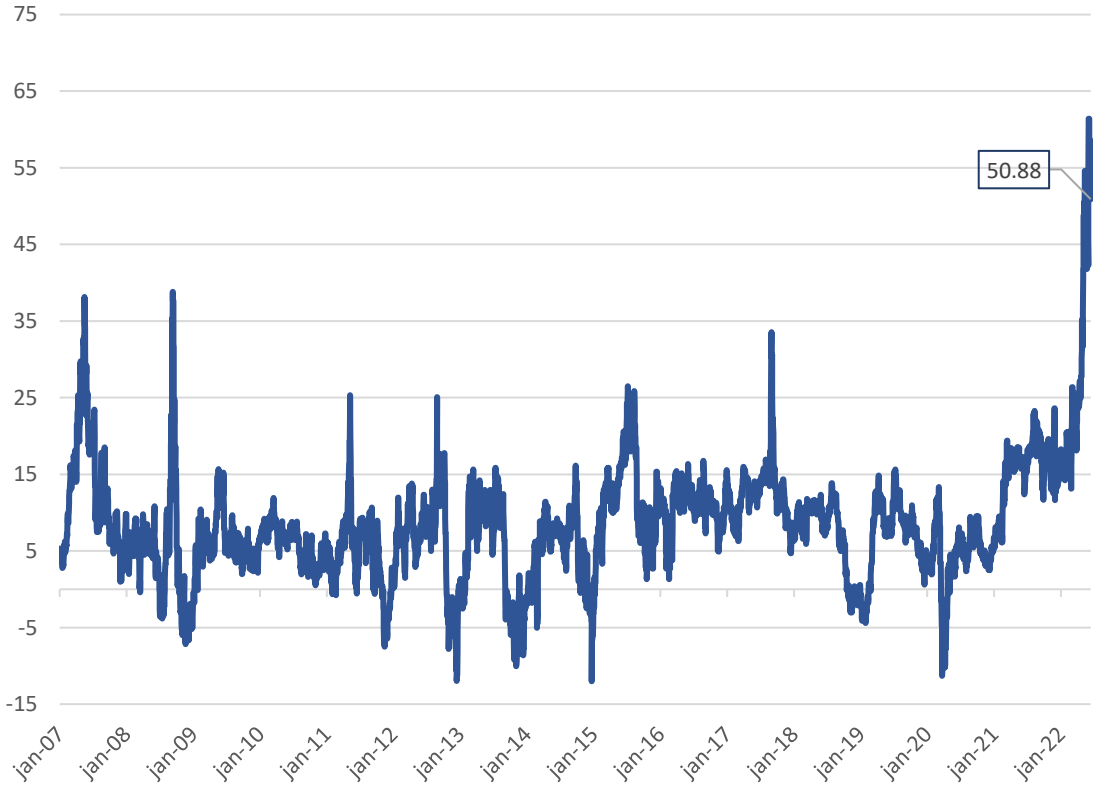
Crack spreads in levels never seen before

- The increase in gasoline and diesel prices was much higher than oil due to the war factor. The difference between diesel and oil, called crack spread, increased to US$60/barrel, the highest level since official records began.
- Under normal circumstances, the crack spread would oscillate around US$10/barrel. Such an increase will temporarily impose an enormous margin on the oil refining industry.

Diesel-Brent Crack Spread (US$/b)



Gasoline-Brent Crack Spread (US$/b)

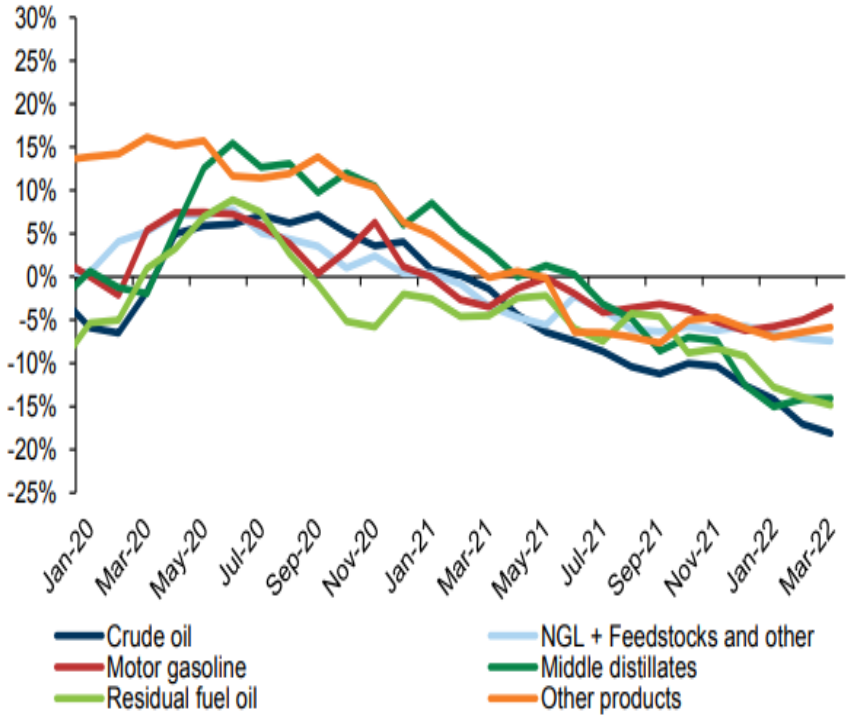


Source: Bloomberg, Mar Asset Management

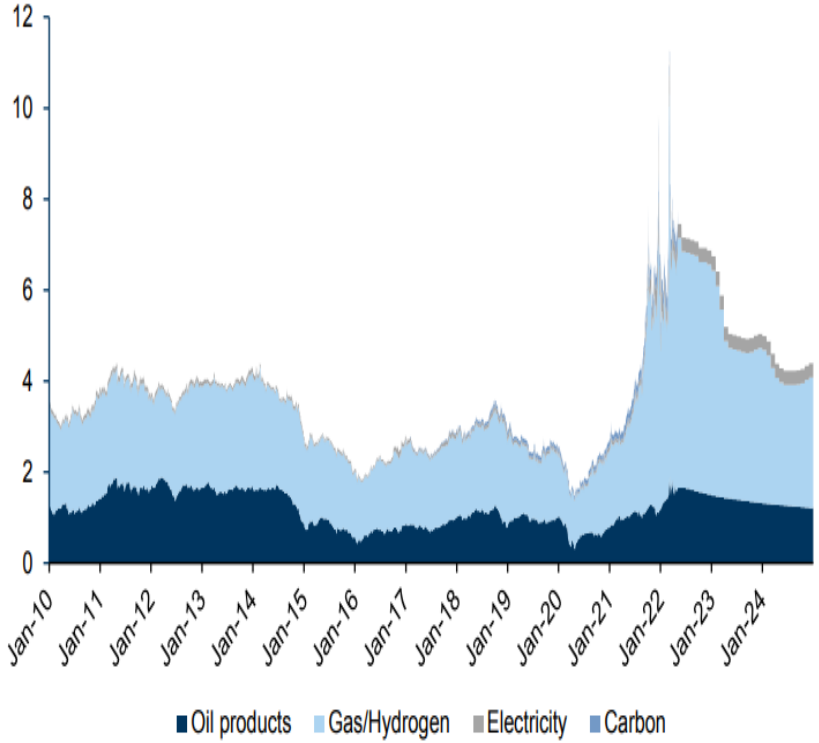
Increased shipping and refining costs are pressuring the crack spread

- middle distillates and fuel oil, employed in the intermediate processes of final goods production, have decreased much more than gasoline stocks. Besides other variables, the Omicron-led mobility reduction may have affected gasoline demand early this year.
- Yet another variable pressuring the crack spread is the increased cost of refining and shipping. In Europe, there is high demand for natural gas as refining input. With the sharp increase in gas prices, refining costs have increased from ~US$3/b to nearly US$8.

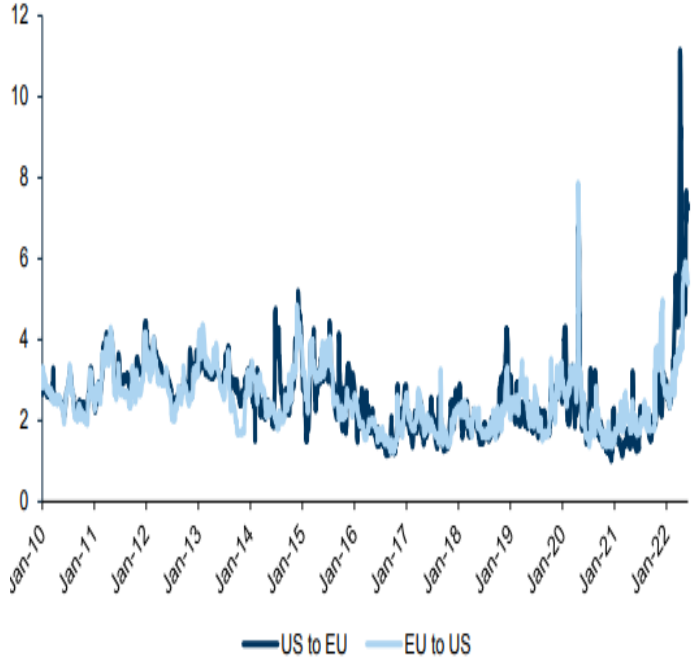
OECD stock variation by fuel (%)



Refining cost in Europe (US$/bbl)



Oil products shipping cost (US$/bbl)

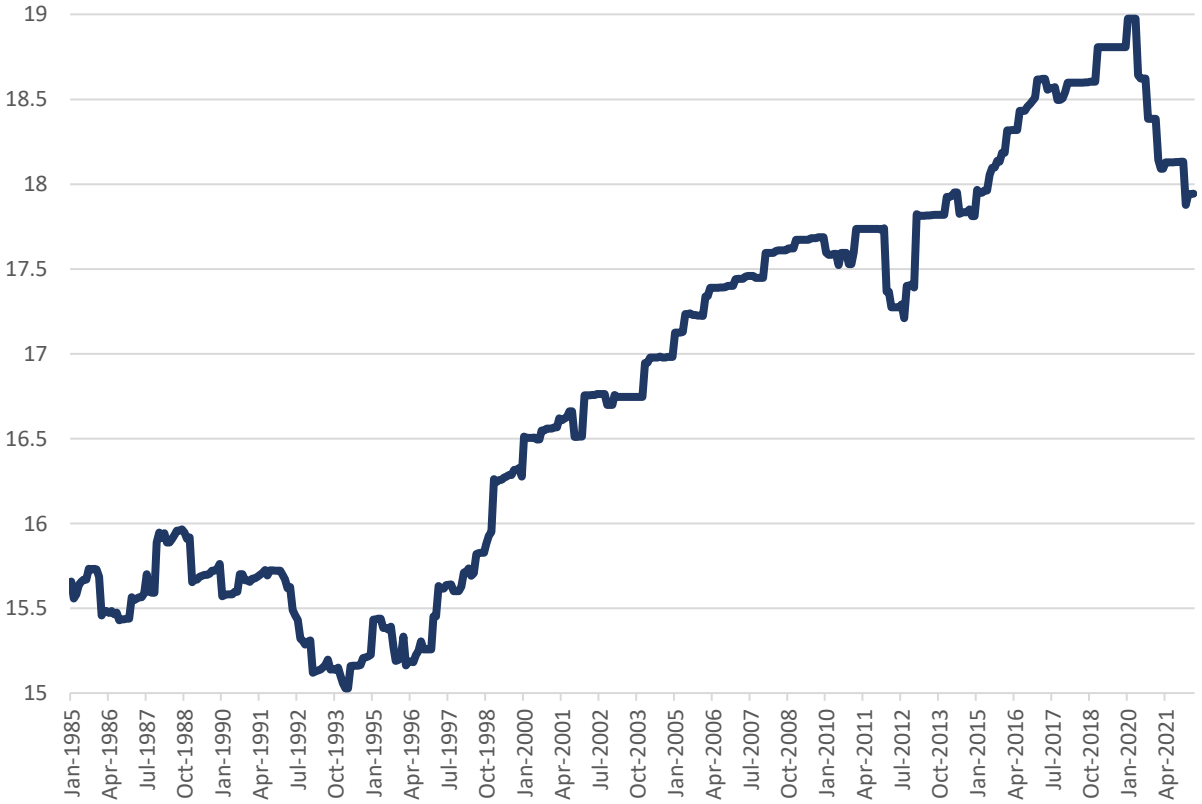


Fonte: Goldman Sachs, Mar Asset Management

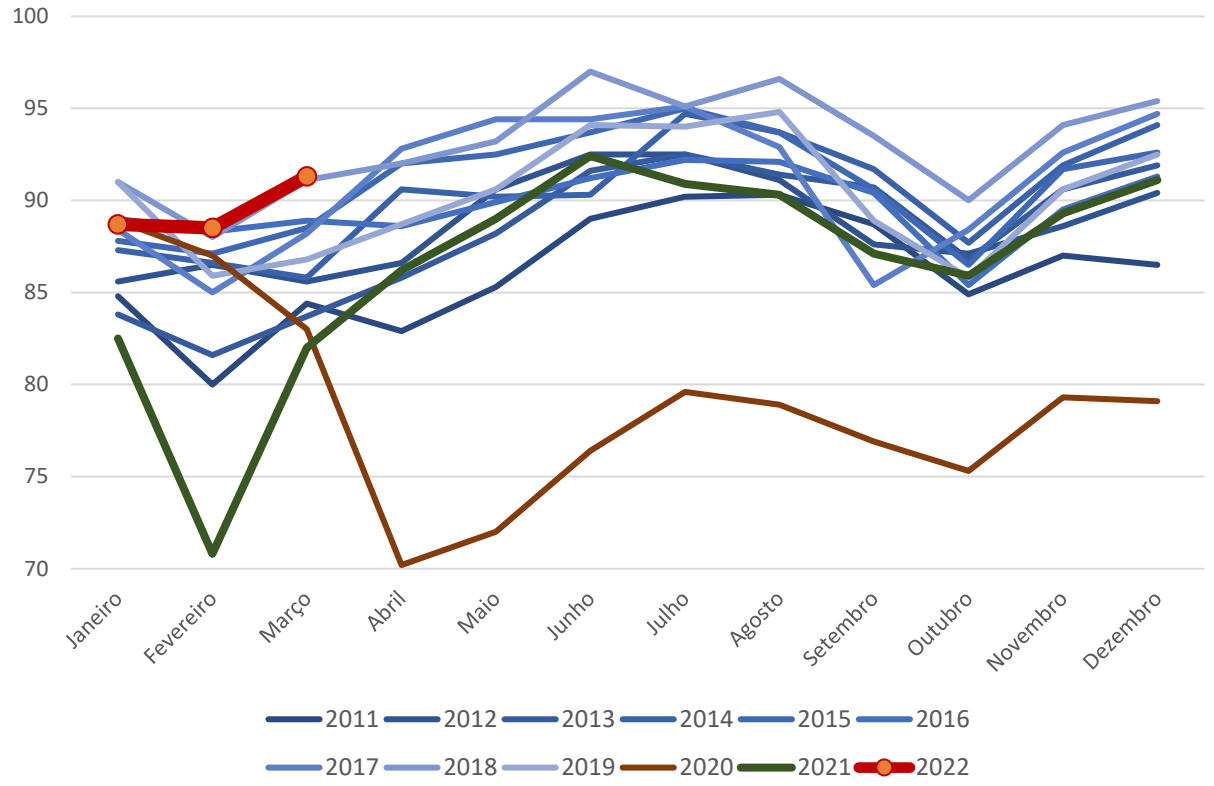
US refining capacity decreased 1mbd since 2020

- US refining capacity decreased by 1mbd since the Covid-19 crisis onset. Throughout 2020 and early 2021, refineries were operating under significant idle capacity. Many of which gave in and shut down their operation (link). We do not have information on how reversible these closings are. High demand for refineries and all-time-high crack spread levels may broaden refining capacity in the future.

US refining capacity (mb/d)



Installed capacity usage by US refineries (%)

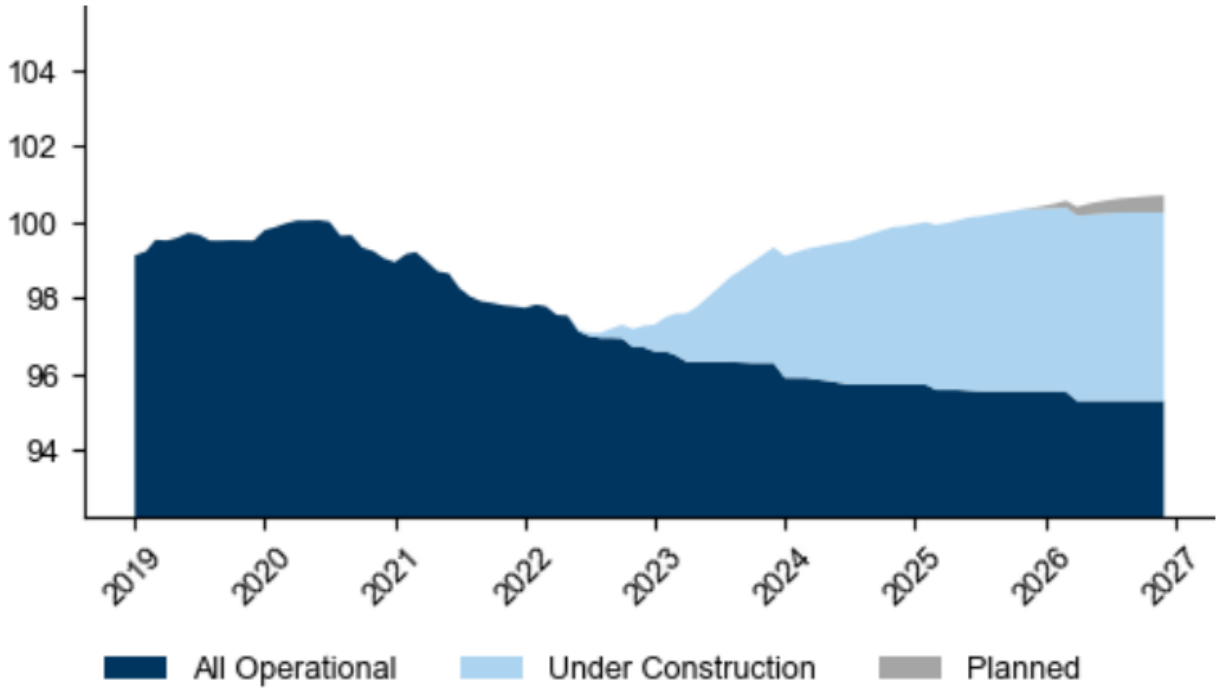


Source: EIA, Mar Asset Management

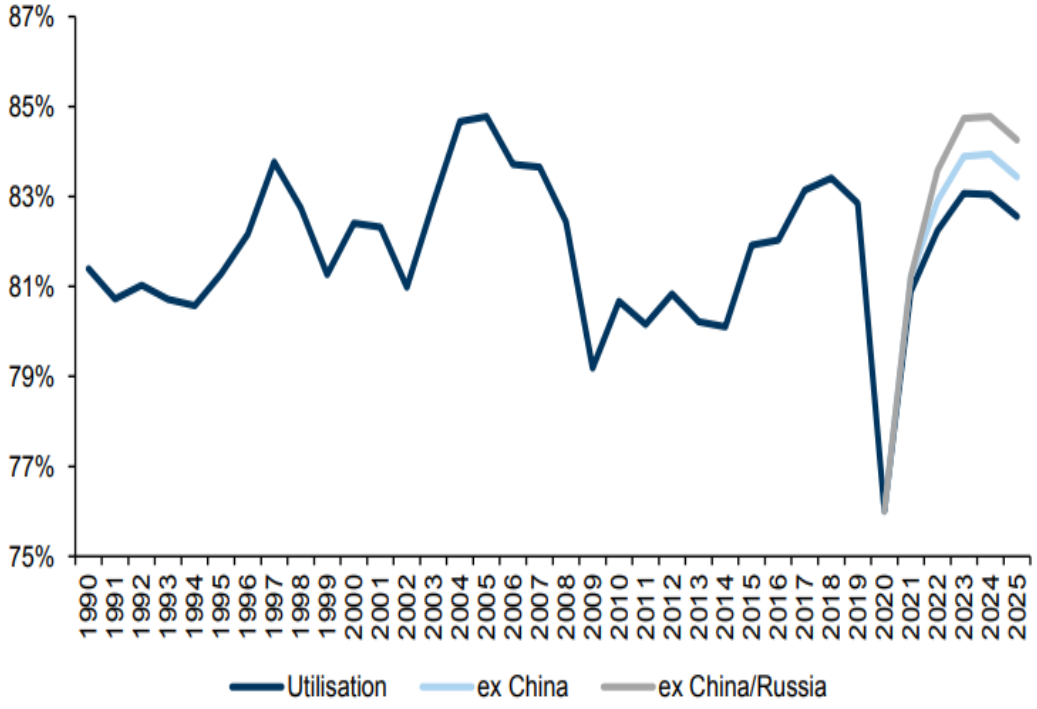
Recovering capacity should take a few years

- The reduction in refining capacity is a global phenomenon. Between 2020 and 2022, there was an approximate 2mbd reduction in the total installed capacity due to the industry's pandemic crisis. Building new refineries take time. Global refining capacity is expected to return to pre-crisis levels only in 2024. Thus, installed capacity usage by ex-China and Russia will remain close to the highest recorded levels for years.

World refining capacity (mb/d)



Installed capacity usage by refineries the world over (%)

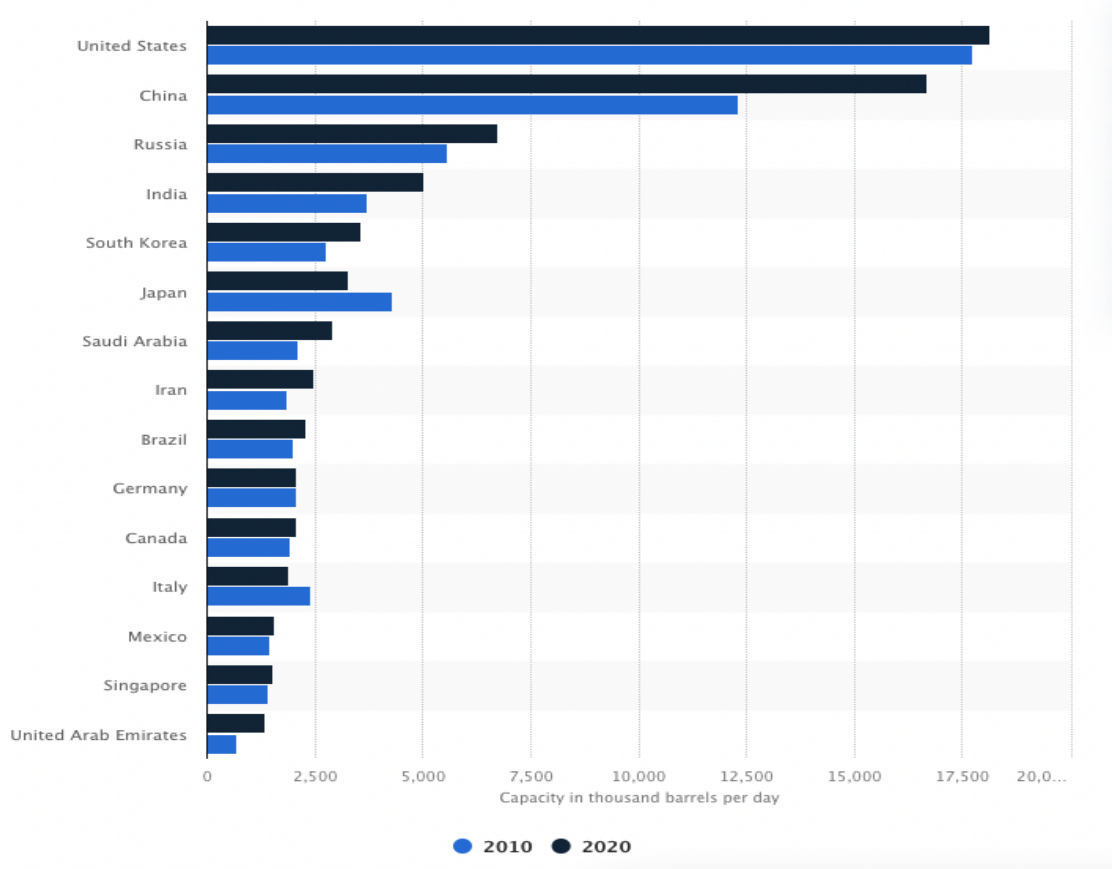


Source: Goldman Sachs, Mar Asset Management

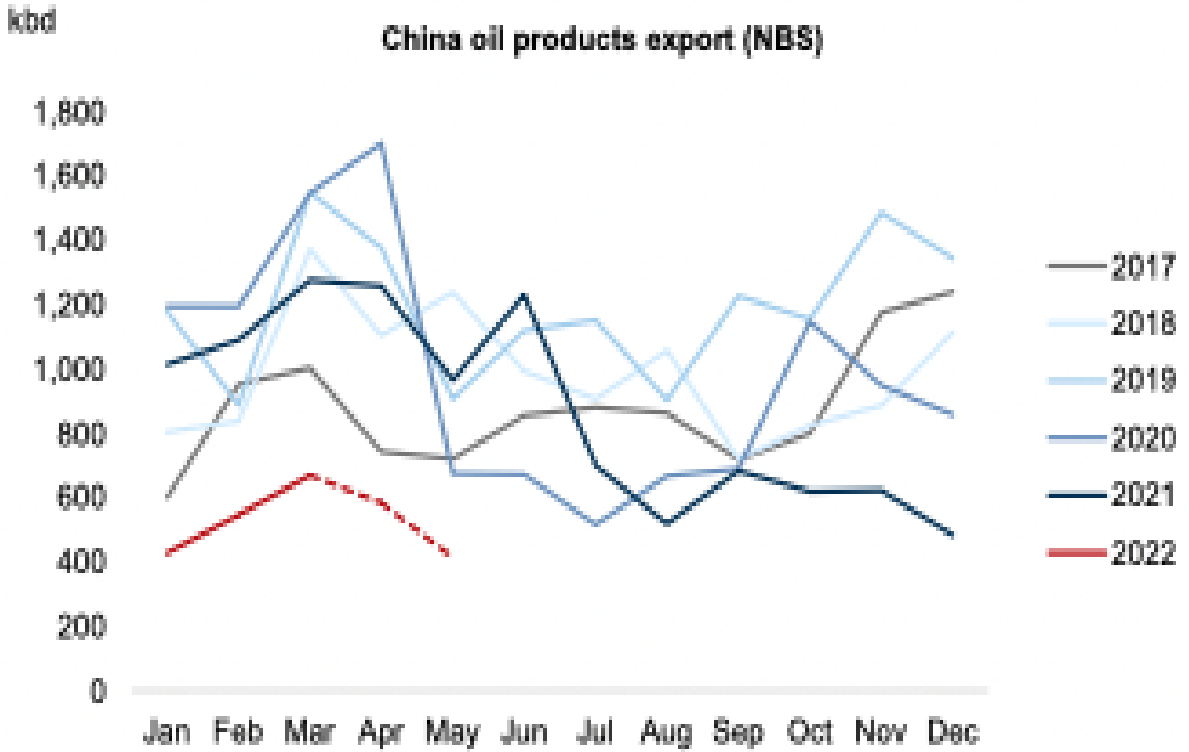
China drastically reduced exports in 2022

- China possesses the most significant oil refining capacity, second only to the US. Since mid-2021, Chinese oil products export have collapsed due to national regulatory changes in the industry. By comparison, the 2019 exports are about 1mbd lower than in early 2022. There is no expectation of substantially reverting the situation in the near future.

Oil refining capacity by country (kb/d)



China oil products export (kb/d)

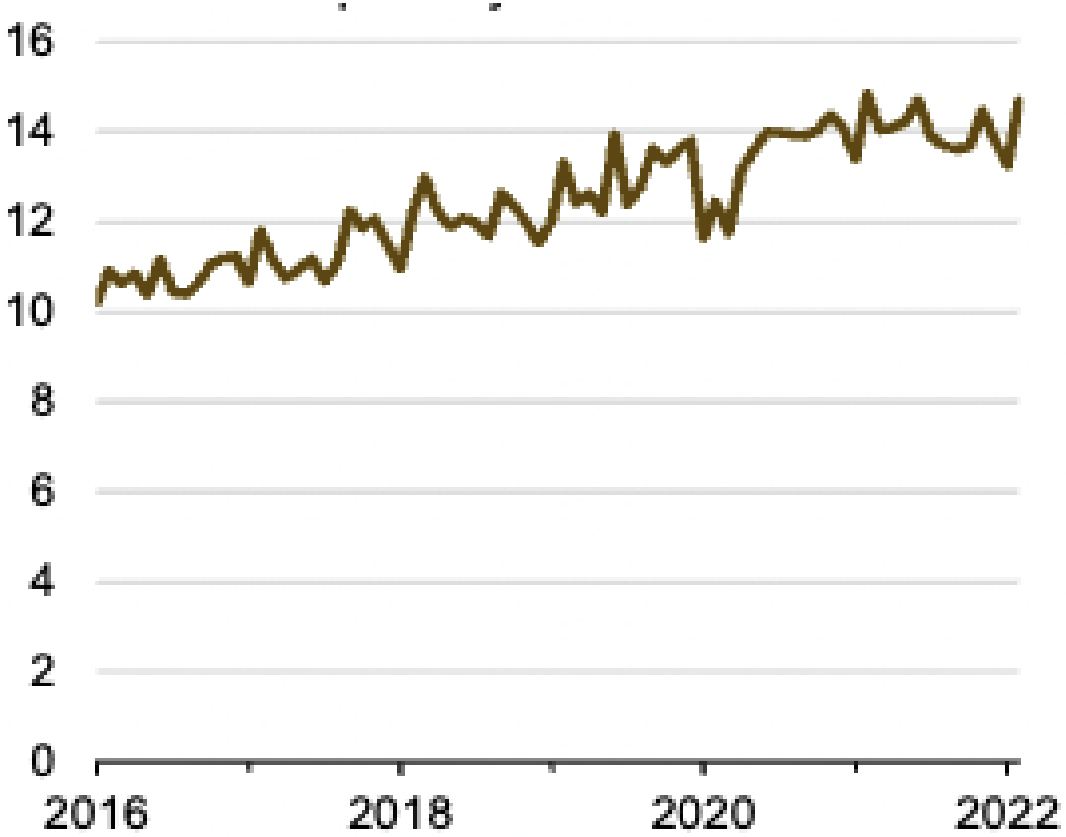


Source: Statistica, Goldman Sachs, Mar Asset Management

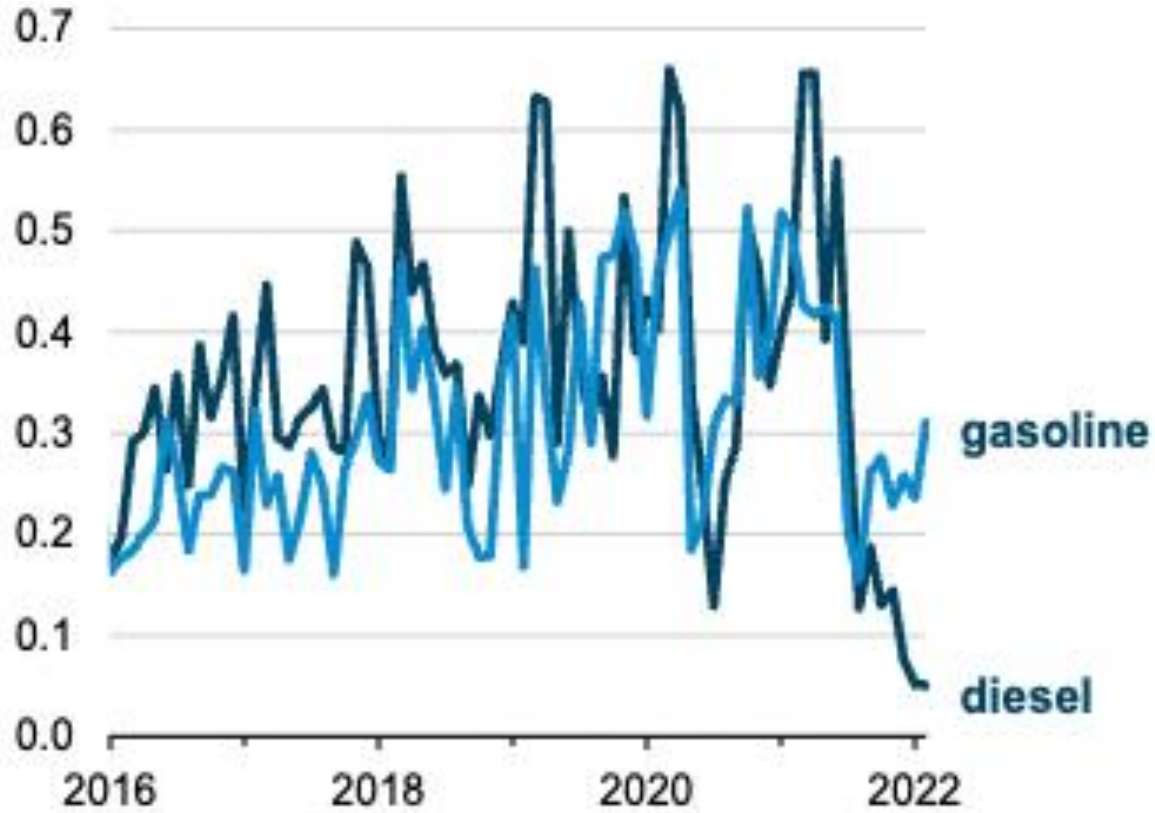
China has not reduced refining, but rather stopped exporting

- China has refined record amounts of crude oil in 2021 to meet the growing domestic demand for oil products. In the second semester, China processed a little less crude oil and started exporting even less gasoline and diesel than in the first semester of the same year in order to secure domestic supply.

Total oil refining by China (mb/d)



China oil products export (mb/d)

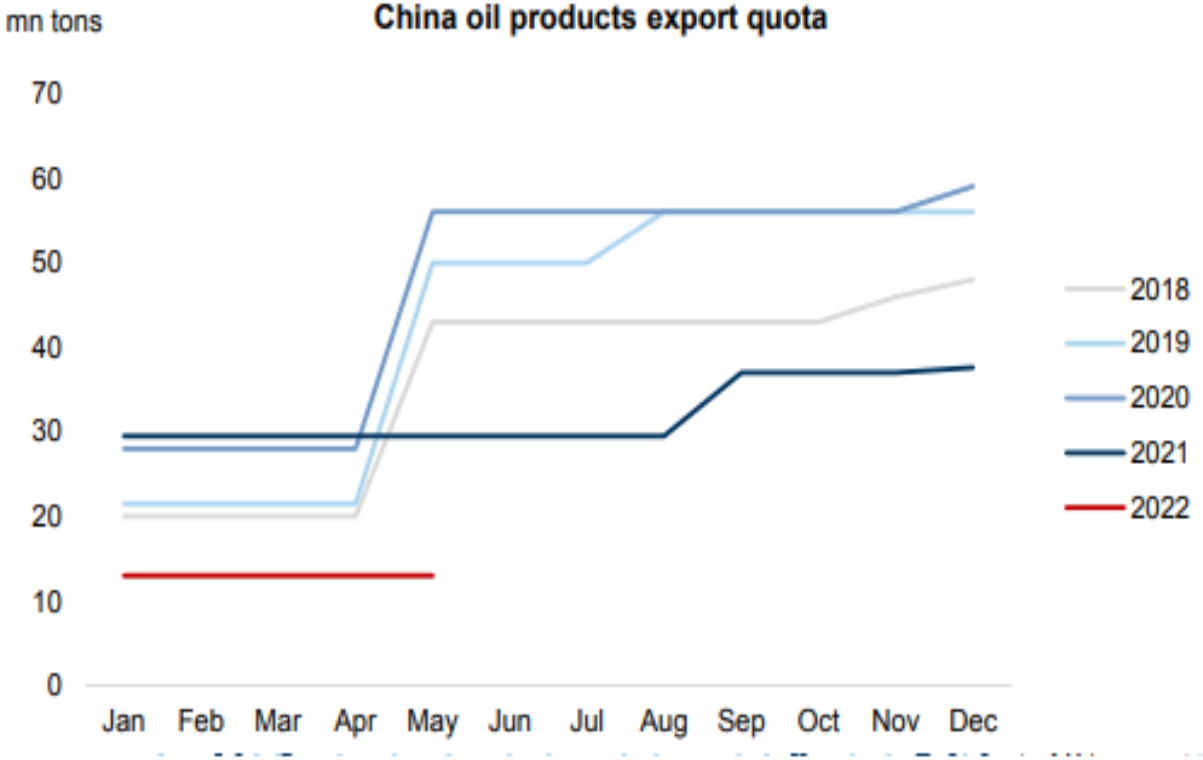


Source: EIA, Mar Asset Management

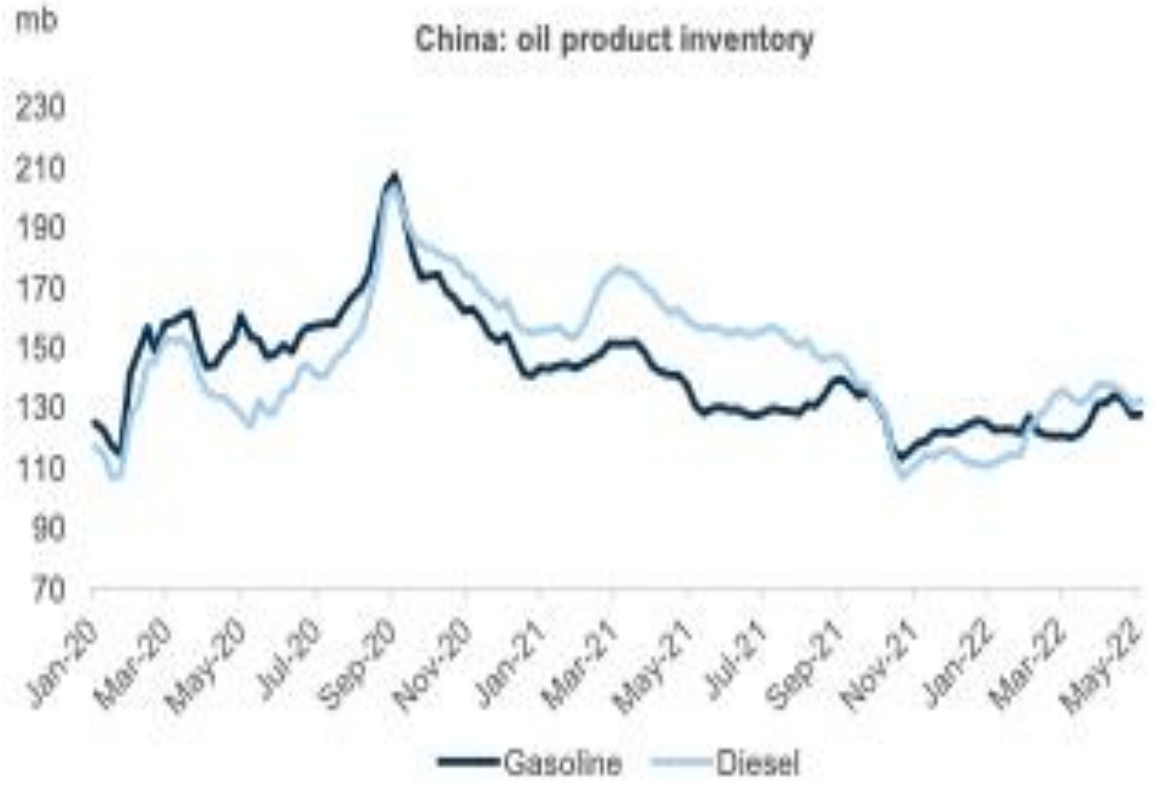
China has not reduced refining, but rather refrained from exporting

- China imposes oil products export quotas. Last year, quotas were exceedingly reduced, as to achieve carbon emission goals set forth in the 13th Popular National Congress carried out in March 2021. Early this year, the war-led instability also prompted the Chinese government to prioritize domestic fuel supply.

China oil products export quota (mn/t)



China oil products inventory (kb/d)

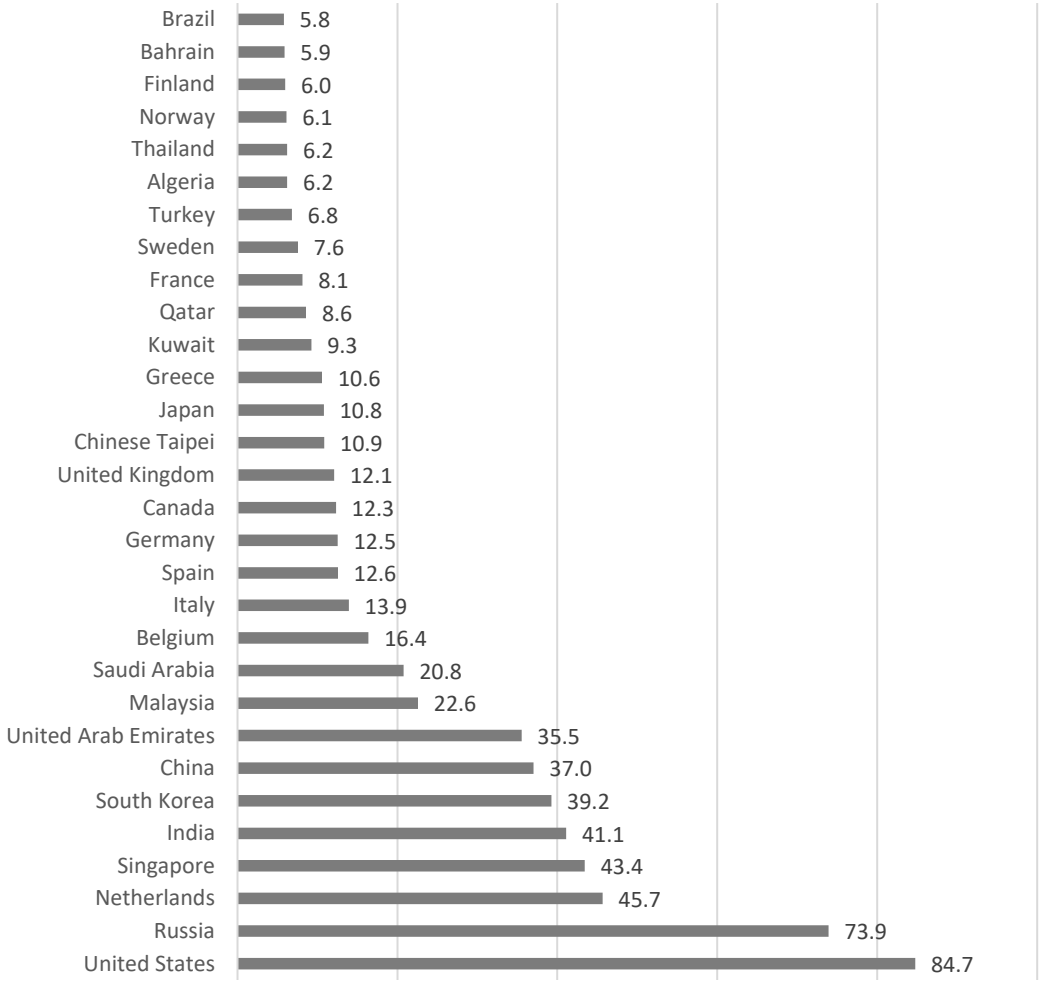


Source: Goldman Sachs, JLC, Mar Asset Management

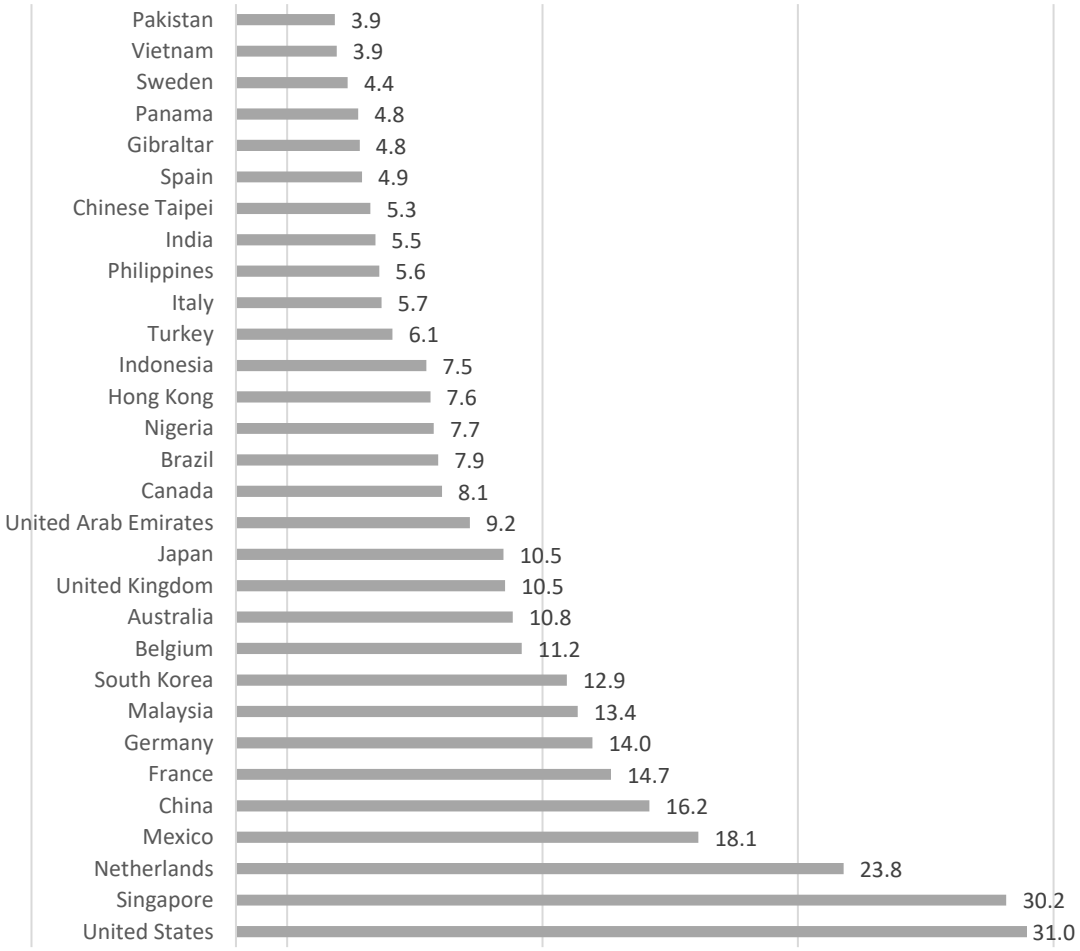
Russia is the second major oil products exporter

- Russia is also the second largest oil products exporter. The country is responsible for 10.6% of global trade shipping.

Oil products exports (US$, bi.))



Oil products imports (US$, bi.)



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Source: OEC, Mar Asset Management

Europe imports 60% of Russian oil products supply

- Europe is the final destination for 60% of Russian oil products supply. An import ban would force Russia to reallocate the surplus to other markets.
- Asia, the largest global market, would first be the most accessible access for Russia. However, it would be harder to diverge oil exports, for its critical potential oil buyers (China and India), thus far neutral to the war, are net oil exporters themselves.
- Exporting to South America, especially Brazil, could also fit the bill.

Oil products imports (US$, bi.)

	Import from Russia	Total import	Ex-Russia	% Russia
Europe	29.0	136.3	107.4	21%
North America	4.8	71.5	66.7	7%
Asia	12.8	169.0	156.2	8%
Africa	1.1	38.6	37.5	3%
South America	0.3	20.7	20.4	1%
Oceania	0.0	14.6	14.6	0%
Total	**48.0**	**450.7**	**402.7**	**11%**

Oil products import in Asia (US$, mi.)

Asia	Rússia	Total	% Rússia
Singapore	1.1	30.2	4%
China	2.2	16.2	13%
Malaysia	0.5	13.4	4%
South Korea	1.7	12.9	13%
Japan	0.4	10.5	4%
United Arab Emirates	0.5	9.2	5%
Hong Kong	0.0	7.6	0%
Indonesia	0.0	7.5	0%
Turkey	2.5	6.1	41%
Philippines	0.0	5.6	0%
India	0.2	5.5	3%
Chinese Taipei	0.1	5.3	2%
Vietnam	0.1	3.9	2%
Pakistan	0.0	3.9	0%
Saudi Arabia	0.4	3.9	10%
Thailand	0.0	3.2	1%
Lebanon	0.4	2.8	15%
Bangladesh	0.0	2.6	0%
Iraq	0.0	2.6	0%
Myanmar	0.0	2.3	0%
Cambodia	0.0	1.8	0%
Sri Lanka	0.0	1.3	0%
Cyprus	0.0	1.2	2%
Israel	0.1	0.9	6%
Oman	0.0	0.9	4%
Nepal	0.0	0.8	0%
Jordan	0.0	0.8	0%
Mongolia	0.7	0.8	89%
Uzbekistan	0.4	0.6	65%
Total	**12.8**	**168.0**	**7.9**

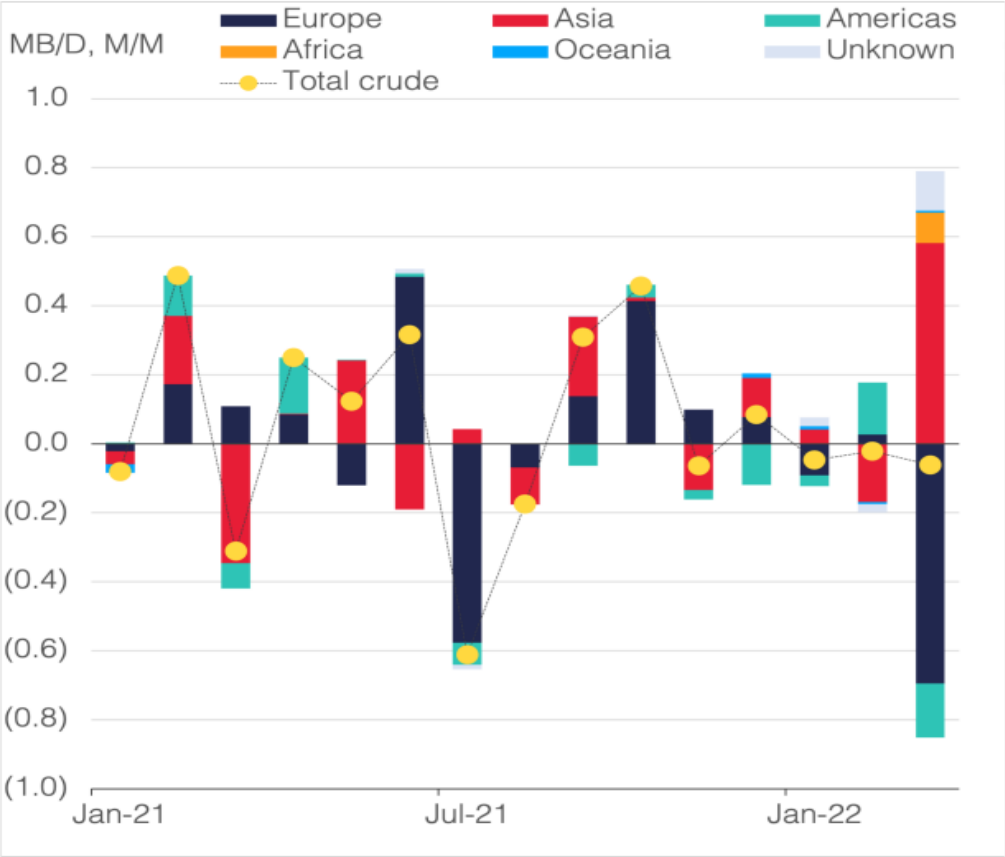
mar asset management

Source: OEC, Mar Asset Management

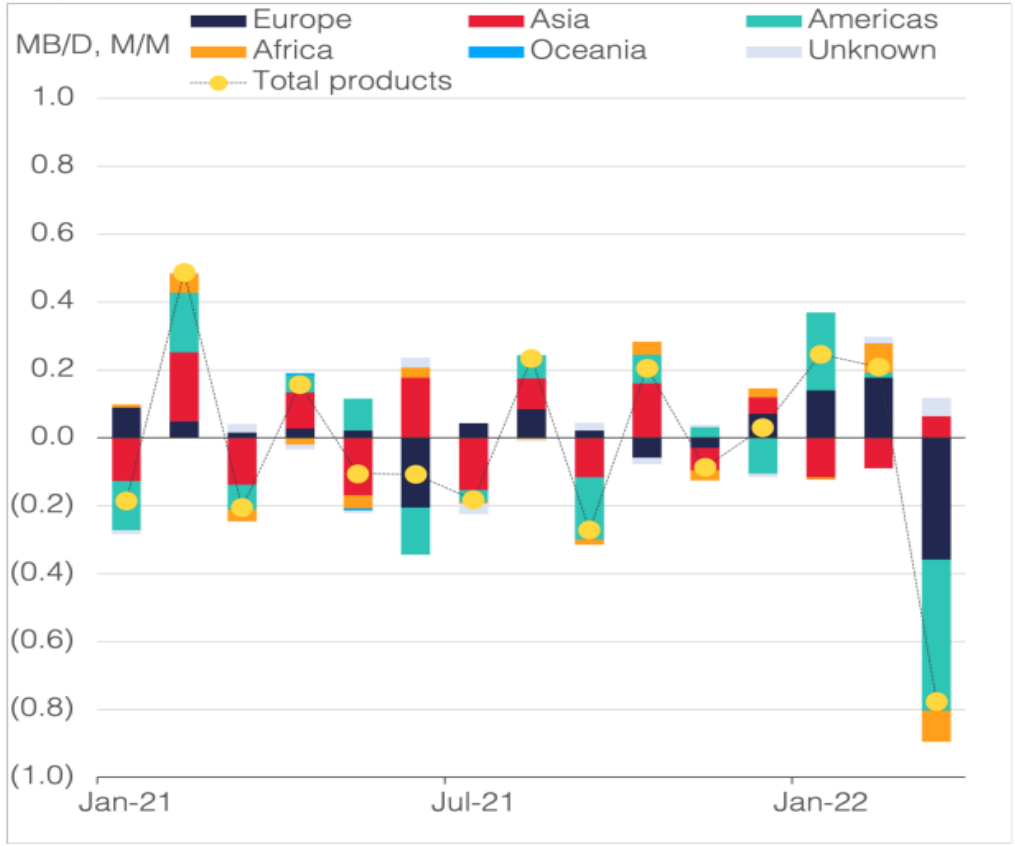
Reallocating oil products exports have proved tough

- Russia has been facing more trouble from reallocating its oil products than its crude oil production. Shipping to Asia has more than made up for the reduction in crude oil shipped to Europe. However, Russia has not yet found new buyers for its previously Europe and US-bound oil products.

Russian crude oil exports (%, mom)



Russian oil products exports (%, mom)

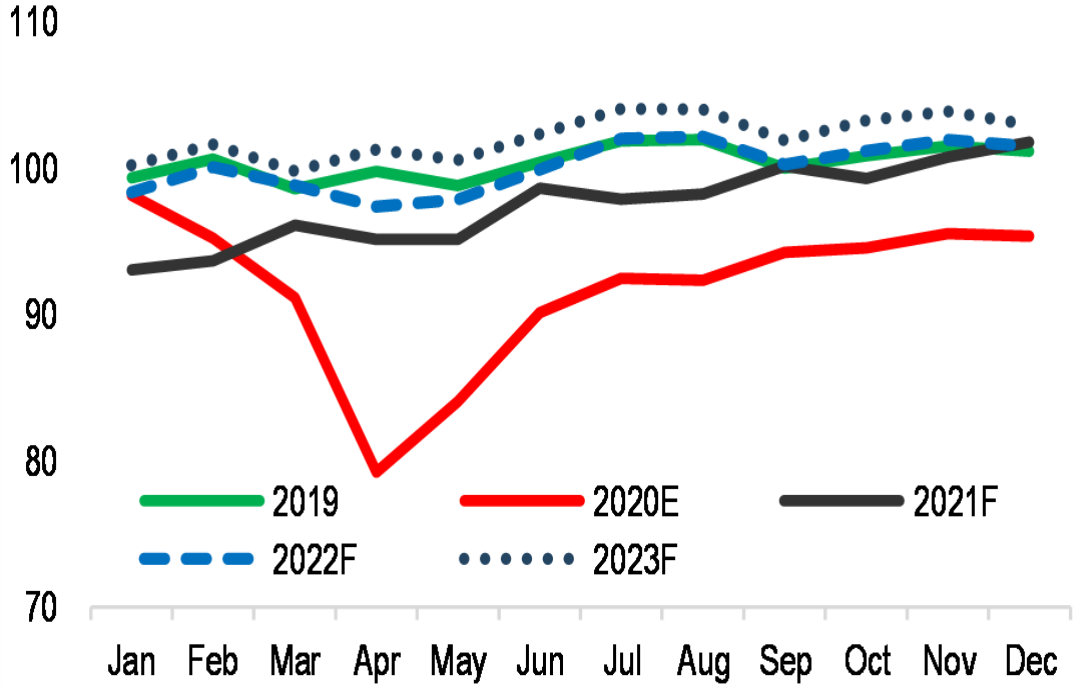


Source: OIES, Mar Asset Management

Assessment of oil products at risk

- The expectation for global oil products consumption is that it will resemble 2019. Therefore, we selected it as the basis for our oil products market assessment. The analysis assesses the market's capacity to supply oil products similarly to 2019.
- In a status quo scenario, in which Russia-to-Europe exports remain as is, we foresee a balanced market. The market would suffer a 1.2 mbd gap in an all-out Russian export ban scenario.

Global oil demand (mb/d)



Ex-China global assessment of oil products (mb/d)

Status Quo

	Supply	Demand
EUA	-0,1	0,1
Europa		-1,0
Canada		-0,2
Japão		-0,4
Rússia	-0,7	
China	-0,7	
ROW	-0,1	
Total	**-1,6**	**-1,5**

Sem exportação para EU

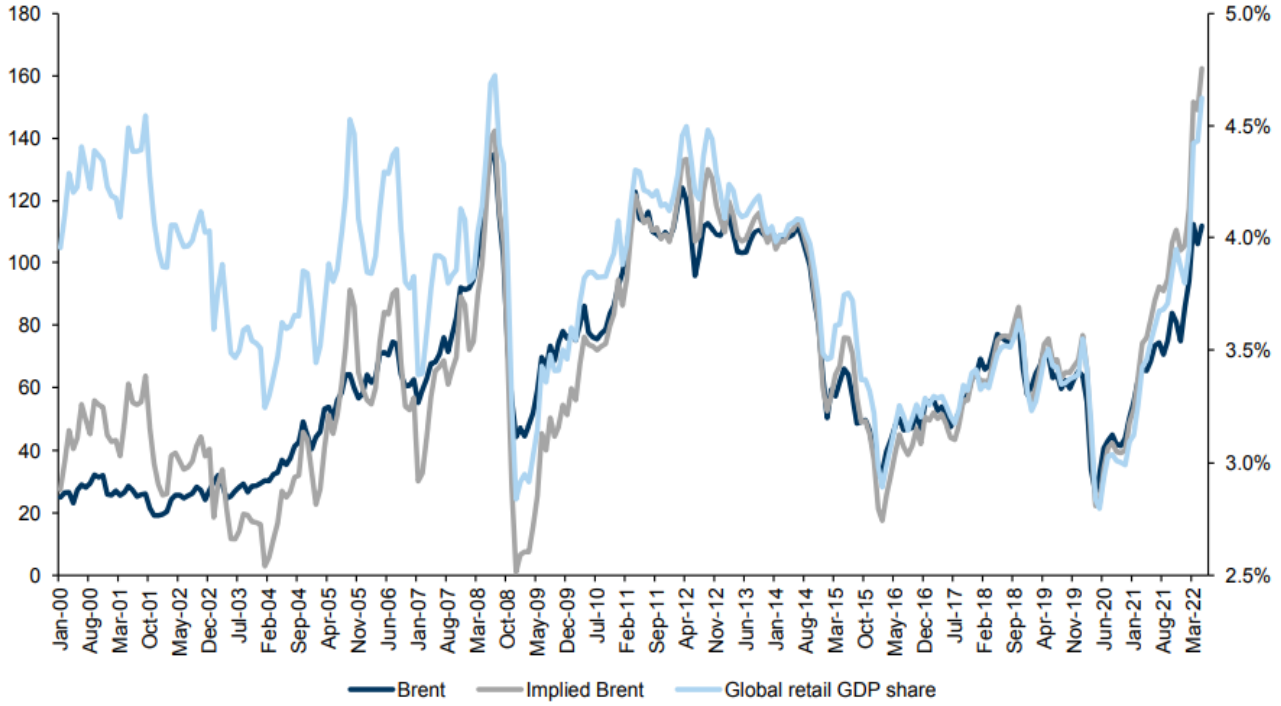
	Supply	Demand
EUA	-0,1	0,1
Europa		-1,0
Canada		-0,2
Japão		-0,4
Rússia	-1,8	
China	-0,7	
ROW	-0,1	
Total	**-2,7**	**-1,5**

Source: JP Morgan, Mar Asset Management

Sanctions' impact on oil prices

- The effective price for Brent, in conformity with the average crack spread, is US$ 160. This is an all-time high, surpassing the 2008 Great Recession's eve. This price reflects the very tight conditions the oil market is facing.
- Goldman Sachs estimates that each extra US$10 on oil price reduces demand by 0.25 mbd. A 1.2 mbd contraction scenario (Russia-to-Europe exports halt) requires a US$50 price increase, all other things being equal. However, Brent's high price has already considered this risk and must not yet have produced a full-blown effect on demand.

Brent effective price (mb/d)



Ex-China global demand sensitivity for oil (mb/d)

Brent prices	Global ex China real GDP 0.0%	1.0%	2.0%	3.0%	4.0%
85	1500	2250	3000	3750	4500
95	1250	2000	2750	3500	4250
105	1000	1750	2500	3250	4000
115	750	1500	2250	3000	3750
125	750	1250	**2000**	2750	3500
135	500	1000	1750	2500	3250
145	250	750	1500	2250	3000
155	0	500	1250	2000	2750
165	-250	500	1000	1750	2500

Source: Goldman Sachs, Mar Asset Management

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