

Russia's war in Ukraine, European import substitution and supply chain sustainability

- Supply chains between Ukraine, Russia and Europe have been affected either by fighting or political sanctions. European governments and firms are looking for alternative suppliers
- The German and the planned European supply chain laws require adherence to minimum social and environmental standards in procurement
- Potential alternative suppliers are identified for 18 major product groups (HS2) exported by Ukraine and Russia to the EU27
- For each product group, the sustainability profiles of the potential supplying countries are assessed
- Substitution of Russian exports is more difficult but may lead to improvement of EU 27 supply chain sustainability.
- This analysis provides policy makers and firms with a tool to identify supplying countries that improve European supply chain sustainability

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War in Ukraine: an external shock to supply chains¹

Since Russia's invasion of Ukraine in February 2022 ² trade sanctions have been gradually imposed by Western trading partners (Russia/Ukraine Sanctions Update - Month of October 2024) (Bultrini et al. 2024). Their immediate impact on the Russian economy has been moderated (Gaur et al. 2023; Kirkham 2023). Based on earlier experience with war related economic sanctions this may be This due to substitution effects in targeted countries. However, in the middle to long term the Russian economy is likely to be more strongly affected (Harrison 2023).

Sanctions erected by the EU will in any case change the EU's import patterns. So will disrupted trade links between the EU and Ukraine. New trading partners or increased trade with existing trading partners will change the composition of the EU's trade sustainability profiles as measured by the partners' Triple Bottom Line (TBL) scores of social, ecological and economic sustainability.

The question tackled in this paper is whether the composition of EU imports will change the sustainability profile of EU imports. For this purpose, alternative suppliers to Ukraine will be identified and their TBL profiles assessed.

Method and Data

Trade data are obtained from Trade Map (International Trade Center 2024), based on the UN's Comtrade database.

Sustainability profiles are obtained from the Sustainable Society Index (SSI) database (TH Köln

2024). This database allows the separate identification of a country's sustainability levels along the TBL-concept: there, social sustainability is measured by "Human Wellbeing" (HUW), ecological sustainability is measured by "Environmental Wellbeing" (ENW) and economic sustainability is measured by "Economic Wellbeing" (ECW)³.

Data are analysed for the years 2019 and 2021, preceding the trade distortions due to the COVID pandemic in 2020 and Russia's extended invasion of Ukraine in 2022.

Structures of trade with EU27 differ

EU27 import structures are analyzed based on the share of HS2 product categories in total EU27 imports of these products. The shares of the top ten goods imported from Ukraine vary more strongly than those from Russia. Within the latter, only three products have a share of less than 5%, while six products imported from Ukraine fall into this category.

HS2	Product	2019	2021
TOTAL	All products	0,4%	0,5%
10	Cereals	13,9%	8,0%
14	Vegetable plaiting materials; vegetable products not elsewhere specified or included	13,6%	4,1%
12	Oil seeds and oleaginous fruits; miscellaneous grains, seeds and fruit; industrial or medicinal ...	7,6%	6,3%
26	Ores, slag and ash	6,8%	7,2%
15	Animal or vegetable fats and oils and their cleavage products; prepared edible fats; animal ...	5,5%	6,1%
72	Iron and steel	2,4%	3,1%
25	Salt; sulphur; earths and stone; plastering materials, lime and cement	2,3%	2,7%
44	Wood and articles of wood; wood charcoal	2,2%	2,6%
23	Residues and waste from the food industries; prepared animal fodder	2,1%	1,4%
43	Furskins and artificial fur; manufactures thereof	1,4%	0,5%

Source: ITC, authors's calculatons

Table 1: Share of EU 27 imports from Ukraine in total EU 27 imports by product category

¹ For editorial reasons research is published in two consecutive papers. This paper focusses on data relating to structural European trade and sustainability patterns. A second paper focusses on impacts on welfare and sustainability (Veit 2025).

² Russian occupation of Crimea and Donbass regions in 2014 is not considered here

³ For a detailed analysis of the SSI see Gehringer und Kowalski 2023

HS2	Product	2019	2021
'TOTAL	All products	2,8%	2,7%
75	Nickel and articles thereof	20,5%	24,3%
27	Mineral fuels, mineral oils and products of their distillation; bituminous substances; mineral ...	19,4%	17,5%
31	Fertilisers	13,5%	12,0%
28	Inorganic chemicals; organic or inorganic compounds of precious metals, of rare-earth metals, ...	7,2%	6,0%
81	Other base metals; cermets; articles thereof	6,3%	4,4%
71	Natural or cultured pearls, precious or semi-precious stones, precious metals, metals clad ...	5,7%	5,1%
44	Wood and articles of wood; wood charcoal	5,2%	6,1%
76	Aluminium and articles thereof	4,5%	3,2%
72	Iron and steel	4,2%	4,8%
'74	Copper and articles thereof	3,7%	4,4%

Source: ITC, authors's calculatons

Table 2: Share of EU 27 imports from Russia in total EU 27 imports by product category

Supplies from Ukraine are dominated by agricultural products like Cereals and Vegetable products (Table 1) while supplies from Russia are dominated by Nickel, Mineral Fuels and Fertilizers (Table 2).

Alternative suppliers

The EU27 imports the products listed in tables 1 and 2 from a differing number of countries, ranging from 154 countries (HS 78 Lead) to 200 countries (HS27 mineral fuels). These countries are potential candidates for the substitution of imports from Ukraine and Russia.

Alternative suppliers must be able to provide the necessary quantities...

However, import substitution is likely to be successful when alternative suppliers offer a sufficiently large quantity of the products as well as an established trade facilitation infrastructure with the EU27. Therefore, in the following analysis only the top 10 supplying countries, measured by their

share in total EU27 imports, are considered as potential alternatives to imports from Russia and Ukraine.

... and have a superior sustainability profile

For the top ten suppliers in each product category sustainability profiles are provided. This will demonstrate how a shift from Ukraine or Russia to an alternative supplier is likely to impact European supply chain sustainability. For that purpose, the SSI scores of the countries in question are compared. For each of the three sustainability dimensions, their distance to Ukraine's and Russia's SSI scores is shown.

Cereals (HS10) hard to substitute...

With a share of 46% in the top ten imports and of 14% of total imports, Ukraine is the dominating supplier of cereals to the EU27. Substituting cereals imports from Ukraine would require the 2nd to 7th ranked countries to double their deliveries to the EU27. By comparison, Russia's shares of 3% and 1%, respectively, are modest and easier to replace.

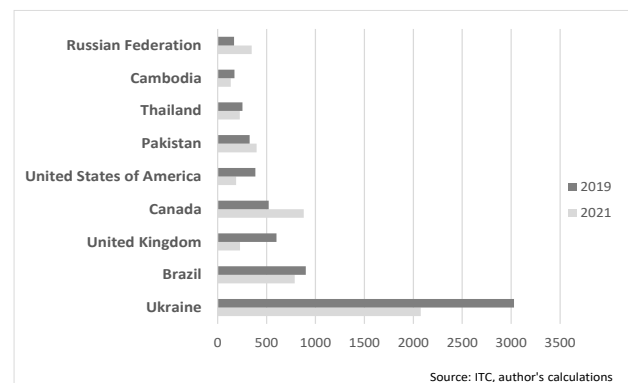


Figure 1: Major cereals imports to EU27, USDmn

Between 2019 and 2021 Ukraine maintained its No1 rank among importing countries, while Russia increased its rank from No9 to No5. This may reflect trade distortions caused by the Corona pandemic, but it indicates that replacing imports from Russia has become more difficult.

... and substituting Russian imports more likely to lead to improved sustainability

Replacing cereals imports with more sustainable suppliers will be easier in the case of Russia than of Ukraine. Only three countries perform better than Ukraine in HUW and ECW, none does in ENW. More sustainable substitutes for Russian imports are possible in all three sustainability dimensions.

On average, countries perform better than Russia in the ENW dimension, promising stronger positive effects from replacing imports from Russia.

With regard to HUW industrialized countries are in the front line, whereas developing countries offer better ENW scores.

HS10	Dist. Ukraine			Dist. Russia		
	HUW	ENW	ECW	HUW	ENW	ECW
Russian Federation	-0,3	-2,3	0,6			
Ukraine				0,3	2,3	-0,6
Brazil	-1,7	-0,3	-0,8	-1,4	2,0	-1,4
United Kingdom	0,9	-1,2	0,4	1,2	1,1	-0,1
Canada	0,8	-2,4	0,1	1,1	-0,1	-0,5
United States of America	0,8	-2,6	-0,3	1,1	-0,3	-0,9
Pakistan	-2,5	-0,9	-0,7	-2,2	1,4	-1,3
Thailand	-0,3	-1,8	1,8	0,0	0,4	1,3
Cambodia	-1,9	-0,5	-0,3	-1,5	1,8	-0,9
Myanmar	-1,2	-0,4	-0,4	-0,9	1,9	-0,9
\bar{x}	-0,6	-1,4	0,1	-0,2	1,2	-0,6
σ	1,2	0,9	0,8	1,2	0,9	0,8

Source: SSI, author's calculations

Table 3: Distance of alternative HS10 suppliers' sustainability scores

Slightly less of a challenge for substitution of oil seed (HS12)

For the EU27 imports of oil seeds Ukraine plays an important role with shares of 8% in total and 21 % in the top ten exporters, respectively (Figure 2)

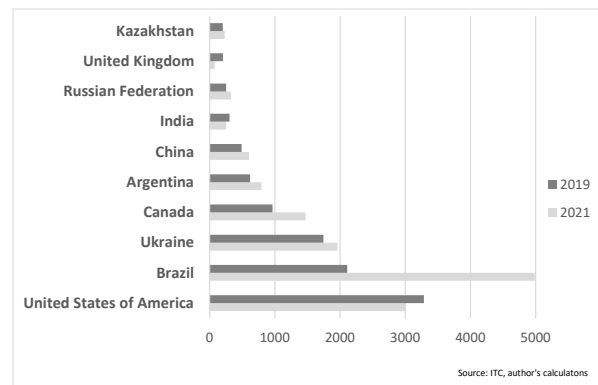


Figure 2: Major Oil Seeds imports to EU27, USDmn

Russia plays a smaller role, with a share of 1% of total exports and 3% of top ten exports to the EU27. However, their combined share of top ten imports is almost a quarter: in order to fill the gap left by those two countries the next largest exporters Argentina, Canada and China would have to double their deliveries to the EU27.

Between 2019 and 2022 the ranks of neither country changed.

Ukraine's sustainability record more difficult to beat

HS12	Dist. Ukraine			Dist. Russia		
	HUW	ENW	ECW	HUW	ENW	ECW
Russian Federation	-0,3	-2,3	0,6			
Ukraine				0,3	2,3	-0,6
United States of America	0,8	-2,6	-0,3	1,1	-0,3	-0,9
Brazil	-1,7	-0,3	-0,8	-1,4	2,0	-1,4
Canada	0,8	-2,4	0,1	1,1	-0,1	-0,5
Argentina	-1,3	-1,5	1,6	-1,0	0,8	1,0
China	-0,3	-1,7	1,0	0,1	0,5	0,4
India	-1,1	-2,2	0,5	-0,8	0,1	-0,1
United Kingdom	0,9	-1,2	0,4	1,2	1,1	-0,1
Kazakhstan	-0,2	-1,7	0,3	0,2	0,5	-0,2
\bar{x}	-0,3	-1,8	0,4	0,1	0,8	-0,3
σ	0,9	0,7	0,6	0,9	0,8	0,7

Source: SSI, author's calculations

Table 4: Distance of alternative HS12 suppliers' sustainability scores

Most alternatives to Ukraine perform worse in the HUW and ENW dimensions and better in the ECW dimension. The alternatives to Russia generally

perform better in the ENW and HUW dimension. For the latter, five countries perform better and three perform worse. Variations among competitors' sustainability scores are mostly moderate.

Vegetable Plaiting Materials (HS14): Ukraine's exports dropped recently...

Combined, Russia and Ukraine account for over a third of top ten vegetable plaiting materials imports of the EU27, and for 18% of total EU27 imports. Except for India and China, the smaller top ten exporters would struggle to replace deliveries from Ukraine and Russia. Rather, India and China would have the means to provide adequate supplies.

Between 2019 and 2021, Russia's rank remained unchanged while Ukraine's position decreased from No3 to No4.

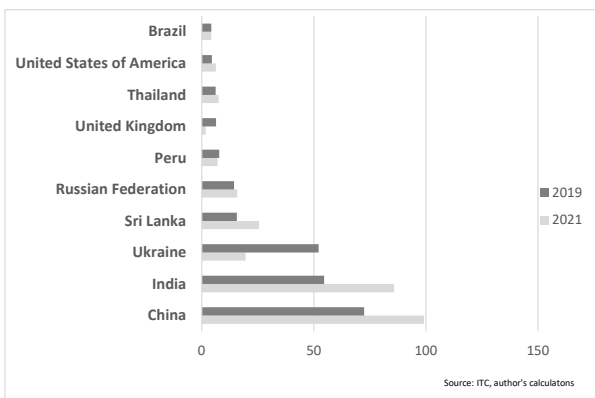


Figure 3: Major Vegetable Plaiting Materials imports to EU27, USDmn

... but its sustainability score is more difficult to match

Replacing Ukraine's supplies would worsen EU27 supply chain sustainability in the HUW and ENW dimensions. Only in the ECW dimension a majority of suppliers exceeds Ukraine's sustainability profiles. For Russia, most alternative suppliers beat its ENW scores, whereas in the HUW and ECW dimensions only half of the suppliers do.

HS14	Dist. Ukraine			Dist. Russia		
	HUW	ENW	ECW	HUW	ENW	ECW
Russian Federation	-0,3	-2,3	0,6			
Ukraine				0,3	2,3	-0,6
China	-0,3	-1,7	1,0	0,1	0,5	0,4
India	-1,1	-2,2	0,5	-0,8	0,1	-0,1
Sri Lanka	-0,4	-1,2	2,5	-0,0	1,0	1,9
Peru	-1,4	0,6	1,4	-1,0	2,9	0,9
United Kingdom	0,9	-1,2	0,4	1,2	1,1	-0,1
Thailand	-0,3	-1,8	1,8	0,0	0,4	1,3
United States of America	0,8	-2,6	-0,3	1,1	-0,3	-0,9
Brazil	-1,7	-0,3	-0,8	-1,4	2,0	-1,4
\bar{x}	-0,4	-1,4	0,8	-0,0	1,1	0,2
σ	0,8	1,0	1,0	0,8	1,0	1,0

Source: SSI, author's calculations

Table 5: Distance of alternative HS14 suppliers' sustainability scores

Animal or Vegetable Fats and Oils (HS15): Russia not among top ten suppliers

Animal and Vegetable Fats and Oils are dominated by three suppliers, including Ukraine with a share of 18% in the top ten imports and 6% in total imports. The remaining exporters have roughly equal weights. With a share of 2% Russia does not rank among the top ten suppliers. The first placed supplier Indonesia may have the best position to at least partly substitute supplies from Ukraine and Russia.

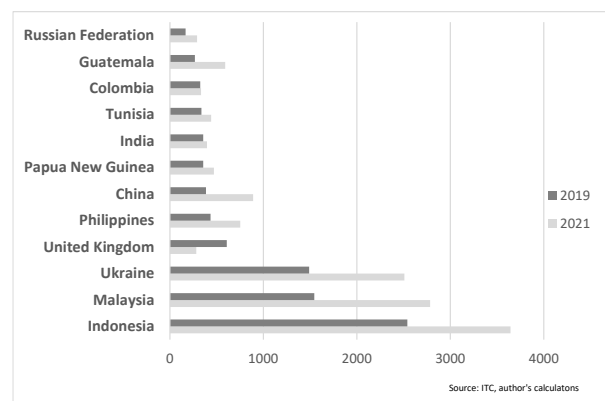


Figure 4: Major Vegetable Oil imports to EU27, USDmn

Between 2019 and 2021 Ukraine's ranking (No3) was unchanged, while that of Russia improved by one point to position No13.

Ukraine's HUW and ENW scores hard to beat

Only the UK matches Ukraine's HUW and ECW scores but lags in the ENW dimension.

With regard to ECW, most alternative suppliers perform better. Taken together, this suggests a worsening of EU environmental and social supply chain sustainability.

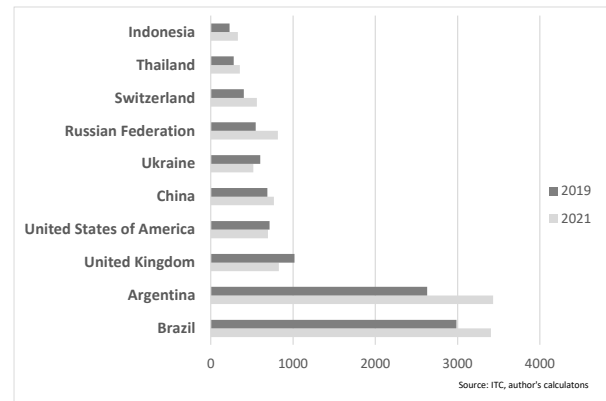


Figure 5: Major Animal Fodder imports to EU27, USDmn

Replacing their combined HS23-exports to the EU27 would be roughly equivalent to the deliveries from the United Kingdom, or roughly one third of Brazil's exports of that product category to the EU27. Between 2019 and 2021 the ranks of Ukraine and Russia moved in opposite directions: Ukraine's position worsened from No6 to No8, while Russia's position improved from No7 to No4.

Russia's HUW and ENW scores easier to beat than its ENC score

Most countries show lower HUW and ENW scores than Ukraine but perform better in the ECW dimension. Russian scores in all three dimensions are lower than most alternative suppliers of HS 23. Thus, replacing Ukrainian supplies would have a strong negative impact on EU27 supply chain sustainability, while replacing imports from Russia would have an overall positive impact.

HS15	Dist. Ukraine		
	HUW	ENW	ECW
Ukraine			
Indonesia	-1,1	-1,2	1,1
Malaysia	-0,3	-1,5	0,3
United Kingdom	0,9	-1,2	0,4
Philippines	-0,9	-1,0	2,1
China	-0,3	-1,7	1,0
Papua New Guinea	-4,6	-0,9	-0,3
India	-1,1	-2,2	0,5
Tunisia	-0,4	-1,0	-1,0
Colombia	-1,8	0,5	-0,3
\bar{x}	-1,1	-1,1	0,4
σ	1,4	0,7	0,9

Source: SSI, author's calculations

Table 6: Distance of alternative HS15 suppliers' sustainability scores

Food Waste and Animal Fodder (HS23): less prominent position

With regard to imports of Food Waste and Animal Fodder (HS23) into the EU27, Ukraine and Russia play a similar role. Their shares in top ten EU27 imports are 6%, and their shares in total EU27 imports are 2% each.

HS23	Dist. Ukraine			Dist. Russia		
	HUW	ENW	ECW	HUW	ENW	ECW
Brazil	-1,7	-0,3	-0,8	-1,4	2,0	-1,4
Argentina	-1,3	-1,5	1,6	-1,0	0,8	1,0
United Kingdom	0,9	-1,2	0,4	1,2	1,1	-0,1
United States of America	0,8	-2,6	-0,3	1,1	-0,3	-0,9
China	-0,3	-1,7	1,0	0,1	0,5	0,4
Ukraine				0,3	2,3	-0,6
Russian Federation	-0,3	-2,3	0,6			
Switzerland	0,5	0,1	4,2	0,8	2,4	3,6
Thailand	-0,3	-1,8	1,8	0,0	0,4	1,3
Indonesia	-1,1	-1,2	1,1	-0,7	1,1	0,5
\bar{x}	-0,3	-1,4	1,1	0,1	1,1	0,4
σ	0,9	0,8	1,4	0,9	0,9	1,4

Source: SSI, author's calculations

Table 7: Distance of alternative HS23 suppliers' sustainability scores

Salt, Sulphur and Building Materials (HS25): both countries supply almost equal volumes...

Ukraine and Russia provide similar amounts of HS25 goods to the EU27. Their share in the top 10 suppliers is 9% and their share in the total supply of HS25 to EU27 is 2%. In order to substitute their deliveries, an increase by one sixth by the top 10 suppliers would be sufficient.

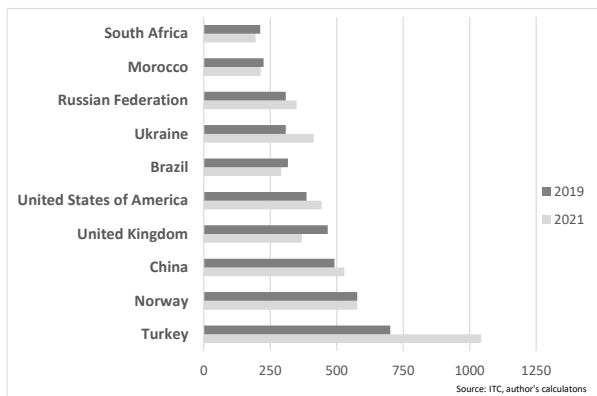


Figure 6: Major Salt, Sulphur and Building Materials imports to EU27, USDm

Between 2019 and 2021 their ranks have improved slightly, Ukraine moving up from 7th to 5th

position, and Russia moving up one point to 7th position.

... but Ukraine matches most alternative's sustainability scores

HS25	Dist. Ukraine			Dist. Russia		
	HUW	ENW	ECW	HUW	ENW	ECW
Turkey	-1,1	-2,2	1,1	-0,8	0,1	0,5
Norway	0,9	-1,3	3,7	1,2	1,0	3,1
China	-0,3	-1,7	1,0	0,1	0,5	0,4
United Kingdom	0,9	-1,2	0,4	1,2	1,1	-0,1
United States of America	0,8	-2,6	-0,3	1,1	-0,3	-0,9
Brazil	-1,7	-0,3	-0,8	-1,4	2,0	-1,4
Ukraine				0,3	2,3	-0,6
Russian Federation	-0,3	-2,3	0,6			
Morocco	-0,8	-0,2	-0,8	-0,4	2,0	-1,4
South Africa	-0,8	-1,4	-1,9	-0,5	0,9	-2,5
\bar{x}	-0,3	-1,5	0,3	0,1	1,1	-0,3
σ	0,9	0,8	1,5	0,9	0,8	1,5

Source: SSI, author's calculations

Table 8: Distance of alternative HS25 suppliers' sustainability scores

Ukraine's strongest advantage over competing suppliers is in its HUW and ENW scores, whereas Russia's scores exceed those of a majority of competitors in the ECW dimension. Social and environmental sustainability of EU27 supply chains would therefore benefit from replacing Russian deliveries only.

Gap between Ukraine's and Russia's exports of Ores, Slag and Ash (HS26) to the EU27 narrowed

In 2019, Ukraine sold almost three times the Russian amount of HS26 products to the EU27, their shares in top ten deliveries being 12% and 5%, respectively. Their shares in total supplies were 7% and 3%.

If the remaining top 10 suppliers increased their deliveries by roughly one sixth, Russian and Ukrainian exports could be compensated.

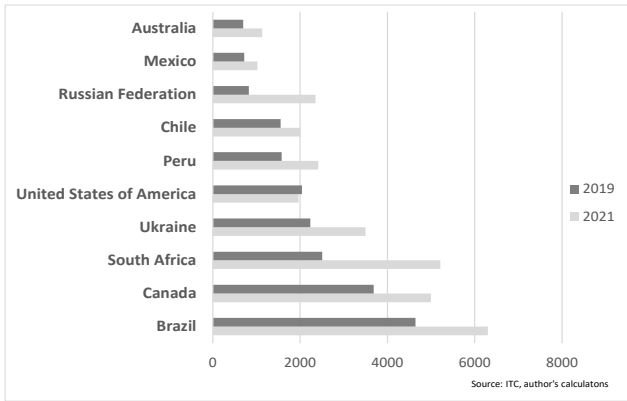


Figure 7: Major Ore, Slag and Ash imports to EU27, USDmn

Between 2019 and 2021 Ukraine’s rank stayed constant, while Russia’s position improved by two points to No6.

Import substitution of HS26 unlikely to have a positive impact on sustainability

Both Ukraine and Russia score better than many countries with import substitution potential, with the exception of Russian ENW scores. Thus, improving EU27 supply chain sustainably when replacing imports from these countries may pose a challenge.

Russia dominates the deliveries of mineral fuels (HS27)

In 2019 Russia’s shares in top ten and in world supplies of mineral fuels to the EU27 were 53% and 19% respectively. Ukraine’s shares were under 0.5% and thus negligible. It would require the top ten suppliers to increase their deliveries to the EU27 by one third each to compensate for a complete stop of Russian mineral fuel deliveries. With a view to the long-term nature of investment in the gas and oil sectors this was believed to be a tall order. However, recent substitution by alternative suppliers appears to have been successful.

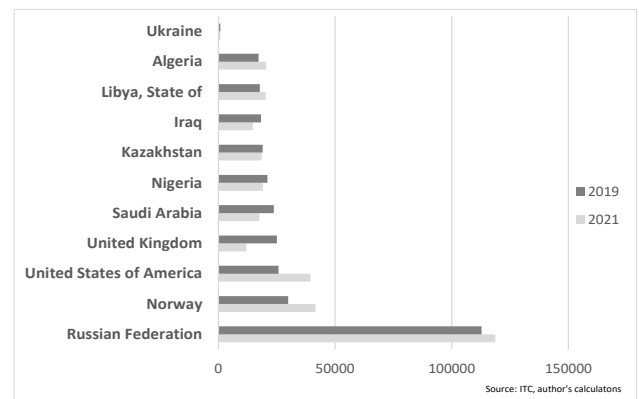


Figure 8: Major Mineral Fuel imports to EU27, USDmn

HS26	Dist. Ukraine			Dist. Russia		
	HUW	ENW	ECW	HUW	ENW	ECW
Brazil	-1,7	-0,3	-0,8	-1,4	2,0	-1,4
Canada	0,8	-2,4	0,1	1,1	-0,1	-0,5
South Africa	-0,8	-1,4	-1,9	-0,5	0,9	-2,5
Ukraine				0,3	2,3	-0,6
United States of America	0,8	-2,6	-0,3	1,1	-0,3	-0,9
Peru	-1,4	0,6	1,4	-1,0	2,9	0,9
Chile	-0,4	-1,2	-0,1	-0,1	1,1	-0,7
Russian Federation	-0,3	-2,3	0,6			
Mexico	-0,4	-1,4	1,7	-0,1	0,9	1,1
Australia	0,4	-2,7	2,4	0,8	-0,4	1,8
\bar{x}	-0,3	-1,5	0,3	0,0	1,0	-0,3
σ	0,8	1,1	1,3	0,8	1,1	1,3

Source: SSI, author's calculations

Table 9: Distance of alternative HS26 suppliers’ sustainability scores

Russia kept its No1 position between 2019 and 2021 as well as its share in top ten suppliers. However, among the latter considerable repositioning took place. While the UK and Saudi Arabia dropped from 4th and 5th position to 11th and 8th position, respectively, Algeria and Libya advanced to positions 4 and 5.

Ambivalent effect on sustainability

As Ukraine is not among the top ten exporters of mineral fuels, only Russia will be considered.

HS27	Dist. Russia		
	HUW	ENW	ECW
Russian Federation			
Norway	1,2	1,0	3,1
United States of America	1,1	-0,3	-0,9
United Kingdom	1,2	1,1	-0,1
Saudi Arabia	-1,4	-0,0	-0,2
Nigeria	-3,3	2,0	-2,0
Kazakhstan	0,2	0,5	-0,2
Iraq	-2,8	1,5	-2,2
Libya, State of	-1,8	2,1	-1,9
Algeria	-1,3	1,2	-1,4
\bar{x}	-0,8	1,0	-0,7
σ	1,7	0,8	1,5

Source: SSI, author's calculations

Table 10: Distance of alternative HS27 suppliers' sustainability scores

Replacing Russian supplies would generally improve the ENW dimension of EU27 supplies, but worsen the ECW dimension. With regard to HUW four potential suppliers perform better and five perform worse than Russia.

Russia a dominant supplier of Inorganic Chemicals (HS28)

The EU27 is heavily dependent on imports of Inorganic Chemicals and Rare Earths from Russia. Its share in top ten imports is 23% and its share in total imports is 7%. Comparable numbers for Ukraine are 2% and 1%, respectively. Compensation of Russia's deliveries would therefore be challenging.

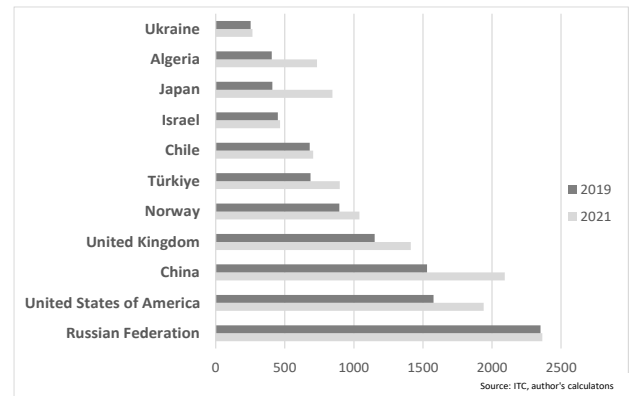


Figure 9: Major Inorganic Chemicals imports to EU27, USDmn

A structural change in suppliers to EU27 is already apparent: while Russia maintained its export volume, all other top ten suppliers increased their volumes. The strongest growth was recorded by Korea which entered the top ten league and moved up to 5th rank in 2021 (not shown in Fig.13).

Import substitution expected to impact positively

Most alternative suppliers perform better than Russia in the HUW and ENW dimensions. In the ECW dimension, five countries perform worse and four perform better, but the average change is still positive. However, scores vary stronger in this dimension than in HUW and ECW. Overall, an improvement in environmental sustainability can be expected.

HS28	Dist. Russia		
	HUW	ENW	ECW
Russian Federation			
United States of America	1,1	-0,3	-0,9
China	0,1	0,5	0,4
United Kingdom	1,2	1,1	-0,1
Norway	1,2	1,0	3,1
Türkiye	-0,8	0,1	0,5
Chile	-0,1	1,1	-0,7
Israel	0,2	1,3	1,6
Japan	1,2	-0,3	-1,1
Algeria	-1,3	1,2	-1,4
\bar{x}	0,3	0,6	0,2
σ	0,9	0,6	1,4

Source: SSI, author's calculations

Table 11: Distance of alternative HS28 suppliers' sustainability scores

Fertilizers (HS31) dominated by Russia, too

Russia was the leading exporter of Fertilizers to the EU27 in 2019 and has expanded its position in 2021. In 2019, Russia's shares in top ten supplies and total supplies were 41% and 14%, respectively.

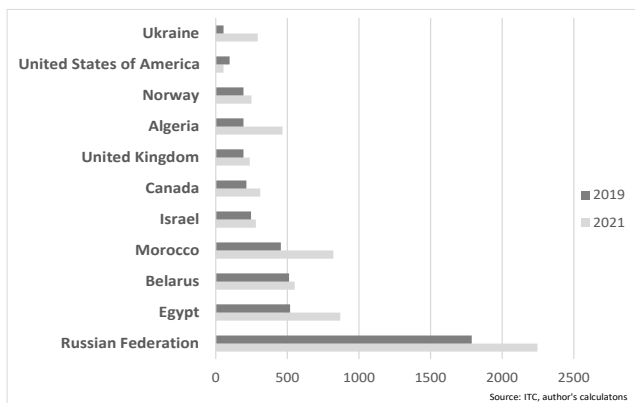


Figure 10: Major Fertilizer imports to EU27, USDmn

Between 2019 and 2021 all top ten suppliers increased their sales to EU27, with the exception of the United States. Belarus, Israel and the UK moved down in the rankings, while Ukraine en-

tered the top ten league and moved to rank 7. Replacing fertilizer imports from Russia would pose a particular challenge.

Only environmental sustainability would benefit

Replacing Russia's Fertilizer supplies would not only be challenging quantitatively, but it would also have a mixed effect on EU27 supply chain sustainability. While the biggest alternative suppliers beat Russian scores in the HUW and ENW dimensions, most countries are lagging in ECW.

HS31	Dist. Russia		
	HUW	ENW	ECW
Russian Federation			
Egypt	-1,7	3,1	0,3
Belarus	0,7	1,9	-0,5
Morocco	-0,4	2,0	-1,4
Israel	0,2	1,3	1,6
Canada	1,1	-0,1	-0,5
United Kingdom	1,2	1,1	-0,1
Algeria	-1,3	1,2	-1,4
Norway	1,2	1,0	3,1
United States of America	1,1	-0,3	-0,9
\bar{x}	0,2	1,2	0,0
σ	1,1	1,0	1,4

Source: SSI, author's calculations

Table 12: Distance of alternative HS31 suppliers' sustainability scores

Much will depend on the actual choice of suppliers as the variability is high in all dimensions.

Both countries among top ten Furs (HS43) suppliers

Fur imports from Russia and Ukraine contribute 9% and 5%, respectively, to the EU27 top ten imports. Their shares in total EU27 imports are 3% and 1%, respectively. In order to replace Russian or Ukrainian deliveries, the top ten suppliers would have to increase their exports by roughly 10% or 5%.

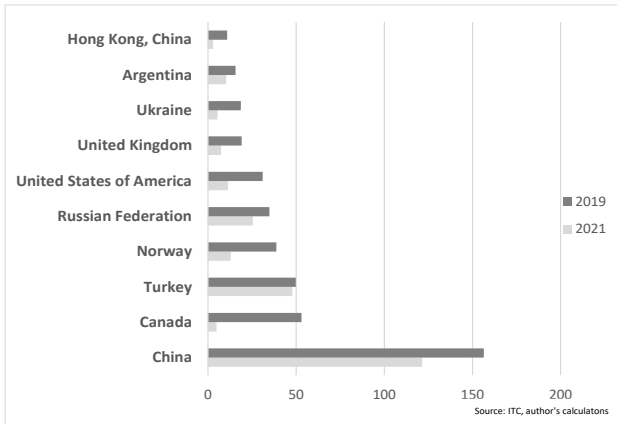


Figure 11: Major Fur imports to EU27, USDmn

Between 2019 and 2021 Russia improved its position within the top ten exporters from rank five to rank 2, while Ukraine’s position decreased from rank 8 to rank 10. Imports from Russia therefore may be harder to substitute.

Dimensions impacted differently

Clearly, all competitors perform worse than Ukraine in the ENW dimension whereas over half perform better in the HUW and ECW dimensions.

HS43	Dist. Ukraine			Dist. Russia		
	HUW	ENW	ECW	HUW	ENW	ECW
China	-0,3	-1,7	1,0	0,1	0,5	0,4
Canada	0,8	-2,4	0,1	1,1	-0,1	-0,5
Turkey	-1,1	-2,2	1,1	-0,8	0,1	0,5
Norway	0,9	-1,3	3,7	1,2	1,0	3,1
Russian Federation	-0,3	-2,3	0,6			
United States of America	0,8	-2,6	-0,3	1,1	-0,3	-0,9
United Kingdom	0,9	-1,2	0,4	1,2	1,1	-0,1
Ukraine				0,3	2,3	-0,6
Argentina	-1,3	-1,5	1,6	-1,0	0,8	1,0
Hong Kong, China	1,1	-1,4	4,2	1,4	0,9	3,6
\bar{x}	0,2	-1,8	1,4	0,5	0,7	0,7
σ	0,9	0,5	1,5	0,9	0,7	1,5

Source: SSI, author's calculations

Table 13: Distance of alternative HS43 suppliers’ sustainability scores

For Russia, most competitors perform better in the HUW and ENW dimensions but worse in the

ECW dimension. In the latter, however, variability among alternative supplier scores is high.

Both countries dominate supplies of wood (HS44)

Russia contributes 5% to total EU27 imports of wood and over a third to the top ten exporters. Ukraine’s figures are roughly half the Russian values. Together, they provide half of EU27 top ten wood imports.

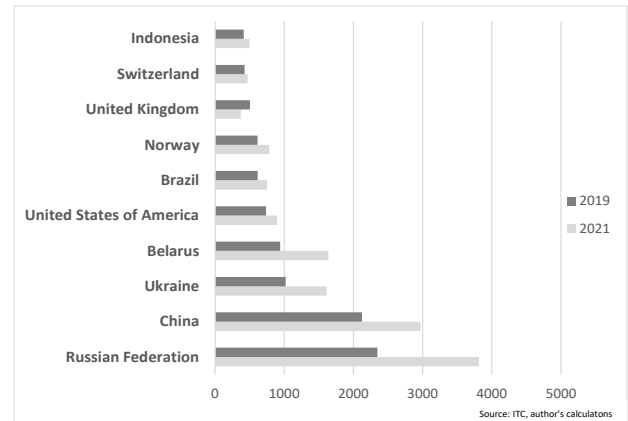


Figure 12: Major Wood imports to EU27, USDmn

Between 2019 and 2021 Russia remained the dominant wood supplier, while Ukraine moved from rank No3 to No4 and Belarus moved up to No3. Due to their strong positions, replacing Russian and Ukrainian wood deliveries poses a challenge to the EU27.

Ukraine and Russia matched in two dimensions each

Among the top ten competitors, Ukraine performs worse than most countries in the HUW and ECW dimensions, whereas Russia on average performs worse in all three dimensions. Only Switzerland performs better than both on all three accounts.

HS44	Dist. Ukraine			Dist. Russia		
	HUW	ENW	ECW	HUW	ENW	ECW
Russian Federation	-0,3	-2,3	0,6			
China	-0,3	-1,7	1,0	0,1	0,5	0,4
Ukraine				0,3	2,3	-0,6
Belarus	0,3	-0,4	0,0	0,7	1,9	-0,5
United States of America	0,8	-2,6	-0,3	1,1	-0,3	-0,9
Brazil	-1,7	-0,3	-0,8	-1,4	2,0	-1,4
Norway	0,9	-1,3	3,7	1,2	1,0	3,1
United Kingdom	0,9	-1,2	0,4	1,2	1,1	-0,1
Switzerland	0,5	0,1	4,2	0,8	2,4	3,6
Indonesia	-1,1	-1,2	1,1	-0,7	1,1	0,5
\bar{x}	0,0	-1,2	1,1	0,4	1,3	0,5
σ	0,9	0,8	1,6	0,9	0,8	1,6

Source: SSI, author's calculations

Table 14: Distance of alternative HS44 suppliers' sustainability scores

Overall, replacing wood imports from Russia is therefore likely to improve the EU supply chain sustainability.

Precious Metals and Stones (HS71)

Only Russia ranks among the top ten suppliers of Precious Metals and Precious Stones. Its share in the top ten supplies is 11% percent and its share in total supplies is 6%, rendering it a less difficult to replace exporter.

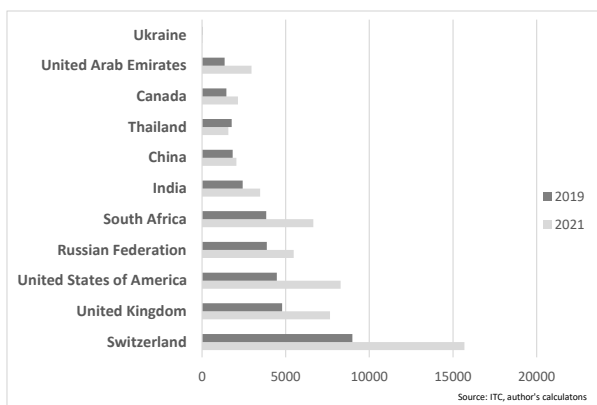


Figure 13: Major Metals and Stones imports to EU27, USDm

Between 2019 and 2021 all top ten countries except Thailand increased their sales to the EU27, moving Russia from rank 4 to rank 5.

Social and Environmental Sustainability to benefit from shift

Only two countries in each of the HUW and ENV dimensions perform worse than Russia, rendering it likely that a substitution of imports from Russia would have a positive effect on EU27 supply chain sustainability. Only in the ECW dimension a majority of countries perform worse than Russia. Switzerland, China and Thailand beat Russia on all three sustainability dimensions.

HS71	Dist. Russia		
	HUW	ENW	ECW
Switzerland	0,8	2,4	3,6
United Kingdom	1,2	1,1	-0,1
United States of America	1,1	-0,3	-0,9
Russian Federation			
South Africa	-0,5	0,9	-2,5
India	-0,8	0,1	-0,1
China	0,1	0,5	0,4
Thailand	0,0	0,4	1,3
Canada	1,1	-0,1	-0,5
United Arab Emirates	0,5	-0,3	1,5
\bar{x}	0,4	0,5	0,3
σ	0,7	0,8	1,6

Source: SSI, author's calculations

Table 15: Distance of alternative HS71 suppliers' sustainability scores

Iron and Steel (HS 72): strong positions

Russia and Ukraine contribute 20% and 11% respectively to the EU27's top 10 Iron and Steel imports. Their share in total imports is 4.2% and 2.4% respectively. In order to make up for a loss of both suppliers the remaining top ten Iron and Steel exporters would have to increase their sales by 50% on average, making replacement difficult.

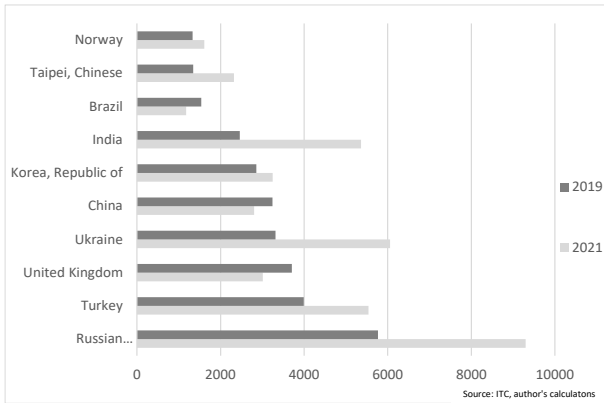


Figure 14: Major Iron and Steel imports to EU27, USDmn

Between 2019 and 2021 both countries increased their sales considerably: Russia sustained rank 1 while Ukraine moved up from rank 4 to rank 2. If the UK and China resumed their 2019 exports they could cover approx. 12% of combined Ukrainian and Russian deliveries.

Russia beats most competitors in ECW, Ukraine in HUW and ENW.

A majority of competitors perform worse than Ukraine in the social and environmental dimensions whereas most perform better than Russia in all dimensions.

HS72	Dist. Ukraine			Dist. Russia		
	HUW	ENW	ECW	HUW	ENW	ECW
Russian Federation	-0,3	-2,3	0,6			
Turkey	-1,1	-2,2	1,1	-0,8	0,1	0,5
United Kingdom	0,9	-1,2	0,4	1,2	1,1	-0,1
Ukraine				0,3	2,3	-0,6
China	-0,3	-1,7	1,0	0,1	0,5	0,4
Korea, Republic of	0,7	-3,2	2,6	1,0	-0,9	2,0
India	-1,1	-2,2	0,5	-0,8	0,1	-0,1
Brazil	-1,7	-0,3	-0,8	-1,4	2,0	-1,4
Taipei, Chinese	-2,0	1,2	-2,0	-1,6	3,5	-2,6
Norway	0,9	-1,3	3,7	1,2	1,0	3,1
\bar{x}	-0,4	-1,5	0,8	-0,1	1,1	0,1
σ	1,0	1,2	1,6	1,0	1,3	1,6

Source: SSI, author's calculations

Table 16: Distance of alternative HS72 suppliers' sustainability scores

Substitution of Iron and Steel imports from Russia is therefore likely to improve EU supply chain sustainability, whereas a substitution of imports from Ukraine would worsen them in two dimensions. However, the variation of country scores is higher than in most other cases. Thus, the impact on supply chain sustainability depends strongly on supplier choice.

Copper and Copper Products (HS74): Russia taking the lead

In 2019, Russia and Chile each provided 17% of EU27 top ten Copper imports and 4% of total EU27 Copper imports while Ukraine's share is negligible.

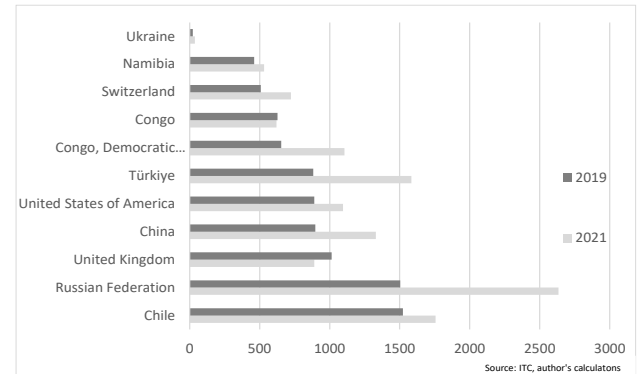


Figure 15: Major Copper imports to EU27, USDmn

Over the following three years Russia expanded its position stronger than any other supplier and gained rank 1. Replacing Russian Copper supplies to the EU will therefore pose a challenge.

Only Environmental sustainability to benefit from change

A majority of Copper suppliers perform worse than Russia in the HUW and ECW dimensions, thus making improvements in the social and economic sustainability of EU27 supply chains unlikely.

HS74	Dist. Russia		
	HUW	ENW	ECW
Chile	-0,1	1,1	-0,7
Russian Federation			
United Kingdom	1,2	1,1	-0,1
China	0,1	0,5	0,4
United States of America	1,1	-0,3	-0,9
Türkiye	-0,8	0,1	0,5
Congo, Democratic Republic of the	-5,1	5,6	-2,3
Congo	-3,5	0,3	-1,0
Switzerland	0,8	2,4	3,6
Namibia	-1,7	2,6	-2,5
\bar{x}	-0,9	1,5	-0,3
σ	2,1	1,7	1,7

Source: SSI, author's calculations

Table 17: Distance of alternative HS74 suppliers' sustainability scores

However, with the exception of the USA all alternative suppliers score better than Russia in the ENW dimension, thus increasing the probability of progress in the environmental sustainability of EU27 Copper supply chains.

Nickel and Nickel products (HS 75): increasing dependency on Russia

Contributing one third to the top ten imports and over a fifth to total imports of Nickel by EU27, Russia is the prime source in this product category. Ukraine's share is negligible.

Between 2019 and 2021 Canada and Russia increased their exports clearly while supplies from the US shrank.

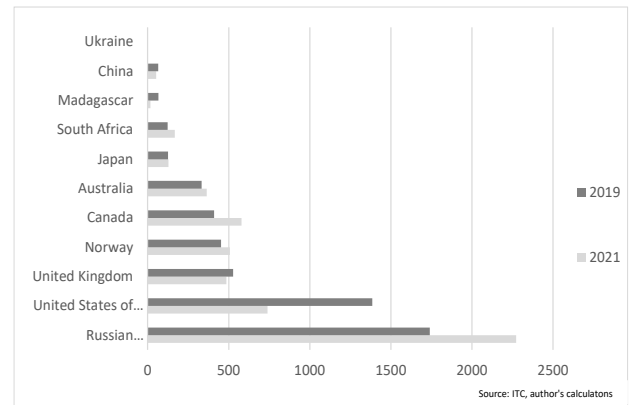


Figure 16: Major Nickel imports to EU27, USDm

Shift to benefit Social Sustainability

Most top ten suppliers score better than Russia in the HUW dimension and worse in the ECW dimension. With regard to ENW, replacing Russian imports would on average improve scores of the top ten suppliers.

HS75	Dist. Russia		
	HUW	ENW	ECW
Russian Federation			
United States of America	1,1	-0,3	-0,9
United Kingdom	1,2	1,1	-0,1
Norway	1,2	1,0	3,1
Canada	1,1	-0,1	-0,5
Australia	0,8	-0,4	1,8
Japan	1,2	-0,3	-1,1
South Africa	-0,5	0,9	-2,5
Madagascar	-4,1	2,0	-2,0
China	0,1	0,5	0,4
\bar{x}	0,2	0,5	-0,2
σ	1,6	0,8	1,7

Source: SSI, author's calculations

Table 18: Distance of alternative HS75 suppliers' sustainability scores

Aluminum and Aluminum Products (HS 76): strong but diminishing role of Russia

Ukraine is not a major supplier of aluminum to EU27. Russia provides 15% of top ten imports and

5% of total imports to EU27, making it the third largest supplier in 2019.

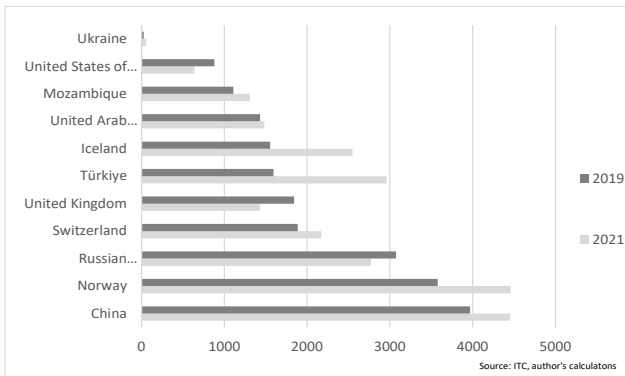


Figure 17: Major aluminum imports to EU27, USDmn

However, between 2019 and 2021 Russian deliveries declined while those of six top ten suppliers increased, making substitution of its sales slightly more manageable.

Clear improvement in all dimensions possible

On average, replacing Russian sales would improve European supply chain sustainability in all three dimensions.

HS76	Dist. Russia		
	HUW	ENW	ECW
China	0,1	0,5	0,4
Norway	1,2	1,0	3,1
Russian Federation			
Switzerland	0,8	2,4	3,6
United Kingdom	1,2	1,1	-0,1
Türkiye	-0,8	0,1	0,5
Iceland	1,1	3,1	1,8
United Arab Emirates	0,5	-0,3	1,5
Mozambique	-3,3	3,1	-2,2
United States of America	1,1	-0,3	-0,9
\bar{x}	0,2	1,2	0,9
σ	1,4	1,3	1,7

Source: SSI, author's calculations Table 19: Distance of alternative HS76 suppliers' sustainability scores

However, country scores vary strongly with a standard deviation >1, making the choice of a particular supplier essential. China, Norway, Switzerland and Iceland score better than Russia in all three dimensions.

Other Base Metals (HS 81)

EU27 imports of Base Metals from Russia ranked fourth in 2019, contributing 11% to the top ten supplies and 6.5% to total supplies, respectively. Ukraine does not figure among top ten import sources.

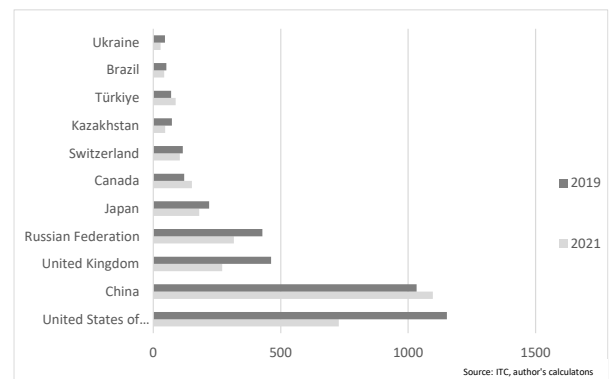


Figure 18: Major imports of Base Metals to EU27, USDmn

Between 2019 and 2021 deliveries from most suppliers declined, while those of China, Canada and Turkey increased. Due to this shift Russia's rank improved by one point, despite its shrinking exports.

Import substitution to have a positive effect on average

Most competitors fare better than Russia in the HUW and ENW dimensions and worse in the ECW dimension. On average, however, substitution would have a positive effect on EU27 supply chain sustainability. Of the three countries expanding their sales between 2019 and 2021, China would have a slightly positive impact in all three dimensions, while Canada would score clearly better in the HUW dimension and Turkey in the ECW dimension.

HS81	Dist. Russia		
	HUW	ENW	ECW
United States of America	1,1	-0,3	-0,9
China	0,1	0,5	0,4
United Kingdom	1,2	1,1	-0,1
Russian Federation	0,0	0,0	0,0
Japan	1,2	-0,3	-1,1
Canada	1,1	-0,1	-0,5
Switzerland	0,8	2,4	3,6
Kazakhstan	0,2	0,5	-0,2
Türkiye	-0,8	0,1	0,5
Brazil	-1,4	2,0	-1,4
\bar{x}	0,4	0,6	0,0
σ	0,9	0,9	1,3

Source: SSI, author's calculations

Table 20: Distance of alternative HS81 suppliers' sustainability scores

Summary of findings

Russian and Ukrainian top ten exports to EU27 vary in their importance for the EU27 and thus in their impact on EU 27 import sustainability profiles.

Trade: overall a strong position for Russia and Ukraine

Roughly a fifth of total European imports of Nickel (Russia) and Mineral Fuels (Russia), and roughly a seventh of imports of Cereals (Ukraine), Vegetable Plaiting Materials (Ukraine) and Fertilizers (Russia) represent a strong and hard to substitute market position of these two countries.

Import shares of the remaining 13 top ten products are in the 4%-7% range for Russia and in the 1%-8% range for Ukraine. Their substitution appears to be slightly more manageable.

Capacity of alternative suppliers differs

For cereals, vegetable oils, mineral fuels, fertilizers, wood, iron and steel, copper, nickel, alternative suppliers' capacity might pose bottlenecks.

However, potential capacity of alternative suppliers is higher for oil seeds, vegetable plaiting materials, animal fodder, salt/sulphur and building materials, ore/slag and ash, inorganic chemicals, furs, metals and stones, aluminium, base metals, rendering substitution of these products comparatively easier.

Dependency on imports from Russia and the lack of supplies in Europe during the COVID pandemic have led to strategies of import diversification ("de-coupling from China" or "de-risking"). For EU 27 imports of vegetable plaiting materials, inorganic chemicals, furs, copper, aluminium, and base metals China plays a major role. Diversifying away from Russia and China will be particularly challenging in these product categories.

Sustainability: Russia and Ukraine score differently

Ukraine and Russia do not show big differences in their Social Sustainability scores, measured by the SSI HUW dimension. However, Ukraine clearly outperforms Russia in Environmental Sustainability, measured by the SSI ENW dimension. The third pillar of the Triple Bottom Line concept, Economic Sustainability, shows a superior performance of Russia.

Due to these different sustainability performances, any substitution of imports from Russia or Ukraine is likely to have different impacts on EU27 supply chain sustainability. Generally, for alternative suppliers it will be harder to beat Ukrainian environmental sustainability scores and Russian economic sustainability scores.

Therefore, in the case of continuing barriers to exports from Russia EU 27 supply chain's environmental sustainability is expected to improve.

Contact Author:

Prof. Dr. Wolfgang Veit

Research Unit Sustainability.Institutions.Management.Markets at Fakultät 04

Technische Hochschule Köln, Claudiusstr.1, 50678Köln, Germany.

wolfgang.veit@th-koeln.de

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