



# ECONOMY during the war



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# ABOUT

“Economy during the war” is a cycle of analytical materials for foreign audiences. These materials are aimed at showing the negative consequences of the war in Ukraine for the world economy. The purpose of our publications is to draw the attention of the foreign community and responsible decision-makers to the events in Ukraine. We are calling for an end to the war, which is devastating not only for Ukraine but for the whole world.

“Economy during the war” described negative consequences of the war in such sectors as iron and steel production, food and fuel supplies, transport, pharmaceutical industry, energy system, gas production, chemical industry and etc.

These analytical materials were published on the site of GMK Center and distributed through social networks, public opinion leaders and leading media. It allowed us to convey our ideas to the officials of the highest level. We believe that this work will bring the expected result – the establishment of peace in Ukraine.





# Steel semis supply to EU IS UNDER THREAT

Date of preparation:  
03.03.2022

**34%**  
of slab import  
to EU  
or 2.3 mln tons  
provided  
by Ukraine  
in 2021

Demand on raw materials for re-rolling mills in EU was traditionally covered with imports from Ukraine and Russia – 84% of steel semis imports in 2021. There is no supply of commercial semi-finished products within the EU. And now high dependence from CIS supply is a great risk for EU steel processing plants. Utilization of steel rolling mills in the EU is in doubt, as well as thousands of jobs at these plants.

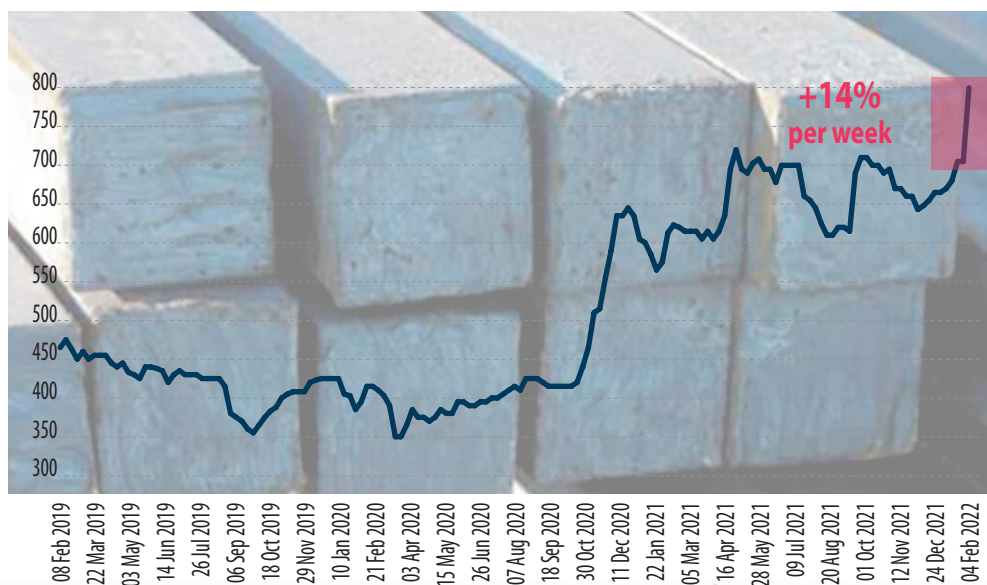
All Ukrainian steel plants that produced flat steel products and semis (Azovstal, Illych Iron and Steel Works, Zaporizhstal) were put in suspension mode as well as long products producer ArcelorMittal Kryvyi Rih. Ukraine satisfied 34% of slabs demand in EU in 2021 and about 50% of square billet.

**84%**  
of semis import  
to EU  
is under threat

European business deliberately refuses to buy Russian products, which is exacerbated by sanctions against major shareholders of some mills, restrictions on the reception of Russian ships in ports and difficulties in settlements.

We could see increased demand for products from Turkey and India. At the same time, Turkish mills are also experiencing difficulties with the supply of semi-finished products, as they were large buyers of products from Ukraine. Prices on square billet from Turkey raised by \$100 per ton during the week.

## Square billet prices export from Ukraine, \$ FOB



There are even rumors about the interest of Chinese mills in deliveries to the EU.

High demand for steel products from Turkey led to the rise in prices for ferrous scrap to historical highs – about \$600 per ton (+20% a week). It will be impossible to replace the supply of raw materials and finished products from the CIS, in the medium term the situation could worsen.

Data source: Kallanish Commodities

**STOP THE WAR**



# Disruption of the sowing campaign in Ukraine **THREATENS THE WORLD WITH FOOD SHORTAGES**

Date of preparation:  
04.03.2022

Ukraine – is one of the largest exporters of agricultural products, that provided a number of countries with food. The sowing campaign should start at the end of March. Active hostilities, as well as a shortage of diesel and fertilizer, can lead to a disruption in the sowing campaign and difficulties in providing food on a global scale.

**50%**  
share of Ukraine  
in global **sunflower  
oil exports**  
in 2017-2021

**15%**  
share of Ukraine  
in global **corn exports**  
in 2017-2021

**15%**  
share of Ukraine  
in global **barley exports**  
in 2017-2021

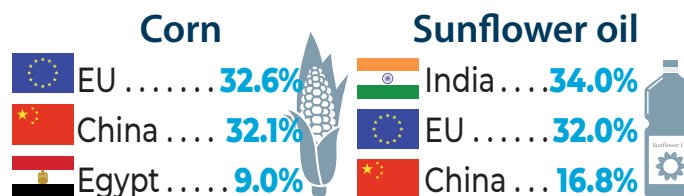
**10%**  
share of Ukraine  
in global **wheat exports**  
in 2017-2021

The sowing campaign of spring wheat usually starts at the end of March, sunflower - in mid-April, corn - in the second half of April. The first to begin work are the Southern regions, where active hostilities are underway today. In total, as of March 4th, 10 regions of Ukraine were covered by hostilities, which in total accounted for 54% of sunflower crops, 42% of corn, 52% of wheat.

First of all, there may be global problems with the supply of sunflower oil and corn. As for wheat, despite the fact that winter crops, which were carried out at the end of the year, occupy more than 90% of the total crops, the export of this product from Ukraine is unlikely.

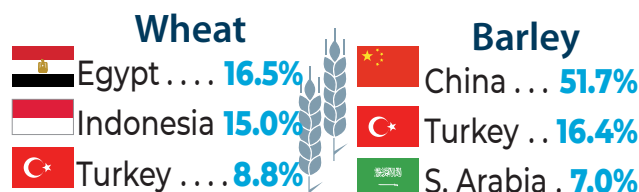
Up to  
**35%**  
yield reduction  
in case of delay  
in sowing  
for 15-20 days

## TOP importers of agricultural products from Ukraine



Agricultural products are becoming more expensive. Corn futures added 14% during 25th of Feb to 04th of March, wheat – 40%. It creates risks for the food supply of the least well-off countries with the worsening humanitarian situation not only in Ukraine, but also in Africa and the Middle East.

**+40%**  
gained wheat  
futures on CBOT  
since 25th Feb  
till 04th March

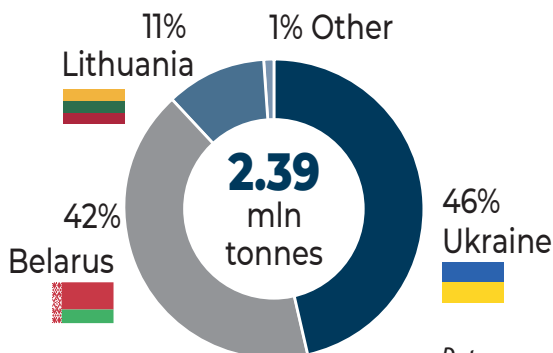


**STOP THE WAR**

# Ukraine needs OTHER SOURCES of fuel supply 1 mln tonnes

of **gasoline** were imported in Ukraine from Belarus in 2021

Structure of gasoline supplies in Ukraine by country of origin in 2021



Data source: Consulting Group A-95

Import from Russia and Belarus was the main source of fuel supply in Ukraine – 42% of gasoline and 63% of diesel. Ukrainian domestic oil refining plants satisfied only 46% domestic gasoline demand and 14% domestic diesel demand. About 20% of the consumption of light oil products in Ukraine is LPG, 45% of which was also supplied from Russia and Belarus. Russian invasion to Ukraine makes it impossible to continue these supplies. Ukraine needs alternative sources of fuel supplies from EU.

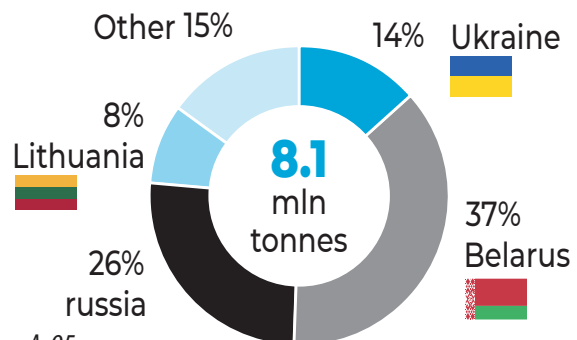
According to BP Statistical Review of World Energy, capacities of EU refining plants loaded at 72.9% in 2020. So, they can increase oil refining by 171 mln tonnes annually. To satisfy Ukrainian needs in gasoline European refiners should increase annual oil refining



# 5 mln tonnes

of **diesel** were imported in Ukraine from Russia and Belarus in 2021

Structure of diesel supplies in Ukraine by country of origin in 2021



only by 1.8 mln tonnes (it could be made in Polish and Lithuanian refining plants). But these volumes of refining will be insufficient for satisfaction of Ukrainian demand in diesel. To satisfy Ukrainian needs in diesel European refiners should increase annual oil refining by almost 30 mln tonnes.

So, it will be necessary to find additional **30 mln tonnes** of oil annually to meet Ukrainian fuel demand. It must be oil from sources which are not associated from Russia. It is great challenge. We believe it is possible, in particular by increasing production in the Gulf countries (Saudi Arabia, Kuwait, United Arab Emirates). But orientation to other sources of oil supply will be inevitably reflected in price growth, which has already began at fuel market.

**STOP THE WAR**

# Ukrainian energy system REMAINS STABLE

Date of preparation:  
08.03.2022

## -40%

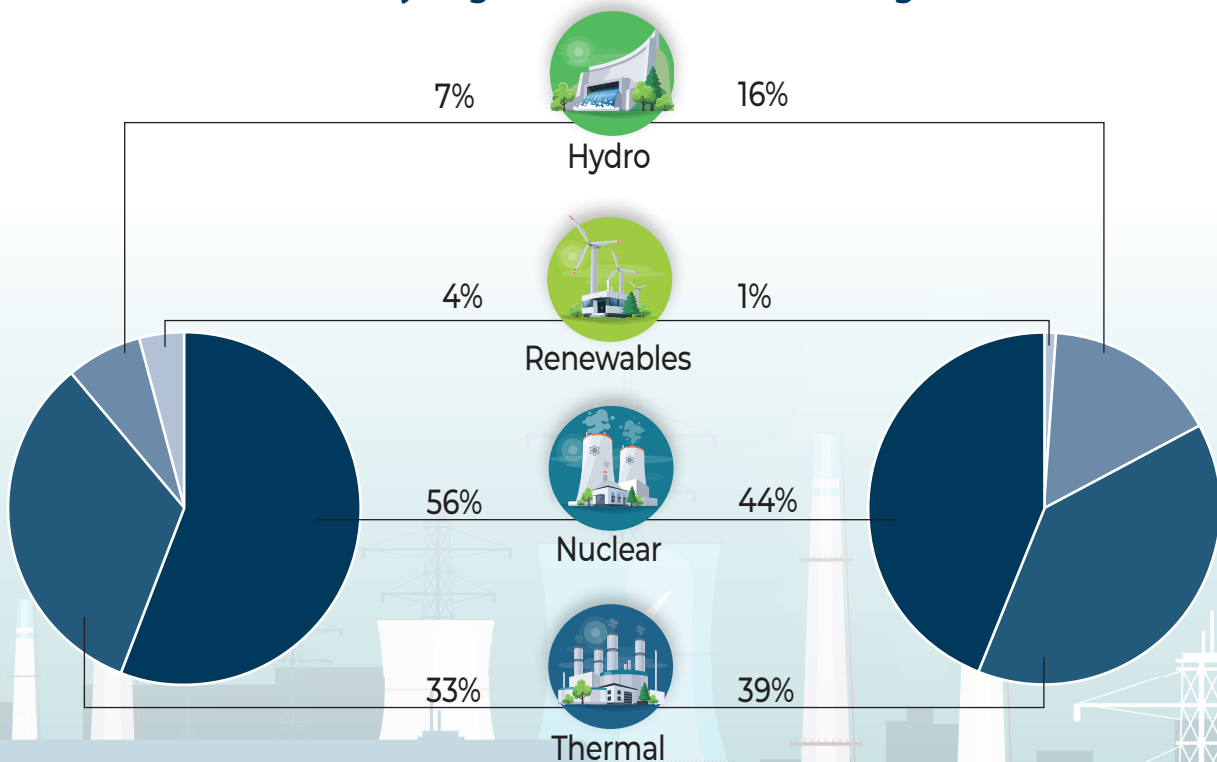
Drop in electricity consumption in Ukraine compared to pre-war period, regardless of temperature difference

**Consumption.** Electricity consumption in Ukraine has dropped by 40% since the start of the Russian invasion. This drop is a reflection of the contraction in business activity in the country. For example, the National Bank of Ukraine estimated a 50% drop in GDP compared to the pre-war period that is close to the electricity consumption performance.

**Energy system.** On the first day of the Russian invasion, Ukraine disconnected from the energy system of Russia and Belarus. And despite the hostilities, the power system remains stable. Largely, it's facilitated by reduced volumes of consumption. For the stability of the power system in the future, Ukraine has applied for emergency synchronization with the European ENTSO-E system, that should be done till 14th of March. It gives additional 2 GWt of power, compared to 13.7 GWt at the peak consumption of 4th of March. Thus, Ukraine is no longer dependent on the energy system of Russia and Belarus.

Energy generation structure  
January avg.

Energy generation structure  
March avg.



Continued on page 8

**STOP THE WAR**



**Energy generation.** Generation volumes in Ukraine decreased in all areas of the energy sector with some changes in the structure. For example, share of thermal generation grew by 6% and share of nuclear generation fell by 12%.

**Thermal power plants.** There is a problem with the transportation of coal to thermal power plants located in combat areas. For example, Zmiivska thermal power plant, Slovianska thermal power plant and Uglegorska thermal power plant. The Ministry of Energy has authorized the use of gas to generate electricity in the event of a shortage of coal. At the same time all coal mines in Ukraine operate at their maximum capacities. Other thermal power plants have sufficient coal reserves.

**Nuclear power plants.** Nuclear power plants generation volumes decreased by 52%. A particular risk is that the aggressor try to take control under nuclear power plants. For

example, Russian military forces captured the Chernobyl nuclear power plant. Active battles are taking place in the areas of nuclear power plant in Zaporizhzhia. This is the first case in the history of mankind when military actions take place near nuclear power plants, that threaten an ecological catastrophe around the world. That's why Ukrainian energy companies ask NATO and other partners to close the sky under such objects.

**Losses.** Objects of critical infrastructure, incl. energy generation plants are among the main targets of the aggressor. Okhtyrsk combined heat and power plant was destroyed as a result of shelling by the aggressor. Kakhovska hydroelectric power station was captured in the first days of invasion. The aggressor's control over the dams poses a risk of man-made disasters in the regions. Also two thermal power plants Zaporizhzhia and Luhansk was captured and five located in regions of active hostilities.

### Energy generation facilities under the control of the aggressor forces\*



Chernobyl nuclear power plant



Zaporizhzhia thermal power plant

Luhansk thermal power plant

\* As of 07.03.2022

### Energy generation facilities located in regions of active hostilities\*



Zaporizhzhia nuclear power plant



Kyiv hydroelectric power station

Kakhovska hydroelectric power station



Chernihiv combined heat and power plant

Kherson combined heat and power plant

Kharkiv 2, 3, 5 combined heat and power plant

**STOP THE WAR**

# Ukrainian seaports STOPPED CARGO TRANSSHIPMENT

## 420

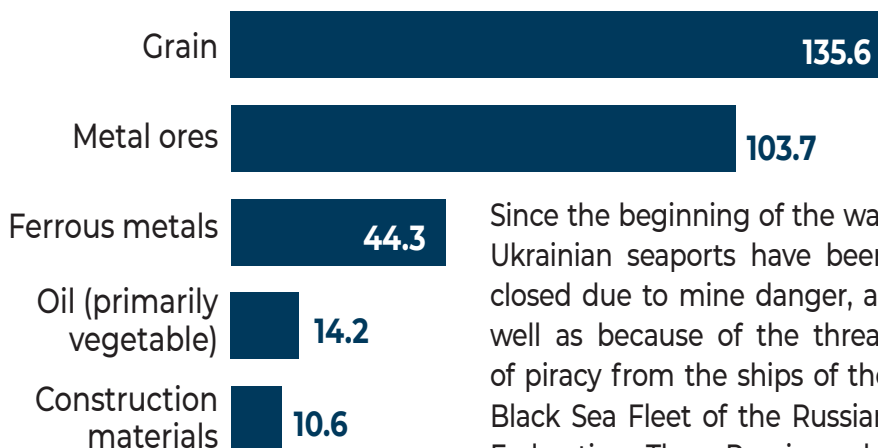
thousand tons

of cargoes do not transship at Ukrainian seaports for every day of war, including 1,666 containers

## 77.1%

of transshipped cargoes at Ukrainian seaports were for export in 2021

### TOP-5 cargoes by transshipped volumes at Ukrainian seaports in 2021, thousands tons daily



Data source: Ukrainian Sea Ports Authority

### Map of Ukrainian seaports



ports which are controlled by Russian army or located near active hostilities



ports which are controlled by the Russian Federation after the annexation of Crimea

Since the beginning of the war Ukrainian seaports have been closed due to mine danger, as well as because of the threat of piracy from the ships of the Black Sea Fleet of the Russian Federation. Thus, Russia seeks to deprive Ukraine of its export potential. Currently, export shipments are carried out only by Ukrainian railway, which is overloaded and cannot complete all shipments on time.

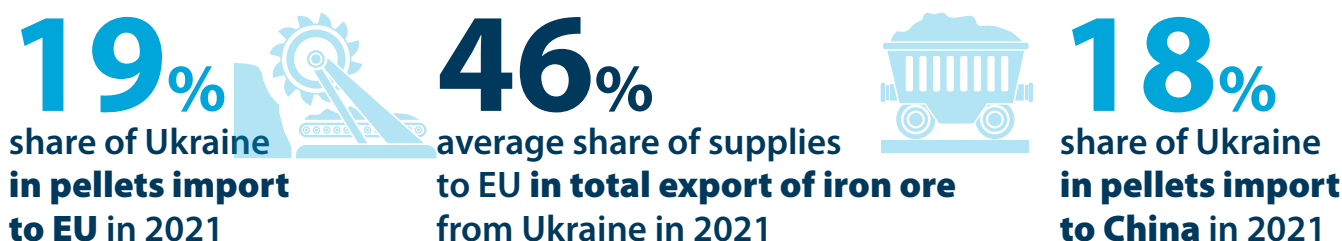
Stoppage of Ukrainian ports leads to disruptions in supply chains and threatens global food security. While in the transshipped cargo volumes of Ukrainian seaports the average share of export is 77.1%, the same indicator for specific products is higher, for example, grain – 95.6%, ferrous metals – 94.7%, oil (primarily vegetable) – 90.2%.

According to mass-media, there are no critical damages to the port infrastructure in the seaports of Ukraine now. In case of damages, which are highly possible, ability to export products will be reduced even after ending hostilities. Ukraine cannot export products without seaports.

## STOP THE WAR

# Ukrainian iron ore companies work WITH LOWER UTILIZATION

Date of preparation:  
10.03.2022



Ukrainian iron ore producers continue to work with a reduced utilization rates. The only way to supply their products is shipments to Europe by rail, when the Russian Navy is blocking Ukrainian ports in Black Sea. For example, Ferrexpo, which is one of the TOP-3 largest exporters of pellets globally, has declared force majeure on seaborne supplies, while at the same time continuing to deliver to Europe.

The share of the EU and other European countries in iron ore exports from Ukraine was 46% in 2021. In other words, the average capacity utilization of local companies could be about 50% from pre-war period. According to some companies, their utilization is 50-75%. This may indicate the desire of companies to increase stocks, counting on the solution of the problem with transport.

Transportation by rail is the bottleneck in Ukraine now. This factor limits the possibility of increasing production with the subsequent export of iron ore to other regions through the European ports.

8 of 10 iron ore plants in Ukraine located in Kryvyi Rih in Dnipropetrovsk region, 1 in Poltava region (both Poltava and Yeristovo mining) and 1 in Zaporizhzhia region. Almost all enterprises of the iron ore industry of Ukraine continue their work. But there are few exceptions. The first one is ArcelorMittal Kryvyi Rih, which

facilities aimed at meeting their own needs for raw materials, and not for export. There is no data on the work of Zaporizhzhia iron ore plant, which is located in the area of active hostilities.

The continued operations of iron ore companies are very important for the Ukrainian economy, as they provided about 54 thousand jobs, 3.2% of GDP and about 10% of exports of goods from Ukraine.

Ukrainian iron ore companies accounted for 19% of pellet imports to the EU in 2021. At the moment, these deliveries are not under threat, European enterprises have no problems with the supply.

The share of Ukrainian iron ore on the Chinese market is minor - about 2%. But on the pellets market it's significant - 18%. And these deliveries were disrupted. Given that the cessation of supplies of cast iron and steel semi-finished products from Ukraine and Russia led to an increase in demand for Chinese rolled products. In other words, there is again a gap between supply and demand for iron ore in China. The rise in global prices for rolled products allows steel producers to accept the rise in prices for iron ore offered from Australia and Brazil. Prices for Fe62% iron ore in China have increased by 15% since the beginning of the Russian invasion to Ukraine and reached \$160 as of March 09th.

**STOP THE WAR**



# Rail cargo shipments in Ukraine

## DECREASED BY ALMOST 70%

Date of preparation:  
14.03.2022

Rail cargo shipments during first 9 days of March in Ukraine has fallen by almost 70% y-o-y, according to national rail operator Ukrzaliznytsia. Approximately the same rate of decline in both domestic transportation and export-import. The structure of transported goods has changed significantly.

The share of coal has risen as thermal power plants build up stocks. The share of iron ore remained at the same level, as it is the only mass export commodity at the moment. The export of ferrous metals has ceased, as all plants have been put into idle mode. The share of oil and oil products increased when the supply routes changed from Russia and Belarus to Poland and other neighboring European countries.

The role of Ukrzaliznytsia is extremely high in ensuring security and economic development in wartime.

First of all, Ukrzaliznytsia transported more than 2 million refugees. Transportation of passengers by rail today is the safest mode of transport in Ukraine.

Also, the rail shipments become the only export opportunity for Ukraine when Russian warships block supplies across the Black Sea. For example, iron ore companies work with 50% utilization

# -69.2%

Drop in rail cargo shipments in first 9 days of March compared to previous year

because of the inability to transport a larger volume of products in the direction of European ports.

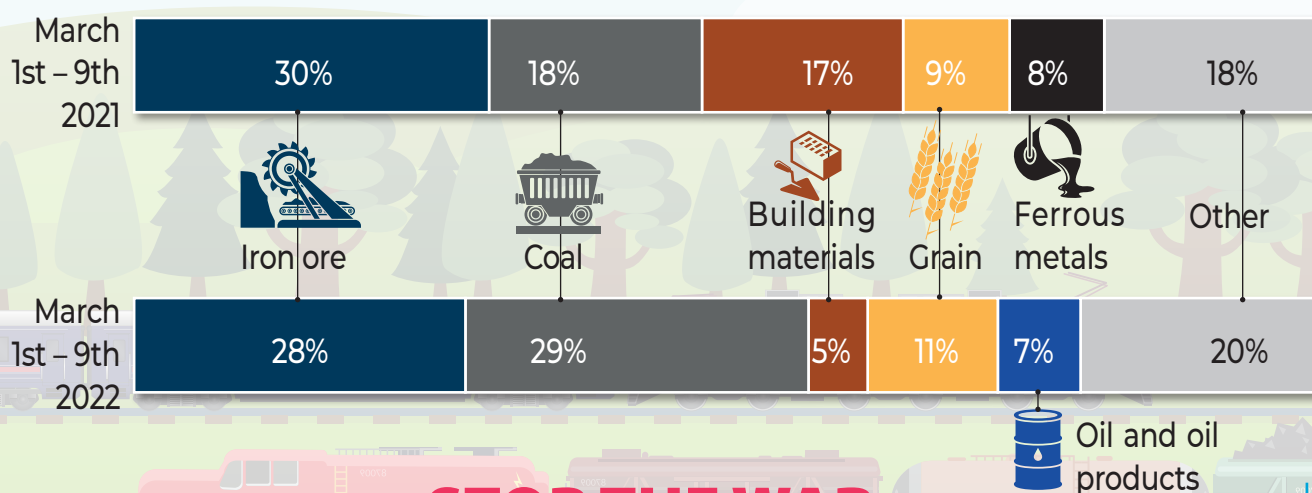
The export of agricultural products was blocked; before the war, 95% was exported through seaports.

The problem here is the low capacity of border crossings with the EU and different gauges in Ukraine and in European countries. To solve this problem, Ukrzaliznytsia plans to double the capacity of border crossings to increase export deliveries.

The company has also developed routes for the delivery of goods to the EU borders with subsequent reloading into European standard wagons and asks businesses to assist in organizing such reloading points.

It is also expected that the fuel shortage in Ukraine will be resolved through imports from the EU by rail.

### Rail shipments by type of cargo



**STOP THE WAR**

# Ukrainian pharmaceutical industry is trying to maintain drug supply

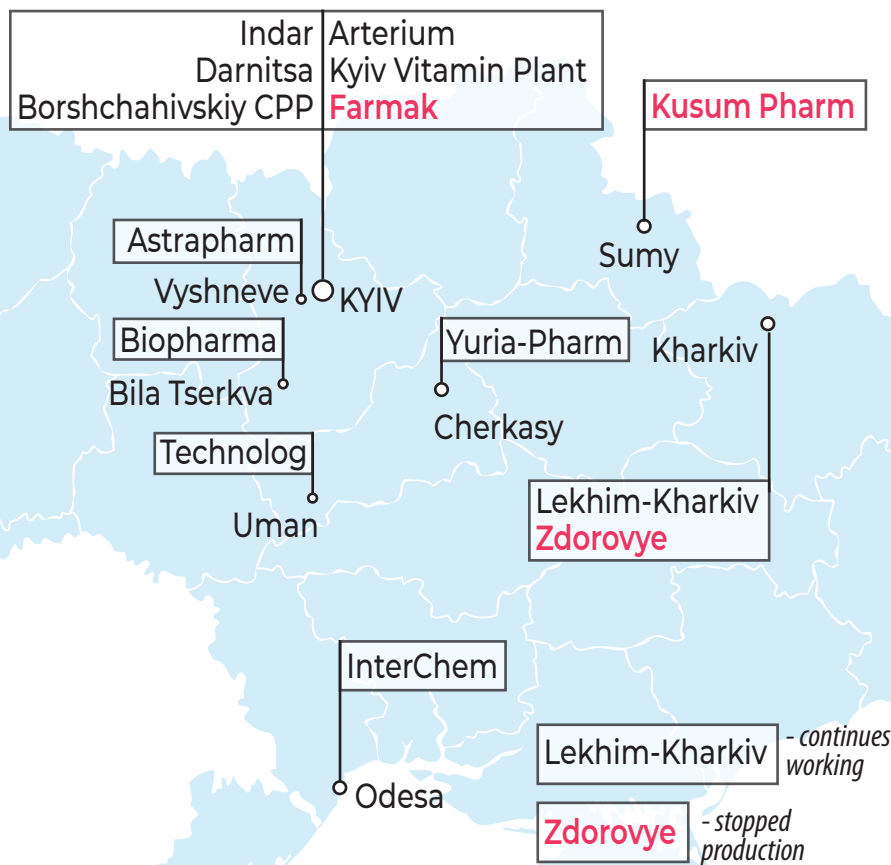
Date of preparation:  
16.03.2022

**+56.7% y-o-y**  
average daily growth of pharmacy drug sales in packs from 24.02.2022 to 08.03.2022 in Ukraine



**69%**  
the share of Ukrainian pharmaceutical manufacturers in pharmacy sales in Ukraine in packs (2020)

## Status of Ukrainian pharmaceutical plants (as of 15.03.2022)



### Companies, which status is unknown:

Fitoform (Bahmut, Donetsk obl.), Viola (Zaporizhzhia), Lubnyfarm (Lybny, Poltavsk obl.), Monfarm (Monastyrishche, Cherkaska obl.), Sperko (Vinnytsya), Infuzia (Vinnytsya), Liktravy (Zhytomyr), Vishpha (Stanyshivka, Zhytomyrska obl.), Orisil-Pharm (Lviv), Novofarm-Biosynthesis (Novograd-Volynskyi, Zhytomyrska obl.).

Data source: company's web-sites, data received from pharmaceutical market participants

Since the war beginning drug demand has increased significantly. According to survey of Proxima Research, from 24.02.2022 to 08.03.2022 daily drug sales in packs rose by 56.7% y-o-y in average, while daily drug sales in monetary terms increased by 65.4% y-o-y in average.

According to our estimations, at least 50% of Ukrainian pharmaceutical plants continue working. But they face with difficulties connected to hostilities (for example, disruptions in supply chains, destruction of warehouses, lack of freight transport, threat to the lives of employees).

Many pharmacies in Ukraine are closed, so it is very difficult to deliver medicines to the end consumer. There is a shortage of some foreign-made medicines as the warehouses of international pharmaceutical companies remain closed.

Now Ukrainian pharmaceutical plants are trying to supply produced drugs at domestic market. But it is uncertain how long Ukrainian pharmaceutical plants will be able to work. Although in 2020 Ukrainian pharmaceutical manufacturers supplied 69% of drugs (in terms of packs) domestically, in the future it will be necessary to increase foreign supplies of medicines to Ukraine.

# UKRAINE DECREASED natural gas production by 17.3%

Date of preparation:  
19.03.2022

## -17.3%

decrease of daily natural gas  
production in Ukraine  
from 23.02.2022 to 15.03.2022

## -13.0%

decrease of average daily gas con-  
sumption in Ukraine (March 2022  
compared to March 2020-2021)

Ukrainian gas companies reduced daily production by 17.3%, since the war beginning. As a result of Russian missile attack a gas treatment plant at the Shebelinka gas field is damaged, that caused a decrease in production by the state-owned company «Ukrgezvydobuvannya» by 8%. Private companies reduced production by 24.7% over the same period.

Production is expected to fall further. Gas companies often don't have possibilities to realize well workover and flow-rate intensification measures due to hostilities. Gas production in Ukraine mainly is carried out at wells that are at the end of their life cycle. It may not be economically viable to restore production from such wells after they have been conserved if hostilities drag on. But, the state operator «Naftogaz of Ukraine» continues drilling in safe areas, despite the hostilities, according to the head of the company.

The shutdown of gas processing plants and LPG production led to overstocking of liquefied gas and oil depots. That's important because liquefied gas and oil are concomitants of natural gas production.

Also, Ukrainian gas companies faced with a lack of methanol, which is necessary for gas production. Methanol previously was imported from Russia and Belarus. Now companies are trying to begin methanol supplies from the EU.

Damage to the gas production infrastructure (gas treatment plants, gas pipelines, storage facilities),

as a result of hostilities, may lead to a significant decrease in gas production. These are objects of high danger, and their damage can create environmental catastrophe.

Daily gas consumption in Ukraine decreased by 13% y-o-y. For example, large industrial enterprises reduced daily gas consumption by 84%. At the same time, residual sector reduced consumption by only 4%. It caused by low temperatures at the beginning of the March and the increase in the number of refugees from cities to private houses with gas heating. Seasonal rise in temperatures should reduce residual gas consumption. So, decrease in production should be offset by even greater decline in consumption.

Export of natural gas from Ukraine is temporary banned. Gas import to Ukraine continues in 3 directions - from Hungary, Slovakia, Poland. Import covers about 10% of domestic gas consumption, production – about 50%. Other provided from gas storing facilities, where inventories are 11% higher than 2015-2018 average. In 2021 domestic needs in gas were met by gas produced in Ukraine by 73.9%. So, the gas supply in Ukraine is stable.

In the future, Ukraine could become a gas exporter and partially replace Russian gas supplies to the EU. Discovered booked reserves of natural gas in Ukraine are 778 bln m<sup>3</sup>. Undiscovered resources of natural gas are estimated at 4.4 trln m<sup>3</sup>. It's a matter of CAPEX in exploration works.

## STOP THE WAR



# Ukraine needs **ADDITIONAL SUPPLIES** **OF FERTILIZERS**

Date of preparation:  
22.03.2022

# 84%

the level of provision of agricultural companies in Ukraine with fertilizers for the sowing season 2022



# 617

thousand tons  
of complex fertilizers  
were imported to Ukraine  
from Belarus in 2021

The war poses a big threat to producers of fertilizer as such plants work with explosive and toxic materials. Many Ukrainian producers of fertilizer located in the regions of active hostilities.

In particular, Sumykhimprom was shelled, which caused an ammonia leak. Severodonetsk Azot (15.3% of nitrogen fertilizer capacities in Ukraine) is on the line of fire near uncontrolled territories and it is not working. Odessa port plant (14.4% of the nitrogen fertilizer capacities) was stopped in the beginning of the war. Rivneazot is located in a potentially dangerous area where missile attacks are possible.

We assume that most of the fertilizer capacities has already been suspended due to both the danger of hostilities and problems with the supply of raw materials. The resumption of production will depend on the timing of the war end and the nature of the damage received.

In the structure of consumption, nitrogen fertilizers are in first place in Ukraine (66% in 2020). The capacities of Ukrainian producers allow us to fully meet the needs of the domestic market for nitrogen fertilizers, in particular, due to increasing production at existing capacities and export restrictions. In 2021 consumption of nitrogen fertilizers in Ukraine reached 4.75 million tonnes. The export of nitrogen fertilizers in 2021 (1.63 million tons) is almost equivalent to the volume of their imports (1.58 million tons) in Ukraine.

Globally restrictions on the export of fertilizers are widely used. For example, in China, where licensing of fertilizer exports has been introduced and, in fact, only ammonium sulfate can be exported. Similar

restrictions have been introduced in Turkey. In Egypt and the Russian Federation, fertilizer export quotas are applied. On March 12, 2022, Ukraine introduced fertilizer export ban to maintain market balance during the war.

Almost 45% of Ukrainian nitrogen fertilizer exports were to the EU in 2021. The biggest importers of Ukrainian nitrogen fertilizers were Romania (190 thousand tonnes), Italy (138 thousand tonnes), France (104 thousand tonnes), Hungary (88 thousand tonnes), Spain (56 thousand tonnes), Bulgaria (50 thousand tonnes), Poland (40 thousand tonnes). So, EU countries will need supply nitrogen fertilizers from other sources.

Due to the launch of the land market in Ukraine, the demand for nitrogen fertilizers is also growing, because farmers apply more fertilizer to the land which belongs to them. Before the war, it was predicted that the consumption of nitrogen fertilizers would increase by 15-25% by 2025 in Ukraine. In the future, restrictions on the export of fertilizers are also possible in Ukraine in order to meet the needs of the domestic market.

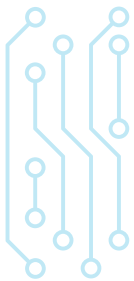
In the second place in terms of use are complex fertilizers (31% of consumption in Ukraine in 2020). In Ukraine, the production of complex fertilizers is underdeveloped. In 2021 1.9 mln tonnes of complex fertilizers were imported in Ukraine. The biggest source of importing complex fertilizers is Belarus. In 2021, 617 thousand tonnes of were imported from this country. It is 32.1% of the total imports of complex fertilizers. So, Ukraine will need to find alternative sources of imports to substitute imports from Belarus.

## STOP THE WAR



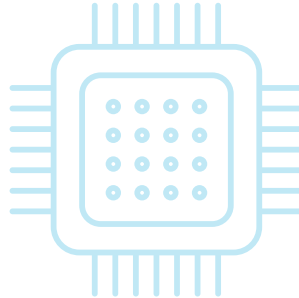
# War exacerbates GLOBAL CHIP SHORTAGE

Date of preparation:  
02.04.2022



## 70%

of neon gas is supplied  
by Ukraine globally



## 40%

of krypton gas is supplied  
by Ukraine globally

Ukraine is the world's largest producer of noble gases including neon, krypton and xenon. All three are critical to semiconductor manufacturing, especially high-end chips. Gas mixtures with neon, krypton and xenon are used to power lasers for photolithography (the process of etching circuits into silicon wafers).

According to market estimates, Ukraine supplies about 70% of the world's neon gas and 40% of the world's krypton gas. Moreover, Ukraine supplies 90% of the highly purified, semiconductor-grade neon for chip production in USA.

Neon, krypton and xenon are all byproducts of the air separation plants that produce oxygen for large steel mills. Gas suppliers like Linde and Air Liquide buy inert gases, purify and liquefy them to get finished product which can be supplied to global chipmakers.

According to Reuters, from 45% to 54% of the world's semiconductor-grade neon comes from two Ukrainian companies, Ingas and Cryoin. Both closed production operations after the start of the war.

Ingas is based in Mariupol. Before the war it produces from 15,000 to 20,000 cubic meters of neon per month.

Cryoin is located in Odessa. The plant produces from 10,000 to 15,000 cubic meters of neon per month.

The possibility of production resume will depend on the state of the steel plants after the end of hostilities. Before the war Ukrainian gas supplier also use neon from Russian steelmakers. Continuing this cooperation in the future is unlikely.

Theoretically it is possible to launch neon production elsewhere, outside Ukraine, but there are several problems. Neon has to be refined to a 99.99 percent purity. Only few companies in the world can receive such quality. It would take nine months to two years to scale up production. Additional issue is product certification that could take several months or even more than half a year.

Interruption in the supply of noble gases has already disrupted the production of high-technology goods, including automobiles. For example, Volkswagen closed two factories in Germany for several days after the Russian invasion.

It is not possible to accurately assess the short-term consequences of disrupting supply chains, because the market of noble gases is not transparent. Market observers assume that large chipmakers have sufficient reserves of inert gases, while small producers are under pressure.

The major risk is the prolongation of the war in Ukraine. In this case forecast for world chip production is unfavorable.



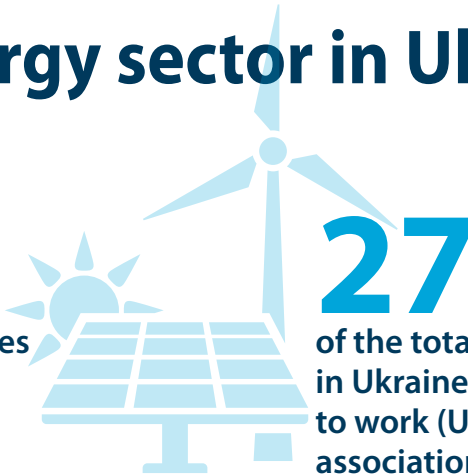
# Renewable energy sector in Ukraine

## IS DAMAGED

Date of preparation:  
03.04.2022

# 47%

of the renewable energy capacities is located in the regions of active hostilities (European-Ukrainian Energy Agency)



# 27%

of the total installed wind capacity in Ukraine is continuing to work (Ukrainian wind energy association)

As of the end 2021, Ukraine had 9.7 GWt of renewable energy capacities, from which 78.6% are solar stations and 17.3% are wind farms. Other capacities refer to biomass, biogas, and small hydro stations.

The war threatened the operation of power plants. Many Ukrainian solar and wind stations are located in the southern regions, which were most heavily attacked by Russian troops. Wind turbines, solar panels, power lines, electrical equipment of power plants are systematically destroyed. Russian soldiers steal power plant equipment.

According to estimations of Ukrainian wind energy association, only 27% of the total installed wind capacity in Ukraine is generating electricity, others are out of operation due to damaged transformer substations and overhead power lines.

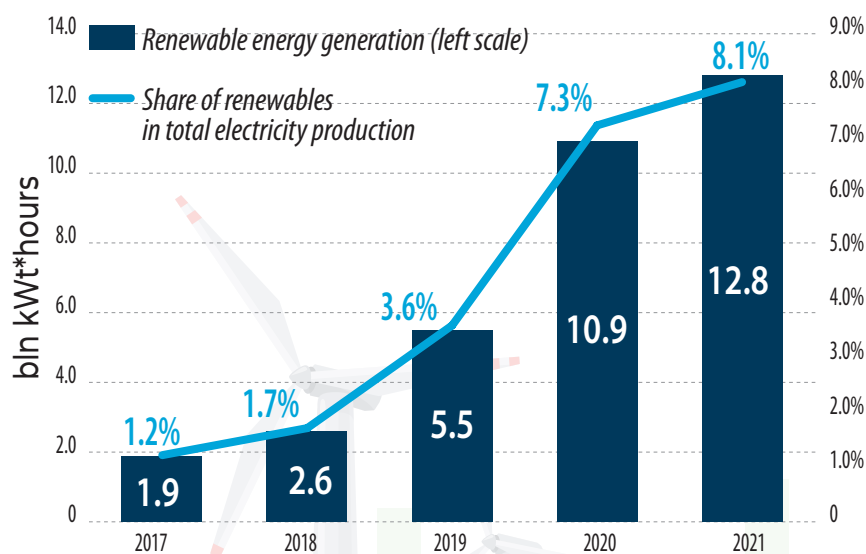
According to estimations of European-Ukrainian Energy Agency, as of March 10, 37% of ground, 35% of roof / facade solar power plants, 29% of biogas plants, 16% of small hydropower plants, 48% of biomass stations were in areas of active hostilities. In general, 47% of the renewable energy capacities were located in the regions of active hostilities.

The separate problem is technical maintenance of renewable plants since all foreign specialists left Ukraine because of hostilities. Currently Ukrainian plant operators and dispatchers are doing their best to resolve technical issues by themselves.

Before the war, renewable energy was actively developing sector in Ukraine. Renewable energy generation increased by more than 6 times from 2017 to 2021. In 2021 renewable plants generated 8.1% of total electricity in Ukraine.

By destroying renewable power plants, the war threatens the green energy transition and energy security of Ukraine.

## Renewable energy sector in Ukraine in 2017-2021

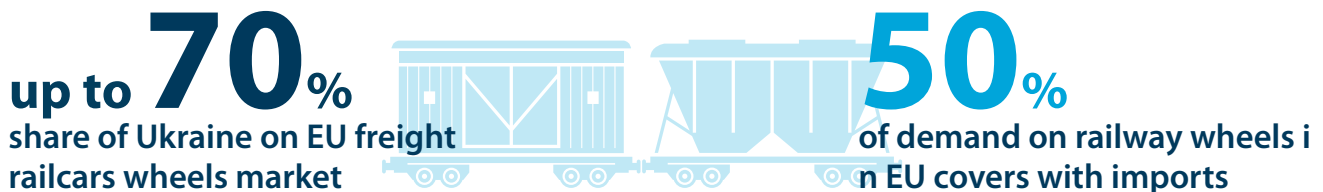


Data source: Ukrenergo, Ministry of Energy of Ukraine



# The European market of railway wheels is in short **WITHOUT SUPPLIES FROM UKRAINE**

Date of preparation:  
03.04.2022

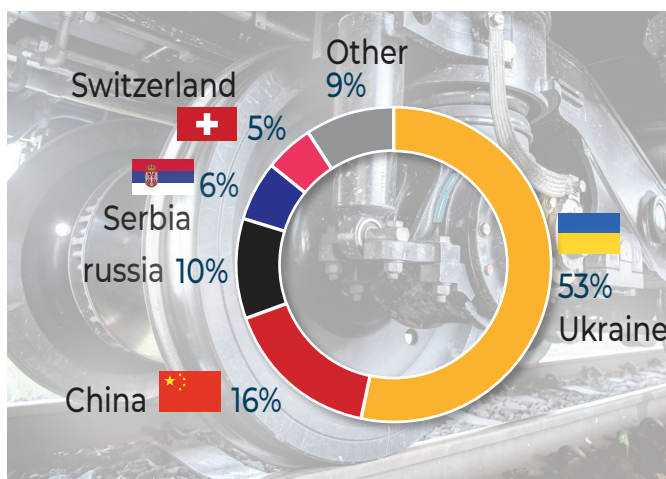


The war in Ukraine has jeopardized the market for railway wheels and wheelsets in the EU, which are the main part of the chassis of railcars in their manufacture and repair.

About 50% of the market in EU is covered by imports. To a greater extent, this applies to wheels for freight railcars. The share of Ukraine is up to 70% in this segment. In the segment of passenger cars, European plants can supply the market themselves.

The Ukrainian industrial company Interpipe is the only manufacturer of railway wheels in Ukraine and one of the largest exporters in the world. Today, Interpipe doesn't produce steel due to disruptions in transport and lack of personnel. The production chain of railway wheels in Ukraine was broken.

## Shares in railway wheels import to EU in 2020



Since Interpipe is the EU market leader in the freight railcars segment, the lack of supply introduces a serious imbalance on the market. Supply of railway wheels is highly concentrated. There are about 20 factories worldwide. Other suppliers are unable to fill this gap in the supply.

China is also a major supplier of railway wheels to the EU. But Chinese manufacturers offer cast wheels for export. In some countries, the use of cast wheels is prohibited for safety reasons. Another disadvantage is that in Europe there is a high demand for wheelsets, which is the next production stage after wheels manufacturing, and Chinese suppliers do not offer that type of product.

The Turkish Kardemir has just started to enter the EU market and is undergoing lengthy certification procedures.

Only Russian suppliers have reserves to cover the shortage of wheels in the EU. However, there is a dilemma of values here. It was the Russian invasion of Ukraine that created opportunities for Russian companies. Ukraine calls at all levels to stop buying Russian products.

In the short term, the demand for wheels in EU will be difficult to close. Rising prices will reduce the ability to produce and repair railcars. Railway development projects have been central to the green energy transition of the transport sector in EU. So this is another blow to the EU's green deal.

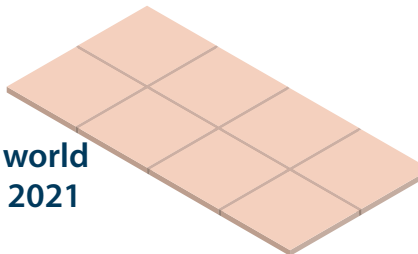
**STOP THE WAR**

# WAR DISRUPTED ceramic clays supplies from Ukraine

Date of preparation:  
19.04.2022

## 3.6%

share of Ukraine in the world production of kaolin in 2021 (according to USGS)



## 7.9%

share of Ukraine in global export of kaolin and other kaolinic clays in 2020 (according to UN Comtrade)

Ukraine is one of the world's leading suppliers of high-quality ceramic clays. In 2021, according to USGS, Ukraine produced 1.6 mln tons of kaolin (white clay). It is 3.6% of the world kaolin production. According to estimations of Industrial Mineral Forums & Research, total ball clay production in Ukraine is 4 mln tons.

Most deposits of ceramic clays are concentrated in Donetsk region, where active hostilities take place now. Ball clays from the Donetsk region are highly suitable for porcelain tile production as they exhibit high plasticity, high whiteness, and low water absorption after firing.

The leading Ukrainian producer of clays is VESCO Group, part of UMG Investments. This company

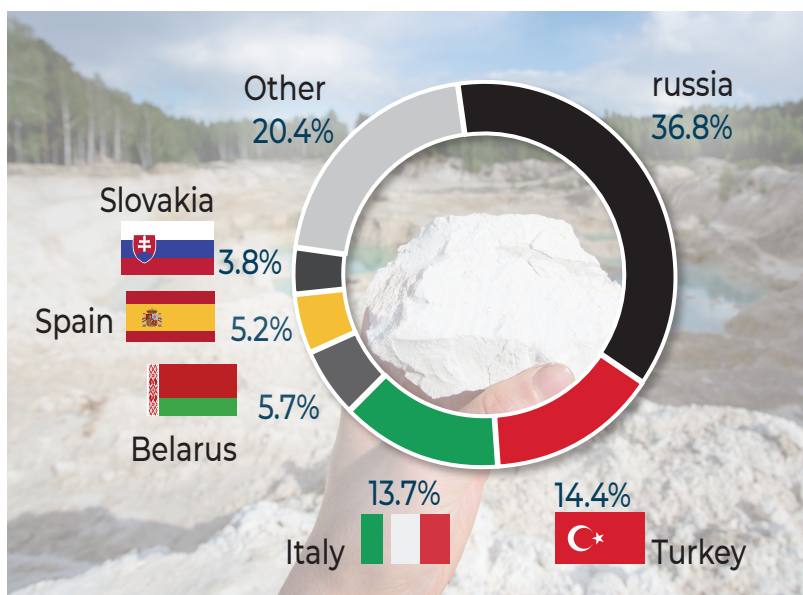
sold 2.4 mln tons of clay in 2020. VESCO exported about 84% of its clay to 18 countries. The largest consumers were ceramic tile manufacturers in Spain, accounting for over 26% of all sales.

Some of European leading mineral groups have also established operating subsidiaries in Ukrainian clay sector, such as Sibelco, Imerys, AKW. For example, Sibelco subsidiary Donbas Clays PJSC produces 1.3 mln tons of high-quality plastic clays annually from three mines at Mertsalovo (Donetsk region).

In general, Ukraine exported 64.1% of kaolin produced domestically in 2021. Top-consumers include ceramic tile manufacturers from Italy and Spain. In recent years, Spanish ceramic manufacturers have switched from using red clays (locally produced) to white clays (mostly imported). According to Industrial Mineral Forums & Research, 70% of required white ball clays in Spain were imported from Ukraine.

According to Industrial Mineral Forums & Research, Spanish ceramic producers have three months' worth of Ukrainian clay in stock. After running out of stock Spanish ceramic producers will have to modify formulations to reduce dependency on Ukrainian clays, but it will be extremely challenging given high quality of Ukrainian clays. Ukraine will be able to resume supplies of ball clays after the end of the war if control over territories with clay deposits is maintained by Ukrainian authorities.

## Kaolin export from Ukraine by country in 2021



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