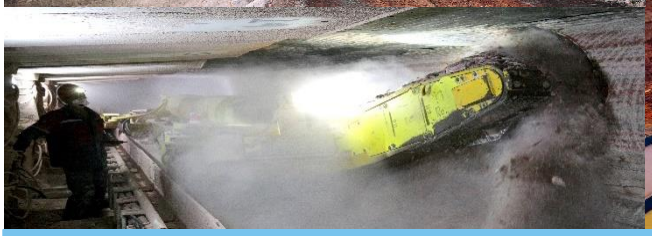
Potash: Impact assessment for supply security

HIGHLIGHTS

- → EU's import dependency on potash has been increasing since 2018. Total EU imports of all forms of potash peaked in 2020, of which more than half were sourced from Russia and Belarus.
- → Russia and Belarus are crucial to the global potash supply. Together they accounted for about 35% of global potash production in 2020. Russia and Belarus are the world's second and third largest potash exporters after Canada. Ukraine does not produce potash.
- → The sanctions imposed on Belarus and Russia will impact potash flows to international markets in the short term. The extent of disruption to potash supply worldwide is highly uncertain.
- → A significant share of potash exports originating from Belarus and Russia are destined for Brazil, China, India, Indonesia and the EU.
- → The global potash market may be subject to further price volatility, adding to soaring fertiliser prices and food security concerns.
- → Canada could compensate for potash supply disruption in the event of severe supply deficits in 2022. The EU could orientate its imports towards Canada in the short term.
- → In the medium term, EU domestic supply from ongoing mine projects is expected to reduce dependence on Belarusian and Russian imports from 2025 onwards.

QUICK GUIDE – This briefing is one of a series of overviews about potential supply disruption of non-food, non-energy raw materials due to Russia's war against Ukraine.

Joint Research Centre

Potash refers to a group of mined and manufactured salts[1] containing potassium (K). A key ingredient in fertilisers, potassium is one of the three vital nutrients (N, P and K) for plant growth used in agriculture.

IMPACT ASSESSMENT

Short-term global impacts

In terms of potential additional supply to meet demand gaps in 2022, an estimated additional 1.2 Mt K_2O[2] of potash could be available from a more intensive use of operating (or idle) production capacity in Canadian mines[3] (Figure 1 and Figure 2). One of the biggest Canadian producers, Nutrien Ltd, has already announced plans to boost production by 1.2 Mt (720 kt K_2O equivalent) in 2022 in response to the uncertainty of potash supply from Eastern Europe[4]; most of this additional potash production is expected in the second half of 2022. The supplementary potash production from Canada that might be available in 2022 more than covers the losses incurred due to the banned EU and US imports from Belarus (470 and 330 kt K_2O, respectively, based on 2020 figures). However, it corresponds to only 9% of global exports from Russia and Belarus combined (12.8 Mt K_2O in 2020). The potential of producers from other countries to ramp up production is trivial as they are already using much of their capacity (Figure 2).

The short-term deficit in global potash supply is uncertain, and the implications for global supply chains are still unfolding. US and EU sanctions will impact Belarusian potash availability, and supplies from Belarus will have to find new export routes. It is still unclear as to how much Belarusian potash output could fail to reach the market. Russian exports are also at high risk of disruption due to the financial measures imposed by several countries against Russia. However, the major global importers (China, India and Brazil) have not imposed sanctions on Russia. The replacement of Russian and Belarusian imports to the EU and US with those from Canada could trigger competition among the top global importers if the balance between global supply and demand is substantially impacted. Such a scenario is probable if Belarusian potash cannot be shipped for a prolonged period to Brazil, China, India and other countries, which will seek alternative suppliers. Also, the ability of Canadian producers to ramp up output depends on the duration of the supply shock and the establishment of a structural supply deficit that can preserve high prices in the longer term.

Sanctions and recent developments

Belarus accounted for about 17% of global potash production in 2020. The USA imposed sanctions on the Belarusian Potash Company (BPC), the export arm of state-owned producer JSC Belaruskali, on 2 December 2021. These came into effect on 1 April 2022 after the winding down of transactions involving BPC.

As of 1 February 2022, Lithuania prevented Belarus from using the Baltic port of Klaipeda, from which Belarus shipped over 90% of its annual potash exports. As a result, the land-locked country lost access to crucial shipping routes to buyers outside the EU. If handling capacity is available, Russian railways and ports have likely become the only option left for Belarus to divert its export shipments of potash, an essential export product for the country. According to media reports, Belaruskali halted shipments in mid-February 2022 unable to fulfil its contracts.

The EU imposed sanctions in June 2021 targeting Belarus potash exports with a K_2O content of less than 40% (low-grade products) or more than 62% by dry product weight (industrial grade). The measures did not cover the key Belarusian potash export, i.e. potassium chloride of 40-62% K_2O by dry weight, which makes up about 80% of EU imports from Belarus.

The scope of the restrictive measures expanded significantly on 2 March 2022 in view of the involvement of Belarus in the Russian military aggression against Ukraine, including a total prohibition of imports of potassium chloride. A wind-down period of three months allows EU fertiliser producers to execute contracts signed prior to the adoption of the ban, but all contracts must be concluded by 4 June 2022.

On 4 March, Russia's trade and industry ministry urged the country's fertiliser producers to temporarily suspend exports of Russian fertilisers due to delivery challenges with foreign shipping companies. The announcement compounded issues for the potash supply chains, and as yet it is unclear how Russian exports will be affected.

[1] Potash products included in the scope of this overview are: potassium chloride (all grades, such as muriate of potash (MOP) used in agriculture), potassium sulphate (or sulphate of potash (SOP)), potassium magnesium sulphate (SOPM), potassium nitrate and crude chloride salts (e.g. carnallite, sylvite). Compound fertilisers containing potassium (NPK, NK and PK fertilisers) are excluded as these will be examined as a separate product group.

[2] Potassium oxide (K_2O) equivalent is a unit commonly used in the potash market to account for differences in the K content of different products.

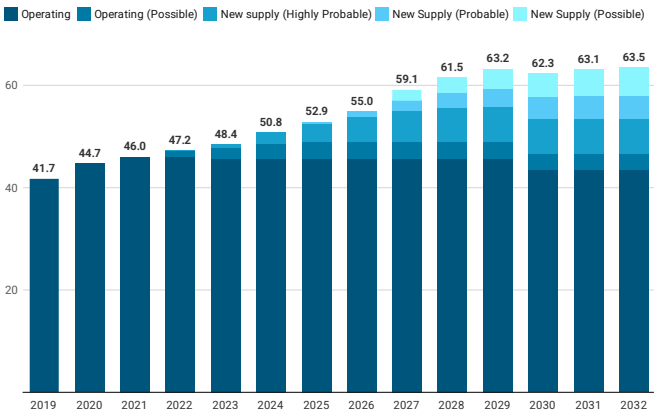
[3] It is assumed that high potash prices will provide adequate economic incentives for Canadian producers to increase their capacity utilisation to the global average in the medium term. Standard rates for ramping up output from capacity expansion of operating mines are applied.

[4] *https://www.nutrien.com/investors/news-releases/2022-nutrien-increasing-potash-production-response-global-supply*;

Medium-term global outlook

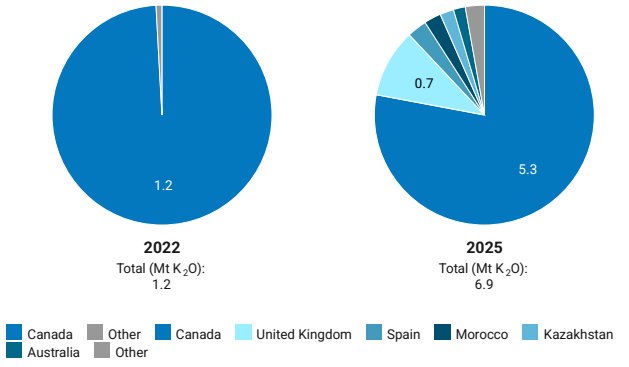
In the medium term, global potash supply is projected to grow from 46 Mt in 2021 to about 53 Mt in 2025 (Figure 1) an increase of 15%[5]. It is estimated that Canada will account for more than three-quarters of the expected growth in global potash output of about 7 Mt K_2O (Figure 2). Other potash producers that plan to expand their capacity by 2025 are located in Australia, Africa (Eritrea, Ethiopia, Morocco, and the Republic of the Congo), Brazil, Kazakhstan and Europe (Spain, UK). The ongoing mine development projects in the UK (Polyhalite) and Spain (MOP) are expected to contribute considerably to global potash supply destined for fertilisers in the next 3-4 years. The forecast reveals a considerable diversification of supply and potential for output growth that could make up for supply shortfalls and partly reduce the world's reliance on Russian and Belarusian potash.

Figure 1 – Forecast of potash production 2022-2032[6,7]



Source: JRC modelling based on S&P Global (2022) and corporate reports.

Figure 2 – Origin of forecast additional potash output[7]



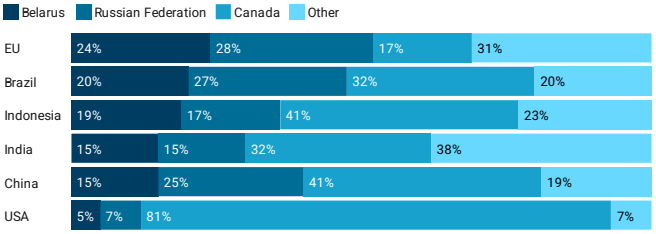
Source: JRC modelling based on S&P Global (2022) and corporate reports.

Short-term impacts on the EU

As there is only marginal potential for increasing EU production in Germany and Spain in the short term, the EU is dependent on external supplies of potash to fill the gap created by banned Belarusian imports. The EU's potash imports from Russia are not currently (April 2022) subject to sanctions. However, countermeasures from Russia in the form of targeted export restrictions remain a possibility. What the geopolitical landscape will look like when the existing long-term supply contracts[8] from Russia expire is also uncertain (with impacts on new supply agreements).

Options for replacing supplies from Belarus and Russia are very limited, and EU importers will have to reroute their supply chain through Canada. In particular, EU importers will need to shift trade flows ranging from 530 kt K_2O (annual average imports from Belarus in 2019-2021) to 1,030 kt K_2O (annual average imports in 2019-2021 from Belarus and Russia combined). It should be noted that EU importers are at a relative disadvantage with regard to trade reorientation; among the top global importers of potash, the EU has the highest exposure to imports from Belarus and Russia (Figure 3). In addition, EU importers may have to compete with other countries for supplies from Canada – the largest trading partner for all major importers – to replace potash supply from Belarus and Russia in the event of a global supply/demand imbalance.

Figure 3 – The share of Russia, Belarus and Canada in potash imports of major global importers by value, 2020



Source: UN Comtrade (2022)

Medium-term outlook in the EU

Concerning new domestic supply in the EU, the most advanced potash project is the Muga–Vipasca mine in the region of Navarra, Spain, developed by Geoalcali, a subsidiary of the Australian company Highfield Resources. Construction is scheduled to begin in the first half of 2022, with production planned to commence at the end of 2024[9]. In addition, other mine projects that aim to produce potash are in early- or late-stage development in Czechia, Spain, and Germany[10]. If all projects successfully make it to commercial production, the

https://www.nutrien.com/investors/interactive-data-tool

[5] Data refer to expected production based on capacity and capacity utilisation rates currently achieved by the potash industry. It is assumed that all projects that are currently in late-stage development will come on stream. The JRC's in-house assumptions for production start-up timeline and ramp-up schedule are applied.

[6] The supply forecast shows the probability of potash mine projects reaching production. The assessment is based on their current development status.

[7] New supply from Belarus and Russia is not included.

[8] The potash market is mainly organised through long-term supply contracts according to *DERA. Chart des Monats (September 2020).*

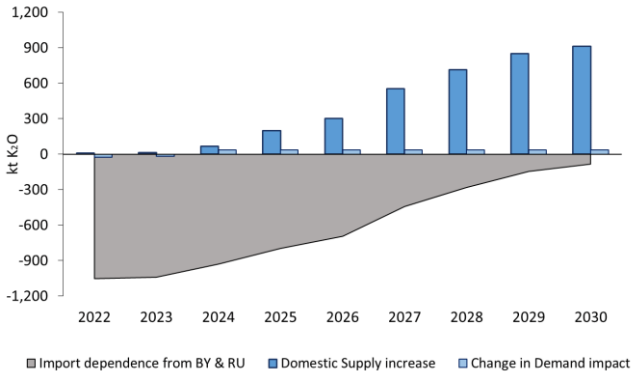
[9] *Highfield Resources Investor Presentation December 2021*

[10] Germany: South Harz (scoping study underway), Zinnwald (feasibility study completed in 2019, lithium's co-product); Spain: Sierra del Perdon (preliminary economic assessment completed in 2015), Pintano (reserves development); Czechia: Cinovec (definitive feasibility study commenced in 2020, lithium's co-product).

current EU output could increase by about 25% towards the end of the decade.

The new supply from the development of mine projects in the EU could greatly reduce dependence on Belarusian and Russian imports by 2030 (Figure 4). The Farm to Fork Strategy (F2F)[11], which aims to reduce fertiliser use by at least 20% by 2030, will also contribute to the EU's autonomy by restraining the year-on-year rise in total demand for potash.

Figure 4 – Forecast of EU import dependence on Russia and Belarus[12]



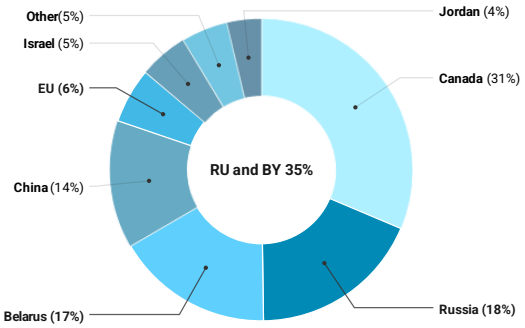
Source: JRC modelling, background data from various sources

SUPPLY

Global production

In 2020, 44 million tonnes (K_2O content) of potash were produced globally. Canada is the dominant producer, with approximately 14 million tonnes (31% of the total; see Figure 5). Russia and Belarus are among the top producers. Their combined output reached 15.5 million tonnes in 2020, accounting for more than one-third of global supply (35%). Ukraine does not produce potash.

Figure 5 – Main global producers of potash in 2020



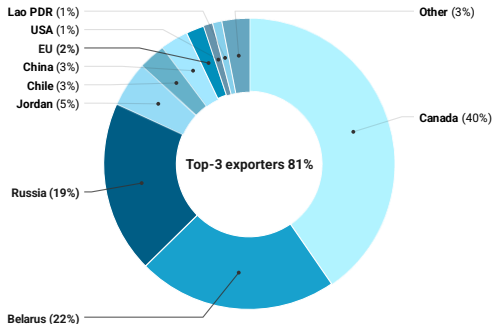
Source: USGS (2022), BGR (2021) for Germany

Global trade

In 2019, Canadian exports held a 40% share of world trade, and exports from Belarus and Russia together accounted for 41% of total potash trade.

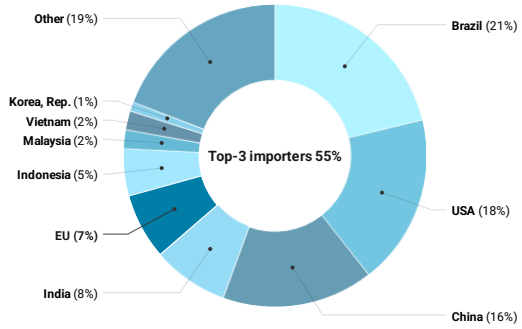
Brazil, the USA and China are among the top importers, representing more than half of the total imports worldwide.

Figure 6 – Main global exporters in 2019 by value



Source: WITS (2021)

Figure 7 – Main global importers in 2019 by value



Source: WITS (2021)

DEMAND

According to the International Fertilizer Association, about 86% of the global potash supply was used for plant nutrition in 2019. Animal feed, the food industry and other industrial sectors accounted for the remainder (Figure 8). There are no substitutes for potash in fertiliser uses.

Figure 8 – Potash applications (%) in the EU manufacturing sector

Industry	Potash consumption %
C2015 – Manufacture of fertilisers and nitrogen compounds	86
C1032 - Manufacture of fruit and vegetable juice	
C1102 - Manufacture of wine from grape	
C1105 - Manufacture of beer	
C1085 - Manufacture of prepared meals and dishes	
C2041 - Manufacture of soap and detergents, cleaning and polishing preparations	
C1091 - Manufacture of prepared feeds for farm animals	14
C2013 - Manufacture of other inorganic basic chemicals	
C231 - Manufacture of glass and glass products	
C2442 - Aluminium production	
C1330 - Finishing of textiles	
C2110 - Manufacture of basic pharmaceutical products	

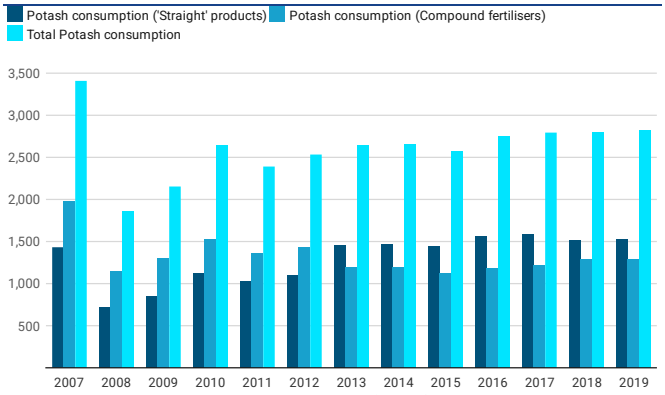
Source: JRC elaboration based on Eurostat (2008) and potash uses

[11] https://ec.europa.eu/food/horizontal-topics/farm-fork-strategy_el#documents

[12] The positive values of 'Change in Demand impact' correspond to net annual decrease in potash demand, and the negative values to net annual increase in potash demand.

In the EU, total nutrient consumption in agriculture amounted to 2,824 kt K_2O in 2019, of which 1,531 kt K_2O (54%) corresponded to individual (or 'straight') potash products (chloride, sulphate and others) and 1,293 kt K_2O (46%) to compound fertilisers (NPK, NK, and PK)[13]. The shares of global consumption for plant nutrition were 40% for individual (straight) potash products and 60% for compound fertilisers. Potassium chloride was the dominant potash compound used for plant nutrition among 'straight' fertilising potash products (88% in the EU and 94% globally).

Figure 9– Consumption of potassium fertiliser products in the EU (in kt K_2O)



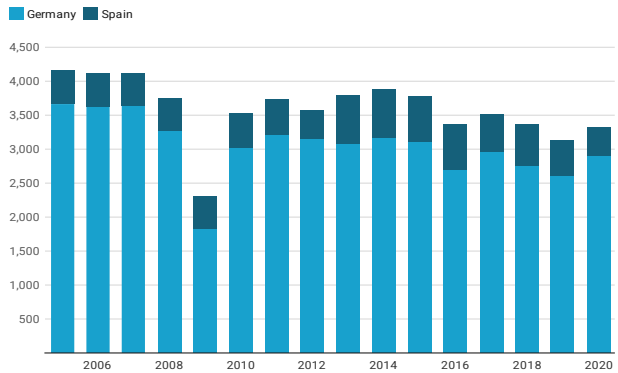
Source: IFAStat (2022)

EU IMPORT DEPENDENCY

EU production

The EU is the fifth-largest potash producer in the world, accounting for 7% of global production in 2020. EU domestic production accounted for 65% of EU sourcing[14] in 2020. Potash is produced in Germany (87% of total EU output) and Spain (13% of total EU output). EU production has been gradually decreasing in recent years: from about 3.9 million tonnes in 2014 to 3.3 million tonnes (K_2O equivalent) in 2020.

Figure 10 – EU production of potash by country (in kt K_2O)



Source: WMD (2021), BGS (2021), USGS (2022), BGR (2021)

The leading potash producer in the EU is K+S Minerals and Agriculture GmbH, which operates five mines in Germany[15]. At the end of 2018, potash production at the Sigmundshall mine was discontinued due to the exhaustion of reserves[16]. DEU SA International GmbH also produces potash and magnesium salt in Germany from brines. In Spain, ICL Iberia (Iberpotash) operates two potash mines. In July 2020, ICL announced its decision to halt production at the Vilafruns mine[17].

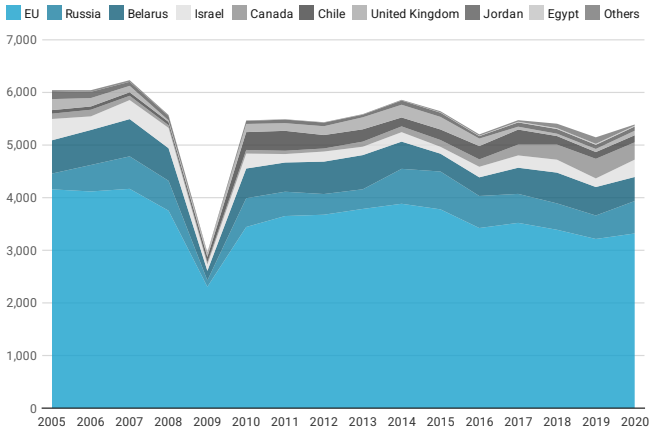
It is noted that Europe has a considerable production capacity for sulphate of potassium[18]. In 2015, Western Europe accounted for about one-quarter of the global SOP production capacity[19].

EU imports

Total EU imports of all forms of potash peaked at 2.1 Mt (K_2O equivalent) in 2020. Russia and Belarus were the leading sources of imports, accounting for 30% and 22% of all potash types in terms of K_2O content, respectively. Israel and Canada came next, each supplying 16% of total EU potash imports. Imports originating from Russia and Belarus accounted for about 20% of the annual potash EU sourcing (production+imports) in 2020. On average, the EU imported about 1 million tonnes of K_2O potash from Russia and Belarus in 2019-2021.

Potassium chloride accounted for 70% of import value in 2020, potassium nitrate for 25%, potassium sulphate for 3% and crude potassium salts for 2%. In terms of K_2O content, potassium chloride represented 87% of EU imports in 2020.

Figure 11 – EU structure of supply (EU sourcing) (in kt K_2O)

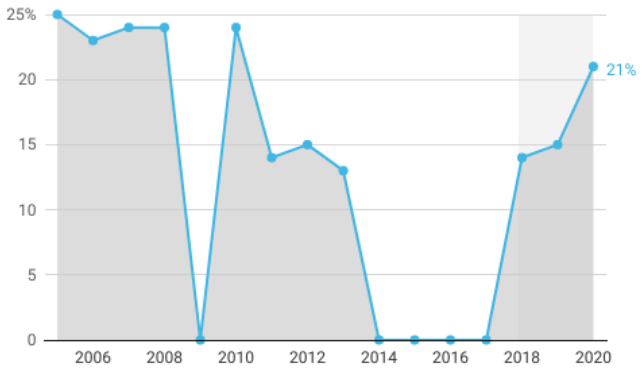


Source: JRC elaboration based on Eurostat Comext (2022), WMD (2021), BGS (2021), USGS (2022), BGR (2021)

The EU's reliance[20] on imports for all potash compounds has been increasing since 2018 and reached 21% in 2020, following a period of net exports between 2014 and 2017. As a share of the EU's annual sourcing (production + imports), potash imports rose from 32% in 2012 to 38% in 2020.

[13] Background data from *IFASTAT*
[14] EU sourcing = Production + Imports
[15] *BGR (2021). Bericht zur Rohstoffsituation in Deutschland 2020*
[16] *"Letzte Tonne" Kalisalz: Das war's in Sigmundshall*
[17] *https://icl-group-sustainability.com/reports/icl-iberia-ibp-spain/*
[18] SOP is produced either by extraction from potassium ore (primary production) or by conversion of MOP (secondary production). SOP can be used as an ingredient of NPK fertilisers.
[19] Background data from *IFASTAT*
[20] 'Import Reliance' Indicator = (Imports – Exports) / Apparent consumption; Apparent consumption = Domestic production + Imports - Exports

Figure 12– Reliance on net imports for potash in the EU (%)[21]

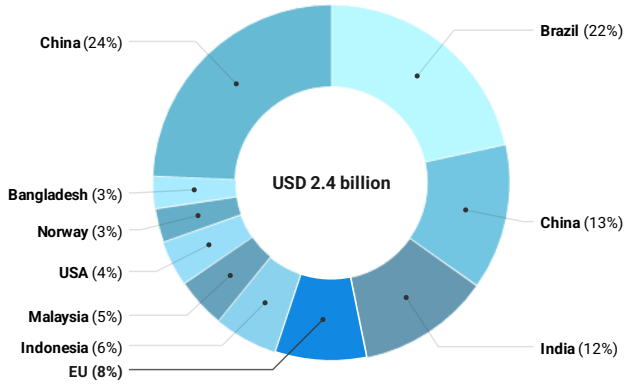


Source: JRC elaboration based on Eurostat Comext (2022), WMD (2021), BGS (2021), USGS (2022), BGR (2021)

TRADE FLOWS FROM RUSSIA AND BELARUS

In 2020, Belarus exported 11.8 million tonnes of potash worldwide in gross weight (7.1 Mt of K_2O), consisting almost entirely of potassium chloride. It is a significant supplier to Brazil, as well as to China and India. Potash exports to the EU and the US, which are currently subject to sanctions, accounted for about 12% of the total value of Belarusian exports in 2020.

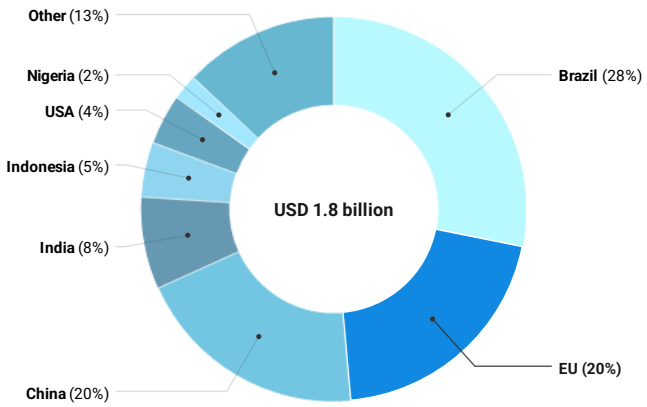
Figure 13 – Global potash exports from Belarus in 2020, by value



Source: UN Comtrade (2022)

In 2020, Russia exported 9.6 million tonnes of potash in gross weight (5.7 Mt of K_2O), 99% of which was potassium chloride. Russian exports are mainly destined for Brazil (28%), the EU (20%), China (20%), and India (8%). About 25% of Russian potash exports are subject to economic sanctions (by the EU, the USA, Australia, Canada, the UK, Switzerland, Japan) due to the war launched by Russia on Ukraine.

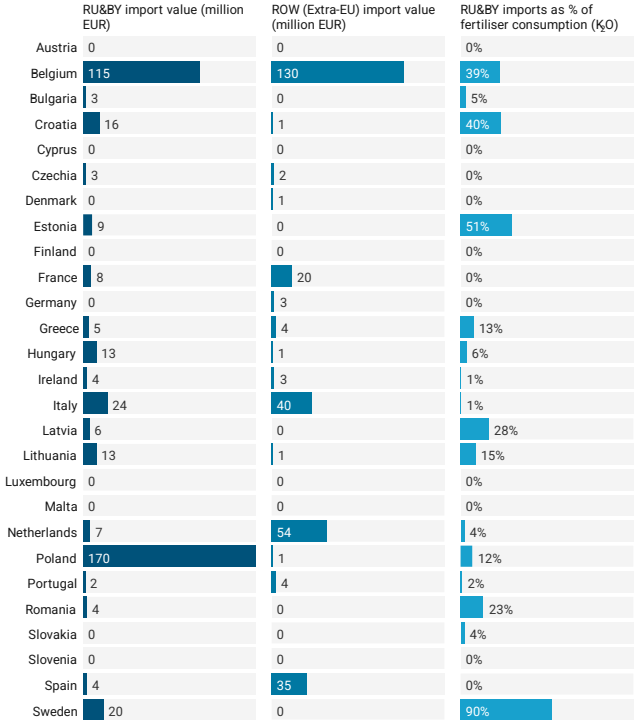
Figure 14 – Global potash exports from Russia in 2020, by value



Source: UN Comtrade (2022)

Many European countries import potash from Belarus and Russia. Figure 15 highlights the import dependence of EU Member States on Belarus and Russia.

Figure 15 – Imports of potash by EU Member State[22]



Source: JRC elaboration based on Eurostat Comext (2022), IFAStat (2022)

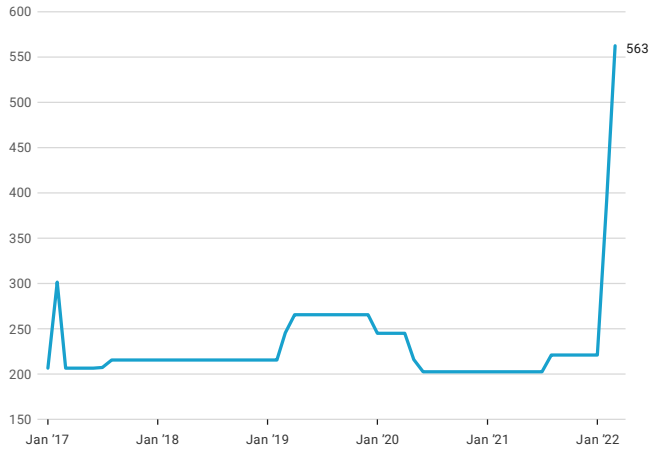
[21] 'Zero' import reliance correlates to net exports.

[22] Import value corresponds to the annual average of imports of all potash compounds (chloride, sulphate, nitrate, and other) over the period 2019-2021. Imports of potash from Belarus and Russia destined for fertilisers (low and medium-grade chloride, sulphate and other crude salts) refer to the annual average over the period 2018-2020. For fertiliser consumption, only individual (straight) potassium compounds are considered.

PRICES

Potash prices as reported by the World Bank increased by 150% in February and March 2022 compared to January 2022, settling at their highest levels since 2009. Spot prices in other regions are reported to have increased at a substantially greater rate[23], leading to an historically large divergence from contract prices[24].

Figure 16 – Monthly potash prices (muriate of potash, Vancouver f.o.b. contract) (USD/tonne)

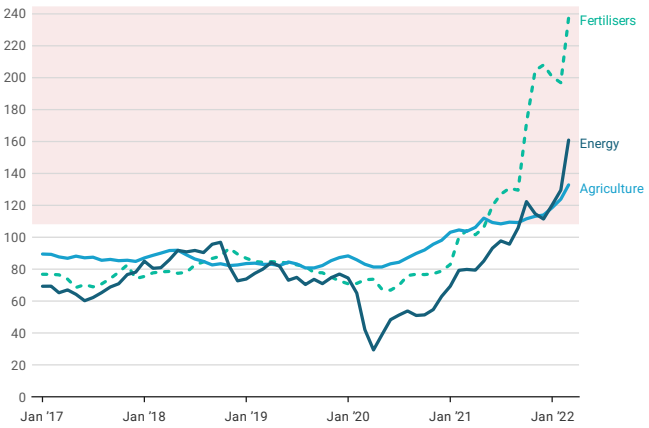


Source: World Bank (2022)

The agricultural sector had already been struggling with soaring prices for other types of vital fertilisers and crucial inputs before Russia's invasion of Ukraine. Prices for fertilisers, primarily of urea and diammonium phosphate (DAP), rose sharply in Q3 and Q4 2021, reaching levels not seen since the 2008-2009 global financial crisis. This was driven by rising input costs such as energy, strong demand, production cuts, extreme weather, Chinese export restrictions and sanctions[25]. In March 2022, the World Bank's Price Index of agricultural commodities surged to its highest ever level, while the Food and Agriculture Organization's (FAO) Food Price Index reached an all-time high[26] in February 2022.

The absence of Russian and Belarusian potash from the global market may have severe consequences as tighter supplies could lead to further price hikes, which would add to the inflationary pressures of agricultural products and the strain on food supply chains.

Figure 17 – Evolution of agriculture, energy and fertiliser price indices, Jan 2019-Mar 2022 (nominal prices, 2010=100)



Source: World Bank (2022)

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[23] https://www.bloomberg.com/news/articles/2022-01-20/u-s-potash-sanctions-may-push-belarus-deeper-into-putin-s-arms
[24] https://blogs.worldbank.org/opendata/soaring-fertilizer-prices-add-inflationary-pressures-and-food-security-concerns
[25] World Bank. Commodity Markets Outlook, October 2021
[26] https://www.fao.org/worldfoodsituation/foodpricesindex/en/

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