India

Neutral *(no change)*

Highlighted Companies

Indian Oil Corp

ADD, TP Rs160, Rs119 close

While Indian government may not let IOC make marketing margins, the company in fact can suffer losses on domestic sales of petrol and diesel. However, overall high refining margin will ensure that the company is better off vis-à-vis its past.

Indraprastha Gas

REDUCE, TP Rs277, Rs369 close

High international gas prices will lead to lower volume growth for the company. Consensus earnings estimates are at a big risk of being downgraded.

Gujarat Gas

REDUCE, TP Rs410, Rs546 close

Gujarat Gas faces multiple headwinds by way of higher LNG prices as well as likely difficulty in procuring spot LNG cargo from international market. Consensus earnings estimates are in for disappointment as either gross profit will decline, or volume growth will disappoint.

Summary Valuation Metrics

P/E (x)	Mar22-F	Mar23-F	Mar24-F
Indian Oil Corp	4.37	5.72	5.32
Indraprastha Gas	19.16	23.44	22.15
Gujarat Gas	34.56	34.73	30.76

P/BV (x)	Mar22-F	Mar23-F	Mar24-F
Indian Oil Corp	0.84	0.79	0.74
Indraprastha Gas	3.47	3.12	2.81
Gujarat Gas	6.89	5.87	5.02

Dividend Yield	Mar22-F	Mar23-F	Mar24-F
Indian Oil Corp	10.11%	8.42%	9.27%
Indraprastha Gas	0.98%	0.98%	0.98%
Gujarat Gas	0.37%	0.37%	0.37%

Oil & Gas - Overall

Global energy commodities outlook

- Prices of natural gas and oil products to remain volatile and on the higher side because of supply side constraints amid the ongoing Russia-Ukraine war
- While crude oil demand-supply is still matched, a different trade flow pattern is needed (if Russia is shunned) and the supply chain is not geared for it.
- Constraints in refining capacity and trade restrictions are leading to high GRM. We see an extremely low probability of GRM cooling in the near to long-term.

Replacing Russia from global supply chain is counter-productive

Post Russian invasion of Ukraine, there has been a slew of measures by global powers to sanction Russia. Europe is importing less gas, crude oil products and even coal from Russia. On its part, Russia had also shut down one of its refineries in Apr 2022, which has put extra strain on the already stretched global refining capacity. Please note that Russia is the second-largest exporter of diesel in global market and hence, any trade embargo needs alternate supply chains which takes time. The lag period and stretched refining capacity is creating a havoc in global energy markets and gross refining margin or GRM is at a multi-year high. We will not be surprised if after temporary cooling diesel cracks again go beyond US$50 in USA and beyond US$35-40 in Asia. By stress testing, our proprietary model for global demand-supply superimposed with trade and vessel availability, one can safely say that in CY22, at best, Europe can get an extra 30-40mt LNG over CY21. If Europe shuns Russian gas during winter, then it may need to use diesel-fired generators to heat their houses. Coal-fired plants are an option, but it will take them at least 12-15 months to make mothballed power plants operational. We believe that gas in storage capacities for natural gas will remain extremely low throughout the year, which will lead to very high gas prices.

What does it mean for India? Uncontrollable energy Inflation

Constrained refining capacity as well as logistics issues will keep the prices of crude oil and crude oil products at high levels. While the government is forcing public sector oil marketing companies to not raise prices, it cannot force the sharing of refining margins (else the sector will be killed forever) as we may end up having hyper energy inflation 3-4 years down the line. The electric vehicle or EV dream has collapsed when faced with the reality in Europe and it will be better if India invests in coal mining as well as refining capacity ASAP. Dependence on foreign refineries will be a disaster for India's energy security.

Stock ideas- standalone refiners, coal miners and utilities

Standalone refiners who are not marketing oil stand to gain the most. Reliance Industries is our top pick in this space. We also like coal miners like Coal India and power utilities like NTPC. High gas prices will make gas-based power plants unviable and hence, capacity utilization of traditional coal-based power plants will increase. Gas distribution companies like MGL, IGL, and Gujarat Gas (who were primarily dependent on increased volume for growth) will find it challenging to source gas and therefore have our Reduce rating. We are also cautious on GAIL, and fear trading losses in a volatile energy prices scenario.

Figure 1: Russia is one of the biggest exporters of gas/crude oil/diesel in global market; sanctions and capacity constraints lead to skyrocketing diesel spreads

Oil Product	Export (tbp/d)	World Rank	World Share	World Leader	Leader Share
Gas/Diesel oil	998	2	13%	USA	14%
Fuel oil	628	1	16%	Russia	16%
Naphtha	500	1	24%	Russia	24%
Motor/Aviation oil	100	17	2%	USA	18%
LPG	95	4	4%	USA	65%
Kerosene	48	9	3%	South Korea	13%
Other oil products	31	17	<1%	USA	70%
Total oil products	2400	2	9%	USA	19%

SOURCES: INCRED RESEARCH, COMPANY REPORTS

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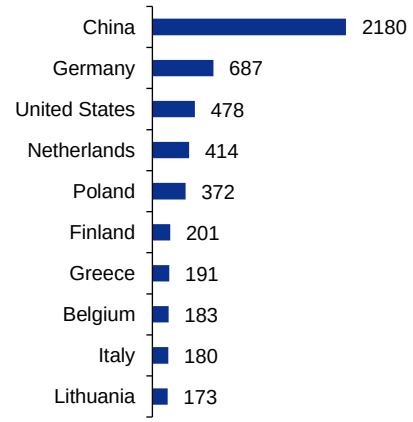
Russian energy commodity void

Crude oil and crude oil derivatives

Russia is the second-largest crude oil exporter in the world ➤

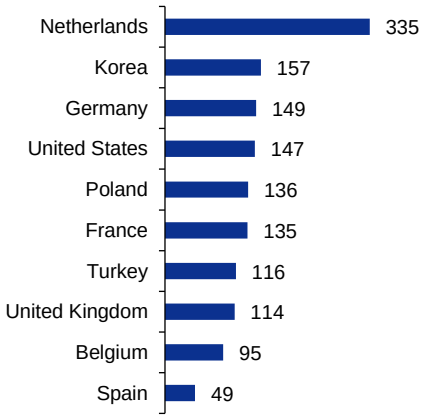
Russia is the second-largest exporter of crude oil in the world after Saudi Arabia. In 2021, Russia exported 4,510 thousand bpd (14% of world exports) of crude oil (JODI data). It is also the second-largest exporter of crude oil products, exporting 2,400 thousand bpd (9% of world exports) in 2021.

Figure 2: Top 10 Russian crude oil importers (in '000 barrels/day, Nov 2021)



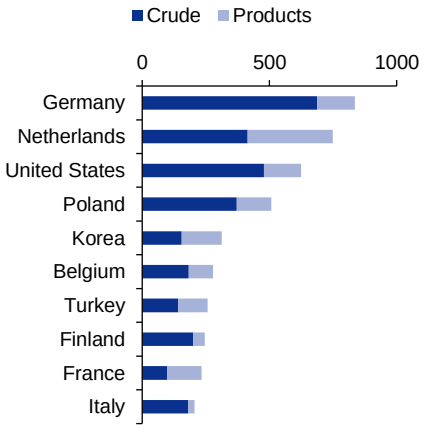
SOURCES: INCRED RESEARCH, COMPANY REPORTS, IEA

Figure 3: Top 10 Russian oil products importers (in '000 barrels/day, Nov 2021)



SOURCES: INCRED RESEARCH, COMPANY REPORTS, IEA

Figure 4: Top 10 Russian total oil importers (in '000 barrels/day, Nov 2021)



SOURCES: INCRED RESEARCH, COMPANY REPORTS, IEA

More importantly, Russia is the second-largest diesel exporter in the world after USA ➤

Russia is also the second-largest exporter of crude oil products, exporting 2.4mbpd (9% of world exports) in 2021.

Figure 5: Russia is the second-largest supplier of diesel in global market

Oil Product	Export (tbp/d)	World Rank	World Share	World Leader	Leader Share
Gas/Diesel oil	998	2	13%	USA	14%
Fuel oil	628	1	16%	Russia	16%
Naphtha	500	1	24%	Russia	24%
Motor/Aviation oil	100	17	2%	USA	18%
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Other oil products	31	17	<1%	USA	70%
Total oil products	2400	2	9%	USA	19%

SOURCES: COMPANY REPORTS, INCRED RESEARCH

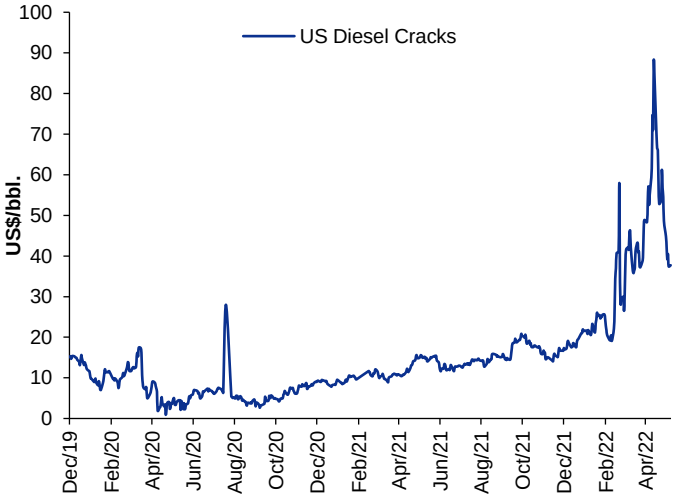
Europe China and CIS countries are mostly dependent on Russian crude oil and crude oil products ➤

1. As per 2020 trade data, 29% of Europe's crude oil imports and 41% of crude oil product imports were from Russia.
2. 97% of CIS's crude oil imports and 45% crude oil product imports were from Russia.
3. Other major dependents on Russia are China and USA. 15% of China's crude oil imports and 25% of US oil products imports were from Russia.
4. From Russia's perspective,
    a. 32% of its crude oil exports went to China while 53% went to Europe.
    b. 21% of oil products exports went to USA while 54% went to Europe and only 18% to Asia Pacific region (3% to China).

Rampaging diesel spreads in the western world are primarily because of the fear of curtailed Russian supplies ➤

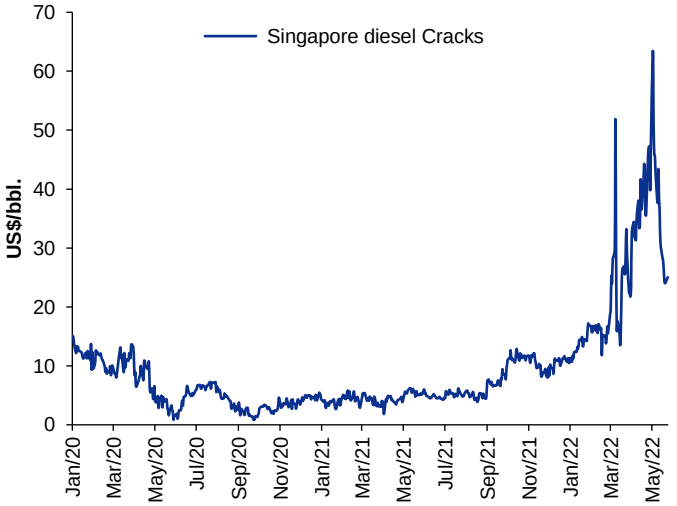
After the war started in Ukraine, diesel spreads exploded in USA and Europe as there were widespread fears that Russian imports will stop. Having said that, the EU and USA found a way to import crude oil from Russia which led to moderation in diesel spreads. Please note that middle distillate refining capacity in the world is limited and hence, while extraordinary high prices may not return, don't expect 2020/21 prices again over the next three-to-four years.

Figure 6: US diesel cracks have corrected as fears of stoppage of Russian supply have receded



SOURCES: INCRED RESEARCH, BLOOMBERG

Figure 7: Like USA, even Singapore diesel cracks have fallen because the fears of extreme shortage have disappeared

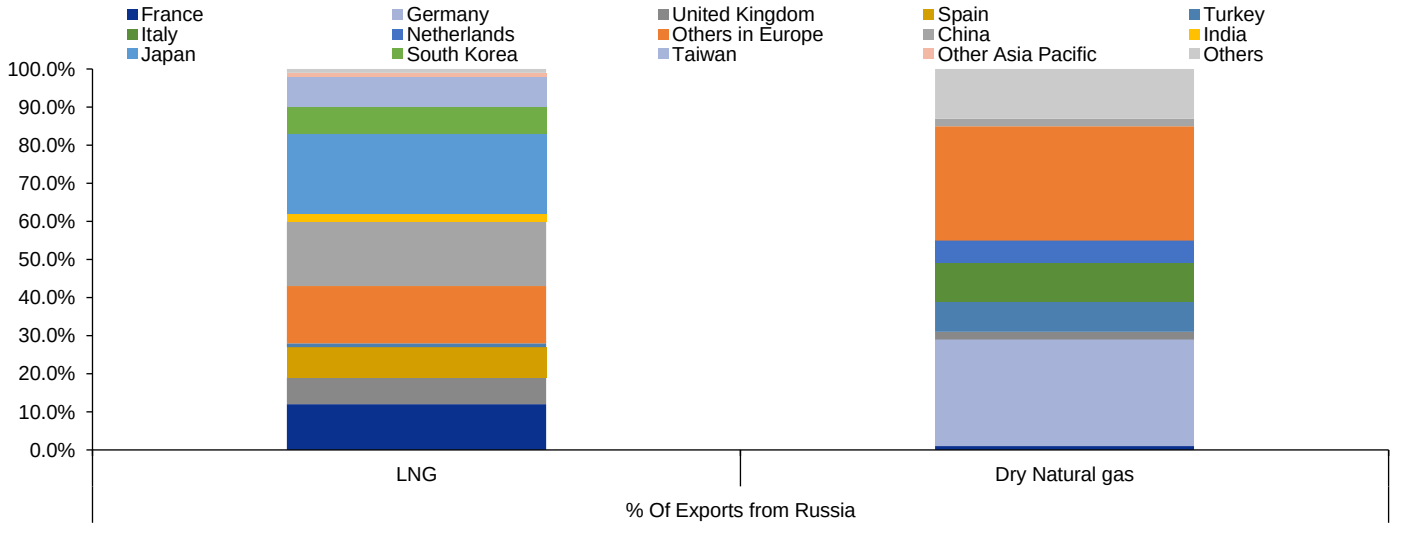


SOURCES: INCRED RESEARCH, BLOOMBERG

Natural gas

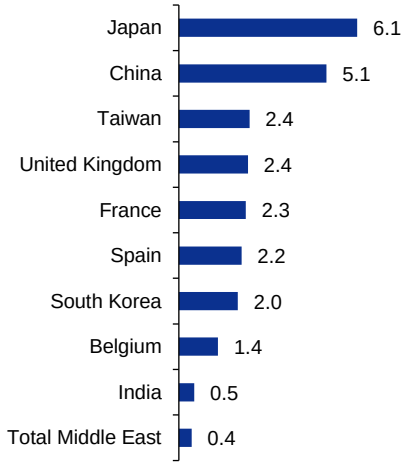
- Russia is the largest exporter of natural gas in the world, supplying 16.3bn cubic metres (bcm) of natural gas per month on an average in 2021 (accounts for 14% of world's natural gas exports).
- Most Russian gas is supplied via pipelines and Russia is the largest gas exporter via pipelines, supplying 12.9bcm of natural gas per month on an average in 2021 (accounts for 18% of world's natural gas exports via pipelines).
- Russia is also the fourth-largest exporter of liquefied natural gas or LNG (trailing Qatar, Australia, and USA), supplying 3,435mcm of LNG per month on an average in 2021 (accounts for 8% of world's LNG exports).

Figure 8: Russia has a highly concentrated dry natural gas export market but its LNG exports are quite diversified



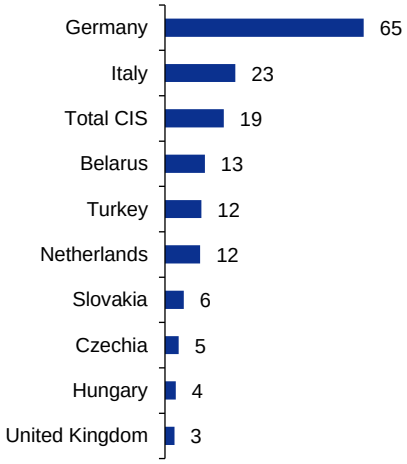
SOURCES: INCRED RESEARCH, COMPANY REPORTS

Figure 9: Top 10 Russian LNG importers (in mt per year, 2020)



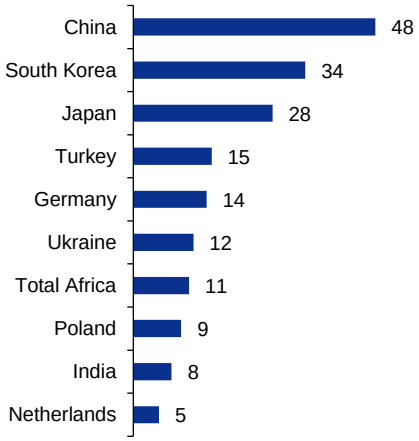
SOURCES: INCRED RESEARCH, COMPANY REPORTS, BP

Figure 10: Top 10 Russian dry natural gas importers (in mt per year, 2020)



SOURCES: INCRED RESEARCH, COMPANY REPORTS, BP

Figure 11: Top 10 Russian thermal coal importers (in mt per year, 2020)

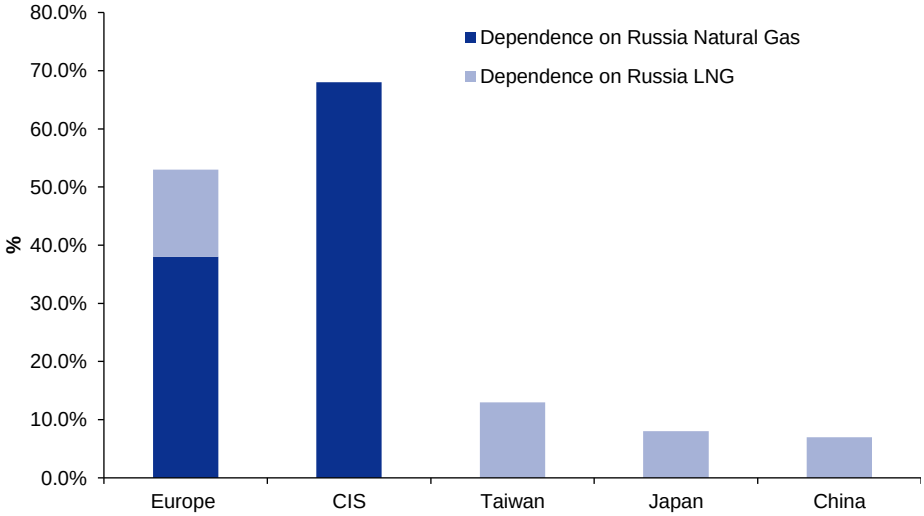


SOURCES: INCRED RESEARCH, COMPANY REPORTS, BP

Europe's dependence on Russian gas in now well known ➤

- As per 2020 trade data, 38% of Europe's dry natural gas imports and 15% of LNG imports are from Russia.
- 66% of CIS's dry natural gas imports are from Russia. Other major dependents on Russia are Taiwan, Japan, and China. 13% of Taiwan's LNG imports, 8% of Japan's LNG imports and 7% of China's LNG imports are from Russia.

Figure 12: Combining dry natural gas and LNG, overall Europe's dependence on Russian gas is nearly 48%

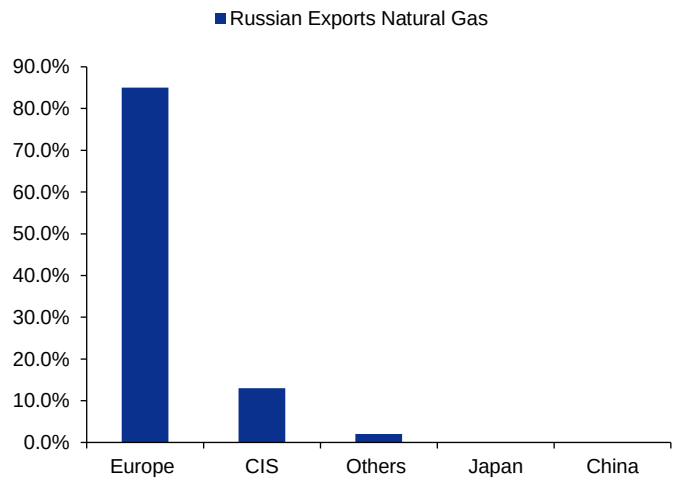


SOURCES: INCRED RESEARCH, COMPANY REPORTS

On the other hand, Russia is heavily dependent on Europe for dry natural gas exports but LNG is diversified ➤

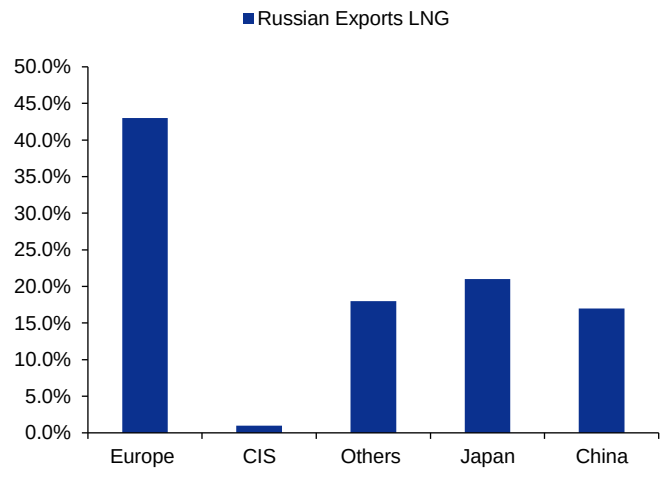
From Russia's perspective, 85% of its dry natural gas exports and 43% of LNG exports went to Europe. 13% of the remaining dry natural gas exports were to CIS. 56% of LNG exports went to Asia Pacific region, of which 21% were to Japan and 17% to China.

Figure 13: 85% of dry Russian natural gas goes to Europe and almost nothing to China



SOURCES: INCRED RESEARCH, COMPANY REPORTS

Figure 14: For LNG, Russia's export base is quite diversified with multiple trading partners in Asia



SOURCES: INCRED RESEARCH, COMPANY REPORTS

Russia is planning to increase its LNG capacity so that it can reach a wider customer base across the world ➤

Russia is planning to increase its share of LNG exports and it has a strong LNG pipeline infrastructure. Increasing the liquefaction capacity from 31.6mtpa in Jun 2021 to 76.72mtpa in 2025F (to add 45.12mtpa in next four years).

Thermal coal

Russia is the third-largest exporter of coal in the world after Australia and Indonesia. In 2020, Russia exported 193mt of thermal coal (15% of world exports).

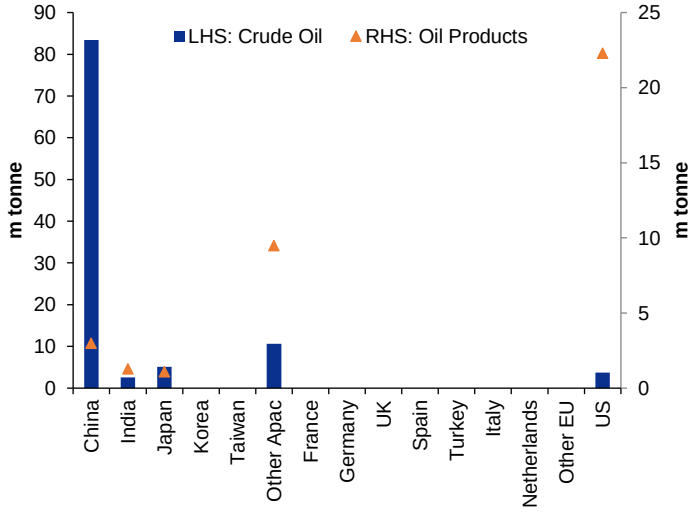
As per 2020 trade data, 50% of Europe's thermal coal imports were from Russia. 47% of Africa's and 30% of the Middle East's coal imports were from Russia. Other major dependents are South Korea, China, and Japan. 22% of South Korea's coal imports, 15% of China's coal imports and 13% of Japan's coal imports were from Russia.

From Russia's perspective, 56% of its coal exports went to Asia Pacific region and 35% to Europe.

Can India and China replace Europe for Russian energy exports?

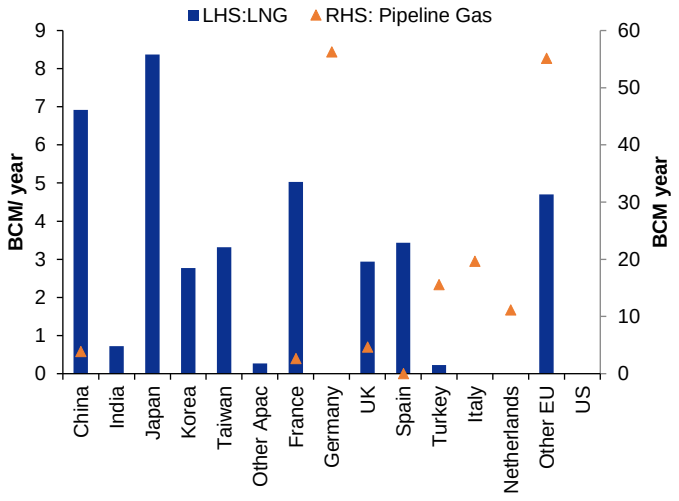
Most Russian commodity exports are to Europe and Asia. India and China are one of the biggest importers of energy commodities in the world. Both the countries are not heavily reliant on Russia. On the other hand, Europe is heavily dependent on Russia. China is heavily dependent on Quad member Australia for LNG imports (44% of total LNG imports). Strategically, China would like to be less dependent on Quad members. Russia is offering deep discounts to India on energy commodities. From an economic perspective, India will look to import more energy commodities from Russia.

Figure 15: USA and EU are in one way or the other dependent on Russian crude oil or crude oil products



SOURCES: INCRED RESEARCH, COMPANY REPORTS

Figure 16: USA is not dependent on Russian LNG, but the EU is dependent in a big way



SOURCES: INCRED RESEARCH, COMPANY REPORTS

Russia diverts crude oil and crude oil products to India or China and if other exporters reduce their exports to India and China, then the market can be balanced »

Crude oil and crude oil products can be diverted by Russia - from Europe to India and China. Excess supply thus created in India and China via other exporters can be then potentially diverted to Europe to fill the Russian void without creating supply volume constraints (logistics constraints may still exist).

Figure 17: If exporters to India and China reduce their respective exports to these countries by 30% (oil and oil products) and Russia starts supplying to India and China, then global demand-supply scenario can be balanced, but logistics issues can pose a big challenge

Top 5 Crude Oil Exporter	Million tonnes	30% diversion to Europe	Top 5 Oil Products Exporter	Million tonne	30% diversion to Europe
China					
Saudi Arabia	84.9	25.47	Other Asia Pacific	33.1	9.93
Russia	83.4		Singapore	8.6	2.58
Other Africa	77.3	23.19	US	8.6	2.58
South & Cent. America	72	21.6	Other Middle East	7.2	2.16
Iraq	60.1	18.03	United Arab Emirates	5.3	1.59
India					
Iraq	47.3	14.19	US	9.6	2.88
Saudi Arabia	37.6	11.28	United Arab Emirates	7.6	2.28
Other Africa	26.5	7.95	Other Middle East	6.9	2.07
United Arab Emirates	22.2	6.66	Saudi Arabia	6.8	2.04
South & Cent. America	16	4.8	Iraq	4	1.2
Total	527.3	133.17	Total	97.7	29.31

SOURCES: INCRED RESEARCH, COMPANY REPORTS

India and China can reduce imports from top five exporters by just 30% and absorb excess Russian supply of crude oil which could then be exported to Europe. These top 5 exporters can then export additional supply to Europe without affecting global crude oil trade balance. The same is not true for oil products - a reduction of just 30% will create global constraints. Moreover, USA is a major importer of Russian oil products and this will add to global constraints in supply of oil products.

However, gas cannot be balanced by any means»

Currently, the only gas pipeline between Russia and China is Power of Siberia with a capacity of 38bcm per year (supplied only 10bcm in 2021). Both countries are planning additional pipelines and the current pipeline upgradation is to increase the gas pipeline trade. Planned projects include Power of Siberia expansion and addition of new pipelines - Power of Siberia-2 and Altai link. After completion, the capacity would be more than 100bcm per year and this will offset European natural gas exports to Russia, but these projects will take a few years.

Thus, crude oil and coal trade can be balanced by diverting flows from Europe to India or China and vice versa. Oil products and natural gas global trade constraints will be created if Russian exports are halted to Europe. It will create supply

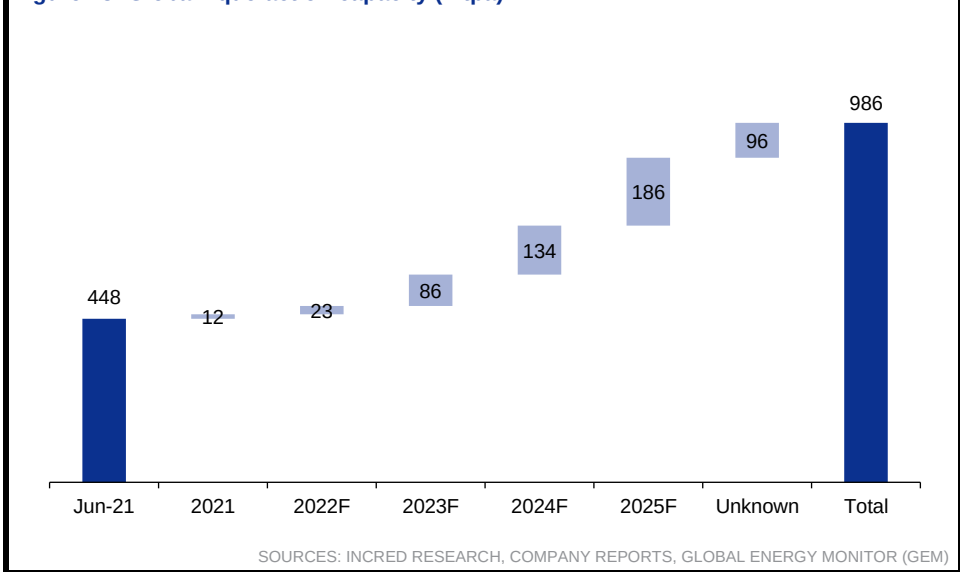
pressure on oil products and natural gas exporters, resulting in higher demand and volatile elevated prices and volume for a longer period - till 2023F.

LNG can replace Russian gas but there is not enough liquefaction capacity currently»

LNG is considered as the potential replacement for Russian dry natural gas. In 2020, Europe imported 75mtpa of LNG. To replace Russia, Europe requires additional 292mtpa of LNG, taking the total LNG requirement to 367mtpa for just Europe. In 2020, total global trade in LNG was 372mtpa only. Total global demand for LNG would be 692mtpa (considering 7.5% global demand increase) if Europe replaces Russian energy with LNG.

Current global liquefaction capacity is only 470mtpa (very less than the required 692mtpa). Normal trade demand is expected to be 400mt (7.5% growth), leaving only 70mtpa additional LNG at full capacity utilization to offset Russia's dependency on Europe. Major capacity addition is being planned and by 2025F capacity is set to be increased to 986mtpa. Considering 5% annual growth in LNG demand, total LNG requirement will be 801mtpa in 2025F and planned capacity would be able to meet LNG demand. Till 2025F, LNG supply will be constrained due to low liquefaction capacity.

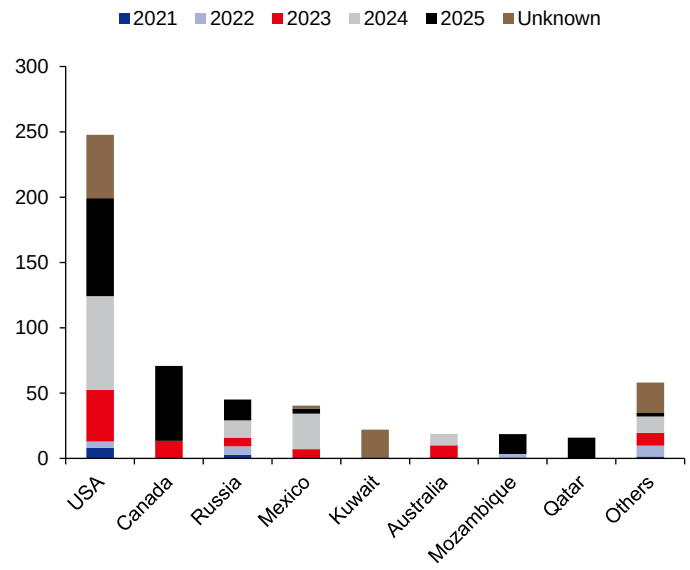
Figure 18: Global liquefaction capacity (mtpa)



SOURCES: INCRED RESEARCH, COMPANY REPORTS, GLOBAL ENERGY MONITOR (GEM)

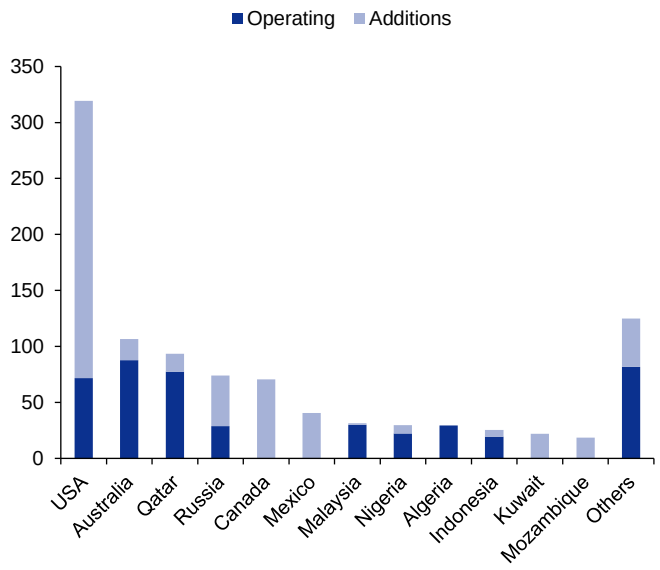
In 2022, LNG capacity will remain short by 208mtpa of global plus offset demand, which will reduce to 157mtpa in 2023F, 59mtpa in 2024F, and finally meeting entire demand in 2025F. Major capacity addition is expected in 2024F and 2025F. Most capacity addition will come in USA, raising its capacity from 72mtpa currently to 320mtpa in 2025F. USA LNG players will be biggest gainers from Europe's Russian commodity switch to LNG. Canada and Mexico, which currently have nil capacity, are planning to add 71mtpa and 40mtpa, respectively, by 2025F. Current key players, Australia and Qatar, are not adding capacity rapidly but increasing their capacity from 88mtpa and 77mtpa currently to 106mtpa and 93mtpa, respectively, in 2025F. Russia is also planning rapid expansion - from 29mtpa currently to 74mtpa in 2025F.

Figure 19: Figure 21: Liquefaction capacity addition - year-wise (mtpa)



SOURCES: INCRED RESEARCH, COMPANY REPORTS, GEM

Figure 20: Figure 22: Liquefaction capacity - 2025 (mtpa)

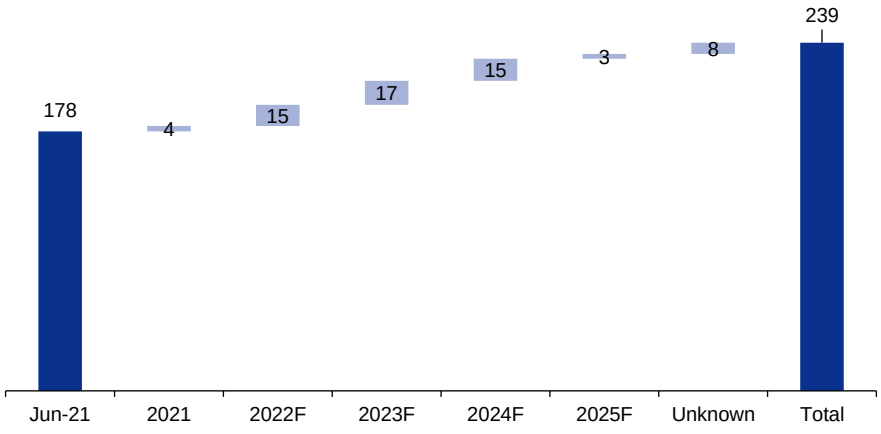


SOURCES: INCRED RESEARCH, COMPANY REPORTS, GEM

Europe has regasification capacity constraints as well

Major constraint for Europe comes from regasification capacity, which will not increase as rapidly as global liquefaction capacity. Current global regasification capacity is 993mtpa, which will balance liquefaction capacity in 2025F, in our view. Major regasification capacity lies with China. Europe will increase its capacity from 178mtpa to only 239mtpa in 2025F. With constant demand, it would require 367 mtpa in 2025F, creating major constraints in LNG imports. In 2022F, Europe can only import 189mtpa LNG at 100% capacity. Of this, 75mtpa it imported in 2020, leaving only 122mtpa additional LNG to be imported. Assuming 80% capacity utilization, it leaves only 83mtpa to be imported additionally. Liquefaction has supply restriction of 70mtpa.

Figure 21: Regasification capacity - Europe (mtpa)

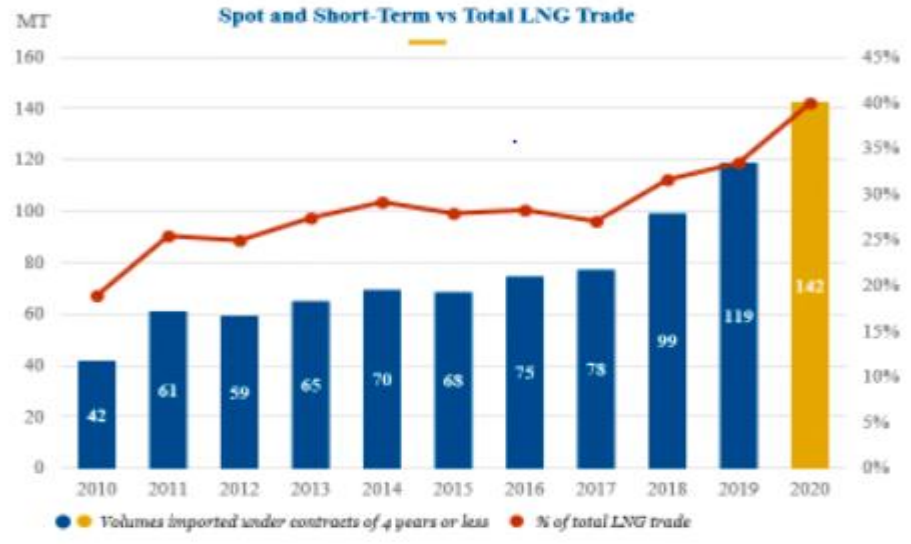


SOURCES: INCRED RESEARCH, COMPANY REPORTS, GEM

Spot LNG is another constraint in replacing Russian gas ➤

LNG trade flows mostly work on long-term contract basis. Spot or short-term trades are on the lower side. As Europe's demand is sudden, it will require short - term contract or spot LNG in the near future. In 2020, only 142mt LNG was traded for short-term/spot. Soon, Europe needs to get 70mt LNG from this 142mt, which will result in elevated prices due to supply constraints. In 2020, Europe imported 30mt spot LNG, of which 16mt (53%) came from suppliers in USA. It now needs to import almost 100mt spot LNG in 2022F.

Figure 22: Short-term and spot LNG volume



SOURCES: INCRED RESEARCH, COMPANY REPORTS, GIIGNL

USA is the biggest contributor to spot LNG cargo ➤

Total spot LNG availability west of Suez canal is 64.85mt (including USA spot). This includes:

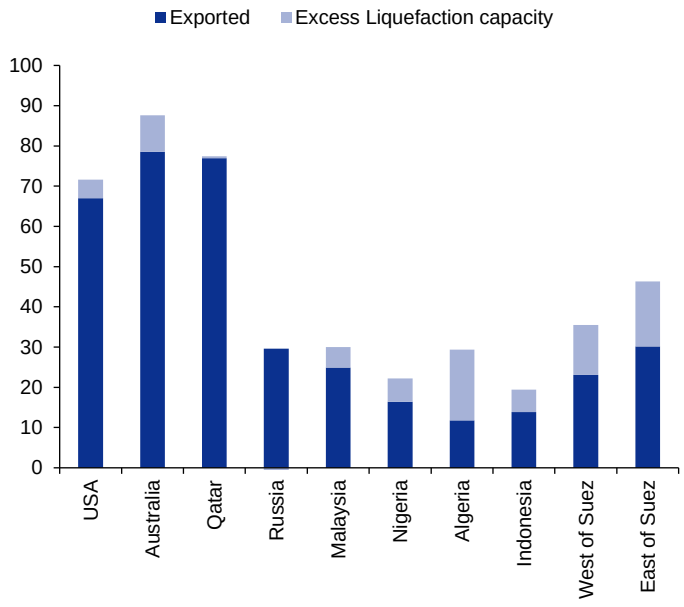
1. USA with 44mt (32% of total spot trade) spot LNG.
2. Next major spot provider is Australia with 25.5mt (19%),
3. 13mt from other countries on west of Suez Canal (10%),
4. Russia with 12.7mt and Malaysia with 11mt.

However, even 50% diversion of USA spot cargo to Europe will not suffice but instead it will raise LNG prices to astronomical level ➤

1. At full liquefaction capacity, potential new 40.35mt spot can be added to west of Suez Canal.
2. Total available spot LNG is 105.2mt (including USA). In 2021, USA exported 16.2mt (37% of its spot) to Europe, 17.6mt (40%) to Asia and 10.11mt to Americas.
3. USA spots are expected to be 48.52mt in 2022F, and if Europe can import 50% of these, then its total spot imports will be 81mt - only 51 additional mt to offset dependence on Russia.
4. To obtain 50% USA spot, USA LNG will be a major conflict point for Europe and Asia and this could potentially result in higher USA LNG spot prices.
5. As major capacity is being added by USA, new long-term contracts for Europe would be highly feasible.

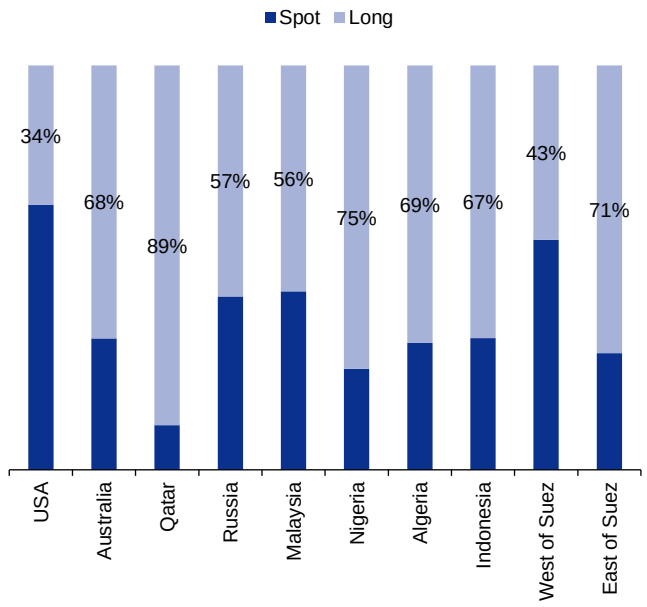
In the short term, there would be supply constraints and price wars for spot LNG.

Figure 23: LNG exports and excess capacities, 2021



SOURCES: INCRED RESEARCH, COMPANY REPORTS, GEM, GIIGNL

Figure 24: Spot vs. long-term contracts by exporter, 2021

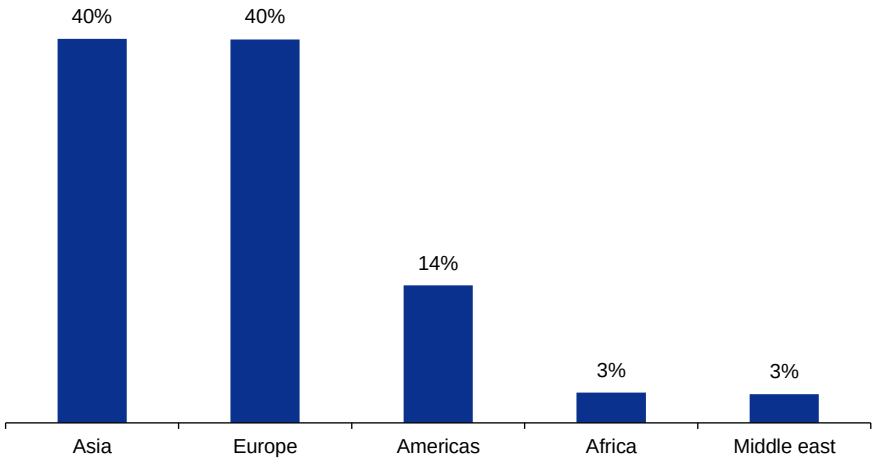


SOURCES: INCRED RESEARCH, COMPANY REPORTS, GIIGNL

Logistics is another major challenge for LNG shipment to Europe ➤

43% LNG ship ownership lies west of Suez Canal (61mt of spot trade) and 14% with USA (20mt). For Europe to import 81mt, it must utilize ships from east of Suez Canal.

Figure 25: Global LNG ship ownership in 2021; in a nutshell, there are not enough ships to transport to Europe



SOURCES: INCRED RESEARCH, COMPANY REPORTS, VESSELSVALUE

In a nutshell, Europe will not be able to replace Russian gas fully - its projection to do so by the end of 2022F is highly optimistic ➤

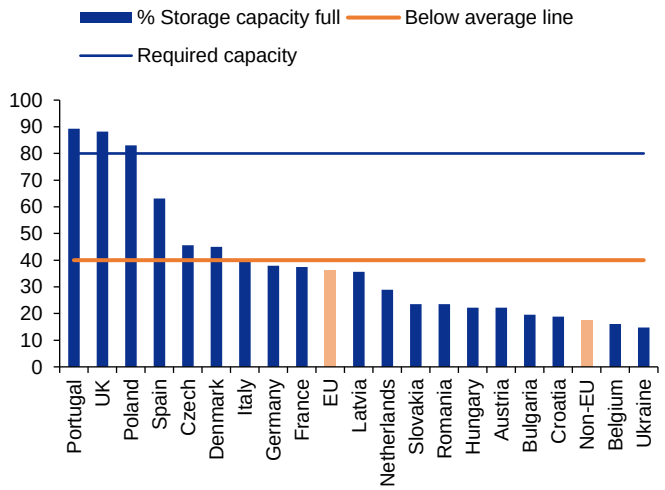
1. Total new LNG supply to Europe is 51mtpa in the near future, but prices paid will be high due to supply constraints for short-term/spot LNG.
2. Overall new gas availability for Europe is only 71mt (20mt dry and 51mt LNG), much lower than the required 92mt for complete independence from Russian supply.
3. Total imports of Russian gas were 140mt in 2020. Europe is targeting to reduce it by two-thirds, requiring 92mt additional gas/LNG but the best-case

scenario is only 71mt (3.25 exajoules). So, Europe will not be able to achieve its goal but still it is very optimistic.

Given the difficulty in sourcing gas, it is likely that storage capacity in winter will be below normal level ➤

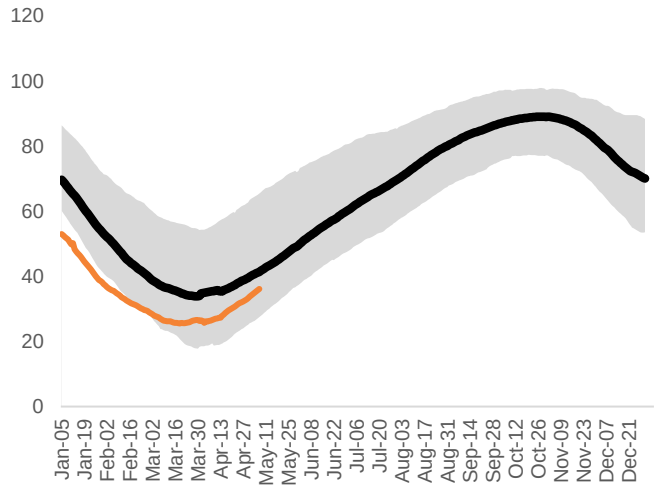
1. EU+UK need to fill their storage capacity to 80% by 1 Nov 2022F in a worst-case scenario. Total storage capacity of the EU+UK is 82mt. It is 36.7% filled as of 7 May 2022. It requires an additional 35mt (10% of global LNG trade) in next six months. For 90% capacity, it requires 44mt additional mt in next six months. Without Russian gas, this could become difficult.
2. Poland, UK, Portugal, and Spain have sufficient % storage full whereas Romania, Hungary, Bulgaria, and Belgium may struggle to fill the capacity to 80% and need to ramp up imports. Average % storage full was below the five-years low at the start of the year, and since Mar 2022 storage capacity has been ramped up, but still below five-year average % capacity full.

Figure 26: % Storage capacity full (7 May 2022)



SOURCES: INCRED RESEARCH, COMPANY REPORTS, AGSI

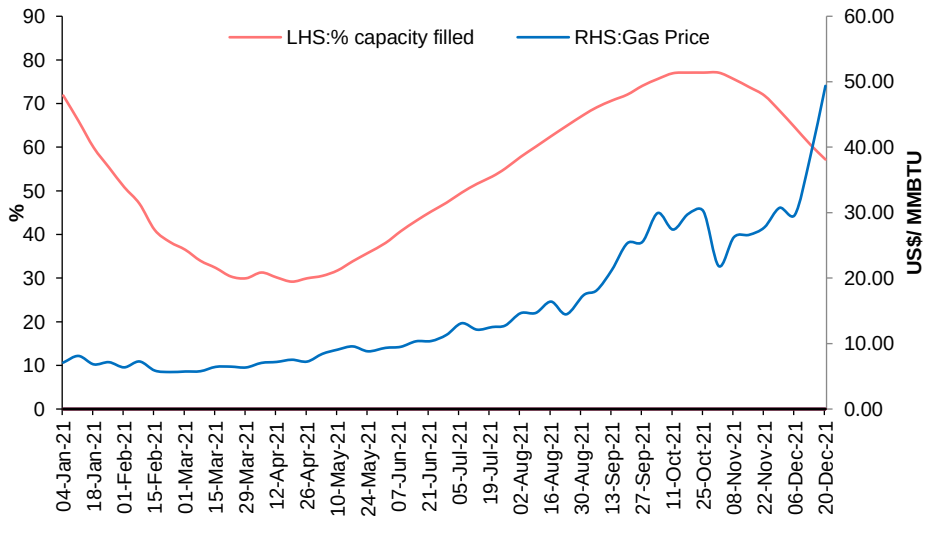
Figure 27: Europe storage compared to five-year average, five-year max and five-year low of % capacity full



SOURCES: INCRED RESEARCH, COMPANY REPORTS, AGSI

This will lead to a rise in LNG prices even more during winter ➤

Figure 28: The lower the % capacity filled during winter, normally higher are the prices



SOURCES: INCRED RESEARCH, COMPANY REPORTS

It's more likely that during winter gas prices can go up US$40/mmBtu

Sensitivity analysis if Russian energy is shunned by Europe

In this section, we analyze the impact of the scenarios when Europe shuns Russian coal, gas, and crude oil, respectively.

Figure 29: The table below gives the impact on different countries in the EU if they shun Russian energy sources

Importer	Coal	Crude Oil	LNG	Pipeline Gas
Germany	-49%	-31%	0%	-55%
United Kingdom	-37%	-11%	-17%	-16%
France	-31%	-9%	-23%	-10%
Italy	-62%	-10%	0%	-59%
Spain	-55%	-3%	-14%	-11%
Ukraine	-70%	0%	0%	0%
Poland	-73%	-65%	0%	-46%
Romania	-91%	-33%	0%	-45%
Netherlands	-47%	-27%	0%	-29%
Turkey	-38%	0%	0%	-49%
Belgium	-39%	0%	-35%	-8%
Czechia	-9%	-49%	0%	-73%
Greece	-98%	-12%	-4%	-79%
Portugal	-1%	0%	-11%	-10%
Sweden	-27%	-5%	-26%	-14%
Hungary	-29%	-79%	0%	-43%
Belarus	-57%	-88%	0%	-100%
Austria	-30%	-10%	0%	0%
Serbia	-78%	-30%	0%	-69%
Switzerland	-49%	0%	0%	-1%
Bulgaria	-79%	-62%	0%	-77%
Denmark	-100%	-11%	0%	0%
Finland	0%	0%	-82%	0%
Slovakia	-33%	-96%	0%	-100%
Norway	-35%	-2%	-30%	0%
Ireland	-21%	0%	0%	0%
Croatia	-76%	0%	0%	0%
Rep. of Moldova	-100%	0%	0%	0%
Bosnia Herzegovina	-21%	0%	0%	-100%
Lithuania	-100%	-64%	-15%	-97%
North Macedonia	-5%	0%	0%	-99%
Slovenia	-68%	0%	0%	-47%
Latvia	-100%	0%	0%	-82%
Estonia	-100%	-100%	-100%	-99%
Montenegro	0%	0%	0%	0%
Luxembourg	-7%	0%	0%	0%
Malta	0%	0%	0%	0%
Iceland	0%	0%	0%	0%
Europe	**-48%**	**-22%**	**-15%**	**-36%**

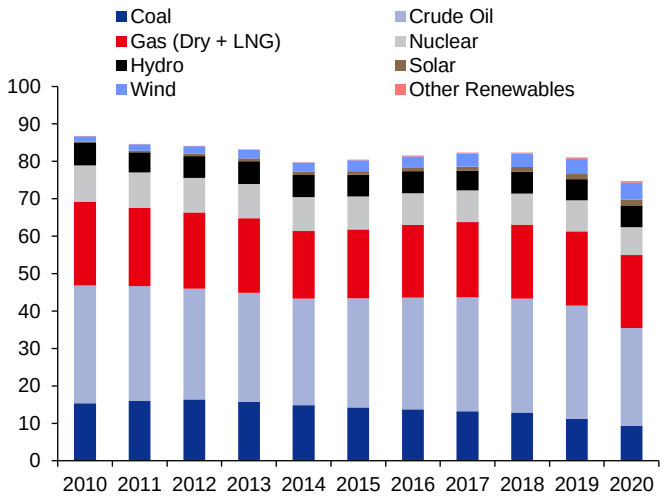
SOURCES: INCRED RESEARCH, COMPANY REPORTS, BP, UN COMMTRADE

Reducing Europe's dependency on Russia

Since 2010, renewable energy consumption in Europe increased from 7.82 exajoules to 12.32 exajoules in 2020. Total energy consumption dropped from 87 to 75 exajoules in 2020. In terms of share gain, renewables share increased from 9% in 2010 to 16% in 2020. Renewable transformation is rapid, but it is not enough to replace the fossils in near future, Europe will have to depend on fossil imports in the near future. Only 0.7 exajoules of renewable energy will be added in 2021/2022F which is not substantial to offset dependency on Russia.

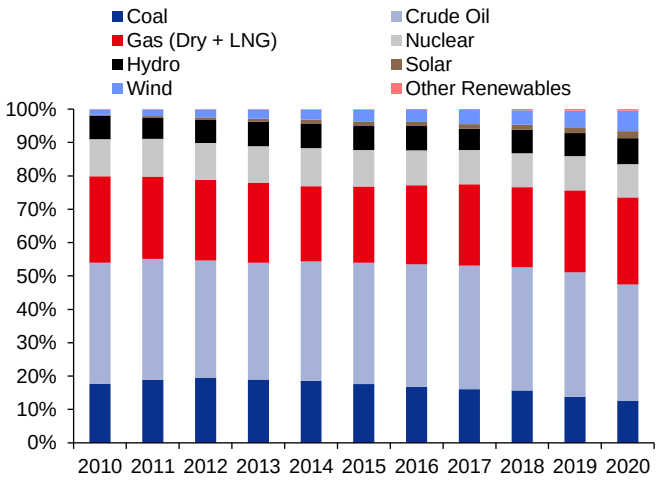
Nuclear energy consumption was 9.69 exajoules in 2010 and it dropped to 7.44 exajoules in 2020 (share drop from 11% to 10%). Nuclear power share is also not very substantial when compared to fossils. Current nuclear energy plant capacity in the EU is 101,913Mwe and no major capacity is being planned. As of end-Mar 2022, only 2,592 Mwe of nuclear power capacity was under construction, 7,210Mwe is being planned, and 17,220Mwe being proposed. Thus, nuclear energy is neither short-term nor long-term replacement to fossil fuels due to current capacity limitations.

Figure 30: Europe energy consumption by source type (in exajoules)



SOURCES: INCRED RESEARCH, COMPANY REPORTS, BP

Figure 31: Europe energy consumption by source type (in %)



SOURCES: INCRED RESEARCH, COMPANY REPORTS, BP

Substituting Russian energy sources on an immediate basis is possible only through fossil fuels »

Substitution of Russian energy commodities will have to be matched with the import of fossil commodities only. Energy dependence on Russia translates to additional imports of either 683mt of coal or 356mt of crude oil or 292mt of LNG/ dry natural gas from other trading partners.

Figure 32: Following is the requirement of different fuels if Russian energy sources are completely shut in Europe

	Replacement Required (in million tonnes)		
Importer	**Coal**	**Crude Oil**	**LNG**
Germany	217.13	113.24	92.76
United Kingdom	21.49	11.21	9.18
France	18.55	9.67	7.92
Italy	68.66	35.81	29.33
Spain	11.58	6.04	4.95
Ukraine	11.91	6.21	5.09
Poland	45.97	23.98	19.64
Romania	6.63	3.46	2.83
Netherlands	67.52	35.22	28.85
Turkey	43.37	22.62	18.53
Belgium	8.70	4.54	3.72
Czechia	16.66	8.69	7.12
Greece	10.50	5.48	4.49
Portugal	1.09	0.57	0.47
Sweden	2.80	1.46	1.19
Hungary	16.63	8.67	7.10
Belarus	52.23	27.24	22.31
Austria	2.29	1.19	0.98
Serbia	3.93	2.05	1.68
Switzerland	0.09	0.05	0.04
Bulgaria	9.86	5.14	4.21
Denmark	1.10	0.57	0.47
Finland	0.37	0.20	0.16
Slovakia	25.91	13.51	11.07
Norway	0.30	0.15	0.13
Ireland	0.09	0.05	0.04
Croatia	0.45	0.24	0.19
Rep. of Moldova	0.13	0.07	0.06
Bosnia Herzegovina	0.57	0.30	0.25
Lithuania	11.83	6.17	5.05
North Macedonia	0.49	0.26	0.21
Slovenia	0.85	0.44	0.36
Latvia	1.96	1.02	0.84
Estonia	1.15	0.60	0.49
Montenegro	0.00	0.00	0.00
Luxembourg	0.00	0.00	0.00
Malta	0.00	0.00	0.00
Iceland	0.00	0.00	0.00
Total	**682.78**	**356.10**	**291.69**

SOURCES: COMPANY REPORTS, INCRED RESEARCH

What can be the sources of dry natural gas (pipeline gas) for Europe? Our calculations indicate only 27bcm is possible in the immediate future ➤

1. Apart from Russia, Norway, Algeria, and Azerbaijan are major suppliers of dry natural gas to Europe, supplying 107bcm, 21bcm and 13bcm of natural gas, respectively, in 2020.
2. Baltic pipeline project with 10bcm/year is the only new pipeline being constructed between Norway and Poland via Denmark, and apart from it no other major new pipeline or capacity is planned in these regions, and Europe to offset Russian supplies in near future.
3. Upgradation of Medgaz gas pipeline is scheduled to be completed in 2022F, adding 2.5bcm/year to previous capacity.
4. Other new planned pipeline is AGRI, but it is scheduled for 2027F with a capacity of 8 bcm/year.
5. Current capacity of pipelines from Norway to Europe is 172 bcm/year (105 bcm/year is to the UK and 67 to mainland Europe) of which 107 bcm/year was utilized in 2020. Production surplus of Norway is only 122 bcm/year (126 bcm production and 4bcm consumption) of which 4bcm was LNG, making effective surplus of 118bcm. Norway can potentially provide 11bcm/year of additional dry gas supply at full capacity.
6. Current total pipeline capacity of Algeria is 53.5 bcm/year of which it supplies only 21 bcm/year dry gas to Europe. Algeria supplied 15bcm LNG and 5bcm dry gas to non-Europe regions in 2020. Algeria has production surplus of 52 bcm/year (95bcm production and 43bcm consumption), and it can also provide additional 11 bcm/year piped dry gas to Europe via Spain at full capacity.
7. Azerbaijan has capacity of 50bcm/year of which it only supplies 13bcm. Capacity is planned to be increased to 64bcm by 2023F and finally 71bcm by 2026F. Two pipelines with total capacity of 35bcm are connected to Turkey while the third is connected to Greece and Italy with a capacity 15bcm. Azerbaijan's current constraint is its production surplus of 18bcm (30bcm production and 12bcm consumption). It can provide additional 5bcm to Europe at full capacity. Supply will depend on evolving political relations.

Total new potential dry gas to Europe is about 27bcm/year (11bcm from Norway, 11bcm from Algeria, and 5bcm from Azerbaijan) or 20mtpa in near future.

On crude oil- shunning Russia can lead to shortage of diesel, fuel oil, and naphtha ➤

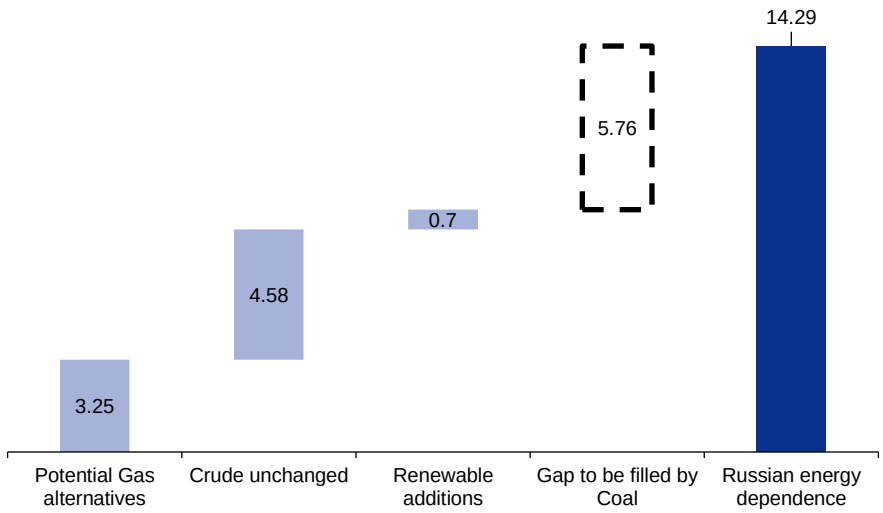
1. Crude oil trade flow can easily be diverted away from Russia-Europe to Russia-Asia and from the Middle East-Asia to the Middle East-Europe. Additional new production is not expected as investment in oil infrastructure has dried up due to green push.
2. Heavy capex investment is required to increase production capacity, these investments are made for long-term. Current demand growth is only temporary and will start fading out from 2024F-2025F when LNG capacity will be added, thus making any such investment unprofitable for oil companies.
3. In last decade, crude oil production has been stable. It has increased substantially for USA and Canada due to shale technology. But shale is also very capex-heavy and more environmentally harmful. With governments currently focusing more on environmental issues, it is unlikely that USA and Canada will further increase their crude oil production.
4. Only alternative to increase crude oil production is bringing Venezuela back on track. No major impact is expected on crude oil supply in the moderate timeframe of 6-12 months. Constraints will only be created if China and India don't import Russian crude oil. Similarly, trade diversion can also be expected for oil products.

5. Naphtha and fuel oil supply will face constraints as Russia has the highest share at 24% and 16%, respectively, of the world's supply.

Coal- this option also needs Russian support ➤

To offset the remaining energy demand, Europe will have to switch back to coal.

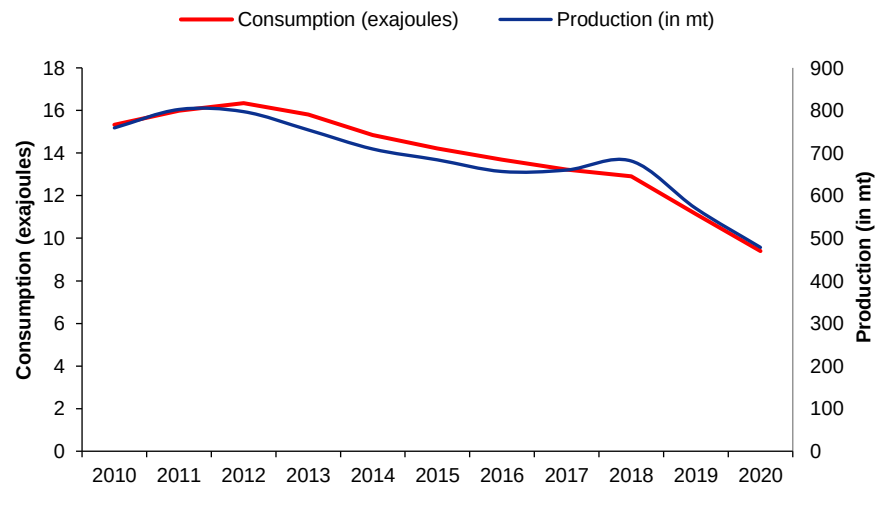
Figure 33: Offsetting Russian energy dependency (exajoules)



SOURCES: INCRED RESEARCH, COMPANY REPORTS

Europe needs to import and consume 5.67 exajoules of additional coal soon. During the last decade, Europe has been pivoting away from coal due to environmental reasons. Europe can ramp up its production as total coal production in 2010 was 760mt (9.6 exajoules) which dropped to 478mt (5.53 exajoules) in 2020. It could potentially provide additional 4.1 exajoules of energy required. Even 50% recovery of lost production will result in 2.05 exajoules. Rest 3.62 exajoules needs to be imported. China and India are heavy coal users and 1.59 exajoules of coal trade can be diverted from Russia-Europe to Russia-Asia and from Africa/Americas-Asia to Africa/Americas-Europe, leaving 2.03 exajoules of additional coal to be imported. Coal dependency will rapidly decrease in 2024F/2025F when sufficient LNG capacity will be added, and the share of renewable energy also increases. Usage of coal is temporary and there will be supply constraints, which will in turn keep coal prices on the higher side in near future.

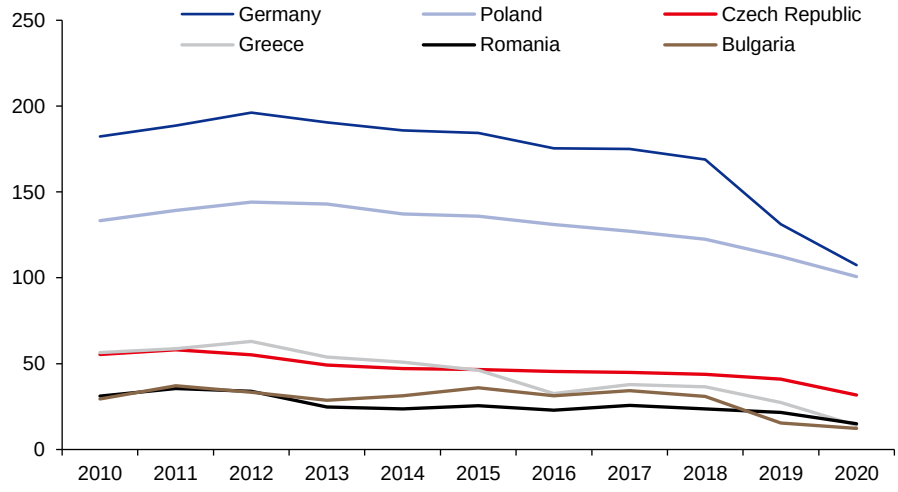
Figure 34: Coal consumption and production decline - Europe



SOURCES: INCRED RESEARCH, COMPANY REPORTS, BP

Germany, Poland, Czechoslovak, Greece, Romania, and Bulgaria witnessed the largest decrease in coal production since 2010. Around 70% recovery in production in these countries will meet the requirement of an additional 145mt (2.05 exajoules).

Figure 35: Coal production downfall of major Europe coal producers



SOURCES: INCRED RESEARCH, COMPANY REPORTS, BP

Even in a best-case scenario, there still exists a gap of 2+ exajoules to offset Europe's dependency on Russia. Europe cannot become Russia-independent in near future and the process is long-term in nature.

Potential impact on India?

Coal

Figure 36: India's coal dependency

	MT coal imported	% of import
Indonesia	98	45%
Australia	47	21%
South Africa	35	16%
USA	11	5%
Russian Federation	8	4%

SOURCES: INCRED RESEARCH, COMPANY REPORTS, UN COMMTRADE, BP

India is mostly dependent on Indonesian, Australian, and South African coal. New investment in mining and improving coal production is likely to remain dry due to demand being short-term in nature. Additional new coal volume availability should not be significant. Diversion of coal trade may happen. Average coal grade of last 15 years of Australia is 5,971 kcal/kg, Indonesia 5,897, South Africa 5,675, Russia 4,811, and Germany only 2,409. Russia exports 76mt coal to Europe. Coal diversion from Australia-India and Indonesia-India to Australia-Europe and Indonesia-Europe seems less likely due to long sea trade distance involved. Coal from South Africa will get diverted to Europe and in a worst case, India receiving no south African coal. Russian coal may come to India's help but for same quantity energy produced will be lower. This will create pressure on India as India is already going through coal shortage and the shift from high grade South African coal to relatively low-grade Russian coal will add to the shortage.

Figure 37: Indian supply chain is not ready for Russian coal as the time to reach Indian ports from Russia is much higher compared to South Africa, Australia or Indonesian sources

Route	Distance (vis Suez Canal)	Days to reach @ 10 knots
Australia - Germany	11739 nautical miles	49
Indonesia - Germany	10058 nautical miles	42
South Africa - Germany	6370 nautical miles	26
Columbia - Germany	4722 nautical miles	20
US - Germany	3585 nautical miles	15
Australia - India	5197 nautical miles	22
Indonesia - India	3511 nautical miles	15
South Africa - India	4390 nautical miles	18
Russia (east) - India	4942 nautical miles	21
Russia (east) - India	8379 nautical miles	35

SOURCES: INCRED RESEARCH, BLOOMBERG

LNG ➤

Figure 38: Table 16: India's LNG dependency

	MT LNG imported	% of import
Qatar	14.14	39%
United Arab Emirates	4.49	13%
Nigeria	4.04	11%
Angola	3.29	9%
USA	3.27	9%
Oman	1.84	5%
Australia	1.09	3%

SOURCES: INCRED RESEARCH, COMPANY REPORTS, BP

India is mostly dependent on the Middle East for its LNG imports, mostly Qatar (39%, 14mt). Qatar is a major non-NATO ally and in a worst case can divert its LNG to Europe, leaving India dry. Russia's exports to Europe were to the tune of 10mt, and thus finding LNG replacement will be tougher and highly competitive in an already heated and constrained LNG spot market until 2025F.

Crude oil ➤

Crude oil can easily be diverted from Middle East-India to Middle East-Europe and from Russia-Europe to Russia-India without creating a major global supply shock.

How world is impacted by reduced trade from Russia?

Global impact because of reduced trade from Russia is felt in a three-fold manner: 1) Rising natural gas prices. 2) Refining product unavailability (please note that refining balance is already on the thin edge). 3) Coal shortage - coking as well as thermal coal.

Rising natural gas prices ➤

In the earlier section, we have shown how attempts to diversify the supply base of Europe is leading to rising natural gas prices.

Rising coal prices ➤

Our global trade model based on Russian exports shows the following impact on the imports of different countries.

Deficit of refinery products i.e., mainly diesel ➤

Our global trade model based on Russian exports shows the following Impact on the imports of different countries:

Figure 39: The table below gives the impact on global trade in energy commodities if Russia is simply shut from global energy market

	Energy Commodity				
Importer	**Crude Oil**	**Oil Products**	**LNG**	**Pipeline Gas**	**Thermal Coal**
Australia	-4%	0%	0%	0%	0%
China	-15%	-4%	-7%	-9%	-15%
India	-1%	-3%	-2%	0%	-4%
Japan	-4%	-3%	-8%	0%	-13%
Malaysia	0%	0%	0%	0%	0%
Singapore	0%	-4%	-2%	0%	0%
South Korea	0%	0%	-5%	0%	-22%
Taiwan	0%	0%	-13%	0%	0%
Other Asia Pacific	-4%	-5%	-1%	0%	-11%
Total Asia Pacific	**-8%**	-4%	-7%	-6%	-13%
France	0%	0%	-26%	-10%	0%
Germany	0%	0%	0%	-55%	0%
United Kingdom	0%	0%	-16%	-16%	0%
Spain	0%	0%	-16%	0%	0%
Turkey	0%	0%	-2%	-49%	0%
Italy	0%	0%	0%	-39%	0%
Netherlands	0%	0%	0%	-29%	0%
Other Europe	0%	0%	-100%	-6%	0%
Other European Union	0%	0%	-20%	-49%	0%
Total Europe	**-29%**	-41%	-15%	-38%	-50%
US	-1%	-25%	0%	0%	-5%
Mexico	0%	0%	0%	0%	-13%
Canada	0%	-1%	0%	0%	-5%
Total North America	**-1%**	-13%	0%	0%	-6%
Brazil	0%	0%	0%	0%	0%
Other S. & Cent. America	0%	0%	-1%	0%	0%
Total S. & Cent. America	**-2%**	-1%	-1%	0%	-8%
United Arab Emirates	0%	0%	-19%	0%	0%
Kuwait	0%	0%	0%	0%	0%
Other Middle East	0%	0%	-16%	0%	0%
Total Middle East	**0%**	-6%	-7%	0%	-30%
Russia	0%	0%	0%	0%	0%
Kazakhstan	0%	0%	0%	-80%	0%
Other CIS	-97%	-45%	0%	-21%	0%
Total CIS	**-97%**	-45%	0%	-66%	-17%
Egypt	0%	0%	0%	0%	0%
South Africa	0%	0%	0%	0%	0%
Other Africa	0%	0%	0%	0%	0%
Total Africa	**0%**	-3%	0%	0%	-47%

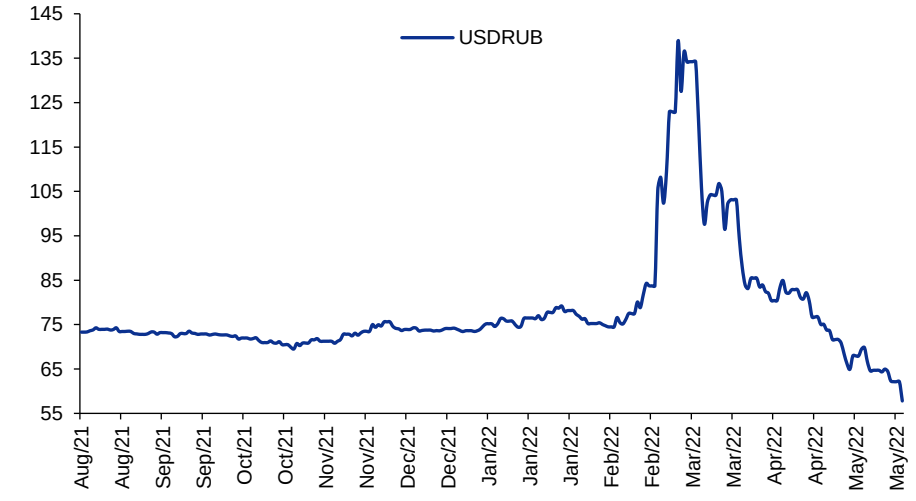
SOURCES: INCRED RESEARCH, COMPANY REPORTS

The catastrophic impact on global imports of energy commodities indicates that Russian President Vladimir Putin is on a very strong footing and replacing Russia is not easy.

More the sanctions, higher the energy prices and better for Russia ➤

Its interesting dynamics for Russia now. More the sanctions, higher the energy prices. As of now, Russian exports to Europe are down by 40% but gas prices are up 4x and so on a net basis, Russia gets 140% more revenue which leads to higher current account surplus and stronger Rouble

Figure 40: The biggest proof that sanctions help Russia in strengthening its Rouble

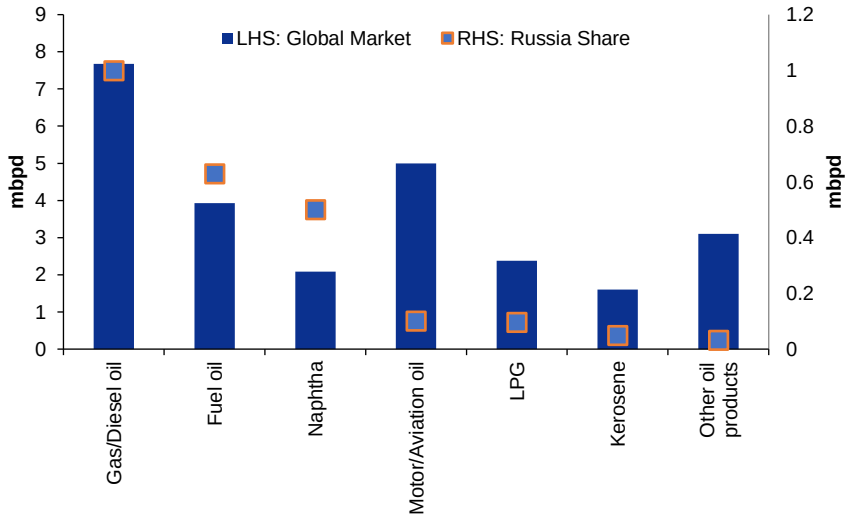


SOURCES: INCRED RESEARCH, COMPANY REPORTS

What does it mean for refining margins? Even without sanctions they were up and with sanctions they will rise much faster ➤

We had written about demand-supply mismatch in global refining capacity in our earlier report: IN: Oil & Gas - Overall - The upcycle is here. However, please note that Russia is one of the biggest suppliers in global diesel market. Stopping the supply will take diesel cracks to more US$100/bbl but even slow supply or threat of partial stoppage will act a big kicker to global diesel spreads.

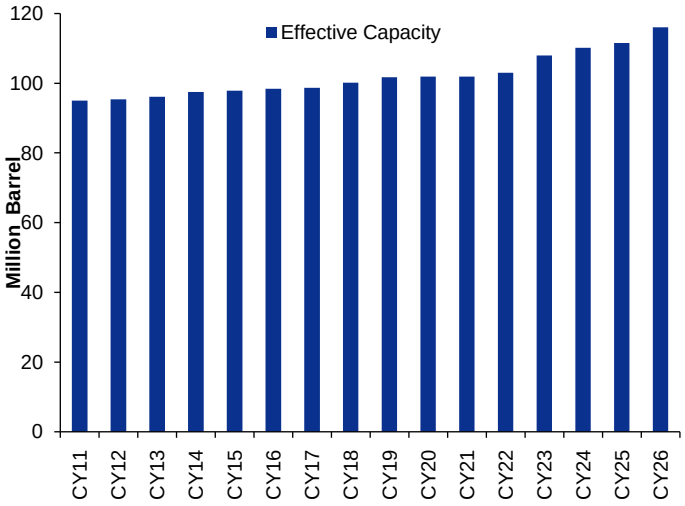
Figure 41: Russia is one of the biggest suppliers in global diesel market and hence, any decline in supply will act as a big impetus for prices



SOURCES: INCRED RESEARCH, COMPANY REPORTS

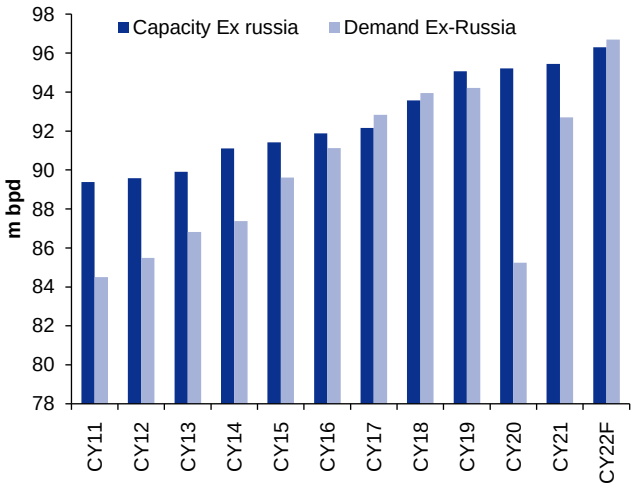
Please note that Russia has already shut down some refining capacity ➤

Figure 42: Global refining capacity of 101mbpd is barely able to fulfil demand



SOURCES: INCRED RESEARCH, COMPANY REPORTS

Figure 43: However, trade barriers on Russia create havoc in oil products market, like in case of diesel



SOURCES: INCRED RESEARCH, COMPANY REPORTS

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