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## INTERACTION OF THE UKRAINIAN GAS MARKET INTO THE WORLD ENERGY SYSTEM (ECONOMIC AND LEGAL ASPECTS)

The article is devoted to economic and legal problems of the emergence and functioning of the gas market of Ukraine and its integration into the world market.

A characteristic feature of the development of the world economy in recent years has been the intensification of competition for non-renewable resources, as evidenced by growing tensions and increasing conflicts in places of large energy deposits. Ukraine, as one of the participants in the world energy market due to its territorial position and potential, is fully involved in global processes.

Trade in energy resources ranks first in value in the structure of international trade. Compared to other markets, the world energy market is more dependent on the world economy, demographic situation, geopolitical situation, emergencies. Changes and shocks in the world economy immediately affect primarily energy markets.

Despite the slowdown (and in some cases stagnation) rates of economic growth in developed countries with market economies in the late first - early second decade of the XXI century, global energy demand continues to grow. In recent years, the annual increase in primary energy consumption was 2.4%, less than 1% in the Organization for Economic Co-operation and Development (OECD), and the rest of the increase came from developing countries and emerging markets. Although the share of oil compared to other energy sources, despite a steady decline in recent years, remains the largest, but, according to experts, due to declining demand for nuclear energy, as well as a number of other factors, natural gas can play a leading role in global energy market.

In this regard, it is of scientific and practical interest to the emergence and development of the gas market of Ukraine. The analysis of the origin and functioning of the gas industry in Ukraine is carried out in the work.

The paper proves that the development of the gas industry in Ukraine is the oldest in Europe and began after the First World War. In 1922, one of the world's first Dashava-Stry gas pipelines was built. In 1975, production reached a record high - 68.7 billion m<sup>3</sup>, but at the same time, there was a gradual depletion of deposits. Currently, natural gas production has stabilized at 20 billion m<sup>3</sup>. Currently, the largest producer of natural gas is PJSC «Ukrgezvydobuvannya». Ukraine lacks its own extracted gas. The needs of this energy resource are much higher, and it takes time and investment to switch to alternative energy sources. Therefore, today, our country is largely dependent on imports of natural gas and other energy products.

**Key words:** gas industry, gas field, gas pipeline, oil and gas industry.

## ІНТЕРАЦІЯ УКРАЇНСЬКОГО ГАЗОВОГО РИНКУ ДО СВІТОВОЇ ЕНЕРГЕТИЧНОЇ СИСТЕМИ (ЕКОНОМІКО-ПРАВОВІ АСПЕКТИ)

Статтю присвячено економіко-правовим проблемам виникнення і функціонування газового ринку України та її інтеграції до світового ринку.

Характерною рисою розвитку світової економіки в останні роки стало загострення конкурентної боротьби за невідновлювальні ресурси, свідченням чого є зростаюча напруженість і конфлікти, що почастишали, в місцях великих покладів енергоносіїв. Україна як один із учасників світового

енергетичного ринку в силу свого територіального становища та потенціалу повною мірою залучена до глобальних процесів.

Торгівля енергетичними ресурсами посідає перше місце за вартістю у структурі міжнародної торгівлі. Порівняно з іншими ринками, світовий енергетичний ринок більшою мірою залежить від кон'юнктури світової економіки, демографічної ситуації, геополітичної ситуації, надзвичайних подій. Зміни та потрясіння у світовому господарстві негайно позначаються насамперед на ринках енергоресурсів.

Незважаючи на уповільнення (а в окремих випадках і стагнацію) темпів економічного зростання в розвинених країнах з ринковою економікою наприкінці першого – на початку другого десятиліття ХХІ ст., світовий попит на енергоносії продовжує зростати. У останніх роках щорічний приріст споживання первинних енергоносіїв становив 2,4 %, при цьому в країнах Організації економічного співробітництва та розвитку (ОЕСР) він виявився менше 1 %, а решта приросту припала на країни, що розвиваються, і країни з ринком, що формується. І хоча частка нафти в порівнянні з іншими енергоносіями, незважаючи на стабільне скорочення протягом останніх років, залишається найбільшою, проте, за оцінками фахівців, через зниження попиту на атомну енергію, а також ряд інших факторів, саме природний газ може вийти провідні ролі на світовому енергетичному ринку.

У зв'язку з цим представляє науковий та практичний інтерес зародження та розвитку газового ринку України. В роботі проведено аналіз виникнення та функціонування газодобувної галузі в Україні.

В роботі доведено, що розвиток газодобувної галузі в Україні є найстарішим в Європі і розпочався після завершення Першої світової війни. У 1922 р. був побудований і один з перших і світі газопровід Дашава-Стрий. У 1975 р. видобуток сягнув рекордної величини – 68,7 млрд. м<sup>3</sup>, але разом з цим, відбувалося поступове виснаження родовищ. Нині видобуток природного газу стабілізувався на рівні 20 млрд. м<sup>3</sup>. В даний час найбільшим видобувачем природного газу є компанія ПАТ «Укргазвидобування». Україні не вистачає власного видобутого газу. Потреби цього енергоресурсу значно вищі, а щоб перейти на альтернативні джерела енергії потрібен час та інвестиції. Тому сьогодні, наша країна значною мірою залежна від імпорту природного газу й інших енергетичних продуктів.

**Ключові слова:** газодобувна галузь, газове родовище, газопровід, нафтогазова промисловість.

**Statement of the problem in general and its connection with important scientific and practical tasks.** The basis of the modern economy is energy. Thus, the economic potential of any country is largely dependent on and largely determined by the availability of energy resources. World energy markets are an integral attribute of the modern world economy. It is their effective functioning that will guarantee a significant further impact on the development of the world economy in general and individual countries in particular. Therefore, it is advisable to study the origin and genesis of the gas market of Ukraine.

**Analysis of recent research that has begun to solve the problem.** The problems of origin and development of the fuel and energy complex are dealt with by a sufficient number of scientists, among whom we can highlight the works: I.K. Chukaeva, R.V. Sherstyuk, G.G. Burlaka, L.G. Chernyuk, L.M. Zaytseva, A.F. Mel'nyk, Z.M. Zaloga, M.Yu. Borodin, O.S. Chervins'ka, however, the urgency of this issue is not exhausted, and further need to further study the prospects and ways of development of the oil and gas complex of Ukraine.

**Objectives of the article.** The aim of the article is to analyze the process of emergence and development of the market and gas production in Ukraine.

**Presentation of the main material of the research with substantiation of the obtained scientific results.**

The history of oil and gas production in Ukraine dates back to ancient times. As early as the 14th century, the first historical facts of oil production from the depths of Western Ukraine were recorded. In the 20s of the XIX century. In the Ukrainian lands, which were part of the Austrian Empire, the industrial development of an oil field near the town of Boryslav began, which covered the territory of the modern Ivano-Frankivsk and Lviv regions. In the beginning, gas remained a by-product of oil production. Later it began to be used for practical purposes. In the 19th century, it was the largest European oil-producing region. At the beginning of the XX century. the volume of oil production from the Boryslav field reached 2 million tons per year.

The direct development of the gas industry in Ukraine began after the end of the First World War. The Dashavsk gas field was put into operation, from which gas was supplied to Polish Galicia. The first gas well began operating in the town of Dashava (modern Lviv region) on April 18, 1921. The next, in 1922, the Dashava-Stryi gas pipeline was built, which was later

completed in Drohobych. In 1929, two more gas pipelines were put into operation: Dashava-Lviv and Stryi-Morshyn-Dolyna-Vyhoda. Dashav gas was supplied to Stryi, Drohobych and Lviv.

In 1945, after the end of the war, the Soviet Union pumped Ukrainian gas from the Dashavsky and Oparsky gas fields to Poland. In 1948 the Dashava-Kyiv gas pipeline started operating. Later, in 1951, it was extended to Moscow, and thus, Ukrainian gas began to flow to Russia (Павлушко, 2018).

In 1940, Ukraine produced 495.1 million m<sup>3</sup> of gas, while in Russia - 209.9 million m<sup>3</sup>. The Russian Federation bypassed the Ukrainian SSR in the gas industry after World War II. However, Ukraine has long remained a leader in gas production among the republics of the USSR (Table 1) (BusinessViews, 2017).

Built in 1948, the Dashava-Kyiv gas pipeline became the longest gas pipeline in Europe - 534.4 km. with a design capacity of 2 billion m<sup>3</sup> of gas per year. Kyiv simply could not consume this amount of gas, however, within a year it became clear that it had a strong capacity. Further construction of the Dashava-Kyiv-Bryansk-Moscow gas pipeline began immediately, through which the vast majority of natural gas produced in Western Ukraine was pumped to Moscow.

Table 1. Production of natural gas in the union republics, billions m<sup>3</sup>

	1928	1940	1955	1958	1959	1960
USSR	304,0	3219,1	8980,9	28084,6	35391,0	45303,2
RSFSR	126,9	209,9	4291,0	13743,4	18365,4	24412,4
Ukrainian SSR	-	495,1	2927,6	9500,7	11698,8	14286,3
Uzbek SSR	-	0,7	103,0	126,4	203,3	446,6
Kazakh SSR	1,3	3,9	24,7	42,0	36,1	39,4
Azerbaijan SSR	175,5	2498,1	1493,8	4446,3	4843,7	5840,6
Moldavian SSR	-	-	-	-	2,0	2,3
Kyrgyz SSR	-	-	-	1,5	9,9	41,2
Tajik SSR	0,3	2,2	-	-	-	--
Turkmen SSR	-	9,2	140,8	224,3	231,8	234,4
Latvian SSR	-	4,7	16,7	17,3	17,3	17,7
Estonian SSR	-	0,9	387,9	415,2	413,5	432,8

In 1950, the Shebelinskoye gas field was explored. Its commercial operation began only six years later. Natural gas from this field was delivered to Kharkiv, Belgorod, Dnipropetrovsk, Zaporizhia, and since 1960 to Kyiv. At the same time, Western Ukrainian gas began to flow through the Dashava-Minsk gas pipeline to Belarus, and from there to Lithuania (Vilnius, Klaipeda) and Latvia (Riga). In the middle of the XX century. Natural gas from the Ukrainian subsoil was transported by gas pipelines to Poland, Austria, Czechoslovakia, Belarus, Russia, Lithuania, and Latvia (Павлушко, 2018).

The Soviet Union strengthened and sought to develop Western energy markets. It is obvious that with the deficit of foreign exchange earnings, it was possible to obtain it through the supply of oil and gas. At that time, almost all industry in Ukraine and part of Russia were supplied with natural gas from the Shebelinskoye field. Therefore, gas from the fields of Western Ukraine, as surplus, could be exported to the European market. In 1965, the Brotherhood gas pipeline system was established to supply natural gas to Eastern European countries. And already in 1967 the first export deliveries of gas from Ukraine (Transcarpathia) to Czechoslovakia began through the Bratstvo gas pipeline. The commissioned gas pipeline with a diameter of 1080 mm reached 558 km (including 183 km in the USSR). A year later, in 1968, the Bratstvo gas pipeline was extended to the town of Baumgarten on the Austrian border, so Ukrainian gas reached Austria.

Gas pipelines, which began to supply natural gas from Siberia to Europe, started

working only in the early 70s of the twentieth century. After the signing of contracts between the USSR and the Federal Republic of Germany. In particular, on February 1, 1970, in Essen, Germany, the first agreement was concluded between the representatives of the USSR and West Germany on the "pipe in exchange for gas" scheme. The agreement contained the following points:

- in 1970–1972, the German company Mannesmannröhren-Werke GmbH provided the Soviet Union with 2,000 km of gas pipelines. 1.2 million tons of large diameter gas pipes;
- instead, starting from November 1, 1973, the USSR will deliver 52 billion m<sup>3</sup> of gas to Germany for 20 years with a total value of 2.5 billion marks;
- a consortium of German banks, led by Deutsche Bank, provided a loan of 1.2 billion marks for 11 years (annual rate of 6%) for the purchase of pipes in Mannesmann USSR (*Der Spiegel*, 1970.)

A year later, the USSR concluded another gas agreement with Germany, in which they doubled the contracted gas and at the same time continued to provide German loans and pipes for the further development of the USSR's gas transportation infrastructure (*Der Spiegel*, 1971).

The prospect of gas profits loomed on the horizon, so the Soviet economy began to actively create the declared infrastructure for natural gas export operations. It should be noted that initially, gas from the Shebelinskoye field was used to ensure export supplies. And in 1970–1972, two branches of the Kyiv-Western Ukraine gas pipeline were put into operation.

In the 1960s and 1970s, gas production in Ukrainian lands set annual records. In 1975, production reached a record high - 68.7 billion m<sup>3</sup>, but at the same time, there was a gradual depletion of deposits. Currently, natural gas production has stabilized at 20 billion m<sup>3</sup> (Fig. 1).

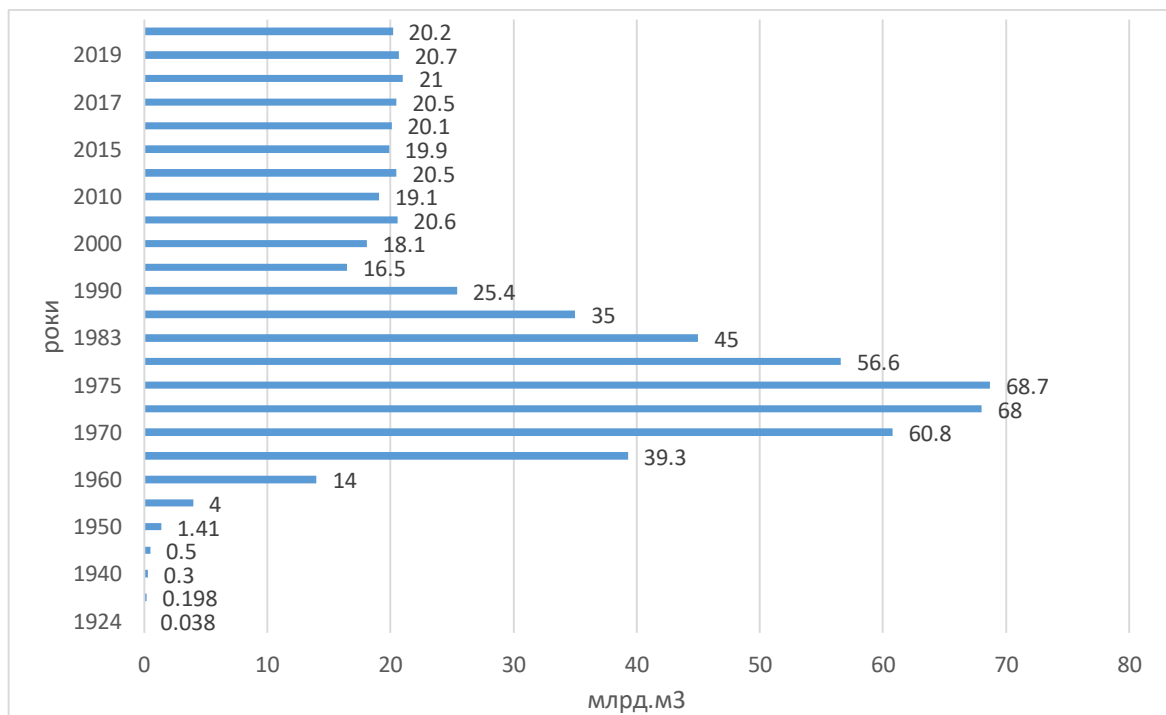


Fig. 1. Gas production in Ukraine in 1924–2020 (*Державна служба статистики України, 2021*).

The German press wrote the following about the first successes of Soviet gas supplies in 1973, when gas pipelines made on German loans and from German pipes were completed at the German border: "Herbert Schelberg, CEO of Ruhrgas AG, which symbolizes the start of natural gas supplies from the Soviet Union. Over the next 20 years, the contract will supply 120 billion m<sup>3</sup> of high-calorie gas from Western Ukraine to Germany, followed by Russian gas, and

later gas from giant fields in Siberia. It should be noted that in 1973, newly built pipelines initially supplied Ukrainian gas to Europe (*Die Zeit*, 1973).

In the postwar period, Ukraine's oil and gas industry developed rapidly. Significant hydrocarbon reserves have been found in the Carpathians, in the Dnieper-Donetsk basin and in the Black Sea-Crimean oil and gas region. In 1972, the maximum oil and gas condensate was extracted - 14.4 million tons; and three years later, in 1975, Ukraine reached the highest level of gas production - 68.7 billion m<sup>3</sup> (*Історія галузі*, 2022).

Regarding the development of the gas industry in recent years, it should be noted that in the period 2000–2016, on average, gas production increased by 0.6% annually. At the same time, gas consumption decreased by an average of 5.3% annually. This trend is quite positive for Ukraine's economy, as gas is the leading energy resource.

In 2014, gas production decreased by 5.9%. This year, state-owned companies extracted 16.8 billion m<sup>3</sup> or 85.2% of the total (*Державна служба статистики України*, 2021). The reason for the reduction in gas production was that due to the occupation of Ukrainian territories by the Russian Federation in March 2014, Naftogaz Ukrainy lost control over Chornomornaftogaz. In 2015, gas production decreased by 1.4%, however, in 2016 it increased by 0.5%. This situation has necessitated a reduction in gas consumption by the economy and the population.

In Ukraine, the largest producer of natural gas is the company PJSC "Ukrgezvydobuvannya". In 2019, it covered about 72% of the total volume of natural gas produced in Ukraine (Table 2).

Ukraine lacks its own extracted gas. The needs of this energy resource are much higher, and it takes time and investment to switch to coal. Therefore, today, our country is largely dependent on imports of natural gas and other energy products. On the political agenda, therefore, the problem of energy imports occupies a key place, especially during changes in pricing policy. To address this issue, urgent reform is needed in order to invest widely in this sector of the economy. The main player in the natural gas market is Naftogaz Ukraine. This structure directly or indirectly controls the production, transportation, storage and supply of natural gas.

Table 2. Gross gas production in Ukraine in 2016–2019, billion m<sup>3</sup> (*Державна служба статистики України*, 2021).

	2015	2016	2017	2018	2019
Private enterprises	3,9	4,2	4,1	4,4	4,6
JSC JSC "Chornomornaftogaz"	0,01	0,01	0,01	0,01	0,01
PJSC "Ukrnafta"	1,5	1,3	1,1	1,1	1,2
JSC "Ukrgezvydobuvannya"	14,5	14,6	15,3	15,5	14,9
Together	19,9	20,1	20,5	21,0	20,7

In 2016, Ukraine reduced natural gas imports compared to 2015 by 32.7% or 5.376 billion m<sup>3</sup> - to 11.078 billion m<sup>3</sup>, worth \$ 1.6 billion. In 2015, the value of 16.5 billion m<sup>3</sup> of natural gas imported to Ukraine amounted to 4.5 billion dollars.

In recent years, Ukraine has been trying to overcome its dependence on Russian gas imports. Since 2015, the state has been cooperating with European operators FGSZ, Eustream and Gas-System S.A., purchasing mostly natural gas in Slovakia, Hungary and Poland.

Ukraine's energy strategy for the period up to 2035 envisages a reduction in the share of natural gas in the country's overall energy balance from 35% to 25% (*Нова енергетична стратегія України на період до 2035 р.*, 2017). In the last five years, total natural gas consumption has decreased from 50.2 to 28.4 billion m<sup>3</sup>. The reasons for this are:

- decline in industrial production and decline in economic activity;
- increase in tariffs in the domestic market;
- loss of Ukrainian territories as a result of military aggression;



- energy efficiency of a number of enterprises.

Despite the rapid decline in natural gas consumption, Ukraine is unable to fully meet domestic demand solely on its own resources. Thus, in 2017, compared to the previous 2016, the volume of natural gas imports increased by 3 billion  $\text{m}^3$ . At the same time, from 2015 to 2018, the coefficient of energy dependence decreased sharply.

In the gas sector of the Ukrainian economy, the transit of natural gas to European countries is an important component. In 2020, the Ukrainian gas transportation system (GTS) transited 55.8 billion  $\text{m}^3$  of gas (38% less than in 2019). A serious problem for Ukraine will be the commissioning of the Turkish Stream and Nord Stream-2 projects aimed at building gas pipelines bypassing our country. Therefore, according to Naftogaz, Ukraine will lose up to a quarter of natural gas transit from 2020 inclusive (*НАК «Нафтогаз України», 2020*).

In general, Ukraine has achieved some results in restructuring the natural gas market.

At the end of 2016, contracts for transportation and storage of natural gas in Ukrainian gas stations were concluded with three European companies (DufEnergyTrading SA, Engie, and TrailStoneEnergy LLC) (*Енергетична галузь України: підсумки 2016 року, 2017*). By using gas storage facilities for the needs of traders, Ukraine will be able to correlate seasonal gas prices. In the future, there is an opportunity to turn Ukraine's Western Gas Storage Complex (CFC) into a powerful European gas hub. This requires taking into account the European experience in the development of the energy sector and solving a number of tasks, including:

- make a feasibility study of the project;
- to establish an exchange for the effective functioning of the hub;
- to ensure equal conditions and appropriate legal framework for all market participants.

The integration of Ukraine's gas storage facilities into the European gas supply system will accelerate the liberalization of the natural gas market and lead to the establishment of a favorable investment climate.

Thus, the Ukrainian natural gas market shows an ambiguous process of development. The state is gradually establishing a system for its liberalization and further integration into the European market space, however, the implementation of this process is too slow. Tendencies to reduce consumption and gradually increase the volume of own natural gas production are positive components of the state's energy security strategy. At the same time, the gradual reduction of gas transit to European countries after the commissioning of Nord Stream 2 and Turkish Stream will become a potential problem for the country's economy. However, the implementation of effective reforms, as well as openness to European suppliers of the Ukrainian gas market will allow Ukraine to create a reliable bridgehead for exchange trade in natural gas. There are now all real grounds for creating an Eastern European gas hub on Ukrainian territory.

**Conclusions.** Thus, the development of the gas industry in Ukraine is the oldest in Europe and began after the First World War. In 1922, one of the world's first Dashava-Stry gas pipelines was built. Built in 1948, the Dashava-Kyiv gas pipeline became the longest gas pipeline in Europe - 534.4 km. with a design capacity of 2 billion  $\text{m}^3$  of gas per year. For a long time, Ukraine remained the leader in gas production among the republics of the USSR. In the middle of the XX century. Natural gas from the Ukrainian subsoil was transported by gas pipelines to Poland, Austria, Czechoslovakia, Belarus, Russia, Lithuania, and Latvia. In the 1960s and 1970s, gas production in Ukrainian lands set annual records. In 1975, production reached a record high - 68.7 billion  $\text{m}^3$ , but at the same time, there was a gradual depletion of deposits. Currently, natural gas production has stabilized at 20 billion  $\text{m}^3$ . In Ukraine, the largest producer of natural gas is the company PJSC "Ukrgezvydobuvannya". In 2019, it covered about 72% of the total volume of natural gas produced in Ukraine. Ukraine lacks its own extracted gas. The needs of this energy resource are much higher, and it takes time and investment to switch to alternative energy sources. Therefore, today, our country is largely dependent on imports of natural gas and other energy products.

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