Razumkov centre

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MATRA Programme

GLOBAL ENERGY MARKET OUTLOOK IN 2022

Analytical Report
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COAL

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For the global coal market, 2022 was marked by a significant increase in trade volumes. Although in Q1 global shipments decreased by 4.8% to 257.4 million tonnes, in the second quarter, coal sales increased by 8.5%, reaching 313.8 million tonnes. Sales continued to grow in the second half of the year, with approximately 317 million tonnes shipped in Q3-4, up 13% year-on-year.

Half of the coal products were transported by sea. So, in 12 months of 2022, global seaborne coal shipments increased by 5.9% compared to the same period in 2021 and exceeded 1,204.9 million tonnes (excluding short sea shipping). However, this figure is still below the record-breaking 2019 results of 1,275.6 million tonnes.

Along with the growing shipment volumes, the global coal market has changed its logistics routes. For example, in 2022, exports from Indonesia increased by 21% year-on-year, while exports from Australia decreased by 5%. Seaborne coal imports to the EU increased by 34%, while imports to India increased by 14% and imports to China decreased by 3% amid declining demand and increased domestic production.

By the end of 2022, Indonesia remained the leader among coal exporting countries, maintaining its share in the global market at 32% or 388.9 million tonnes. China remains the leader among coal importing countries, having purchased 36.9% of the world's coal production in the reporting year.

In 2023, the structural transformation of the global coal market will continue, with the epicentre of trade flows shifting from the Atlantic to the Asia-Pacific economic region, which already accounted for almost 80% of international coal trade in 2022.

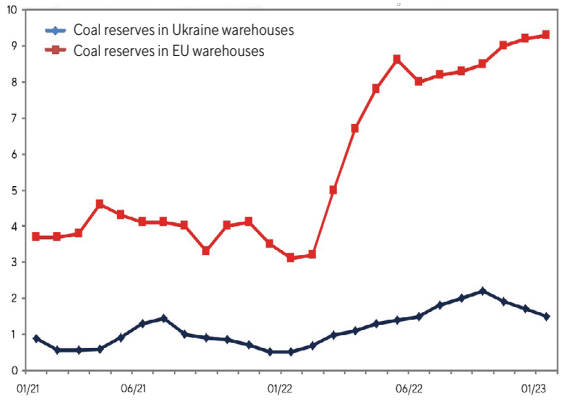
Such a transformation of the global coal market will continue to create additional problems for the Russian Federation in terms of transporting products from mining regions to Far East seaports due to the limited capacity of their railway infrastructure. This became particularly painful for Russia in August 2022, when the EU imposed sanctions on Russian coal supplies. Thus, the European market, which accounted for 23% of total coal exports, was closed to the aggressor state. As a result, Russia reduced its coal exports by 7.6% by the end of 2022.

China became the largest buyer of Russian coal in 2022, increasing imports by 31% to 69.5 million tonnes. Sales could have been much higher if Beijing had not imposed coronavirus restrictions. Meanwhile, India's imports of Russian coal increased by more than 20 times to 21.8 million tonnes, as in 2022 it began purchasing significant volumes of thermal coal from Russia for the first time.

Despite the decline in shipments, Russian exporters made super-profits due to the artificially provoked price panic that peaked in Q2-3, when coal prices reached record highs of $450 per tonne.

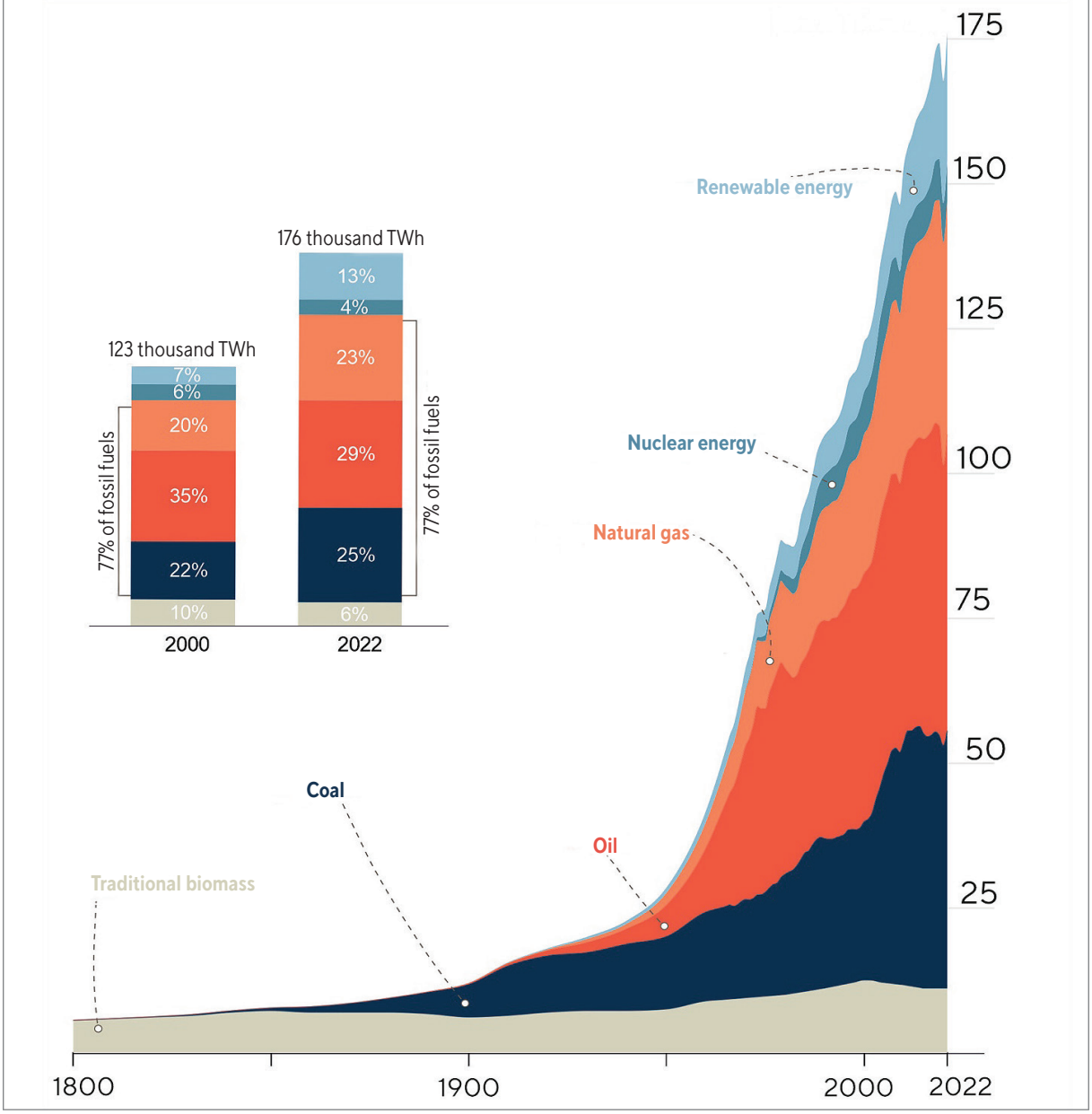
Despite Russia's withdrawal from the European market, no changes were observed in coal supply: the average amount of coal stored in warehouses was about 8 million tonnes, which is 20% higher than the average for the last five years.

DYNAMICS OF COAL RESERVES IN UKRAINE AND EU WAREHOUSES, million tonnes



Despite Russia's unprovoked full-scale aggression, Ukraine managed to double its coal stocks in Q2 of 2022 and bring them to 1.35 million tonnes. This achievement is unprecedented for three reasons. First, the main source of Ukraine's coal — own production — has reduced by about 30% since the beginning of the year. Second, contacts and control over two state-owned mines were lost. And Third, the logistics hubs for coal shipments were and still are under constant shelling. The Ukrainian government's decision to ban the export of coal products was timely, allowing the country to successfully pass the 2022-2023 heating season with reserves exceeding 1.1 million tonnes.

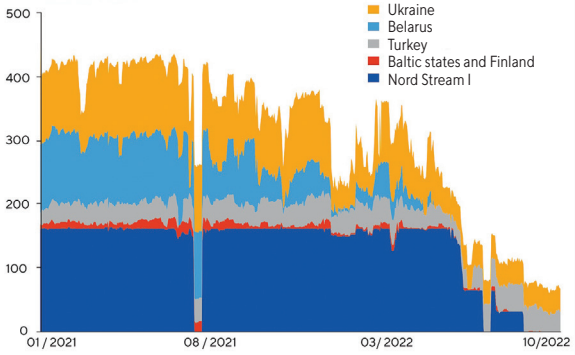
SHARE OF FOSSIL FUELS IN GLOBAL CONSUMPTION, thousand TWh



NATURAL GAS

In the context of the EU gas market, 2022 consolidated the so-called European solidarity, which enabled the most responsible approach to the heating season due to a significant decrease in demand for natural gas (up to 56% in some countries); increased manoeuvrability in natural gas supplies (LNG terminal utilisation in Q3-4 reached 80%) and the accumulation of maximum volumes of gas in storage facilities (90% capacity utilisation). All of this helped to overcome the price shock on the spot market and stabilise the indicative price of natural gas in the EU at $900/tcm in Q4 of year under review.

DYNAMICS OF DAILY SUPPLY OF RUSSIAN GAS TO THE EU MARKET, mcm/day

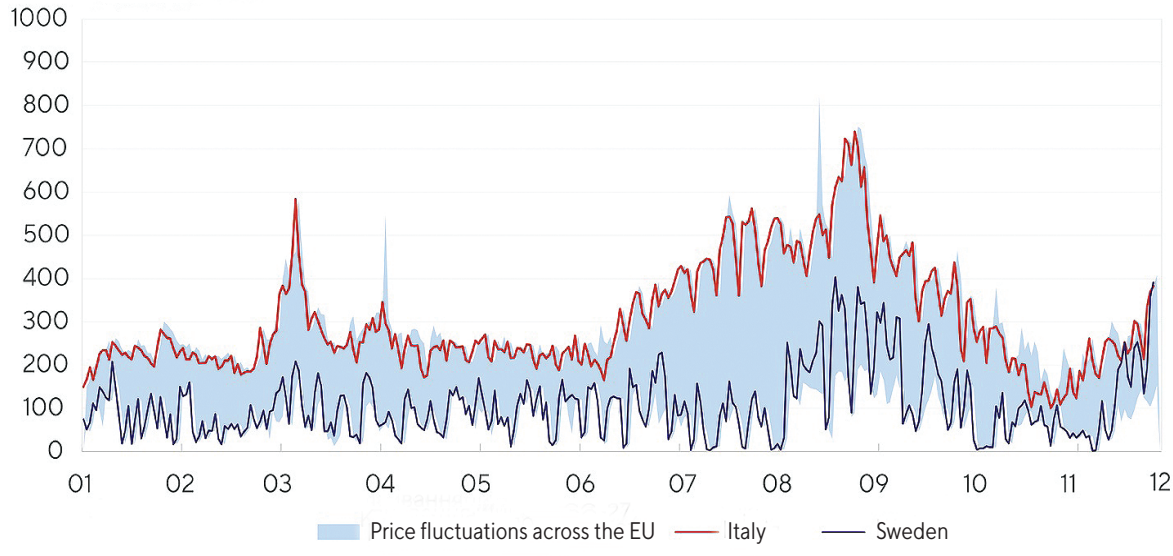


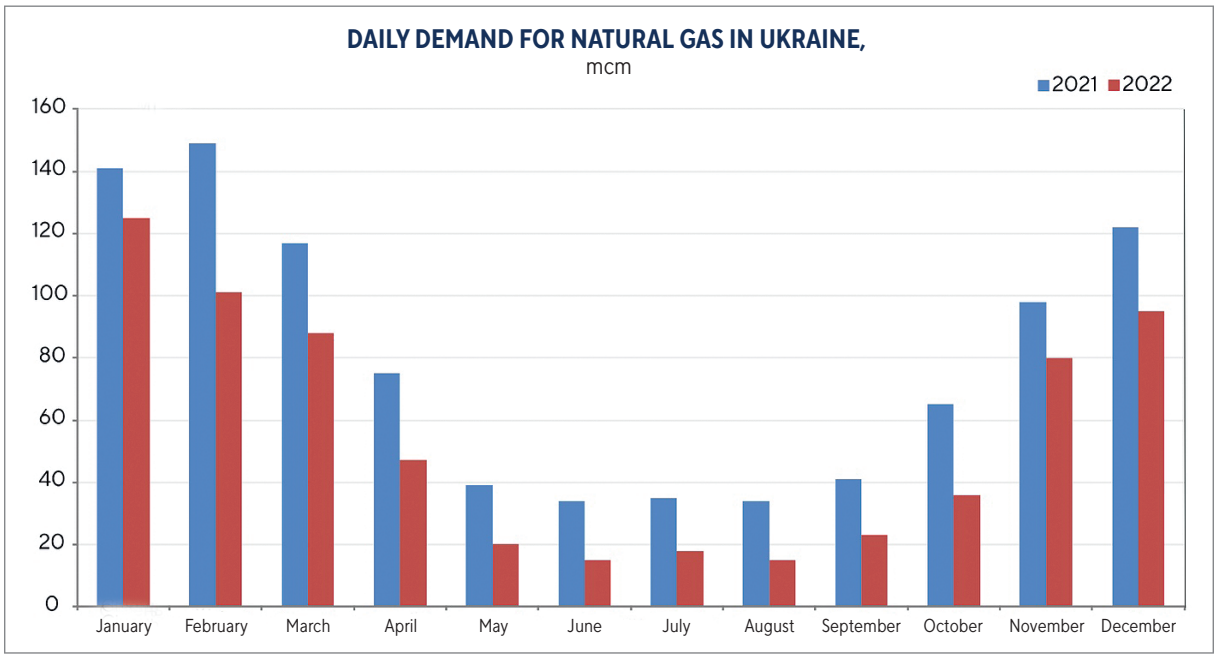
The past year was a period when the Russian gas industry saw the trend of increasing natural gas production breaking down. According to the 2022 results, the aggressor state produced 672 bcm, which is 11.8% less than the previous year's historical record of 762.3 bcm.

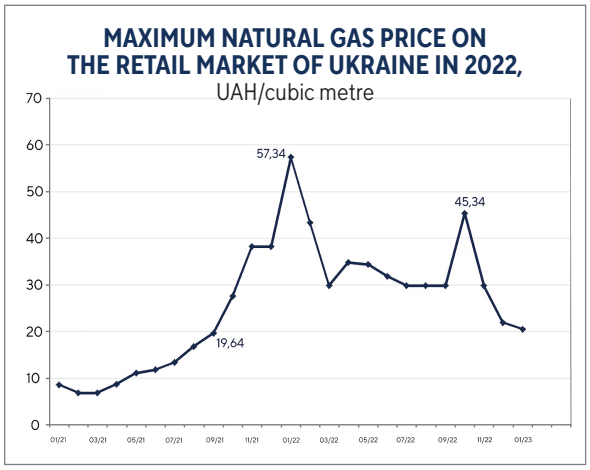
The decline in production was due to a 45.6% decrease in Russian gas exports, the lowest figure in the history of sales. The main decline was in supplies to the EU, which fell by almost 2.5 times and totalled about 61 bcm in the reporting year, compared to 145 bcm in 2021. In daily terms, supplies by the end of 2022 showed a four-fold reduction compared to December 2021. Despite the declining production and exports, Gazprom still managed to earn about $90 billion in the reporting year amid abnormally high prices, which is twice as much as in the previous year.

In general, the aggressor's gas production in 2022 was 1.5% lower than the average for the last ten years. Given the closure of the European market, Russian production will continue to decline in 2023, despite political expectations of increased demand in China or the opening of a hub in Turkey.

DYNAMICS OF ELECTRICITY SPOT QUOTATIONS IN 2022 ON THE EU MARKET, €/MWh







Due to unprovoked Russian aggression and large-scale destruction, in 2022 Ukraine saw a 32% drop in natural gas consumption and a 12% drop in production. Nonetheless, the country managed to successfully complete the 2022-2023 heating season with sufficient gas reserves of 9.8 bcm. Significant changes occurred in the Russian gas transportation through Ukraine's pipelines to the EU, with daily supplies reducing almost threefold to 40 mcm during the reporting year.

Due to the war, exchange trading was very limited, and Ukraine's gas market was essentially separated from European trading platforms due to abnormally low demand and, consequently, low volumes of natural gas imports from the EU.

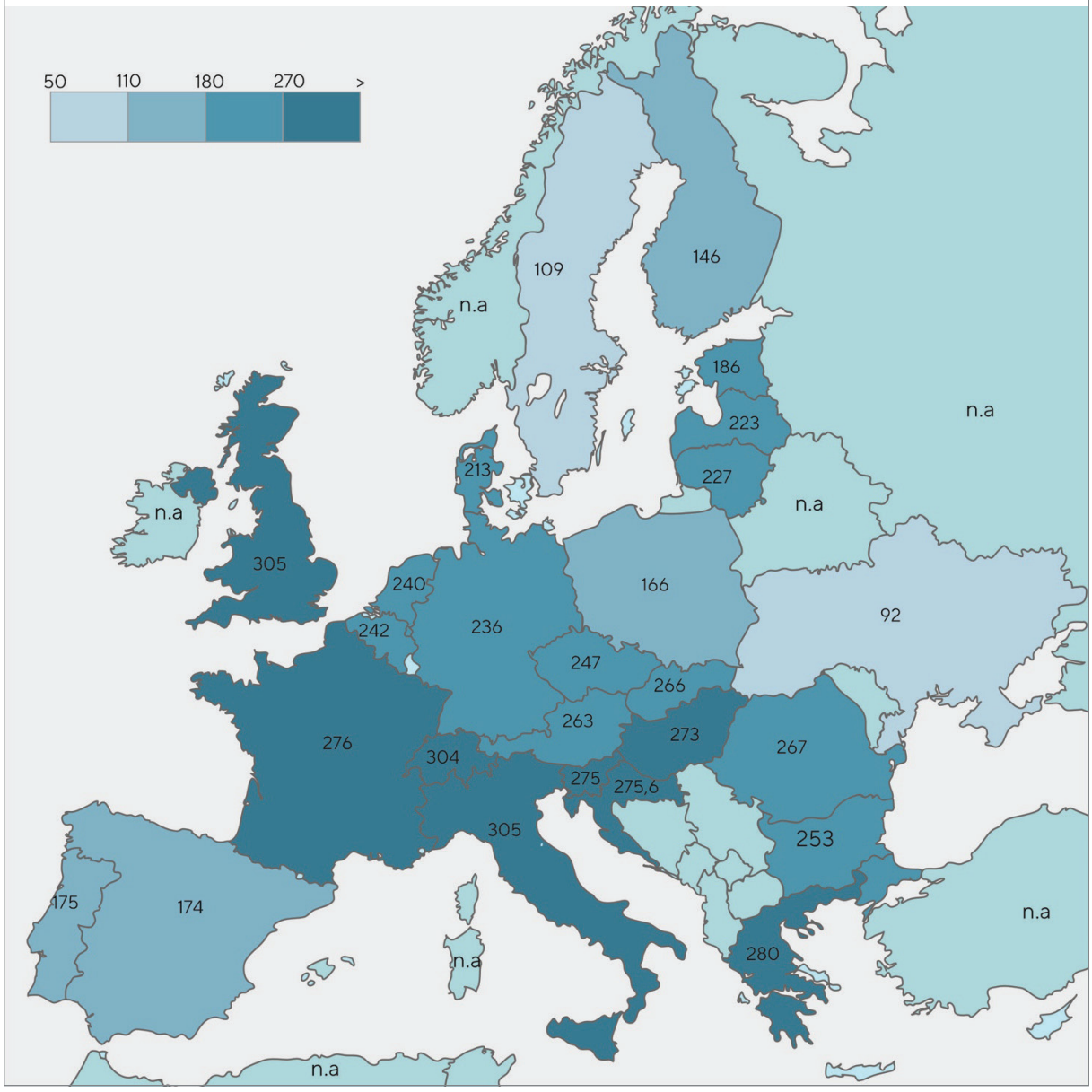
In particular, from March to May 2022, the weighted average price of natural gas on the Ukrainian wholesale market decreased by only 15% to UAH 31,048 /tcm. The loss of Ukrainian gas market's synchronisation with the European one resulted in prices in our country remaining at the same level during 2022 despite the fall in EU prices.

ELECTRICITY SECTOR

Since October 2022, the demand for electricity in the EU has declined significantly compared to the previous year. The largest decline in consumption was recorded in Q4, down 8.5% year-on-year, which helped to contain the rise in electricity prices. By country, demand fell in almost all EU countries except Malta, Cyprus, Ireland and Portugal.

In total, electricity demand in the EU in 2022 amounted to 2,809 TWh, which is 10% of global demand. Germany had the highest level of consumption among EU countries - 556 TWh, or almost 20% of the total European market. Other European leaders in consumption included France (484 TWh), Italy (322 TWh) and Spain (265 TWh).

DISTRIBUTION OF THE AVERAGE ELECTRICITY PRICE IN 2022 IN THE EU, €/MWh



Despite the fairly rapid development of renewable energy sources, the EU is still dependent on fossil fuels — in 2022, almost 40% of the generation structure was made up of coal and gas.

At the same time, nuclear power plants continue to be the largest producers of electricity — 22%, or 613 TWh. It is important to note that in 2022, the EU energy market saw a record-breaking production and an increase in wind and solar power capacity. More specifically, 15%, or 420 TWh of electricity was generated from wind energy, and 7.3%, or 203 TWh — from solar energy. The smallest share belonged to hydropower (10%, or 283.8 TWh) and biomass power plants (6%).

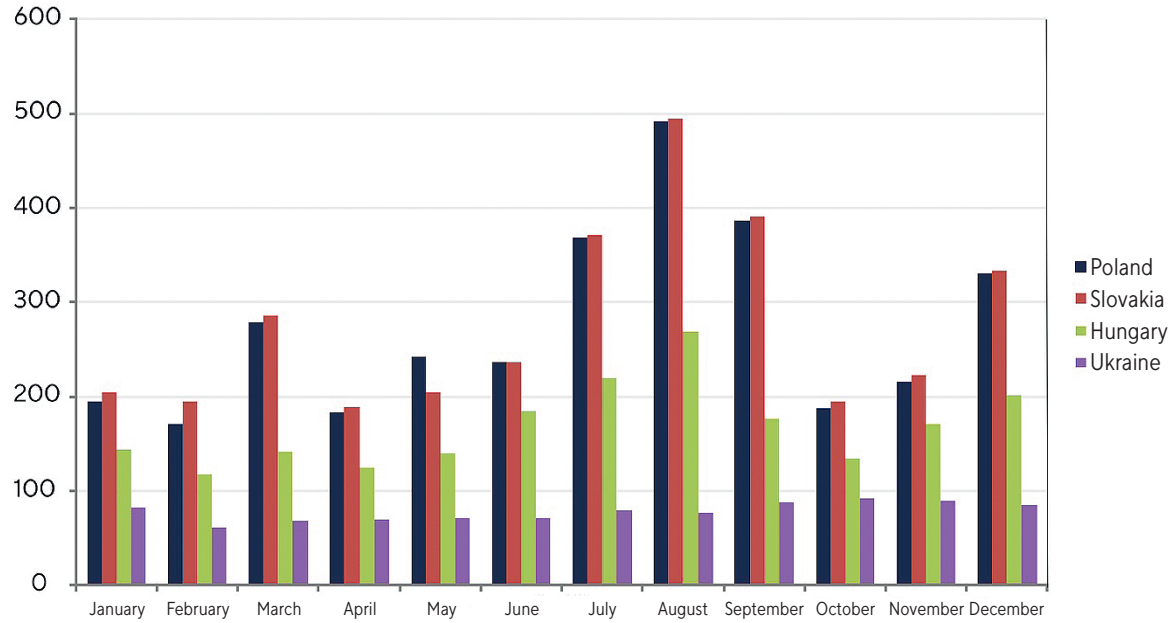
Last year was a period of anti-records in the EU energy market. For example, in France, the volume of electricity produced fell to the level of the early 1980s due to inconsistencies in the repair at nuclear power plants and led to a change in the country's status from a net exporter to a net importer of electricity. As a result, in 2022, France had to import 16.5 TWh of electricity worth more than €7 billion. In contrast, in 2021, France exported electricity with a profit of €3 billion. This imbalance was also reflected in the price situation at the EU energy market, where electricity cost up to €700 per MWh in August 2022. Then in early October 2022, the indicators showed a three-fold reduction, staying at €230 per MWh by the end of 2022.

Ukraine's power system faced the most difficult challenges not only by 2022 standards: in addition to 255 missile strikes on 112 facilities, the industry lost 98 of its best specialists.

As a result, in the most critical period of Q4 2022, the number of disconnected consumers in Ukraine exceeded 13.5 million metering points, or more than 80% of all clients.

Due to the Russian invasion, temporary occupation and missile attacks, Ukraine lost about 10 GW of various types of generation capacity, including 6 GW lost at Zaporizhya NPP. In addition, about a quarter of the installed renewables capacity is currently located in the Russia-occupied territories, including 75% of wind farms and up to 15% of solar energy facilities.

ELECTRICITY PRICE IN THE DAY-AHEAD SEGMENT IN THE EU AND UKRAINE IN 2022, €/mWh



The price index for base load in Ukraine's unified power system in February-August was actually within the same range (€60-€75 per MWh) and, despite its synchronisation with ENTSO-E, was significantly lower than the electricity price in the EU (€140-€670 per MWh). From August to December 2022, the price of electricity on the Ukrainian wholesale market increased from €70 to €88 per MWh.

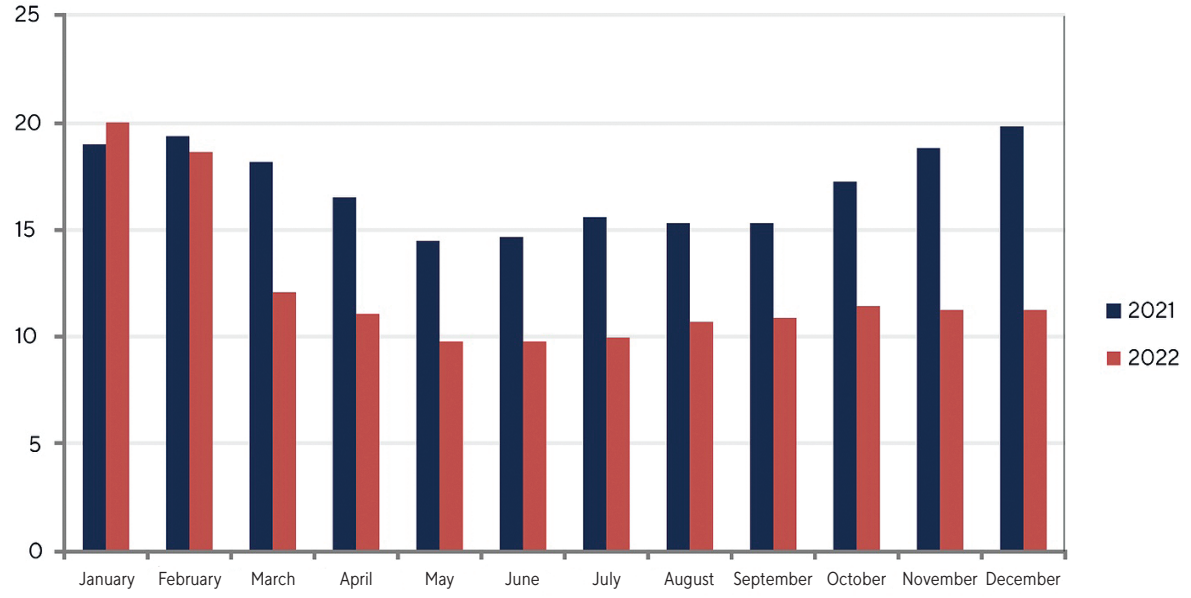
Overall, electricity consumption in Ukraine decreased by 31.5% in 2022, with significant changes taking place in the structure of electricity consumption, as the share of industry decreased from 42% to 33% compared to the last pre-war year.

The drop in electricity consumption in other sectors was also significant: chemical and petrochemical industry (60%); metallurgy (52%); production of construction materials (47%); machine building (38%); food and processing industry (24%); and fuel industry (24%).

In contrast to industry, the share of households in the overall structure of electricity consumption in 2022 rose to a record 38% from 31% in 2021. Of course, in terms of physical kilowatt-hours, households used 16% less electricity, but amid a huge economic slump and a significant drop in production, households are the largest consumer, buying electricity at a price below the cost of generation. It is this aspect that hinders the restoration of financial liquidity in the Ukrainian energy market.

In the meantime, the level of payments for electricity consumed does not exceed 50%. This is due to the fact that in 2022, about 5 million people were forced to leave Ukraine, and up to 7 million more became internally displaced persons and largely lost their solvency. Similarly, most citizens who remained in their places of residence lost their income due to the shutdown of production facilities and also have difficulty paying their bills. These factors create a projected monthly deficit of up to UAH 1 billion for generating companies, which makes it extremely difficult for them to finance infrastructure repair and restoration, including in preparation for the 2023-2024 heating season.

CAPACITY OF ELECTRICITY DEMAND IN UKRAINE, MW

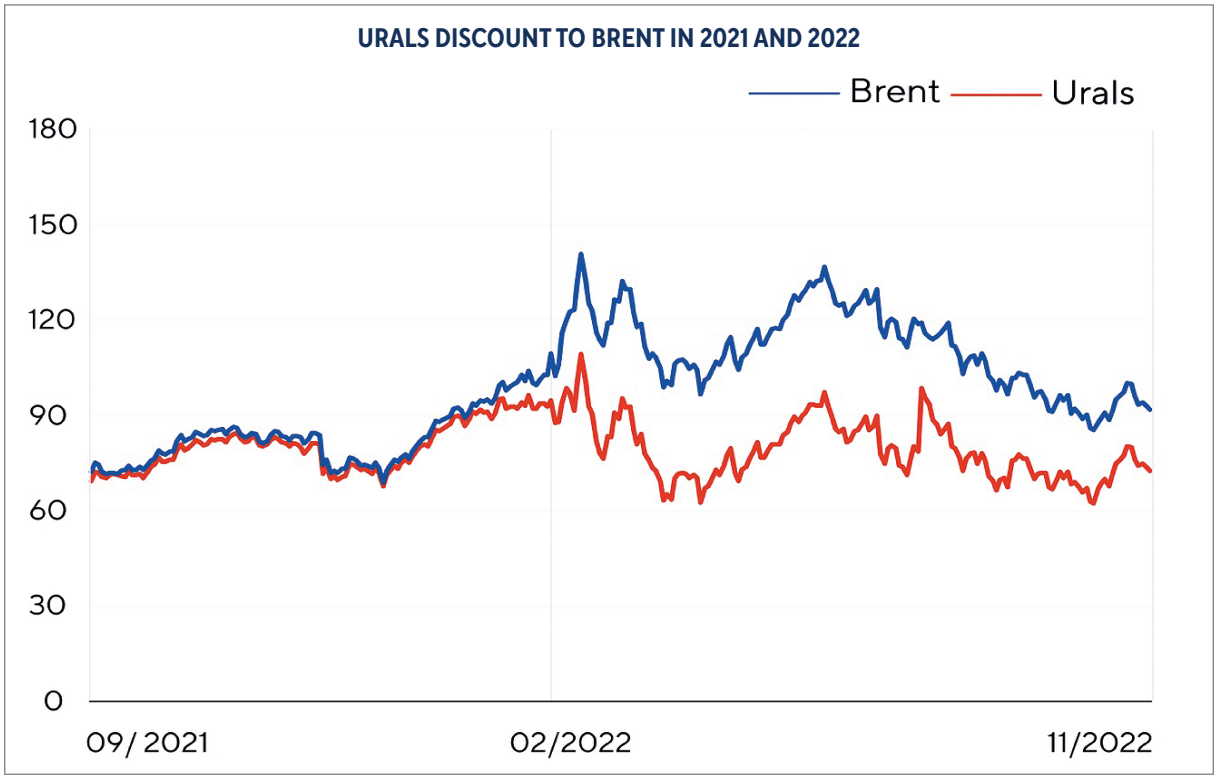


OIL AND OIL PRODUCTS

In 2022, the global oil market underwent a structural transformation, primarily in terms of export destinations. For example, in February, 70% of Russia's maritime oil exports went to the EU and the UK, and another 9% to Japan and South Korea. The combined share of China and Turkey in maritime oil supplies from Russia was just over 20%, and there were virtually no supplies to India. As early as December 2022, India already became the largest market for Russian oil shipments by sea, with a share of 42%. Another 25% of marine shipments went to China, 3% to Turkey and South Korea, and about 5% to other countries. The only EU country that continues to purchase Russian oil by sea is Bulgaria (2%).

In addition to export destinations, 2022 saw the growing discount of the most widely used Russian Urals grade to the Brent benchmark due to the refusal of some European buyers to purchase Russian cargoes and the rising costs of freight and insurance for ships exporting marine cargoes from the aggressor. The discount reached its maximum (on average across all export destinations) of $33.5 per barrel in April and then declined slightly. In December, the discount rose sharply again under the influence of the EU embargo.

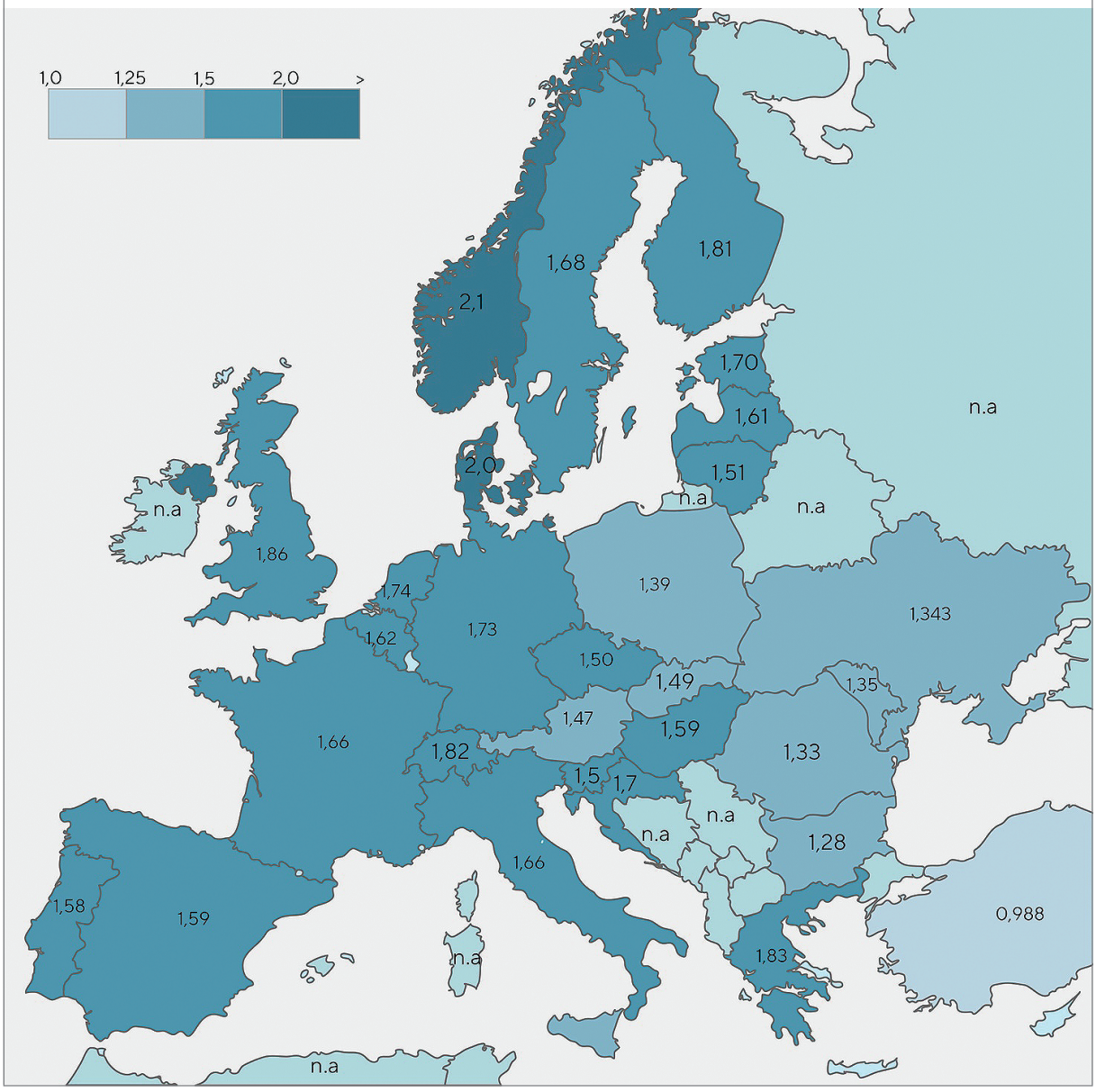
As a result, the total production of Russian oil and condensate in 2022 was even higher than in 2021, exceeding 530 million tonnes. Unfortunately, the aggressor managed to maintain the volume of oil production by increasing the level of utilisation of its refining capacities. The main driver of the increase in refining volumes was high prices for oil and oil products on the global market, which, in turn, led to record revenues for the aggressor and the amount of the so-called fuel damper payments.



Along with its super-profits, the aggressor was ruthlessly destroying Ukraine's oil and oil refining industry in 2022. Intense rocket attacks by the Russian army significantly damaged the infrastructure for storing oil and oil products (more than 20% of storage facilities), also forcing the Kremenchuk Oil Refinery and Shebelynka Gas Processing Plant to shut down.

In March 2022, the retail segment of the market experienced a so-called controlled fuel shortage due to sufficient stocks of oil products that were previously imported or produced at domestic refineries. However, since April, after the start of the sowing campaign, demand has increased significantly, giving a rise to acute fuel shortages. Fortunately, this did not have a significant impact on oil

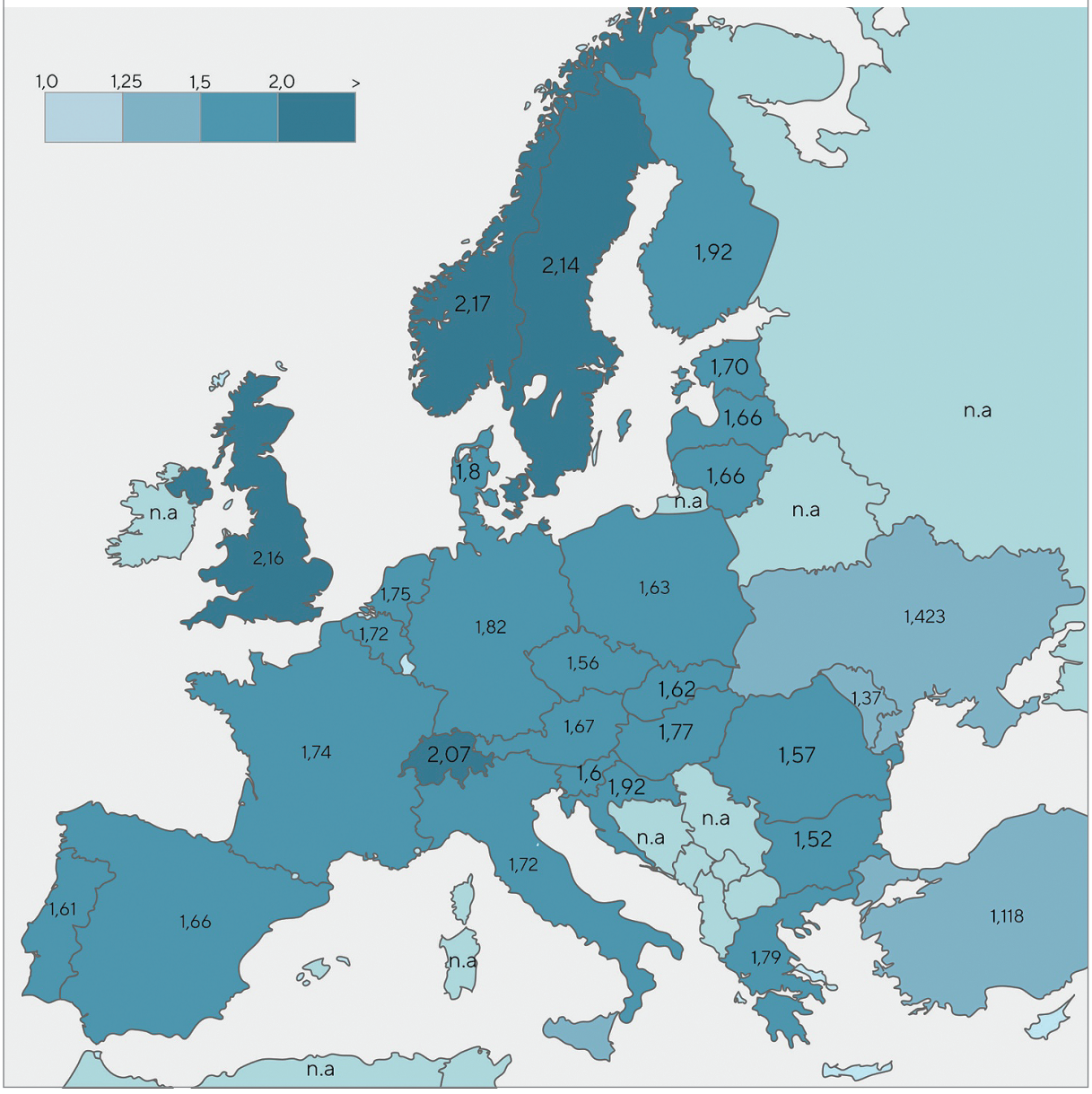
AVERAGE PRICE OF PETROL ON THE MARKETS OF UKRAINE, EU AND TURKEY IN 2022, €/l



product prices due to government regulation, which effectively divided the market into an official and a shadow market.

The first group of petrol stations sold the minimum amount of fuel to minimise losses, as diesel fuel in the wholesale segment cost 44 UAH/l, while the government-recommended price was only 37.42 UAH/l as of early April. Other sellers sold oil products at import parity, effectively creating a shadow segment of the retail market. In addition, there was an increase in shipments of low-quality motor fuel produced at uncertified mini-refineries.

AVERAGE PRICE OF DIESEL FUEL ON THE MARKETS OF UKRAINE, EU AND TURKEY IN 2022, €/l

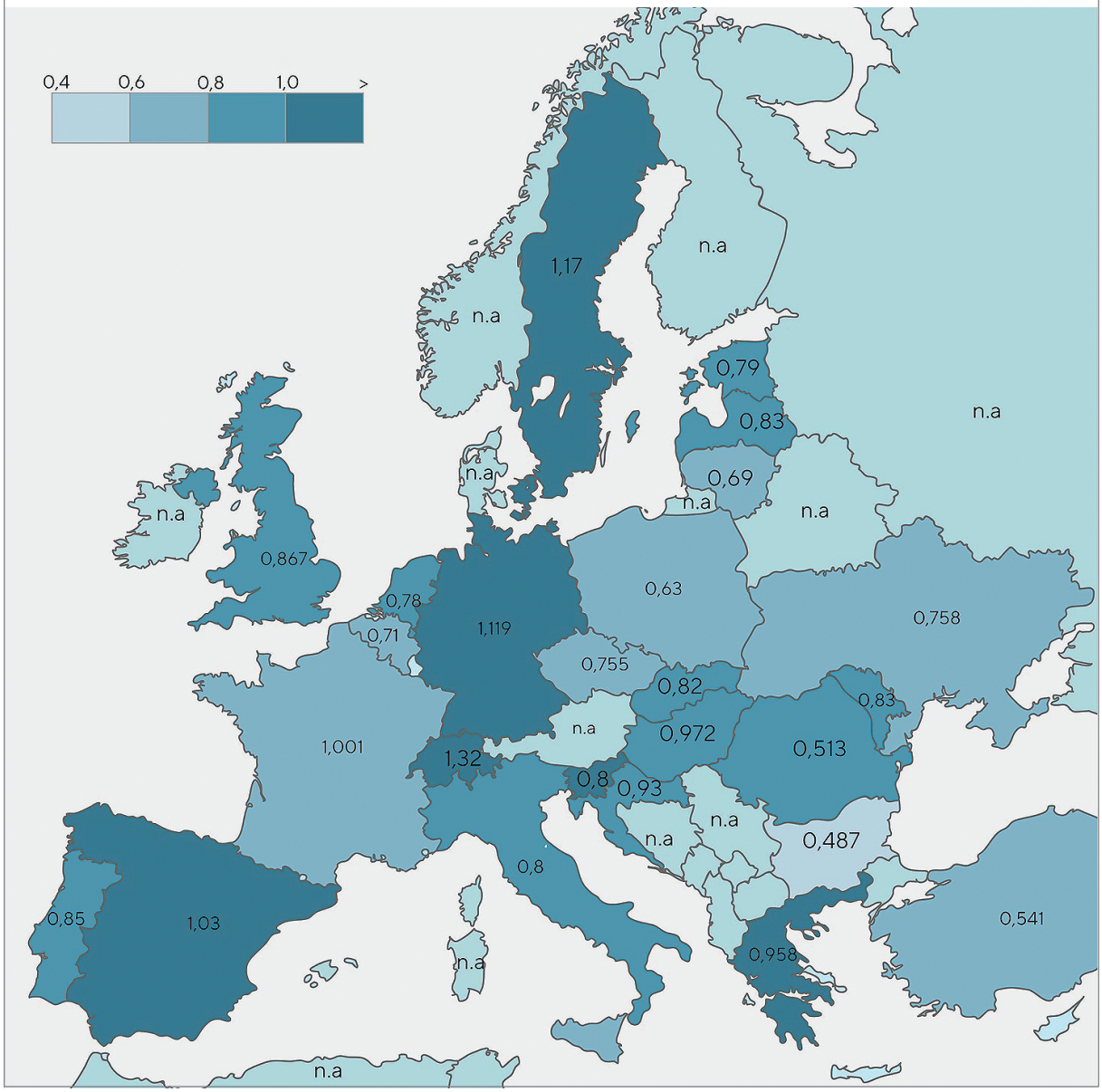


The problems associated with the restructuring of the pre-war logistics model into a new one, where the vast majority of supplies are provided by road tankers, exerted additional pressure. As a result, since May 2022, the Ukrainian market has gradually started to receive oil products from Germany, Belgium and the Netherlands.

Already in June, imports of oil products increased to 600 thousand tonnes per month, which was three times higher than in March.

The situation on the Ukrainian motor fuel market was fully balanced in July 2022, when the retail network and traders fully switched to 100% of oil products from the EU.

AVERAGE PRICE OF AUTOGAS (LPG) ON THE MARKETS OF UKRAINE, EU AND TURKEY IN 2022, €/l



TRANSFORMATION OF GLOBAL ENERGY MARKETS: IMPLICATIONS FOR UKRAINE

1. Analysing the situation on global energy markets in 2022, this year can be described as the most difficult for energy consumers since the major oil crisis of 1973 caused by the escalation of the Arab-Israeli conflict. The main reason for skyrocketing energy prices in Europe in 2022 was Russia's use of energy weapons against the EU by limiting supply of natural gas via Gazprom's breach of contractual obligations and abuse of European gas storage facilities.

The purpose of this energy war was the Kremlin's attempt to force NATO countries to withdraw their military and financial assistance to Ukraine in countering Russian aggression.

2. Instead of succumbing to outright blackmail, as expected by the Kremlin, the EU developed a plan to rapidly reduce dependence on Russian fossil fuels and fast forward the green transition (REPowerEU). Increased hydrocarbon supplies from alternative sources, additional energy saving measures and increased investment in the renewables sector helped the EU countries to reduce their dependence on Russian energy supplies by more than 70% by 1 June 2023 and stabilise the situation on energy markets. This also had a positive impact on the stabilisation of the gas, oil, coal and electricity markets in Ukraine.

3. The EU and G7's sanctions policy against Russian oil, oil products and coal supplies produced a deep transformation of energy markets globally. Having lost the most liquid market in Europe, Russian energy companies have begun supplying to Asian markets, primarily China and India. As a result, while Russian coal exports decreased by 7.6% in 2022 compared to 2021, oil exports suffered no significant losses, while oil production increased slightly to 530 million tonnes.

The sanctions began to bear fruit in January-May 2023. Despite the same volumes of oil and oil products exports, the Russian state budget lost 45% due to complicated logistics and large discounts. This factor significantly undermines the economic situation in Russia and reduces its economic capacity to wage a large-scale war in Ukraine.

The Russian gas sector suffered the most, as compared to the coal and oil sectors, it is technologically impossible to diversify it rapidly. As a result, Russian gas exports to the EU fell by 2.5 times, and total exports by 45.6%.

Since the onset of Russia's large-scale aggression, Gazprom has not fulfilled its contractual obligations for transit through Ukraine. Instead of the contractual volumes of 109 mcm/day, the Russian monopolist transferred only about 40 mcm/day on average to the entry point of the Ukrainian GTS.

4. Despite Russia's unprecedented missile and drone attacks on energy infrastructure, Ukraine managed to address the problem of diversification of oil products in an extremely short time. Also, due to the professional and dedicated work of energy sector professionals, it was possible to preserve the United Energy System of Ukraine as an integral complex and provide consumers with the minimum necessary energy resources during the 2022-2023 heating season.

5. Ukrainian state institutions should immediately, without waiting for the end of the war, step up preparations for the reconstruction of the Ukrainian energy sector through:

- ✓ implementation of EU legislation on the development of competitive markets within the country and their legal integration with EU markets;
- ✓ regulatory and legal support for the green transition to a carbon-free economy (energy);
- ✓ elaboration of investment projects for decarbonisation: energy saving technologies; renewables sector development; energy storage systems; smart grids; hydrogen energy.