INCORRYS

REPLACEMENT OF RUSSIAN ENERGY IMPORTS

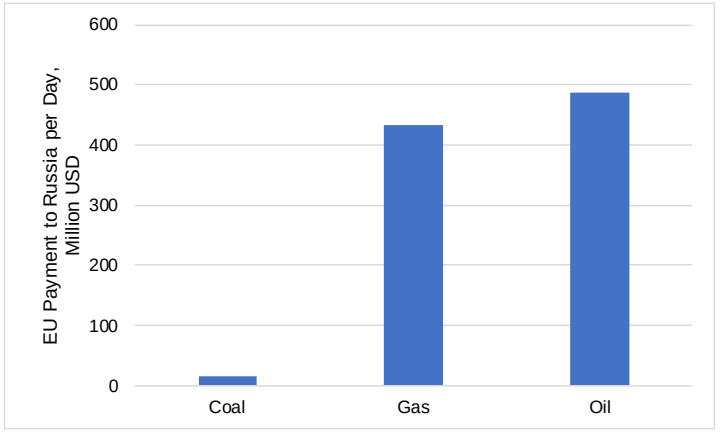
APRIL 2022

INTRODUCTION

In April 2022, the EU paid an average USD 1B per day for Russian Energy sources. The EU is planning gradual steps to reduce and eventually eliminate its reliance on crude oil, refined products, natural gas, and coal from Russia. In addition to the EU actions, other countries (including the UK, US, and Canada) are planning to or have already stopped receiving Russian energy.

Russian energy supply remains very significant to Europe. The following measures are planned:

- Supply diversification
- Expand using alternative energy sources
- Increased storage and pipeline efficiency
- Decreased industry energy consumption
- Decreased household energy consumption



Such changes will affect world energy markets and create some opportunities for energy exporters including the US and Canada.

Source: DW

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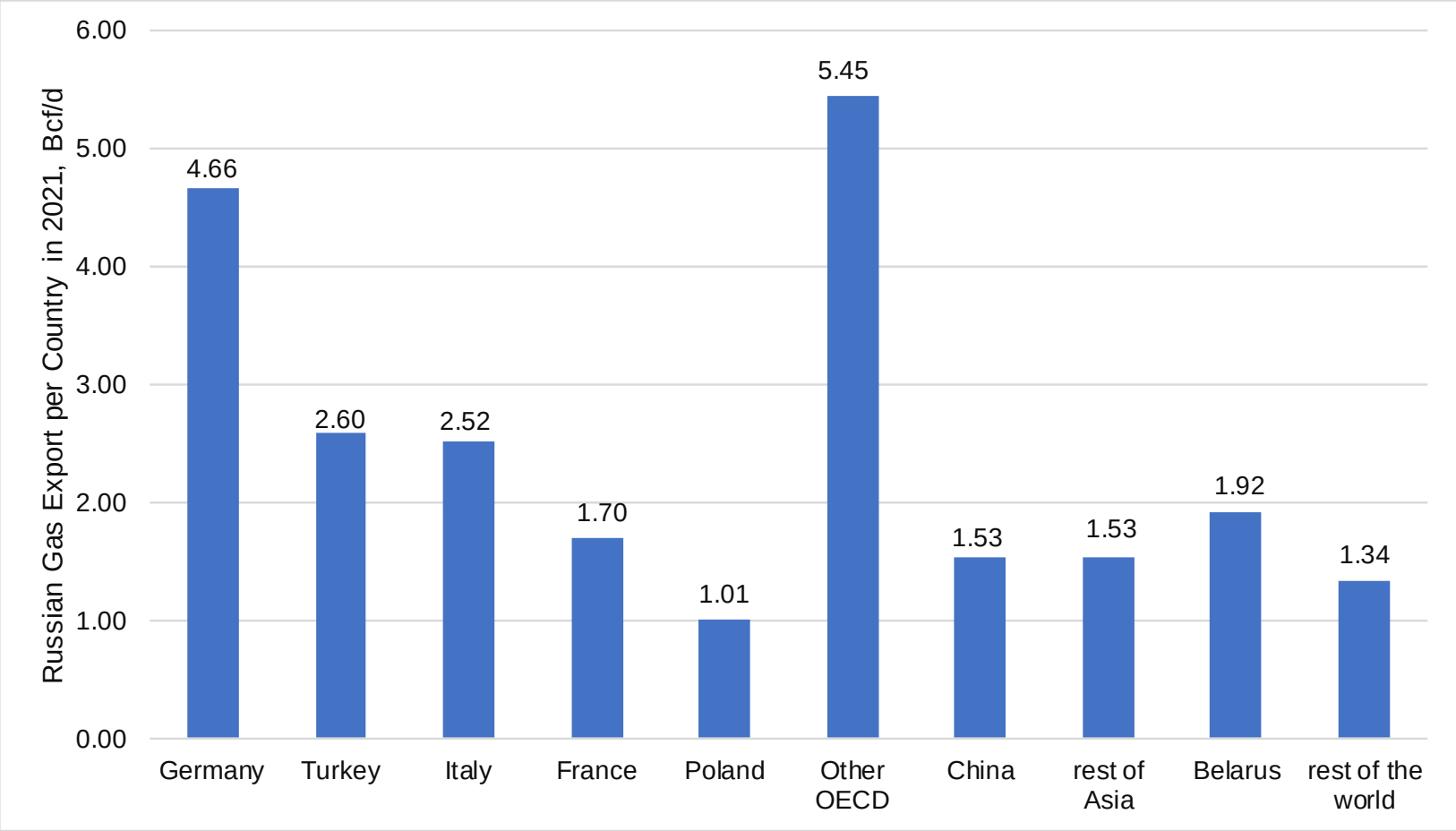
RUSSIAN NATURAL GAS EXPORTS



- Russian Natural Gas production in 2021: 73.6 Bcf/d
- Russia is the second-largest producer of natural gas behind US.
- Russia has the world's largest natural gas reserves.
- Russia is the world's largest gas exporter: 20.3 Bcf/d via pipeline. In 2021 Russia exported 4 bcf/d of LNG.
- State owned Gazprom produced 68% of gas in 2021; other producers include Rosneft and Novatek.
- Russian gas pipelines transport gas to Europe through Belarus and Ukraine, as well as directly through underwater pipelines Nord Stream, Blue Stream, and TurkStream.
- Russia completed Nord Stream II pipeline in 2021, but the German government has not approved its certification and the pipeline remains non-operational.
- Russian exports natural gas to China via the Power of Siberia pipeline with a capacity 3.7 Bcf/d.

Russia exported 18 Bcf/d of natural gas to Europe (OECD) in 2021, mostly by pipeline. Germany is by far the largest European importer of Russian Gas (4.66 Bcf/d).

Source: EIA and IEA

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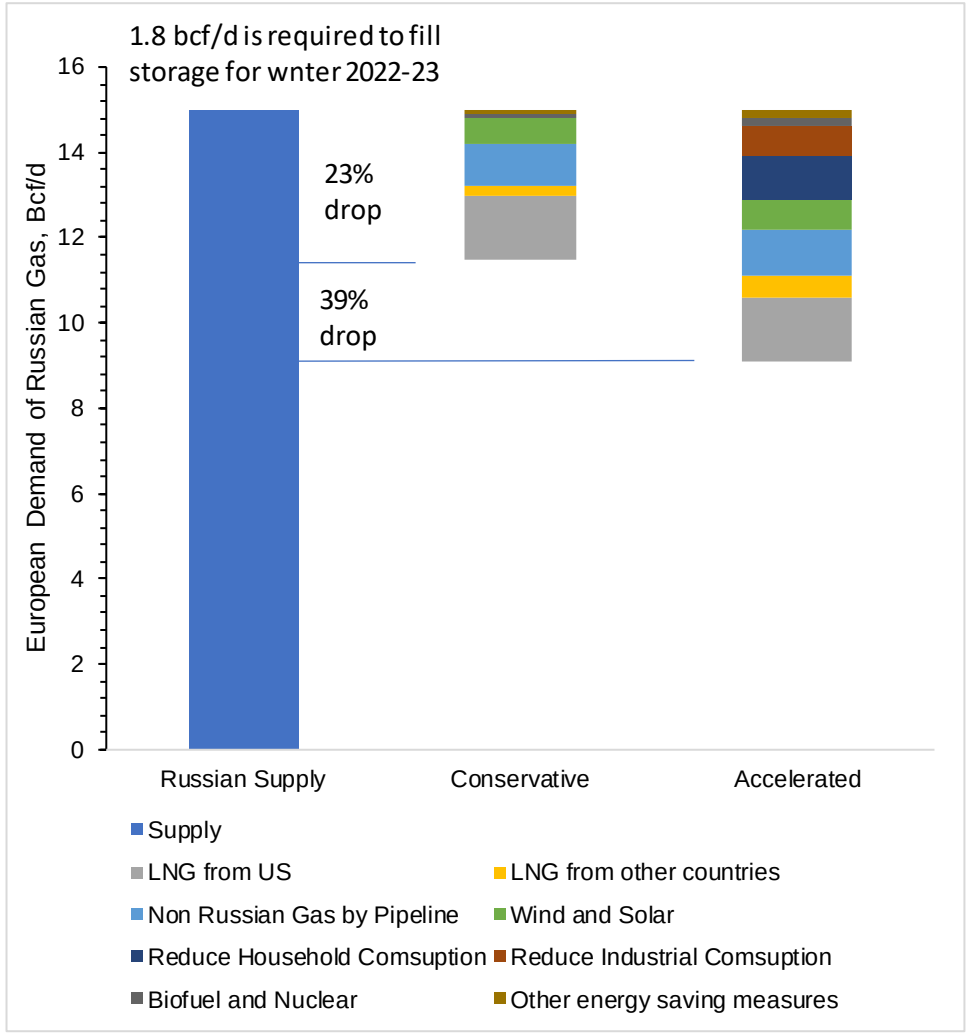
RUSSIAN NATURAL GAS REPLACEMENT IN EUROPE



- The EU currently consumes 15 Bcf/d of natural gas from Russia, an additional 1.8 Bcf/d is required to fill storage for the winter 2022-23.
- The EU is currently analyzing multiple scenarios to reduce dependency on Russian gas. Incorrys presents its own assessments of Russian gas replacement before the end of 2022: conservative and accelerated*:
  - Conservative Scenario - Russian gas imports are reduced by 23% (21% with storage requirements) before the end of 2022.
  - Accelerate Scenario - Russian gas imports are reduced by 39% (35% with storage requirements).
- In both scenarios Europe must rely on increased LNG imports. Around 1.5 Bcf/d of incremental supply will need to come from US and another 0.2 – 0.5 Bcf/d from other countries. Since the current LNG market is tight, sourcing additional LNG supply to the EU may lead to increased LNG pricing worldwide.
- Gas supply by pipeline from other countries (Algeria, Norway, and Azerbaijan) can grow by 0.5 – 0.8 Bcf/d. In can be partially achieved by reducing methane leaks and flaring.
- Additional wind and solar power generation capacity will reduce gas demand by 0.6 – 0.7 Bcf/d.
- The Accelerated Scenario also includes reductions in household and industrial consumption. Turning down the thermostat for heating by just 1°C would reduce gas demand by 1 Bcf/d. Industrial demand can be lowered by reducing, or even shutting down, production at some industries, including fertilize and steel.
- The Accelerated Scenario also includes extending the life of nuclear plants and more a extensive use of biofuel.

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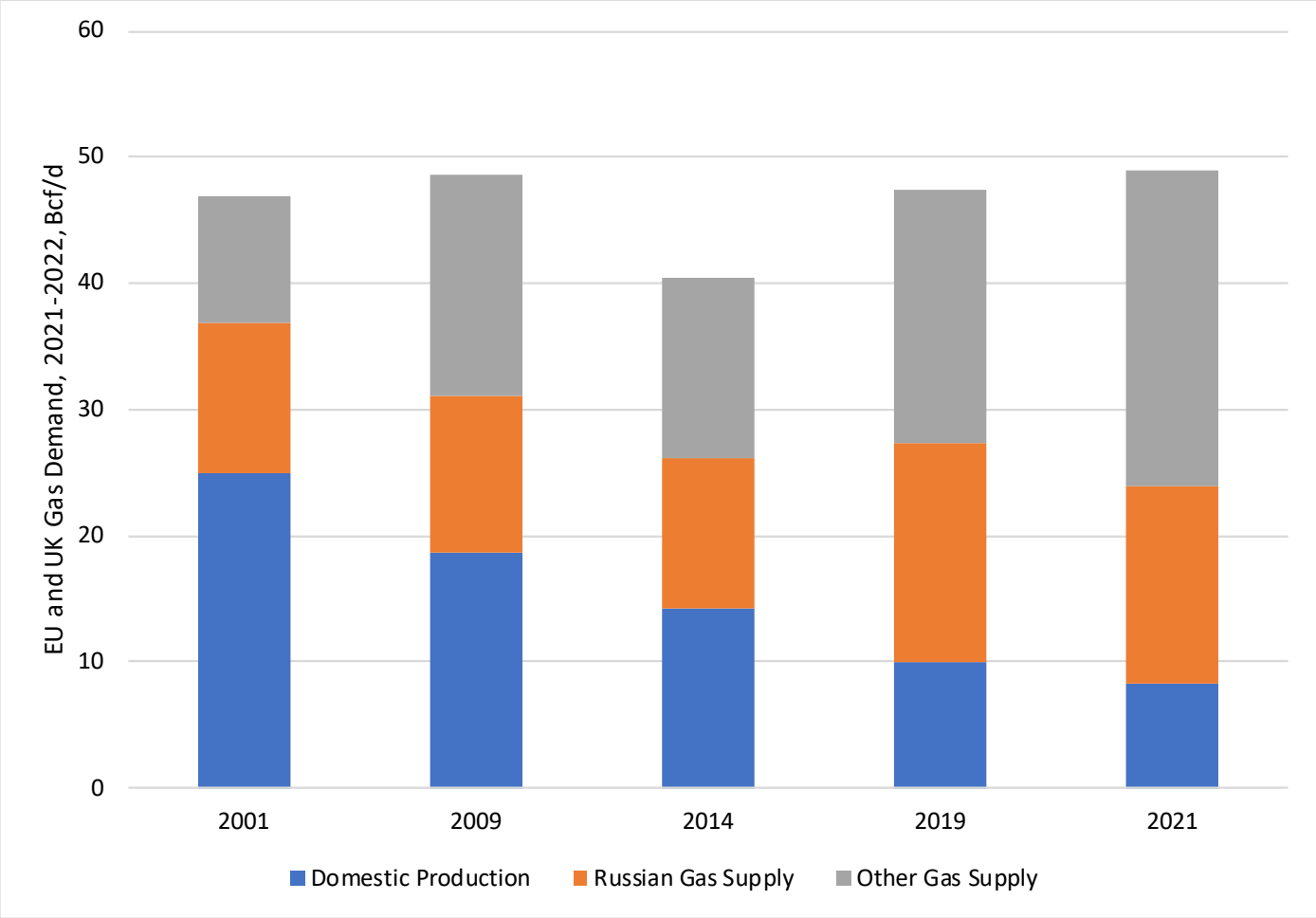
* Accelerated scenario uses data from IEA's A 10-Point Plan to Reduce the European Union's Reliance on Russian Natural Gas

RUSSIAN NATURAL GAS EXPORTS TO EUROPE



Source: IEA

Russia supplied 32% of natural gas to the EU and UK in 2021; up from 25% in 2009 and 29% in 2014.

Russian Pipelines via Ukraine:

- Over 25% of gas to the EU was transit via Ukraine
- In 2021, pipelines via Ukraine were utilized at approximately 50%.
- In 2022, transit via Ukraine continues.

Deliveries via pipeline from other countries:

- Europe receives gas from Norway, Azerbaijan, and Algeria.

LNG deliveries to Europe:

- Russia: 1.3 Bcf/d in January 2022.
- US: represented 37% of European LNG supplies
- Europe also receives deliveries from Qatar and other countries.

European Domestic Production:

European domestic production continues to decline due to the maturity of main producing areas. In 2020, the EU produced 4.7 Bcf/d of gas (UK is not included) down from 23.8 Bcf/d in 2000. The UK remains Europe's largest gas producer.

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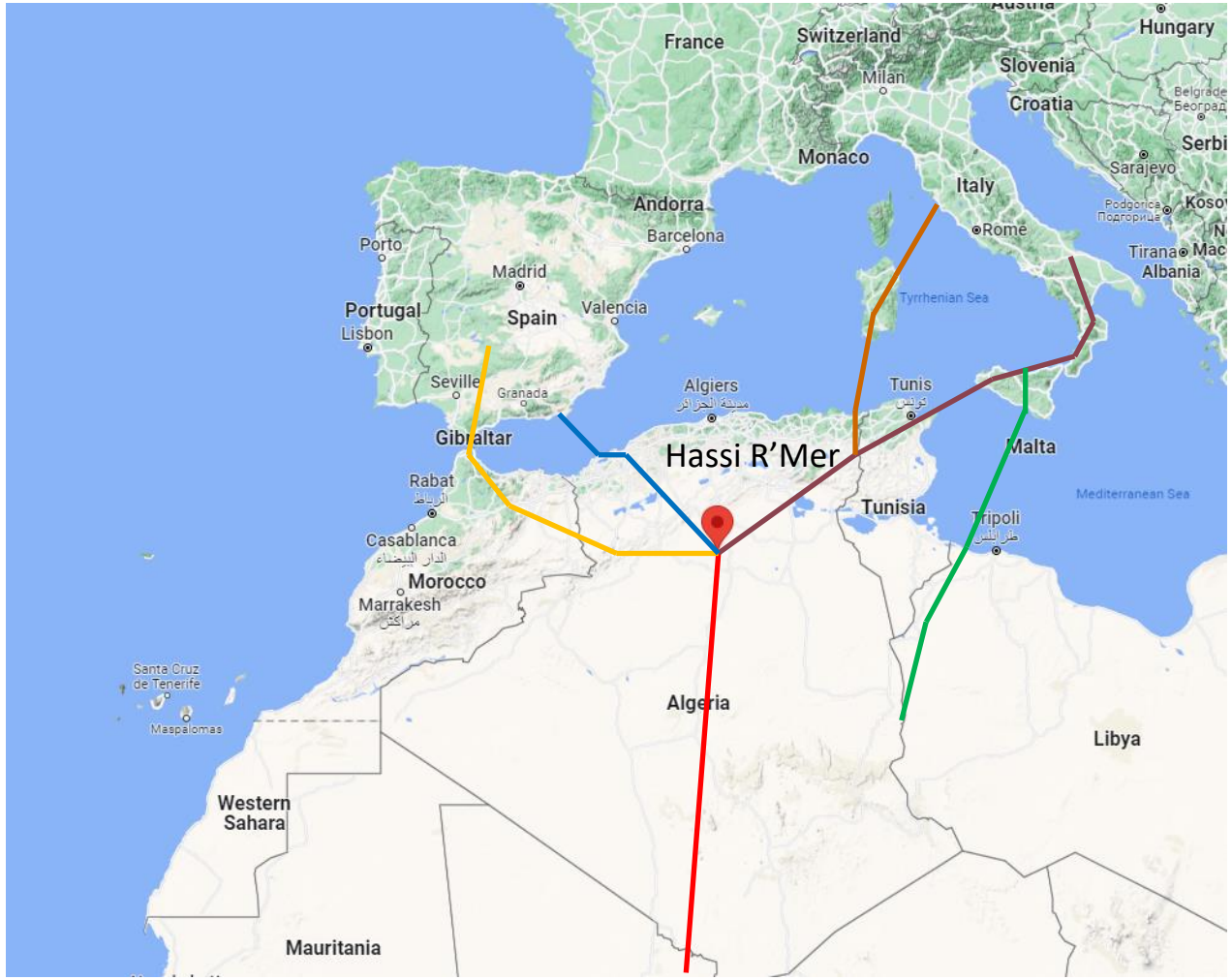
AFRICAN NATURAL GAS SUPPLY TO EUROPE



Trans-Saharan (NIGAL) - Planned

Maghreb-Europe - Offline

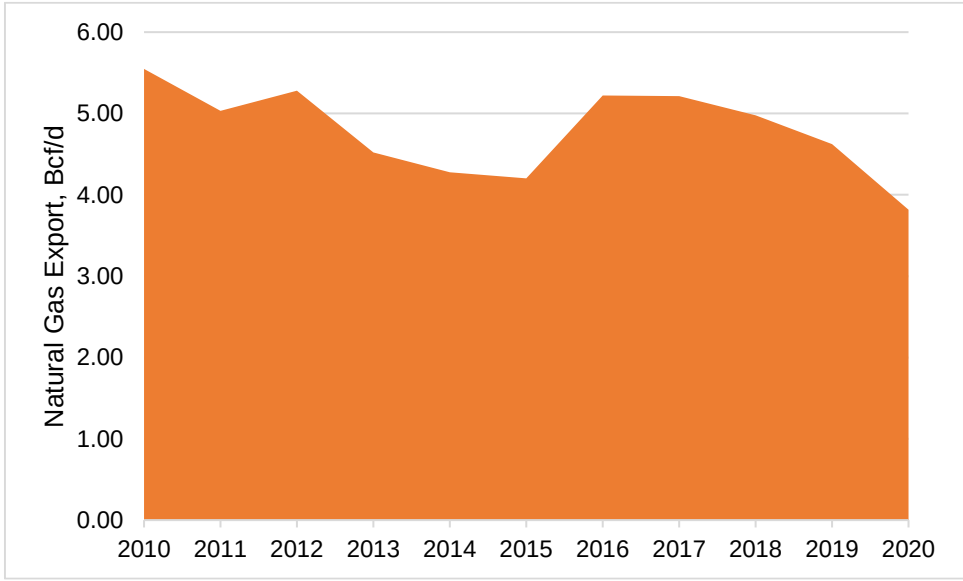
Medgaz, capacity : 1 Bcf/d, recently completed expansion

Galsi – Under Construction

Trans-Mediterranean, capacity 3.6 Bcf/d, Flows 2.1 Bcf/d in 2021.

Green Stream, Offline

Algerian Natural Gas Exports



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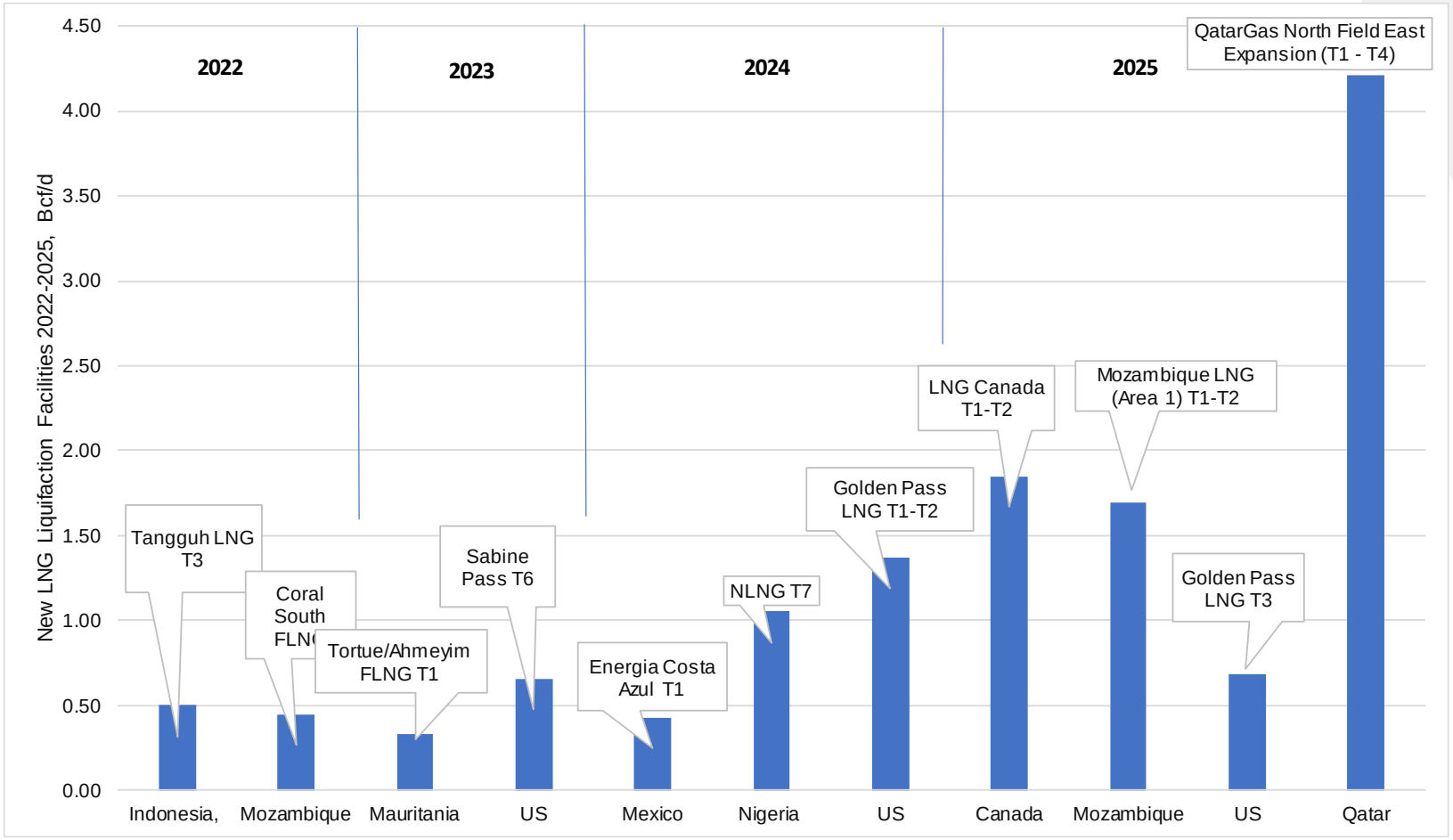
WORLD LNG CAPACITY GROWTH



- The chart shows new LNG liquefication projects from 2022 through 2025.
- LNG imports to Europe is one of the supply sources intended to replace natural has from Russia.
- Although US LNG facilities operate under privately negotiated commercial contracts, the US Government has committed to deliver to Europe an additional 15 Bcm (1.5 Bcf/d) of LNG by the end of 2022 and increase deliveries by 5 Bcm (0.5 bcf/d) each following year by rerouting LNG exports from other countries, primarily Asia.
- Worldwide LNG liquefication capacity is expected to increase by 13.2 bcf/d by 2026, which is still not sufficient to fully displace Russian gas without conservation measures and pipeline gas from other countries.
- The largest project is QatarGas North Field East Expansion with capacity of 4.2 Bcf/d.
- New European regasification terminals and other infrastructure will be required to accept higher volumes of LNG.
- Russian Artic LNG is not included due to uncertainties in the start-up date and volumes. Production from Arctic LNG was originally expected to start between 2023 and 2025.
- Additional worldwide LNG liquefication capacity is proposed post 2025 with US proposals representing about 5.6 bcf/d.

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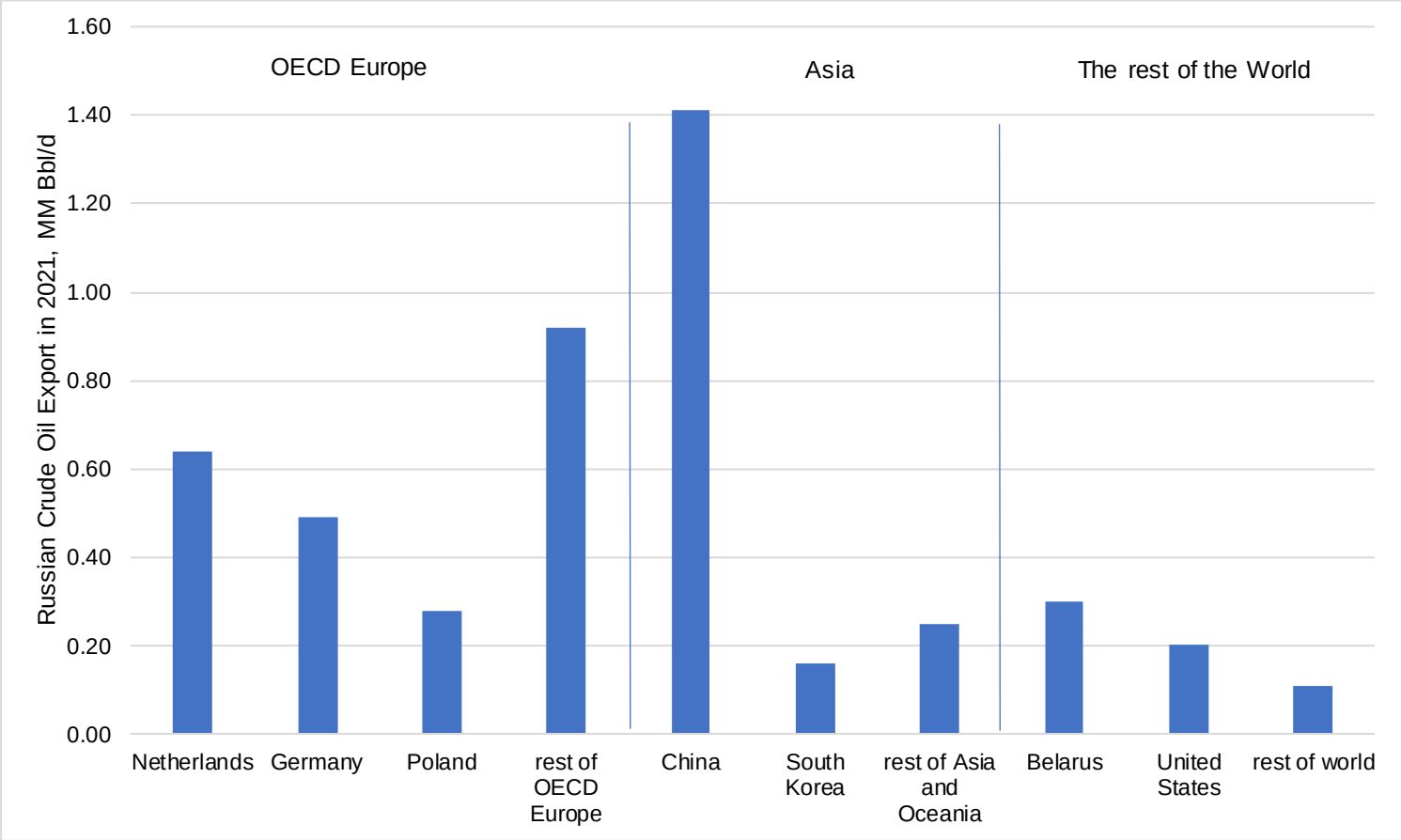
RUSSIAN OIL EXPORTS



Source: EIA https://www.eia.gov/todayinenergy/detail.php?id=51618

- In January 2021, Russian oil production was 11.3 MM Bbl/d. Russia is the world's third largest oil producer after Saudi Arabia and the US.
- In December 2021, Russian exports of crude oil and condensate was 5 MM Bbl/d. Total export of refined products was 2.9 MM Bbl/d.
- In 2021, Russia exported around 2.3 MM Bbl/d of oil to OECD Europe. Most exports are done via the Friendship Oil Pipeline.
- China remains the largest buyer of Russian oil (1.4 MM Bbl/d in 2021). China receives oil from Russia by both tankers and pipeline.

EU plans to reduce its dependency on Russian oil via full or partial oil embargo. A Russian oil embargo must be carefully planned and executed:

- Current Russia-EU trade utilizes smaller short-haul Afromax tankers whereas, longer haul re-routing of Russian supplies away from EU and replacement supplies to the EU will require larger VLCCs which are currently in short supply.
- This can lead to increased oil prices which in turn would benefit Russia; albeit with wider differentials. Russian oil needs to be replaced, at least partially, by production growth in other parts of the world.
- Some countries in Central Europe, including Hungary and Slovakia, receive oil primarily by Russian pipeline.
- Russian companies, including Rosneft and Lukoil, own refineries in Europe.

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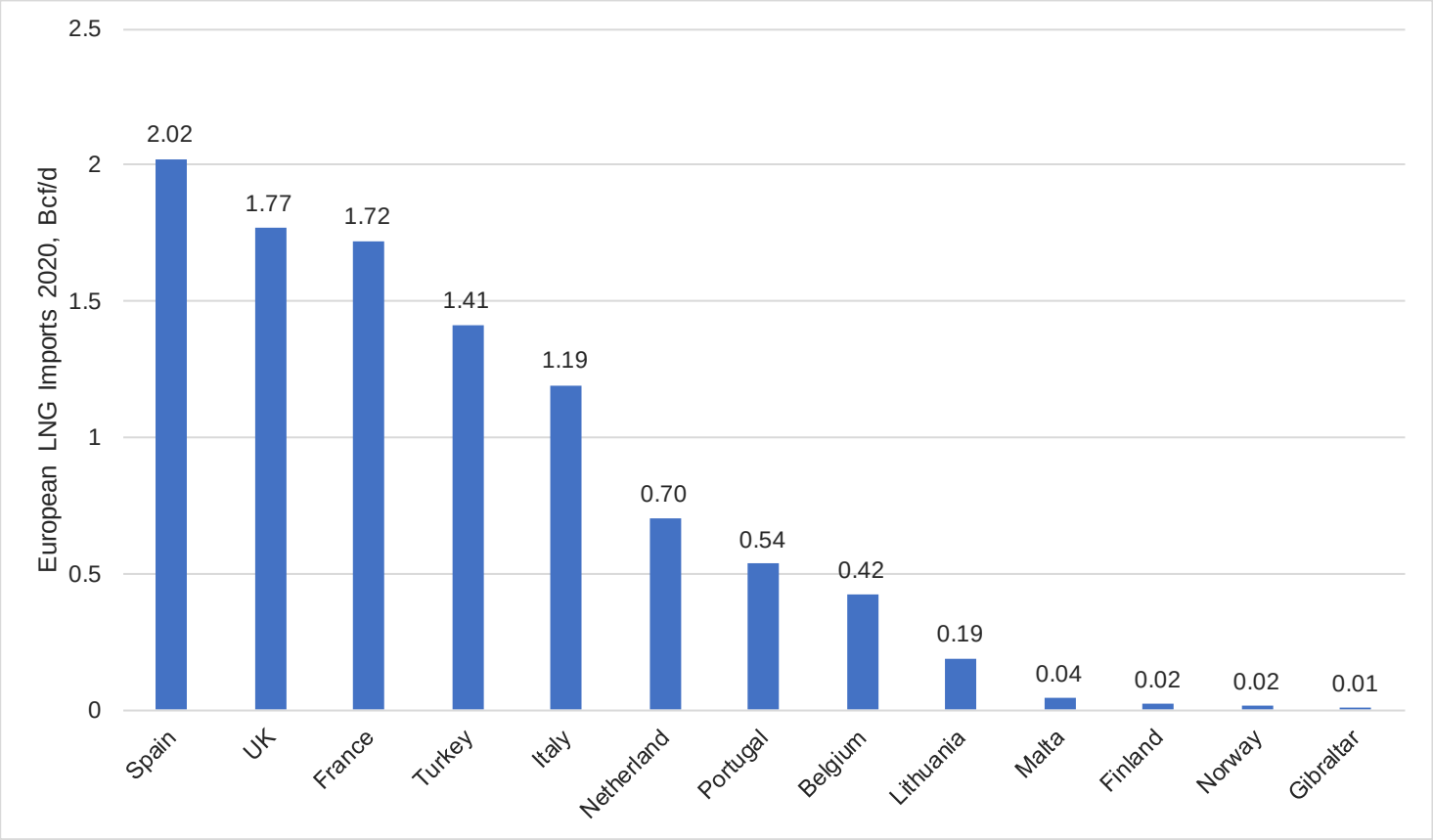
EUROPEAN LNG IMPORTS



Total LNG Imports to Europe in 2020: 10 Bcf/d

Germany does not have any LNG regasification terminals and relies on Russian gas delivered by pipeline and LNG deliveries via terminals in Belgium, France and the Netherlands.

Source: International Gas Union

- Europe currently has 37 LNG regasification terminals, of which 26 are located in EU member states.
- Between January 2021 and January 2022 load factors averaged 40% as terminals were primarily used to cover peaking requirements with LNG costing more than Russian sourced gas.
- However, utilization increased to almost 100% during the winter of 2021. This means that existing capacity used to fill storage during summer cycle will increase consumer costs.
- In response to Russia's war against Ukraine, Germany has announced the building of two LNG terminals. Due to high cost of regasification terminals, government backing is required to ensure long-term profitability.
- One of these terminals, in the northern city of Stade, can be completed by 2026 and could account for 10% of German natural gas requirements.
- Environmental groups in Germany expressed concern that the stated goal of achieving climate neutrality by 2045 will be jeopardized with significant investment in new LNG infrastructure.
- The German government is in favor of using more hydrogen as a source of energy in the decades ahead by converting LNG terminals to hydrogen terminals. Another option is to use LNG terminals to handle biogas or synthetic methane.

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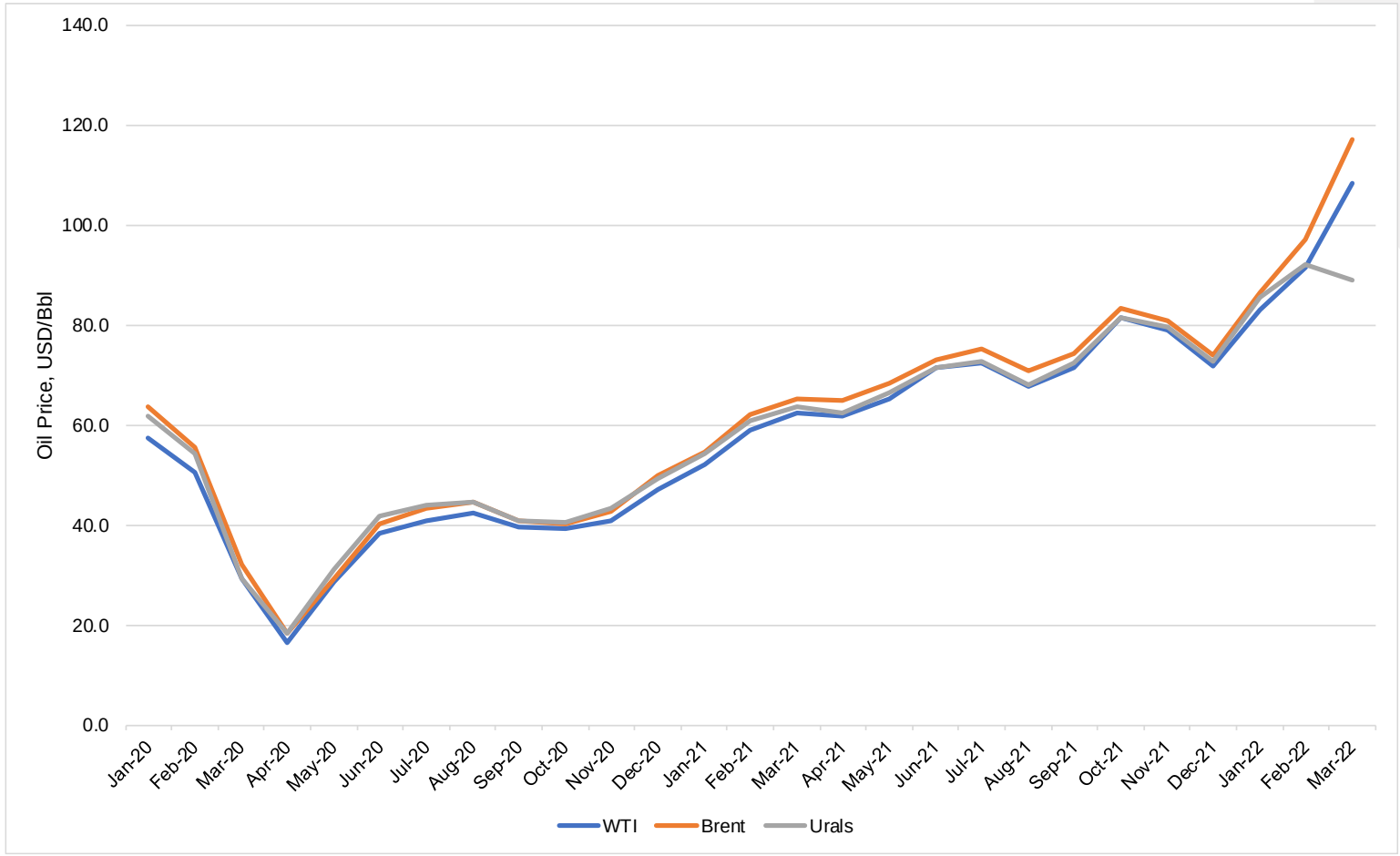
URALS VS BRENT OIL PRICE DIFFERENTIALS

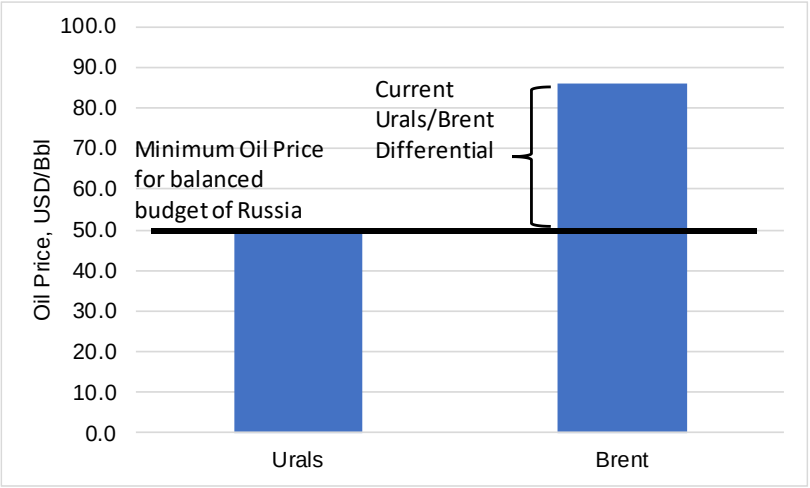


A Brent price of USD 86/Bbl, combined with current Urals differential of USD 36/Bbl, would lead to the peacetime USD 50/Bbl threshold required for a Russian balanced federal budget based on 2019 estimate**.

** https://www.rbc.ru/economics/02/10/2018/5bb23b549a79471eac66c73

The average price differential between Brent and the Russian oil benchmark of Urals in 2020-2021 was US$1/Bbl. However, in March 2022 this differential widen to US$28.20/Bbl. On April 29, 2022, this differential reached US$36.20/Bbl. The widening of the Brent-Urals oil price spread occurred as sanctions against the Russian economy were enacted, although most countries have not imposed an immediate full embargo on Russian Oil * Many traditional buyers are not purchasing Russian oil while other buyers are ready to purchase Russian Oil but with a significant discount.

* The EU is considering a complete halt to purchasing Russian energy sources prior to 2027 (Source https://www.kommersant.ru/doc/5281665, April 28, 2022)



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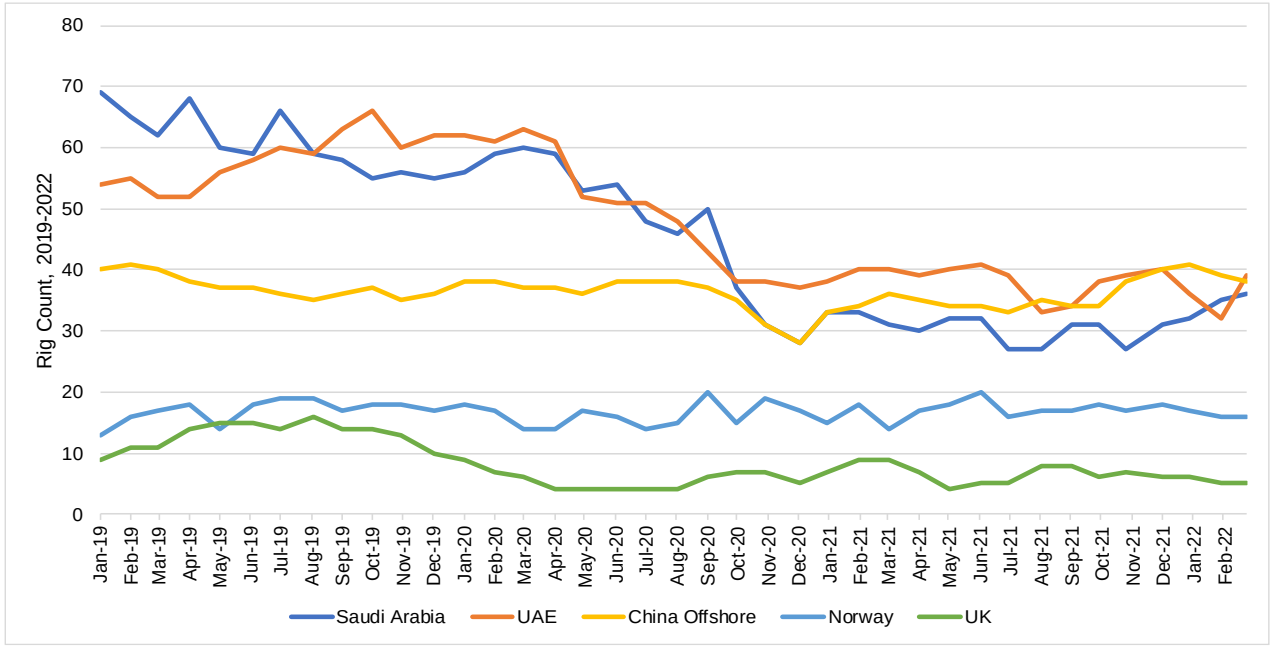

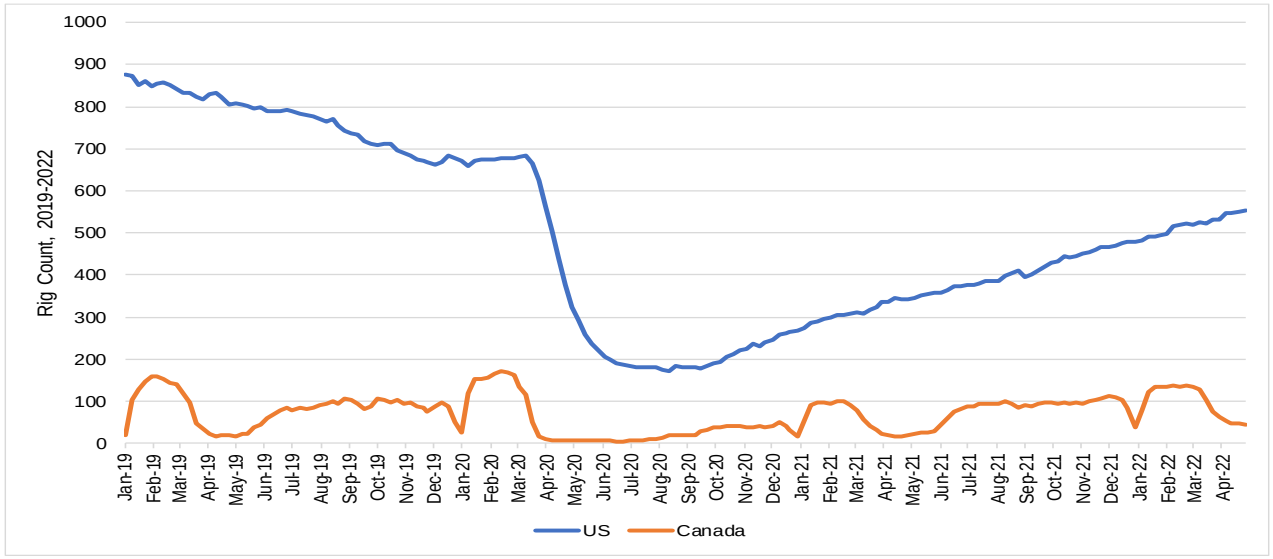

INTERNATIONAL OIL RIG COUNTS

The charts show rig counts in selected oil producing regions. The rig count usually acts as a leading indicator of expected oil production. Rig counts have remained flat in most large oil regions reporting rig count data. The exception is the US, where the rig count has been growing since September 2020, although still below pre-covid levels. US Tight Oil production is expected to grow and reach over 9 MM Bbl/d by September 2022 and exit 2022 at 9.5 MM Bbl/d, up from 8.5 MM Bbl/d in April 2022.

Canadian oil production is expected to grow by 0.2 MM Bbl/d before then end of 2022 mostly due to oil sands production growth accessing the recently re-opened line 3 pipeline capacity. The Fort Hills oil sands mining project, currently operating at 50% of capacity, is expected to begin to produce closer to design capacity of 0.2 MM Bbl/d.

According to the EIA, total world oil and condensate production in 2022 will be 100.2 MM Bbl/d, up from 95.6 MM Bbl/d in 2021. In 2023 world production will continue to increase to 102.2 MMBbl/d.

Source: Baker Hughes
Some countries, including Russia, don't provide comprehensive periodic report of rig count

US OIL PRODUCTION

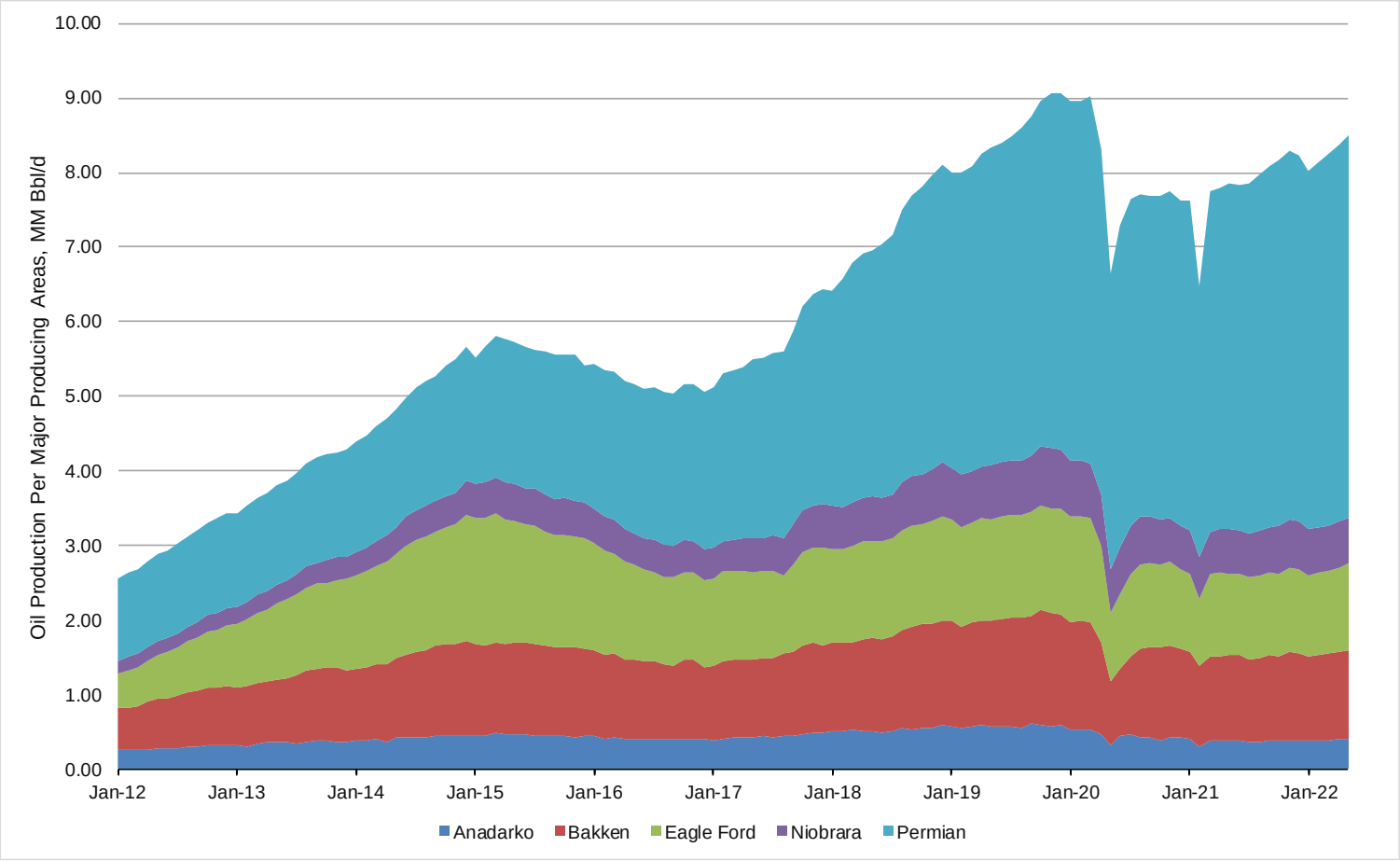

Chart shows crude oil and condensate production from major Tight Oil producing basins in US (other producing areas, such as US Offshore, Alaska, and California are not included). After a significant Covid-19 related drop, 2020-2021 oil production in the US started to grow again, although still below its peak of 9 MM Bbl/d achieved early 2020.

- The Permian, with over 5 MM Bbl/d of current production, continues to drive overall growth of US production. This is followed by Bakken and Eagle Ford. Total production from these areas was 8.5 MM Bbl/d by the end of April 2022.
- Continued 2022 Tight Oil production growth of 1 MM Bbl/d should offset the benefit from the release of 1 MM bbl/d of Strategic Petroleum Reserve which is set to stop in September/October 2022.
- In 2023, US oil production from Tight Oil basins is expected the reach 10 MM Bbl/d.
- There are some signs that US Tight oil basins are becoming more mature with new well initial productivity declining slightly. However, it will not constrain new production growth from these areas for the next 2-3 years as well counts will continue to grow.

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Source: EIA Drilling Productivity Report

CONCLUSIONS

- World oil industry is experiencing a significant transformation due to the shift from Russian Energy sources.
- Oil price outcomes for 2022-2023 remains uncertain due to geopolitical risks and decisions, which are being taken with regards to Russian energy exports.
- If oil prices drop and the differential between the Russian benchmark and Brent remains high, Russian profit from the oil industry may not be enough to balance its budget.
- Russian revenue from natural gas imports will decline due to reduction in European demand. This drop in demand cannot be compensated by Russian gas to other countries, including China.
- European countries will need to significantly change their energy consumption in order to impose partial or full embargo on oil, refined products, natural gas, and coal imports from Russia.

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