

## ANALYZING THE TENDENCIES IN MEETING THE COUNTRY'S NEEDS FOR MOTOR FUEL\*

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**Analyzing the Tendencies in Meeting the Country's Needs for Motor Fuel**

*The aim of the article is to analyze the oil and petroleum products markets in Ukraine and tendencies in meeting the country's needs for motor fuel. To achieve this aim, an analysis of the state of the oil and gas condensate market in Ukraine was carried out; the dynamics of oil and gas condensate consumption in Ukraine is studied; the main consumers and producers of motor fuel in Ukraine are identified; the dynamics of oil and gas condensate refining volumes is analyzed. The article also examines the dynamics of exports and imports of oil and gas condensate in Ukraine. The demand for crude oil and gas condensate in Ukraine is analyzed and it is determined that the dependence of domestic producers of light oil products on imported oil supplies significantly affects the oil market of Ukraine. The tendencies of oil and gas condensate production in Ukraine have been studied and their steady decline in recent years has been noted. The results of the study of the current state and trends in the development of the oil products market in Ukraine are presented. The dynamics of consumption and production, as well as the features of demand for motor fuel both in general and for its types in particular – motor gasoline, diesel fuel and liquefied natural gas (LNG) – are analyzed. The geographical structure of motor fuel imports by its individual types is analyzed. Their main importers in the Ukraine have been identified. The balance of the market for the main types of motor fuel has been studied.*

**Keywords:** motor fuel, oil and petroleum products, oil refining, gasoline, diesel fuel, liquefied natural gas, fuel security, energy security.

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**Хаустова В. Є., Кизим М. О., Костенко Д. М., Шпілевський В. В. Аналіз тенденцій забезпечення потреб країни в моторному паливі**

Метою статті є аналіз ринків нафти та нафтопродуктів в Україні та тенденцій забезпечення потреб країни в моторному паливі. Для досягнення поставленої мети було: проведено аналіз стану ринку нафти та газового конденсату в Україні; досліджено динаміку споживання нафти та газового конденсату в Україні; визначено основних споживачів і виробників моторного палива в Україні; проаналізовано динаміку об'ємів переробки нафти та газового конденсату в Україні. Також у статті досліджено динаміку експорту й імпорту нафти та газового конденсату в Україні. Проаналізовано попит на нафту сиру та газовий конденсат в Україні та визначено, що на нафтовий ринок України істотно впливає залежність вітчизняних виробників світлих нафтопродуктів від імпортних поставок нафти. Досліджено тенденції видобутку нафти та газового конденсату в Україні та визначено їх неухильне зниження в останні роки. Наведено результати дослідження сучасного стану та тенденцій розвитку ринку нафтопродуктів України. Проаналізовано динаміку споживання та виробництва, а також особливості попиту на моторне паливо як загалом, так і на його види зокрема – бензин автомобільний, дизельне паливо та зріджений природний газ (ЗПГ). Проаналізовано географічну структуру імпорту моторного палива за його окремими видами. Визначено основних їх імпортерів в Україні. Досліджено баланс ринку основних видів моторного палива.

**Ключові слова:** моторне паливо, нафта та нафтопродукти, нафтопереробка, бензин, дизельне паливо, зріджений природний газ, паливна безпека, енергетична безпека.

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**Introduction.** Motor fuel is an important component of both energy and national security of any world country, as it provides civilian transport and military equipment with the energy resource necessary for their operation.

One of the main regulators of the sphere of petroleum oil use and the circulation of motor fuel in Ukraine is the market of finished petroleum products, the most important component of which is the motor fuel sector. It is the turnover of motor fuel, which is formed under the direct influence of the nomenclature of its market, that determines the conditions for the emergence of demand, supply and price formation, and therefore the economic feasibility of motor fuel production in the country.

The main entities of the oil refining industry of Ukraine are oil and gas refineries, which process crude oil and manufacture petroleum products, the main of them being motor

fuel. At the beginning of 2022, only two of the country's seven largest oil and gas refineries operated at 6.7% of their capacity in Ukraine. The import dependence of the national motor fuel market was 79.0% for diesel fuel, 47.3% for gasoline, 83.0% for liquefied natural gas, and 97.4% for biofuels.

In February 2022, after Russia's invasion of Ukraine and massive missile attacks, the last of Ukraine's largest oil refining enterprises ceased to operate.

Under such conditions, our country faces the problem of weakening Ukraine's external oil dependence through the structural modernization of the national fuel complex in order to ensure the energy self-sufficiency of the national economy by intensifying the use of the own energy resources and reducing the related imports. Therefore, carrying out research on the current state of the oil and motor fuel market in Ukraine, as

well as the prospects for its development in order to create a scientific basis for the structural modernization of the national industrial complex, appears relevant.

**Analysis of the latest research and publications.** At present, there are certain developments on various aspects of the problem of motor fuel production in Ukraine. Thus, a number of publications by O. Brahinskiy, E. Shlikhter, V. Bondarenko, H. Varlamov, I. Volchin, H. Burlak, R. Sherstyuk, I. Kornilov and others are devoted to the issues of the state of the global oil market, as well as the state of the domestic market of oil and oil products. A large number of researches on the analyzed topic is carried out by the scientists of the Research Center for Industrial Problems of Development of the National Academy of Sciences of Ukraine [1–9].

**The purpose of the study** is the status and tendencies of meeting Ukraine's needs for motor fuel based on the analysis of oil and petroleum products markets.

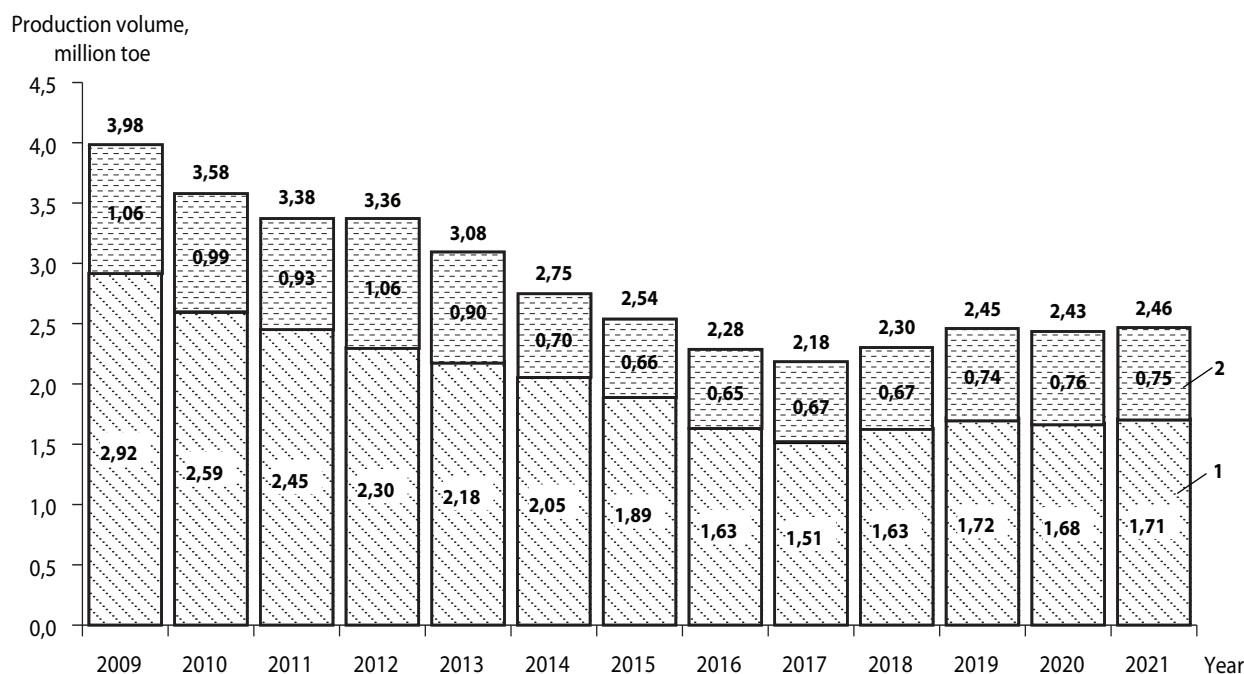
**Research results.** The country's needs for energy resources are determined by the demand for a certain energy

resource. Crude oil is the most widely used fuel source in the world and satisfies about a third of energy needs. It is also used to other products, including plastics, synthetic fibers, bitumen, etc. The volume of the world oil market is much larger than for any other commodity, both in terms of physical production and the operation of the financial market, changes in which have an interdependent and interrelated impact on national markets.

The dynamics of the structure of supply formation in the Ukrainian petroleum oil market in Ukraine in 2009–2021 is shown in the Fig. 1.

The Fig. 1 shows that the main component of the formation of oil supply in Ukraine is its own production, comprising 61.19%. The imports provide 38.8% of oil supply in the domestic market. In 2009, compared to 2021, the share of imports in the oil market in Ukraine was 64.52%. The formation of such a supply structure takes place against the background of a decrease in oil production in Ukraine in 2009–2021.

The indicators characterizing the dynamics of oil and gas condensate production are presented in the Fig. 2.



**Fig. 1. The dynamics of the structure of supply formation in the petroleum oil market in 2009–2021:**  
1 – domestic production; 2 – imports

Source: based on the materials of [10–30]

As can be seen from the Fig. 2, since 2010, the volume of oil and gas condensate production has been steadily decreasing. In 2021, compared to 2009, oil and gas condensate production in Ukraine decreased by 1.52 million toe or 38.2%.

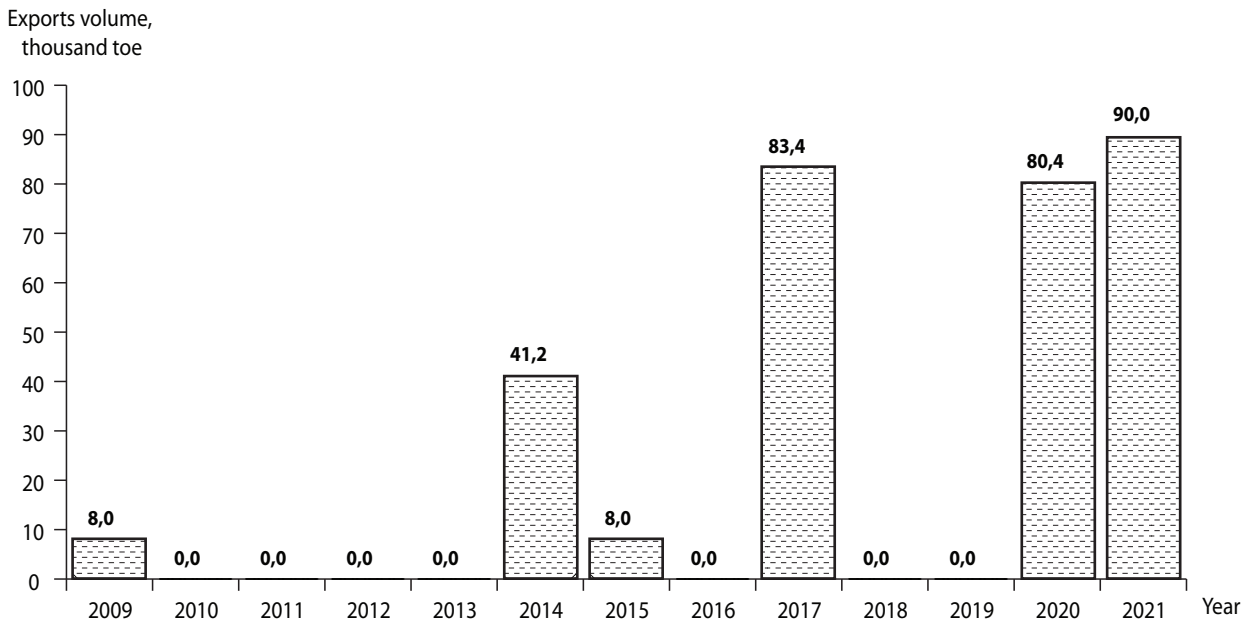
In 2021, Ukraine produced 2.46 million tons of oil and gas condensate, which corresponds to the indicators of 2020, including the production of condensate and oil by JSC «Ukr-gasvydobuvannya» at the level of 414 thousand tons (7.2% less than in 2020). The PJSC «Ukrnafta»'s production in 2021 amounted to 1.5 million tons of oil, which corresponds to the level of 2020. Oil and condensate production by private companies amounted to 0.5 million tons, in particular, the largest private gas production company «Naftogazvydobuvannya»

DTEK-Naftogaz produced 96 thousand tons of condensate (+45%) at the end of the year.

Today, the export of oil and gas condensate from Ukraine is rudimentary. Significant potential in the processing of oil and gas condensate and the production of finished petroleum products for export has been lost.

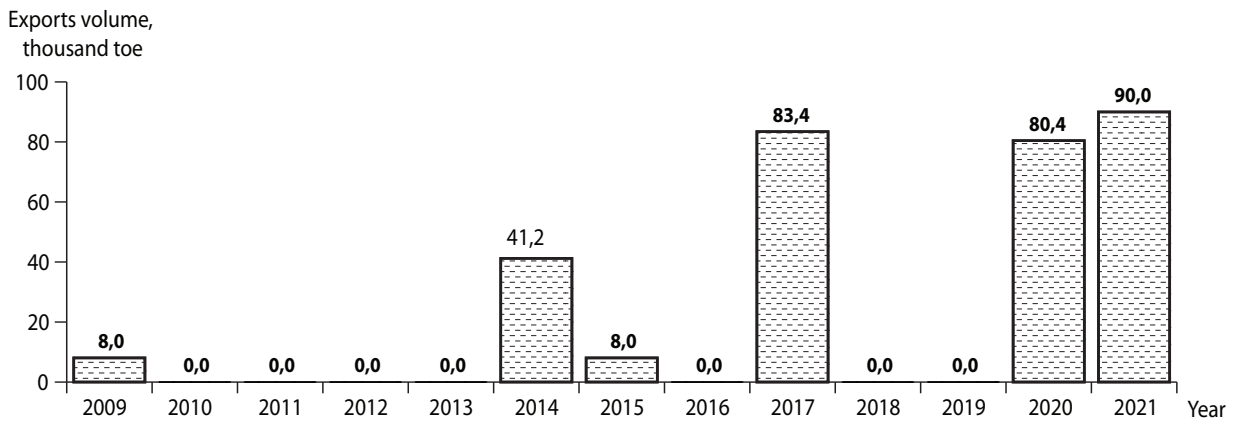
The dynamics of exports of oil and gas condensate from Ukraine is presented in the Fig. 3.

As can be seen from the Figure 3, in 2021, compared to 2009, there was a significant increase in the supply of oil and gas condensate from Ukraine for export, namely by 82 thousand toe. The largest volume of exports was recorded in 2021, amounting to 90.0 thousand toe.



**Fig. 2. The dynamics of oil and gas condensate production in Ukraine in 2009–2021:**  
1 – oil; 2 – gas condensate

Source: based on the materials of [16–28]



**Fig. 3. The dynamics of oil and gas condensate exports from Ukraine in 2009–2021**

Source: based on the materials of [10–30]

Data characterizing the dynamics of import supplies in the Ukraine of oil and gas condensate in 2009–2019 is shown in the Fig. 4.

As can be seen from the Fig. 4, during 2009–2021 there was a significant reduction in the supply of imported oil and gas condensate to the Ukraine, namely by 5657.7 thousand toe, or by 78.4%. There is also a sharp reduction in oil imports in 2012.

A comparison of the geographical structure of Ukraine’s imports of crude oil and petroleum products in 2009 and in 2021 from the countries of the Customs Union (Russia, Kazakhstan) and other countries of the world is presented in the Fig. 5.

As can be seen from the Fig. 5, imports of crude oil and gas condensate in Ukraine during the analyzed period occurred mainly from one country only. That is, the main importer in Ukraine in 2009 was Russia, and in 2021 it was Azerbaijan, which

accounted for about 74.5% of imports (1162.77 thousand toe). Under such conditions, it is impossible to talk about a sufficient level of diversification of supplies in this area, which is a matter of ensuring the country’s energy security. Other countries accounted for only 25.5% of oil imports to the country, namely Algeria – 10.25% (160.03 toe), Libya – 10.12% (157.94 toe) and other countries – 5.16% (80.5 toe).

The main subjects of the oil refining industry of Ukraine are refineries, where crude oil is processed to become source for the petroleum products, the main petroleum product being motor fuel. The low competitiveness of the domestic oil refining industry is determined by its technical and technological equipment, which does not meet modern requirements, and the economic conditions for the economic activity of industry entities.

The oil refineries located on the territory of Ukraine use outdated technologies aimed at increasing the yield of heavy

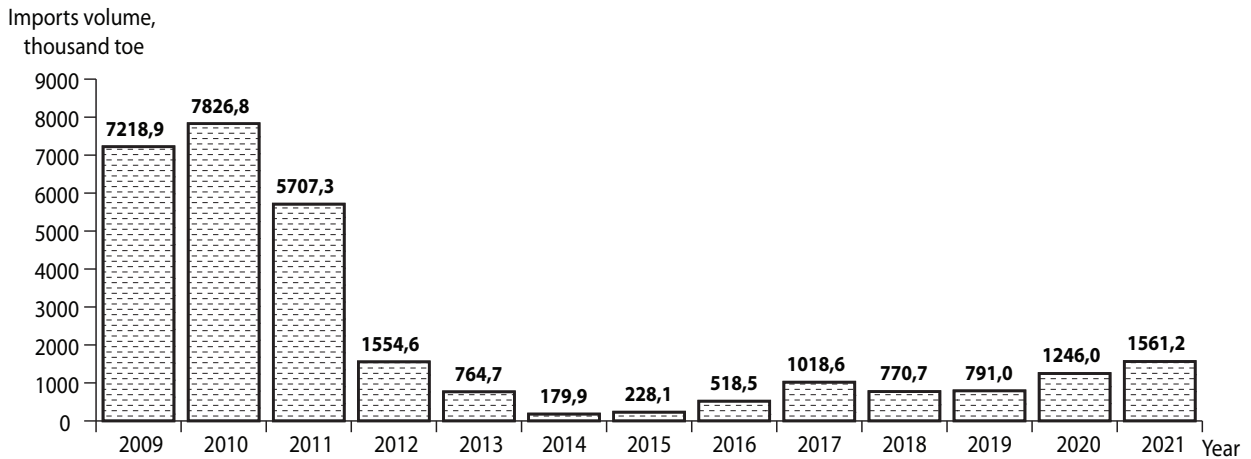


Fig. 4. The dynamics of imports of oil and gas condensate in Ukraine in 2009–2021

Source: based on the materials of [10–30]

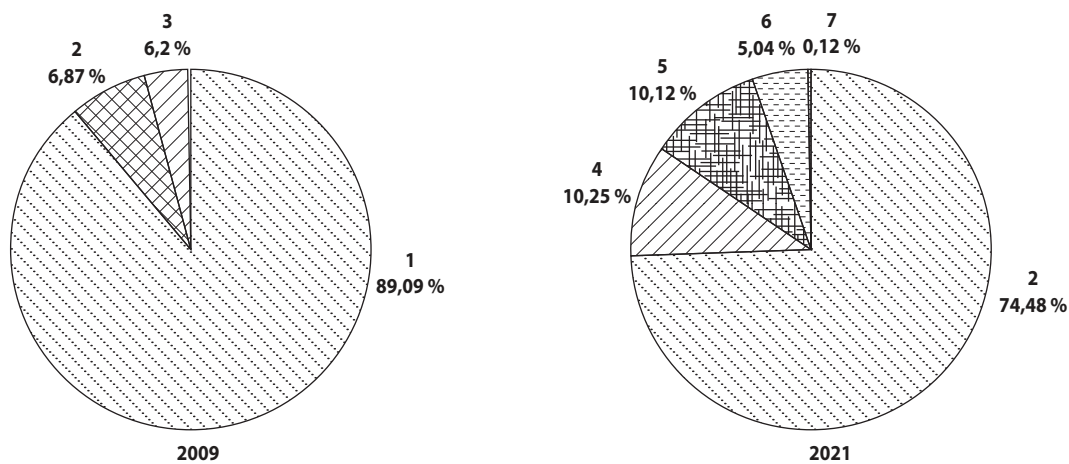


Fig. 5. The geographical structure of imports of crude oil and petroleum products in Ukraine in 2009 and in 2021: 1 – russia; 2 – Azerbaijan; 3 – Kazakhstan; 4 – Algeria; 5 – Libya; 6 – Great Britain; 7 – others

Source: based on the materials of [28–30]

petroleum products, which does not meet the environmental requirements (standards) in force in the EU.

Negative tendencies in the national market of petroleum products are mainly caused by the decline of domestic oil refining. Among these, is a gradual decrease in oil refining in the country, which in the analyzed period was observed from 2009 to 2011. The decrease in the volume of primary processing in this period was stable.

In 2012, the situation deteriorated sharply, the volume of oil refining fell sharply and amounted to only 50.5% compared to the level of 2011. In the next period from 2013, the tendency of a gradual decrease in oil refining resumed, as a result of which by the end of 2021 the volume of domestic oil refining decreased by 3.2 times compared to the level of 2009.

The dynamics of primary processing of crude oil and gas condensate in Ukraine is presented in the Figure 6.

The result of the reduction in the volume of domestic oil refining was the suspension of production at five plants – the main producers of motor fuel out of seven. In the 1990s, motor fuel production in Ukraine was carried out by six oil refiner-

ies (in the cities of Kremenchuk, Drohobych, Nadvirna, Lysychansk, Kherson, and Odesa) and one gas processing plant (village of Shebelynka). In February 2022, after russia's invasion of Ukraine, the Shebelynka gas processing plant was shut down, and then irrevocably destroyed as a result of the aggressor's shellings. In April 2022, after a massive missile attack, the last among the largest enterprises in Ukraine, the Kremenchuk oil refinery, ceased to operate.

Characteristics of large-scale sites for processing petroleum oil in Ukraine are presented in the Tbl. 1.

The Tbl. 2 shows the indicators characterizing the processing of crude oil and gas condensate by the major producers of petroleum products.

The Tbl. 2 also shows that in 2021, oil refining in the country was provided by only one of the six oil refineries, namely the Kremenchuk oil refinery, which is part of PJSC «Transnational Financial and Industrial Oil Company Ukrtafta», 43.06% of the shares of which are owned by NJSC «Nafgaz of Ukraine», and one gas processing plant in the village of Shebelynka, which is part of PJSC «Ukr gasvydobuvannya»,

Primary processing,  
thousand tons

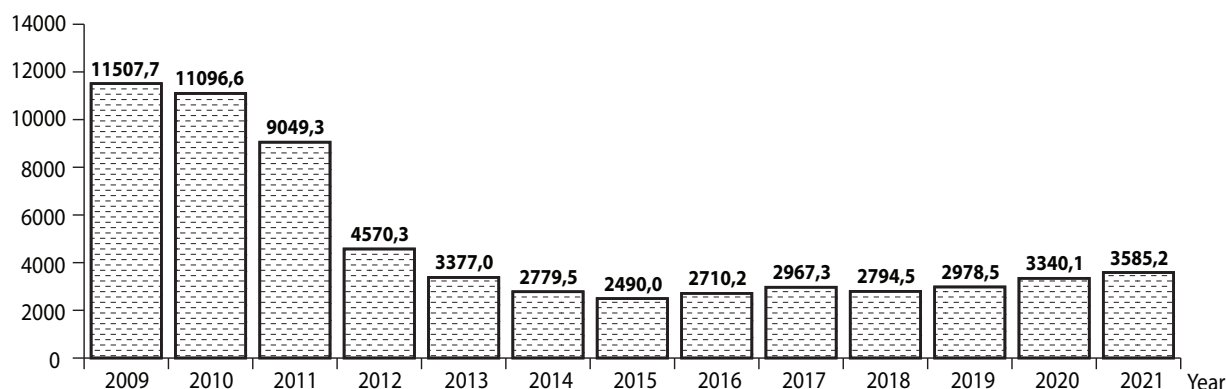


Fig. 6. The dynamics of primary processing of crude oil and gas condensate in Ukraine in 2009–2021

Source: based on the materials of [9–45]

Table 1

The characteristics of large-scale sites for processing petroleum oil in Ukraine in 2009–2021

Enterprise	Year of foundation	Largest owners	Location	Nominal primary processing capacity, million tons/year	Category of refinery	Depth of processing, %	State of affairs
Kremenchuk refinery	1963	Pryvat Group – 57% Naftogaz – 43%	Poltava region	18,6	B – semi-complex processing scheme	72,2	April 2022 – the plant was shut down as result of massive missile strikes by the russian armed forces
Drohobych refinery	1866	Pryvat Group – 75% State Property Fund of Ukraine – 25%	Lviv region	3,2	A – simple processing scheme	62,0	2012 – the plant was shut down for reconstruction and mothballed
Nadvirna refinery	1902	Pryvat Group – 73% State Property Fund of Ukraine – 26%	Ivano-Frankivsk region	2,6	A – simple processing scheme	50,0	2013 – the plant was shut down for reconstruction and mothballed
Lysychansk refinery	1976	PJSC NK Rosnafta – 100%	Luhansk region	16,0	B – semi-complex processing scheme	71,5	2013 – the plant was shut down for reconstruction, in 2022 – shelled by missiles of the russian armed forces
Kherson refinery	1938	Group of Companies «Kontynium» – 100%	Kherson region	7,1	A – simple processing scheme	48,0	2009 – the plant was shut down for reconstruction
Odesa refinery	1937	SE «Ukrtransnafta-product» – 100%	Odesa region	3,6	A – simple processing scheme	57,0	2015 – the plant was shut down for reconstruction, in 2022 – shelled by missiles of the russian armed forces
Shebelynka refinery	1960	Naftogaz – 100%	Kharkiv region	0,55	A – simple processing scheme		February 2022 – the plant was shut down, shelled by missiles of the russian armed forces

Source: authors' own development

Table 2

**The dynamics of crude oil and gas condensate refining by major producers of petroleum products in Ukraine  
in 2009–2021, in thousand tons**

Enterprise	Year											
	2009	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021
Kremenchuk refinery	3188,8	3119,0	3033,6	2400	2086,3	2017,4	2194,8	2473,8	2340,5	2505,8	2917,6	3164,6
Drohobych refinery	422,9	165,7	0	0	0	0	0	0	0	0	0	0
Nadvirna refinery	155,3	137,8	9,0	0	0	0	0	0	0	0	0	0
Lysychansk refinery	4952,8	4946,4	810	0	0	0	0	0	0	0	0	0
Kherson refinery	0	0	0	0	0	0	0	0	0	0	0	0
Odesa refinery	2051,6	0	0	345,6	213	0	0	0	0	0	0	0
Shebelynka refinery	736,3	680,3	663,2	584,3	480,2	472,6	515,4	493,5	454,00	472,71	422,5	420,6
other small refineries	0,0	0,1	54,5	47,1	0	0	0	0	0	0	0	0
total	11507,7	9049,3	4570,3	3377,0	2779,5	2490,0	2710,2	2967,3	2794,5	2978,5	3340,1	3585,2

Source: based on the materials of [9, 10, 28, 39 – 45]

100% of which is owned by NJSC «Naftogaz of Ukraine». With the beginning of Russia's full-scale war against Ukraine, the last two plants ceased operations.

The national and energy security of Ukraine requires the earliest possible restoration or creation of a new production of motor fuel in the country on the own raw material base.

Low investment activity of domestic motor fuel producers and the practical lack of modernization of production facilities in most of them are both a consequence and a cause of technological backwardness and a low level of utilization of production capacities.

The decrease in the volume of oil refining in the country has led to inefficient use of the production potential of the domestic oil refining industry. The dynamics of utilization of production capacities of primary oil refining in 2009–2021 are presented in the Fig. 7.

The Fig. 7 shows that in 2009 the domestic oil refining industry had an unacceptably low level of capacity utilization, amounting to 27.8%. This tendency continued during the period under review and, as a result, in 2021, the utilization rate of primary oil refining capacities was only 8.7%.

For more efficient use of resources in Ukraine, it is necessary to build new refineries with a complete refining scheme and to modernize and reconstruct existing refineries, to use new innovative methods of oil refining. These measures require significant capital investments and time, but their profitability has been proven by world experience. Using outdated oil refining technologies while expecting a decrease in world reserves is an irrational step in the development of Ukraine's oil refining industry.

The main regulator of oil use in Ukraine is the motor fuel market. The ratio of supply and demand, or the conjuncture of

Capacity utilization rate, %

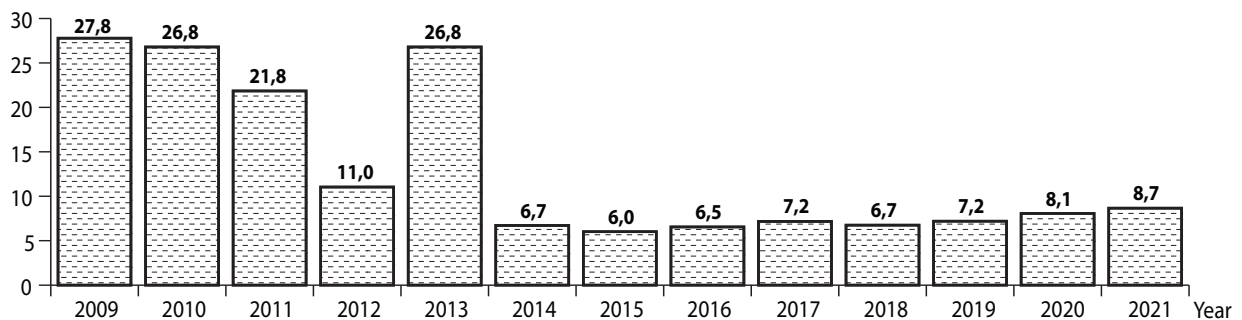


Fig. 7. The dynamics of utilization of production capacities of primary oil refining in Ukraine in 2009–2021

Source: based on the materials of [9; 10; 28; 39–45]

this market, is a determining factor in the formation of conditions for the circulation of motor fuel in the country.

The Fig. 8 presents the dynamics of the structure of demand for motor fuel in Ukraine.

The Fig. 8 shows that in 2021 the demand for motor fuel amounted to 12.44 million toe. In general, in 2009–2021 demand for motor fuel increased by 1.23 million toe, or 10.97%. There was a decrease in demand for gasoline in 2009–2021 by 2.62 million toe or 52.9%, and an increase in demand for diesel fuel by 2.67 million toe or 49.4%, and for LNG by 1.18 million toe (137.2%).

The structure of demand for motor fuel in Ukraine is presented in the Fig. 9.

The Figure 9 shows that there is a substitution in the demand of gasoline for diesel fuel. Thus, from 2009 to 2021, the

share of diesel fuel in the total turnover of motor fuel increased by 16.72 percentage points. In 2021, the structure of demand for motor fuel was as follows: diesel fuel – 64.88%, motor gasoline – 18.72%, LNG – 16.39%.

The dynamics of the structure of motor fuel supply and its changes in the period from 2009–2021 is shown in the Fig. 10 and 11.

The Fig. 10 and 11 show that the reduction in demand caused a corresponding reduction in supply in the motor fuel market of Ukraine. The reduction in supply was accompanied by negative changes in its structure, namely an increase in the share of imports in total supplies. Thus, the share of imports increased from 32.92% in 2009 to 78.96% in 2021. The volume of supply of motor fuel in 2022 amounted to 12.3 million toe.

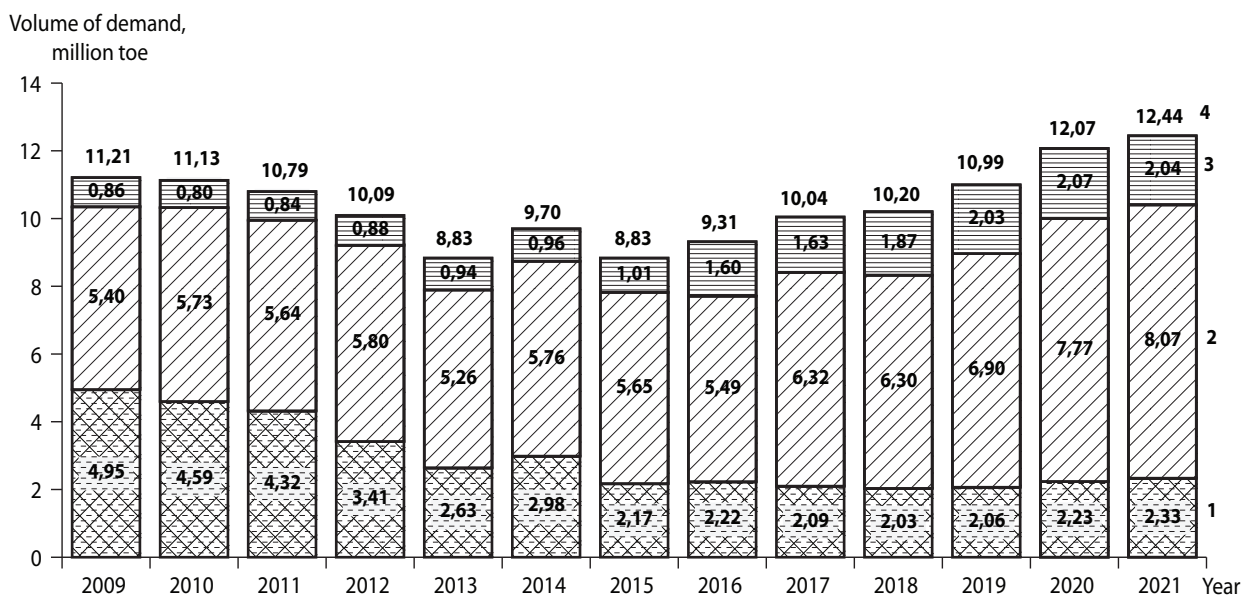


Fig. 8. The dynamics of the structure of demand for motor fuel in Ukraine in 2009–2021: 1 – motor gasoline; 2 – diesel fuel; 3 – liquefied natural gas (LNG)

Source: based on the materials of [9–45]

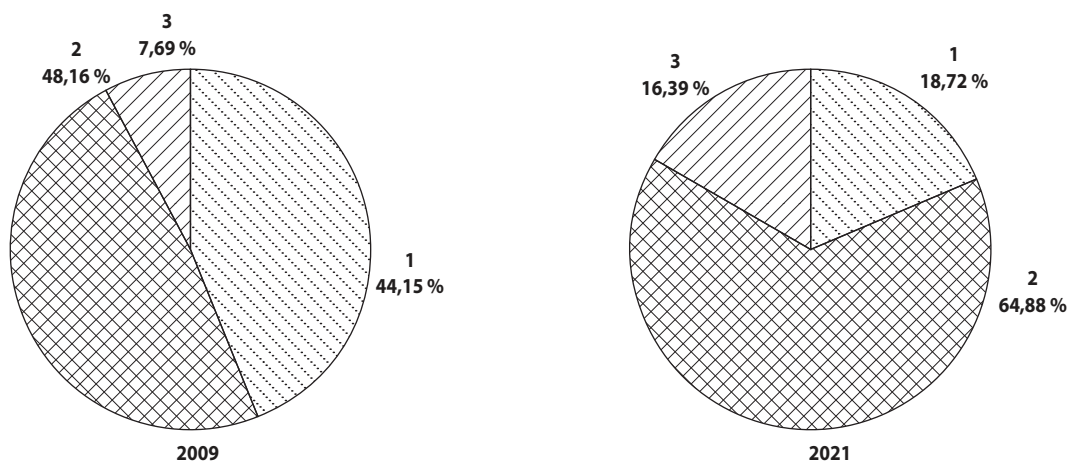


Fig. 9. The structure of demand for motor fuel in Ukraine: 1 – motor gasoline; 2 – diesel fuel; 3 – liquefied natural gas (LNG)

Source: based on the materials of [9–45]



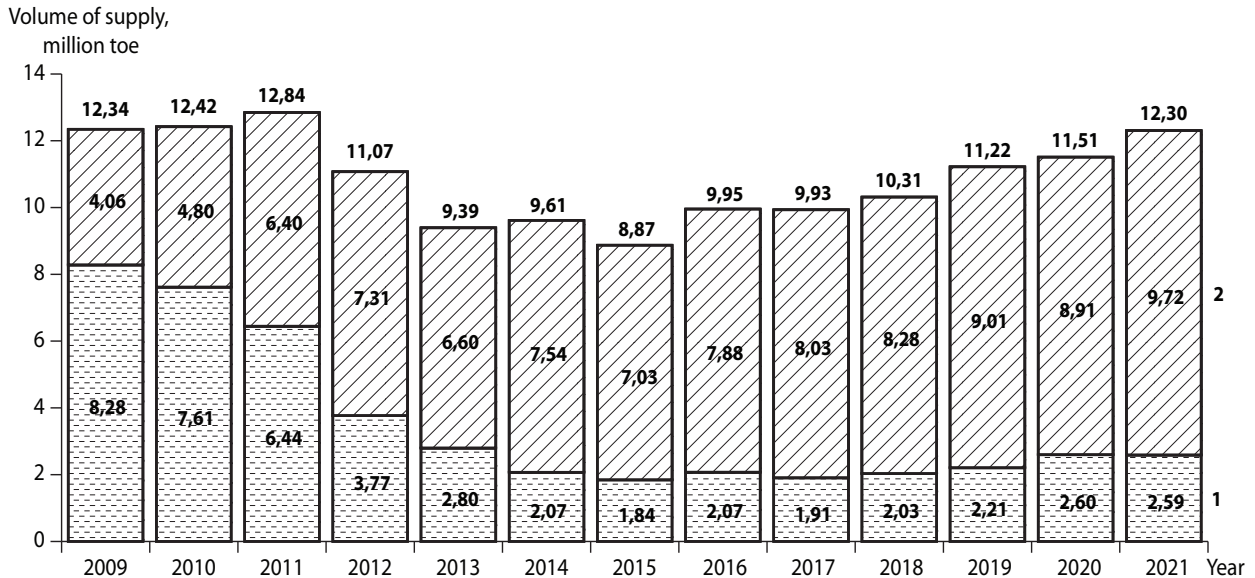


Fig. 10. The dynamics of the structure of motor fuel supply in Ukraine in 2009–2021:  
1 – domestic production; 2 – imports

Source: based on the materials of [9–45]

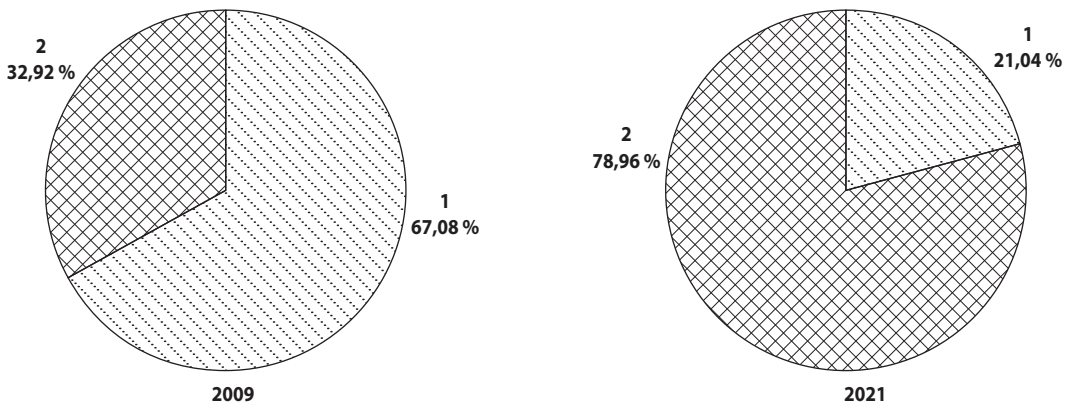


Fig. 11. The structure of motor fuel supply in Ukraine:  
1 – domestic production; 2 – imports

Source: based on the materials of [9–45]

The structure of production and imports of motor fuel by type is presented in the Fig. 12.

The Fig. 12 shows that the structure of imports (9.716 million toe) of motor fuel in Ukraine by its types was as follows: diesel fuel – 71.2%, gasoline – 15.78%, liquefied natural gas – 13.0%.

The structure of production (2.588 million toe) of motor fuel in Ukraine by its types was as follows: diesel fuel – 42.89%, gasoline – 40.19%, liquefied natural gas – 16.92%.

The main reason for the increase in the imports of motor fuel to the country was the abolition of import duties on the imported petroleum products against the background of the relatively low quality of Ukrainian oil products and the shutdown of all major producers of petroleum products in Ukraine.

The dynamics of the supply structure of motor gasoline and its changes in the period of 2009–2021 is shown in the Fig. 13 and 14.

The Fig. 13 shows that the dynamics of the supply of motor gasoline tends to decrease, so in 2021 compared to 2009, the supply decreased by 2.89 million toe of oil equivalent, or 55.7%. The supply of the Ukrainian gasoline market in 2021 amounted to 2.3 million tons, which is 170 thousand tons more than last year.

According to the Fig. 14, the main source of the supply of motor gasoline in Ukraine in 2021 was imports. During the analyzed period, the share of imports in the total supply of motor gasoline increased from 33.98% to 54.84%. The imported resource in 2021 amounted to 54.8% of the total market (1.26 million tons); own gasoline production, excluding the aggregated volume of mini-refineries, is estimated at 1.04 million tons and is almost at the level of the indicators of 2020. The lion's share of this volume was produced on the basis of the Kremenchuk refinery, the share of the owner company in the gasoline market was about 38.0%.

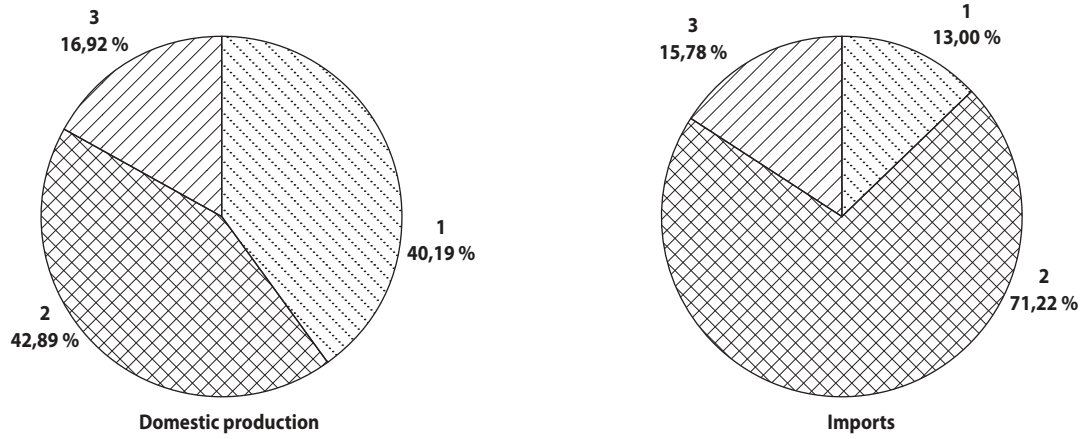


Fig. 12. The structure of production and imports of motor fuel by type in Ukraine in 2021:  
1 – motor gasoline; 2 – diesel fuel; 3 – liquefied natural gas (LNG)

Source: based on the materials of [9–45]

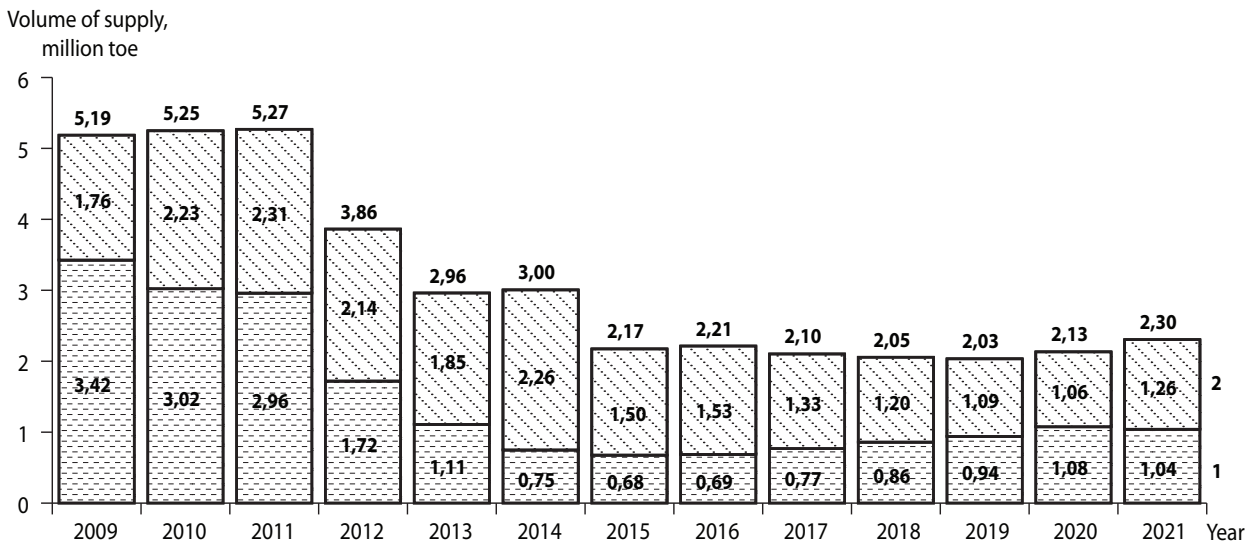


Fig. 13. The dynamics of the structure of motor gasoline supply in Ukraine in 2009–2021:  
1 – domestic production; 2 – imports

Source: based on the materials of [9–45]

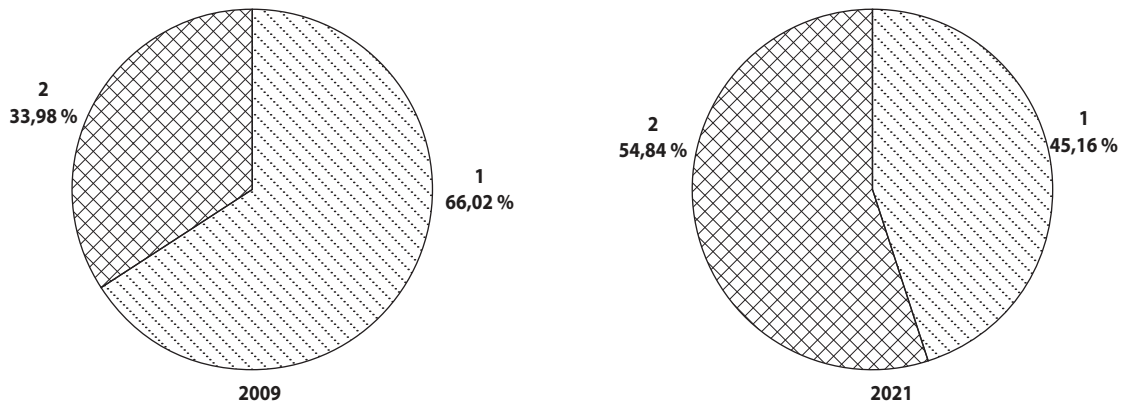
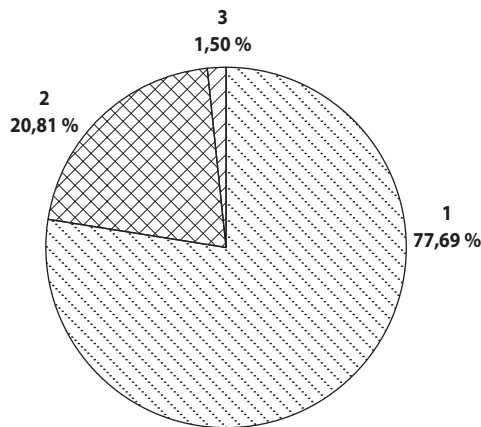


Fig. 14. The structure of motor gasoline supply in Ukraine:  
1 – domestic production; 2 – imports

Source: based on the materials of [9–45]

The geographical structure of imports of motor gasoline is shown in the Fig. 15.



**Fig. 15. The geographical structure of imports of motor gasoline in Ukraine in 2021:**  
1 – Belarus; 2 – Lithuania; 3 – others

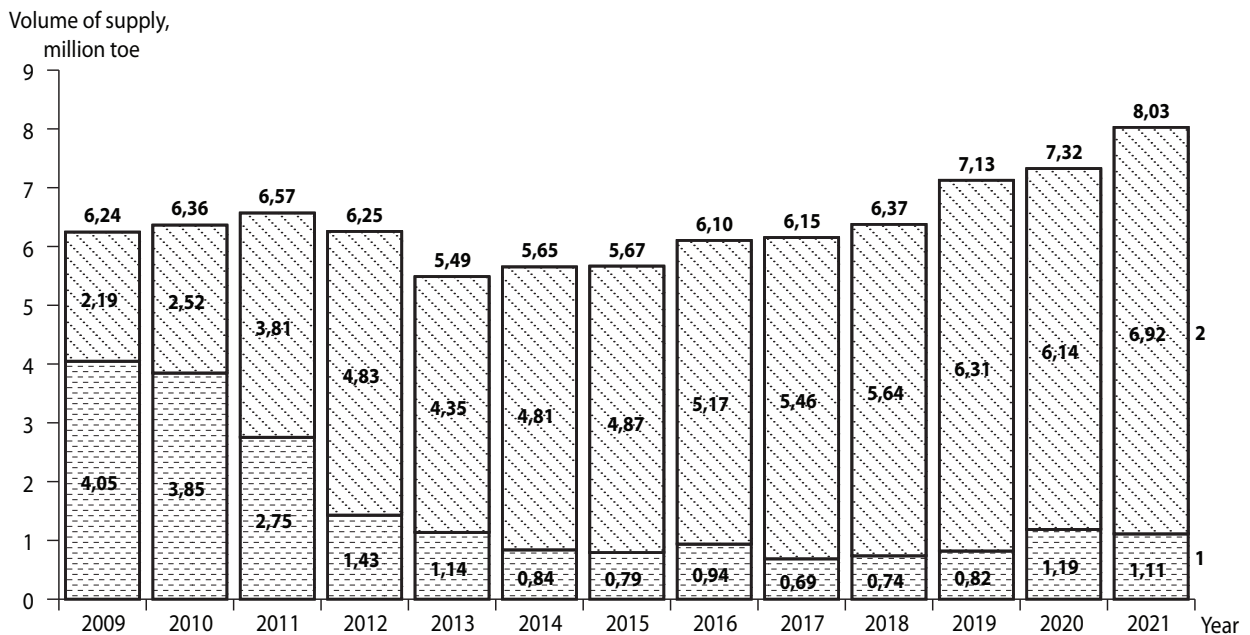
Source: based on the materials of [28; 30]

The Fig. 15 shows that the structure of imports of motor gasoline in Ukraine in 2021 by countries of the world was as follows: Belarus – 77.69%, Lithuania – 20.8% and others – 1.5%. Belarus, as in 2020, remained the main supplier of gasoline to the Ukrainian market, the volume of supplies in 2021 amounted to 0.981 million tons.

More than 90.0% of the total volume was the production of Mozyr oil refinery. The Belarusian resource mainly came to Ukraine by rail. More than 60.0% of the total volume were the supplies of A-95 gasoline, followed by A-92 gasoline. In 2021, A-98 and A-100 gasoline were also supplied from Belarus. Imports of gasoline from Lithuania (produced by the Mažeikiai oil refinery) in 2021 increased to 262.78 thousand tons and were mainly represented by the A-95 gasoline. In 2021, the resource was also imported by sea, mainly from Greece and Romania.

The dynamics of the structure of diesel fuel supply and its changes in the period of 2009–2021 are shown in the Fig. 16 and 17.

These figures show that, in contrast to motor gasoline, in 2021 compared to 2009, the supply of diesel fuel increased by 1.79 million toe, or 28.7%.



**Fig. 16. The dynamics of the structure of supply of diesel fuel in Ukraine in 2009–2021:**  
1 – domestic production; 2 – imports

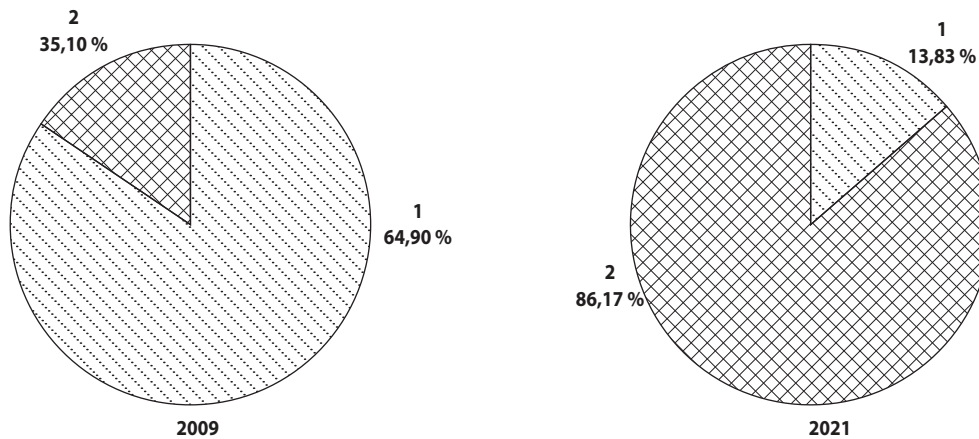
Source: based on the materials of [9–45]

The main component of the formation of the supply of diesel fuel in Ukraine in 2021 was imports, the share of which in the total supply amounted to 86.17%. During the period under review, the share, and therefore the significance of diesel fuel imports in the country’s market increased by almost 2.5 times.

The geographical structure of diesel fuel imports is shown in the Fig. 18.

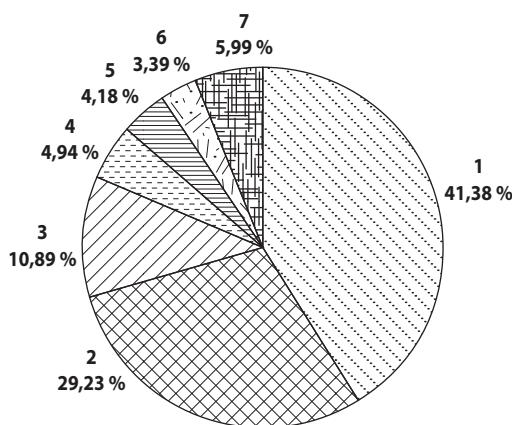
The Fig. 18 shows that Belarus became the main supplier of the import resource in 2021, the volume of supplies amounted to 2.86 million toe (41.38%) and was mainly represented by the products of the Mozyr oil refinery, which came to Ukraine

by rail. Imports of diesel fuel from Russia in 2021 amounted to 2.02 million toe (29.23%). The supplies of the Lithuanian resource (Mažeikiai oil refinery) amounted to 0.753 million toe (10.89%). In 2021, imports of the resource by sea intensified significantly, the total volumes received in the ports of Mykolaiv, Odesa, Pivdennyi, Kherson and others amounted to 1.28 million toe and was represented mainly by diesel fuel produced in Turkey – 0.342 million toe (26.71%), Greece – 0.289 million toe (22.6%) and India – 0.235 million toe (18.34%). In 2021, the resource also came from Israel, Italy, Bulgaria, Malaysia, and Spain.



**Fig. 17. The structure of supply of diesel fuel in Ukraine:**  
1 – domestic production; 2 – imports

Source: based on the materials of [9–45]



**Fig. 18. The geographical structure of imports of diesel fuel in Ukraine in 2021:**  
1 – Belarus; 2 – Russian Federation; 3 – Lithuania;  
4 – Turkey; 5 – Greece; 6 – India; 7 – others

Source: based on the materials of [28; 30]

The dynamics of the supply structure of liquefied natural gas and its changes in the period 2009–2021 are shown in the Fig. 19 and 20.

The Fig. 19 and 20 show that in 2021 compared to 2009, the supply of liquefied natural gas increased by 1.06 million toe, or 116.5%. The balance of the liquefied natural gas market in Ukraine in 2021 amounted to 1.97 million toe. The main component of the formation of the supply of liquefied natural gas in Ukraine in 2021 was imports, the share of which in the total supply amounted to 77.78%. During the period under analysis, the share, and therefore the significance of liquefied natural gas imports in the country's market increased by 6.5 times.

In 2021, Ukrainian producers increased the production of liquefied gas to 438 thousand toe (+102 thousand toe to the level of 2020). The increase in production volumes was facilitated by the increase in processing volumes by the Kremenchuk refinery, and, accordingly, the production of liquefied gas. According to experts, 2021 in Ukraine was marked by a decline

in the LPG (autogas) segment and an increase in the level of consumption of liquefied gas by industrial and agricultural enterprises, which actively switched from the use of natural gas in production processes to liquefied gas.

The geographical structure of imports of liquefied natural gas is shown in the Fig. 21.

The Fig. 21 shows that the largest exporter of liquefied gas in 2021 was again the Russian Federation, supplying 40.87% (0.626 million toe). The decrease in imports from the Russian Federation is mainly a result of a change in the supplier of the resource (an intermediary in the Ukrainian market) in the spring of 2021, when the work of the Proton Energy trader was stopped. Another reason was a number of accidents at processing and mining enterprises of the Russian Federation. The second largest supply to the Ukrainian market in 2021 was Kazakhstan, supplying 32.56% (0.499 million toe). According to estimates, the volume of revenues from Kazakhstan has increased almost eleven times over the past 5 years. In 2021, the volume of supplies from Belarus (mainly the production resource of the Rechytsa gas processing plant and the Mozyr oil refinery) amounted to 136 thousand toe (17.7%). Almost three-quarters of imported gas is supplied by rail from Russia and Kazakhstan. The Belarusian resource was mainly supplied in trucks. In 2021, imports by sea intensified, the total level of revenues to the ports of Ukraine amounted to 114.7 thousand tons. Most of the sea imports were produced by Tengizchevroil (Kazakhstan). In 2021, for the first time, the resource was imported by sea from Great Britain (2.3 thousand toe) and Nigeria (5.05 thousand toe).

Thus, it can be stated that the tendencies of changes in the national motor fuel market are determined by the negative impact of a reduction in demand as a result of rising prices, which in turn is caused by a structural shift in supplies in favor of imports of finished motor fuel. This tendency further exacerbates the consequences of the problems facing the oil refining industry of Ukraine today.

The decrease in the production of all types of light oil products in Ukraine occurred under the influence of an aggregate of interrelated factors. Previously, domestic refineries operated with a large margin, but the oil refining margin at non-modernized refineries is now negative. That means, either to

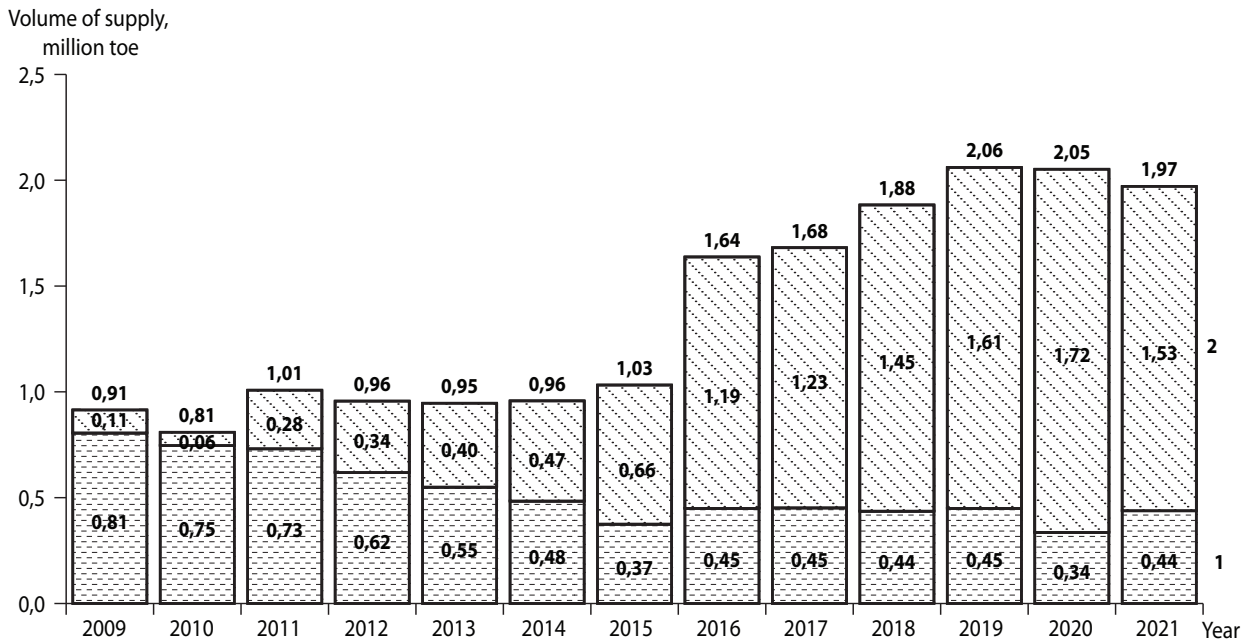


Fig. 19. The dynamics of the structure of supply of liquefied natural gas in Ukraine in 2009–2021: 1 – domestic production; 2 – imports

Source: based on the materials of [9–45]

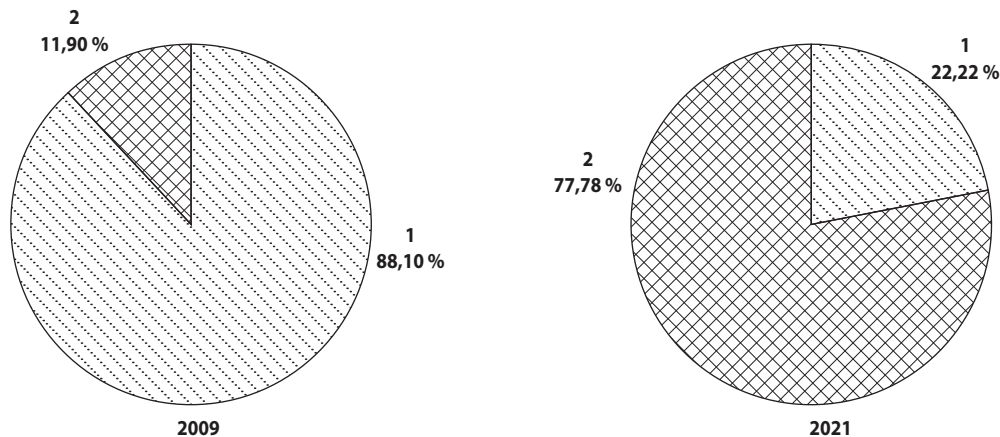


Fig. 20. The structure of supply of liquefied natural gas in Ukraine: 1 – domestic production; 2 – imports

Source: based on the materials of [9–45]

work at a loss, or to save on taxes, quality and other expenses. This happened because against the background of the widespread practice of providing preferences to market participants close to the authorities, domestic enterprises were not interested and practically did not modernize.

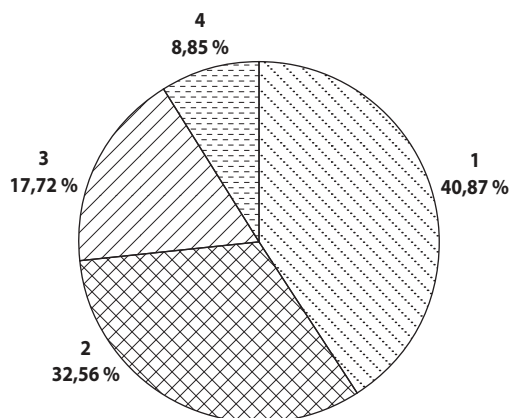
Thus, the main facts influencing the production of motor fuel in Ukraine are: low technological level of processing and quality of products; small oil refining margin; insignificant financing of production modernization; dependence on raw materials; significant volumes of motor fuel imports.

Against the background of the above-mentioned factors, it seems logical that the production of the main types of motor fuel in Ukraine reduces. The decrease in the production of the

main types of motor fuel was characteristic of both gasoline and diesel fuel.

The main factors in the decline in the efficiency of the national oil refining industry have been and remain the low competitiveness of domestically produced petroleum products, which arose as a result of the weakening of regulatory barriers to the import of petroleum products and the risks of low diversification of sources of imports of petroleum raw materials. These factors were:

- abolition in 2005 by Ukraine of the import duty on finished petroleum products, which caused significant changes in the conjuncture of the national motor fuel market in favor of imported petroleum products;



**Fig. 21. The geographical structure of imports of liquefied natural gas in Ukraine in 2021:**

1 – russian federation; 2 – Kazakhstan; 3 – Belarus; 4 – others

Source: based on the materials of [28; 30]

- the introduction in 2011 by the Russian Federation of an export duty (for Ukraine) on crude oil, which made it economically inexpedient for the domestic oil refining industry to use Russian oil raw materials.

After assessing the state of the oil and refining industry of Ukraine, it can be concluded that at the moment there is a systemic crisis in the oil refining industry of Ukraine, the main reasons of which are: firstly, the insufficiency of domestic oil production to meet the needs of the national oil refining; inefficiency of measures of the State regulation of the domestic market of finished petroleum products; focus on the import of finished motor fuels; the provoked by the Russian Federation cessation of crude oil supplies from Russia in the absence of effective actions on the part of Ukraine to replace this source with supplies from other regions of the world, the destruction of the remnants of the oil refining complex as a result of large-scale military aggression by the Russian Federation.

**Conclusions.** Thus, the carried out study allowed to determine the following:

- The main component of the formation of oil supply in Ukraine in 2021 was its own production, amounted to 61.19%. Imports provided 38.8% of oil supply in the domestic market.
- The oil and gas condensate production in the time period from 2009 to 2021 decreased by 1.52 million toe or 38.2%, and in 2021 amounted to 2.46 million tons of oil and gas condensate.
- During 2009–2021 there was a significant reduction in the supply of imported oil and gas condensate to the Ukraine, namely by 5657.7 thousand toe, or by 78.4%. The main deliveries of imported oil and gas condensate in 2021 were carried out from Azerbaijan (74.5%, or 1162.77 thousand tons).
- Volumes of primary processing of crude oil and gas condensate in Ukraine from 2009 to 2021 decreased by 68.8% and amounted to 3585.2 thousand tons. During the same time, the utilization of production capacities decreased from 27.8% to 6.7%.
- At the end of 2021, there were two large oil and gas refineries left out of seven in Ukraine that processed oil

and gas condensate, namely: Kremenchuk oil refinery, producing 3164.6 thousand tons; and Shebelynka gas processing plant – 420.6 thousand tons, which in 2022 stopped their operations as result of the military aggression of the Russian Federation on the territory of Ukraine. In addition, both enterprises were significantly damaged as a result of missile shellings by the Russian armed forces.

- The State owns 100% of two enterprises: Odesa oil refinery (owned by SE «Ukrtransnaftoprodukt») and Shebelynka gas processing plant (owned by «Naf-togaz of Ukraine»). Three following enterprises are controlled by Pryvat Group: Kremenchuk oil refinery (57% ownership), Drohobych oil refinery (75%), Nadvirna oil refinery (73%). The oil refinery in the city of Lysychansk is owned by Russian businesses (PJSC NK «Rosnafta» – 100% ownership). The owner of the Kherson oil refinery is the Ukrainian SE «Kon-tynium».
- The largest in terms of nominal capacity for primary oil refining are Kremenchuk oil refinery (18.6 million tons per year) and Lysychansk oil refinery (16.0 million tons per year); in terms of the depth of processing, they are 72.2% and 71.5%, respectively. The most promising from the point of view of oil and gas condensate processing are, respectively, Kremenchuk oil refinery and Shebelynka gas processing plant.
- In 2021, the Ukrainian market consumed 12.44 million toe of motor fuel, of which 64.88% was diesel fuel, 18.72% was gasoline and 16.39% was liquefied natural gas (LNG).
- Ukraine's import dependence by type of motor fuel in 2021: diesel fuel – 86.17%, gasoline – 54.84%, liquefied natural gas – 77.78%.
- The structure of imports (9.716 million toe) of motor fuel in Ukraine by its types was: diesel fuel – 71.2%, gasoline – 15.78%, liquefied natural gas – 13.0%.
- The structure of production (2.588 million toe) of motor fuel in Ukraine by its types was as follows: diesel fuel – 42.89%, gasoline – 40.19%, liquefied natural gas – 16.92%.
- The volume of gasoline production in Ukraine in 2021 amounted to 1040 thousand toe, which is 69.6% less than in 2009, the volume of diesel fuel production in Ukraine from 2009 to 2021 decreased by 72.5% and amounted to 1110 thousand toe, the volume of liquefied natural gas production for 2009 – 2021 decreased by 45.7% and amounted to 438 thousand toe in 2021.
- The structure of imports of motor gasoline in Ukraine in 2021 by countries of the world was as follows: Belarus – 77.69%, Lithuania – 20.8% and others – 1.5%.
- The structure of diesel fuel imports in Ukraine in 2021 by country was as follows: Belarus – 41.38%, Russia – 29.23%, Belarus – 17.7% and others – 18.5%.
- The structure of imports of liquefied natural gas in Ukraine in 2021 by countries of the world was as follows: Russia – 40.87%, Kazakhstan – 32.56%, Lithuania – 20.8% and others – 8.87%.
- To date, none of the major oil refineries operate in Ukraine. Shebelynka gas processing plant and Kre-

menchuk oil refinery stopped working in early April 2022 as result of massive missile shellings by the aggressor, after which they suffered repeated missile strikes from the Russian Federation; the Odesa oil refinery and the Lysychansk oil refinery, both standing idle, were also subjected to missile strikes by the aggressor. All this testifies to the unsatisfactory state of meeting the country's needs with motor fuel, which poses a significant threat to the fuel and energy security, national security in particular, and necessitates to find ways to solve this problem.

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