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THE IMPACT OF TARIFF FORMATION ON THE SUSTAINABLE DEVELOPMENT OF THE GAS SECTOR OF UKRAINE

Abstract. The sustainable development of the gas sector and the formation of tariffs are closely interrelated, namely, adequate and stable tariffs stimulate investors to develop new technologies and infrastructure, which in turn contributes to the sustainable development of the gas sector. Adequate tariffs reflect the cost of implementing new effective technologies, improving environmental standards, infrastructure development, and modernization. However, due attention is not paid to the issue of tariff formation in the gas sector as an element of sustainable development. That is why the purpose of the study is to study the impact of tariff formation on the sustainable development of the gas sector of Ukraine.

The study outlines the importance of tariff formation for the sustainable development of the gas sector of Ukraine. In particular, it is stated that correctly formed tariffs should provide sufficient profit to support investments in the development and modernization of gas infrastructure. This helps to ensure a reliable supply of gas to consumers and to expand opportunities for the development of the energy sector. Setting differentiated tariffs can encourage consumers to use less gas and switch to more ecologically clean types of energy. Taking into account the emissions and impact on the environment contributes to the reduction of greenhouse gas emissions and other negative effects. Gas tariffs also have an impact on the social condition of the population and enterprises.

The research also analyzed the legal framework governing sustainable development in the countries of the world and Ukraine, and their relationship with the oil and gas sector of the economy. The peculiarities of tariff formation in European countries and Ukraine are considered and various methodologies used in European countries are highlighted, namely, those based on: regulated costs (cost-of-service); regulated revenue norms (revenue-cap regulation); under the responsibility of the gas pipeline operator (incentive-based regulation).

An analysis of the dynamics of gas sales on the market and for Ukrainian consumers, as well as the dynamics of gas transportation tariffs, was carried out. It showed a significant decrease in prices on the market and a relatively small decrease in tariffs for Ukrainian consumers. However, tariffs for the population remain lower than market prices due to their own production.

The main determinants influencing the formation of tariffs in gas transportation are

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identified, including geographic location, availability of natural resources, the degree of development of transport infrastructure, gas supply, and demand, competition in the gas transportation market, price trends, contractual conditions of service customers, regulatory policies and regulatory gas market requirements, costs related to gas transportation, investments in infrastructure development and maintenance, etc.

On the basis of the conducted research, the main aspects of the formation of gas tariffs to ensure the sustainable development of the gas sector have been established, namely, ensuring investment for innovation and development of gas enterprises, covering the costs of infrastructure and modernization, balancing economic and environmental aspects, reducing risks for investors, developing alternative energy sources, flexibility and adaptation to change, social impact and provide guarantees for consumers.

Keywords: *gas sector, tariff, tariff formation, sustainable development, determinants, price.*

Introduction. Research on the sustainable development of the gas sector is an extremely important task in today's world since the energy sector has a great impact on the ecology, economy, and social development of countries. Reducing the consumption of hydrocarbons such as natural gas is essential to reducing greenhouse gas emissions and combating climate change. Research is aimed at finding environmentally friendly alternatives to energy solutions and increasing the efficiency of resource use. In addition, the improvement and integration of the latest technologies and methods in the gas sector can help to reduce the costs of production, transportation, and consumption of gas. This will help to increase energy efficiency and reduce dependence on energy resources. Compliance of the gas sector with the principles of sustainable development helps to ensure a stable energy supply and reduce dependence on imports and risks of geopolitical conflicts. The sustainability of the gas sector involves not only economic and environmental dimensions but also social ones. Research can contribute to the development of social support programs, and jobs, and to ensuring energy availability for the population. These and other key aspects determine the relevance of this topic.

Analysis of recent research and publications. Issues of sustainable development are given considerable attention both at the international, state, regional, and enterprise levels. Both domestic and foreign scientists pay little attention to this topic. In particular, in September 2015, within the framework of the 70th session of the UN General Assembly, the UN Summit on Sustainable Development was held in New York, at which new guidelines were approved. The final document of the Summit "Transforming our world: the agenda for sustainable development until 2030" approved seventeen sustainable development goals and 169 tasks (<https://me.gov.ua/Documents/>). In 2017, the "Sustainable Development Strategy of Ukraine until 2030" (<https://www.undp.org/sites/g/files/zskgke326>) was developed, which establishes a comprehensive system of strategic and operational goals for the transition to integrated economic, social, and environmental development of the country.

Regarding the oil and gas industry, the UN, the International Finance Corporation (IFC), and IPIECA, the global association of the oil and gas industry on environmental and social issues, have developed an atlas "Mapping the oil and gas industry for sustainable development" (<https://www.ipieca.org/>), which defines the oil and gas industry and each of its parts from exploration and production to pipelines, processing, transportation and retail can most effectively support the achievement of the 2030 Sustainable Development Goals. The

contribution of the oil and gas industry to the achievement of the goals of sustainable development was also discussed in the research of U. Hamzah (<https://iopscience.iop.org/article>), the results of which are aimed at increasing the understanding of the relationship between the goals of sustainable development and the oil and gas business. As the researcher notes, the oil and gas industry is the center of the global and national economy, including in developed and developing countries, which is important for sustainable development, since oil and gas are the main pillars of the global energy system, and therefore are the driving forces of economic and social development. In addition, the International Petroleum Industry Environmental Conservation Association (IPIECA) in collaboration with the World Business Council for Sustainable Development (WBCSD) has introduced a new roadmap for sustainable development goals for oil and gas companies (<https://www.ipieca.org/work/>), which provides guidance on how to achieve the future with low emissions.

Building on the atlas (<https://www.ipieca.org/>) and the WBCSD 2018 WBCSD Roadmap Guidelines (<http://docs.wbcsd.org/2018/>), the new roadmap outlines more than 90 actions aimed at accelerating the implementation of the Sustainable Development Goals. As noted by (<https://www.offshore-technology.com/news/>), although the oil and gas industry has the potential to achieve all 17 SDGs, the roadmap highlights 10 SDGs that the industry can have the greatest impact on by innovating within its own operations and throughout the supply chain. Priority is given to good health and well-being; clean water and sanitation; affordable and clean energy; decent work and economic growth; industry innovations and infrastructure; responsible consumption and production; climatic actions; life underwater; life on earth; peace, justice, and strong institutions.

In general, the essence of sustainable development research is to meet the needs of today's society without harming future generations. This means ensuring the sustainable growth of the gas sector, using innovative technologies, conserving resources, and reducing the impact on the environment.

For this reason, Naftogaz NJSC pays considerable attention to issues of rational use of resources, improvement of gas production, and processing technologies, reduction of greenhouse gas emissions, development of alternative energy sources, increase in efficiency and provision of energy security. For example, in 2021, Naftogaz set a goal of reducing greenhouse gas emissions from operational activities to net zero by 2040. The company monitors and reduces direct greenhouse gas emissions. This is done by reducing methane leaks and blowing wells with gas. As a result, the company not only reduces the impact on the environment but also reduces the inefficient consumption of resources. Therefore, in order to reduce methane emissions, the introduction of mechanized gas production technologies (plunger lift, capillary systems) is being intensified.

Naftogaz also supports Ukraine joining the Global Methane Initiative, which took place during the UN Climate Conference in Glasgow in November 2021. The result of joining the initiative should be a reduction of methane emissions by Ukraine by 30 % by 2030. In addition, the company will increase the generation of electricity from renewable sources for its own consumption, as well as implement energy-efficient solutions in production processes to reduce indirect emissions.

Priority sources of new types of energy for the company are bioenergy and hydrogen, given the growing demand and the possibility of decarbonization of carbon-intensive sectors of the economy (<https://www.naftogaz.com/>).

The research of scientists helps to find more effective methods of extraction, use, and conservation of gas, and implementation of the latest technologies that can help to develop new directions and industries in the energy sector, stimulating innovation, economic growth, and environmental protection. So much attention is paid to the issue of decarbonization as a priority of sustainable development. They are considered in the following works (Gura & Petruk, 2021; Kuznetsova, 2021; Matkivskiy, 2021).

The purpose of the article. However, due attention is not paid to the issue of tariff formation in the gas sector as an element of sustainable development. That is why the purpose of our study is to study the impact of tariff formation on the sustainable development of the gas sector of Ukraine.

Formulation of the main material. The implementation of an effective tariff policy in the gas sector is important for ensuring sustainable development, contributing to the optimization of the use of resources and increasing energy efficiency in this key sector of the economy.

The formation of the tariff for natural gas and its transportation has an important economic, ecological and social component that affects various aspects of society and the economy. Namely:

1. Economic component. The economic aspect of forming tariffs for natural gas and its transportation is related to ensuring the stable financial condition of gas enterprises, as well as supporting the effective functioning of the gas sector. Properly formed tariffs should provide sufficient profit to support investments in the development and modernization of gas infrastructure, including gas pipelines and compressor stations. This helps to ensure a reliable supply of gas to consumers and to expand opportunities for the development of the energy sector.

2. Ecological component. Setting differentiated tariffs can encourage consumers to use less gas and switch to more ecologically clean types of energy. Taking into account emissions and the impact on the environment when forming tariffs contributes to the reduction of greenhouse gas emissions and other negative effects.

3. Social component. Gas tariffs have an impact on the social condition of the population and enterprises. It is important to ensure the availability of energy sources for the population, in particular for vulnerable groups, and to support social tariffs. At the same time, rational use of resources and energy efficiency help to reduce heating and energy costs for the population and businesses, which can have a positive impact on their incomes.

Therefore, the economic, ecological, and social components of the formation of tariffs for natural gas and its transportation are interconnected and affect the sustainability, availability, and efficiency of energy resources for society.

Having analyzed how tariffs are formed in European countries, we can conclude that the general approach to tariff formation in gas transport is carried out by the Gas Regulatory Forum, GRIFF, which harmonizes EU energy transmission and trade rules through gas network codes and their implementation. The Network Code improves transparency by harmonizing the

main principles and definitions used in the calculation of tariffs and includes a mandatory comparison of national tariff-setting methodologies with a reference methodology. It also provides requirements for publication of information on tariffs and revenues of transmission system operators (<https://bit.ly/3HVAzvo>).

However, each country has its own national legislation that defines the rules and procedures for tariff formation in the gas sector. Therefore, in order to ensure consistency between the national level and the EU level, the cross-border gas committee with experts from national energy ministers is considering proposals for the formation of tariffs.

Starting from July 1, 2009, the European Union introduced the Directive on Common Rules of the Internal Natural Gas Market (EU Directive 2009/73/EC) (<https://insat.org.ua/files/>). According to this Directive, member states must ensure the creation of effective regulation of tariffs, which must be transparent and objective.

The studied sources (<https://bit.ly/44Jct0r>, <https://www.creg.be/sites/>, <https://periodicals.karazin.ua/irtb>) gave reasons to highlight different methodologies used in European countries, namely, those based on: regulated costs (cost-of-service), where tariffs are formed based on the calculation of costs related to operation gas pipelines; regulated revenue norms (revenue-cap regulation), where the revenue of the gas pipeline operator is limited to a certain level established by the regulator; under the responsibility of the gas pipeline operator (incentive-based regulation), where tariffs are formed depending on the results of efficiency and quality of service provision.

In Ukraine, tariff formation in the gas industry is regulated by a number of legislative and regulatory documents, namely the Law of Ukraine "On the Natural Gas Market" (<https://zakon.rada.gov.ua/laws/>) and Resolution of the Cabinet of Ministers of Ukraine dated May 19, 2010 No. 545 "On Approval of the Procedure for Formation of Tariffs for the Transportation of Natural Gas by Distribution pipelines on the basis of multi-year stimulating regulation" (<https://zakon.rada.gov.ua/laws/show/z2071>), "On the approval of the Rules for the safety of gas supply systems" (<https://zakon.rada.gov.ua/laws/show/z0674>), "Rules for accounting and measurement of natural gas" (<https://zakon.rada.gov.ua/laws/show/z0067>), "Rules for the organization of gas transportation" (On the approval of the Rules for accounting for natural gas during its transportation through gas distribution networks, supply and consumption (<https://zakon.rada.gov.ua/laws/show/z0067>), etc. The main bodies responsible for the tariff policy in the field of gas supply are the National Commission for State Regulation of Energy and Utilities (NKREKP) and the Ministry of Energy and Coal Industry of Ukraine (Ministry of Energy).

According to the information posted on the official website of the NKREKP (<https://www.nerc.gov.ua/sferi-diyalnosti/prirodnij-gaz/>), there are currently three methods of forming gas transport tariffs. These are:

– The procedure for forming tariffs for the transportation of natural gas through distribution pipelines on the basis of multi-year stimulating regulation, approved by the resolution of the NKRE dated November 28, 2013 No. 1499.

– Methodology for determining and calculating tariffs for natural gas transportation services for entry points and exit points based on multi-year stimulating regulation, approved by the resolution of the NKREKP dated September 30, 2015 No. 2517.

– Methodology for determining and calculating the tariff for natural gas distribution services, approved by the resolution of the National Energy and Mineral Resources Commission of Ukraine dated February 25, 2016 No. 236.

Resolution No. 2517 dated September 30, 2015 approved "On the approval of the Methodology for determining and calculating tariffs for natural gas transportation services for entry points and exit points on the basis of multi-year incentive regulation" (<https://zakon.rada.gov.ua/laws/show/z1388>), according to which the projected necessary income from the implementation of activities is determined (PN_t^n) from natural gas transportation for year t is calculated on the basis of the capacity fee according to the formula:

$$PN_t^n = OCE_t^n + OUE_t^n + PTE_t^n + D_t^n + P_t^n + RK_t^n + AP_t^n + PP_t \quad , \quad (1)$$

where: OCE_t^n – forecasted operating controlled expenses for natural gas transportation for year t, thousand UAH;

OUE_t^n – forecasted operational uncontrolled expenses of natural gas transportation for year t, thousand UAH;

PTE_t^n – forecasted expenses of the licensee related to the purchase of natural gas, which is used to ensure production and technological expenses, normalized losses of natural gas for year t, thousand UAH;

D_t^n – projected depreciation for year t, thousand UAH;

P_t^n – projected profit on the regulatory base of assets for year t after taxation, thousand UAH;

RK_t^n – projected profit on working capital for year t after taxation, thousand UAH;

AP_t^n – adjustment of the necessary income in connection with the detection and confirmation of violations based on the results of planned and/or unplanned measures of state supervision (control) regarding compliance by the business entity with the requirements of the legislation in the oil and gas sphere and the Licensing conditions for carrying out business activities in the transportation of natural gas, approved by the resolution of the NKREKP dated February 16, 2017 No. 201;

PP_t – projected income tax for year t, thousand UAH.

Resolution No. 236 dated February 25, 2016 "On approval of the Methodology for determining and calculating the tariff for natural gas distribution services" (<https://zakon.rada.gov.ua/laws/show/z1434>) is also in force, according to which the tariff for natural gas distribution services (T_{distr} , UAH/ m^3 per month) per unit of annual ordered power is calculated by the formula:

$$T_{distr} = \frac{TR}{W_{distr}}, \quad (2)$$

where: TR – the planned annual tariff revenue of the economic entity from the distribution of natural gas for the planned period, thousand UAH;

W_{distr} – total planned annual ordered natural gas distribution capacity of the licensee ($1000 m^3$ per year).

Such a number of regulatory documents significantly complicates the system of tariff formation in gas transport.

Let's analyze the change in the price of natural gas on the market.

The prices for natural gas at which it is traded at the gas hub TTF (Title

Transfer Facility) in the Netherlands, on the London ICE Exchange and the New York Mercantile Exchange NYMEX (New York Mercantile Exchange) are shown in Fig. 1.

The TTF gas hub provides an opportunity for traders to conduct exchange operations, and is one of the largest gas hubs in Europe, and also has a significant impact on European (and global) sales markets on the London ICE exchange. The Henry Hub gas reference grade is traded on the NYMEX exchange, which is the basis for gas prices in the Western Hemisphere and significantly influences pricing worldwide [25].

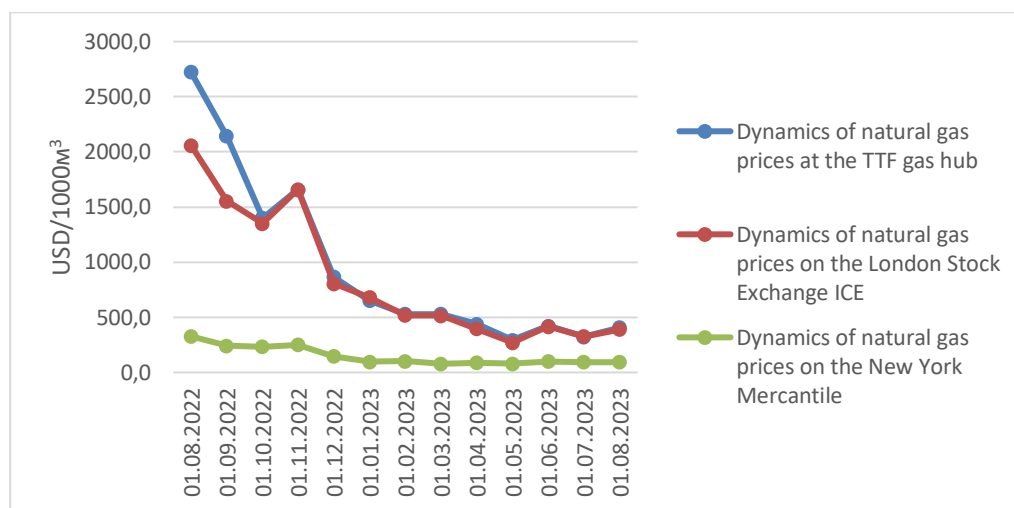


Fig. 1 – Dynamics of natural gas prices

Source: built by the authors based on (<https://index.minfin.com.ua/ua/tariff/gas/>)

As we can see, the price of natural gas has decreased significantly over the last year. Thus, at the TTF gas hub, it decreased from 2,722.7 to 406.3 USD per 1,000 m³, which is 6.7 times less as of August 28, 2023 than as of August 31, 2022. The same situation is observed on the London ICE Exchange and the New York Commodity Exchange NYMEX, where the price of natural gas decreased from \$2,059.5 to \$389.8. US for 1000m³ and 327.1 to 93.2 dollars. USA per 1000m³, respectively, which in percentage terms is 81 % and 76 %. That is, in UAH equivalent, taking into account the exchange rates on the relevant dates, the price, for example, on the London ICE exchange was 75.5 UAH/m³ as of January 01, 2022 and 14.2 UAH/m³ as of January 08, 2023.

Let us now analyze the change in the natural gas tariff for enterprises in Ukraine. The dynamics of tariffs is shown in Fig. 2.

So, according to the Ministry of Finance, natural gas tariffs for three years based on actual consumption for enterprises in Ukraine have almost halved in Naftogaz Ukraine GC LLC, Askania Energy LLC, and Enera Vinnytsia LLC. Tariffs of other gas sellers have practically not changed. Gas is sold at the market price only by Naftogaz Ukraine GC LLC, whose payment for the actually consumed gas for enterprises is UAH 14.9/m³, so in fact this enterprise remains a monopoly in Ukraine.

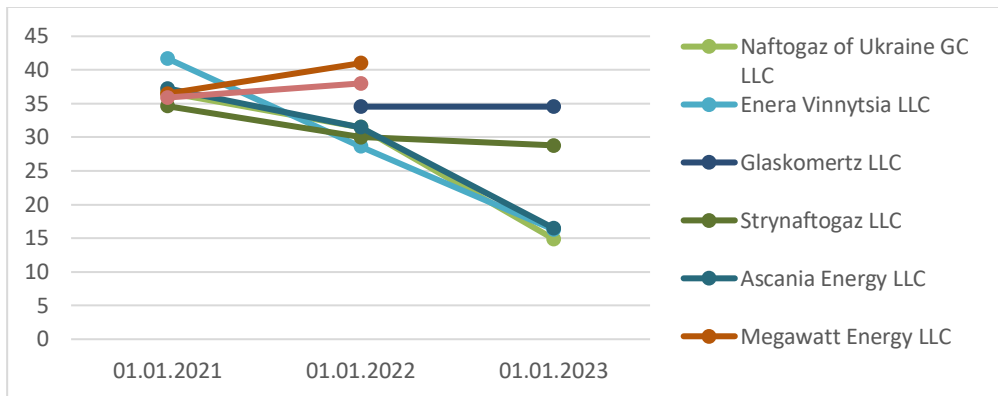


Fig. 2 – Dynamics of natural gas tariffs for Ukrainian enterprises
 Source: built by the authors based on (<https://index.minfin.com.ua/ua/tariff/gas/>)

Looking at the change in gas tariffs for the population (Fig. 3), we also see that the tariffs have practically not changed in three years. An insignificant decrease occurred in 2022 in such enterprises as Dnipro Energy Services LLC (Yasno), Prykarpatenenergotrade LLC, Galnaftogaz LLC, Energy Trade Group LLC (ETG), ERU Ludyam LLC, Kyiv Energy LLC Services (Yasno), Poltavagaz Sales LLC and Ternopiloblgaz Sales LLC, however, their change is on average 11%, that is, the decrease occurred by 1.1 times. Of course, the price for the population is formed based on own production, so it is much lower than the market price.

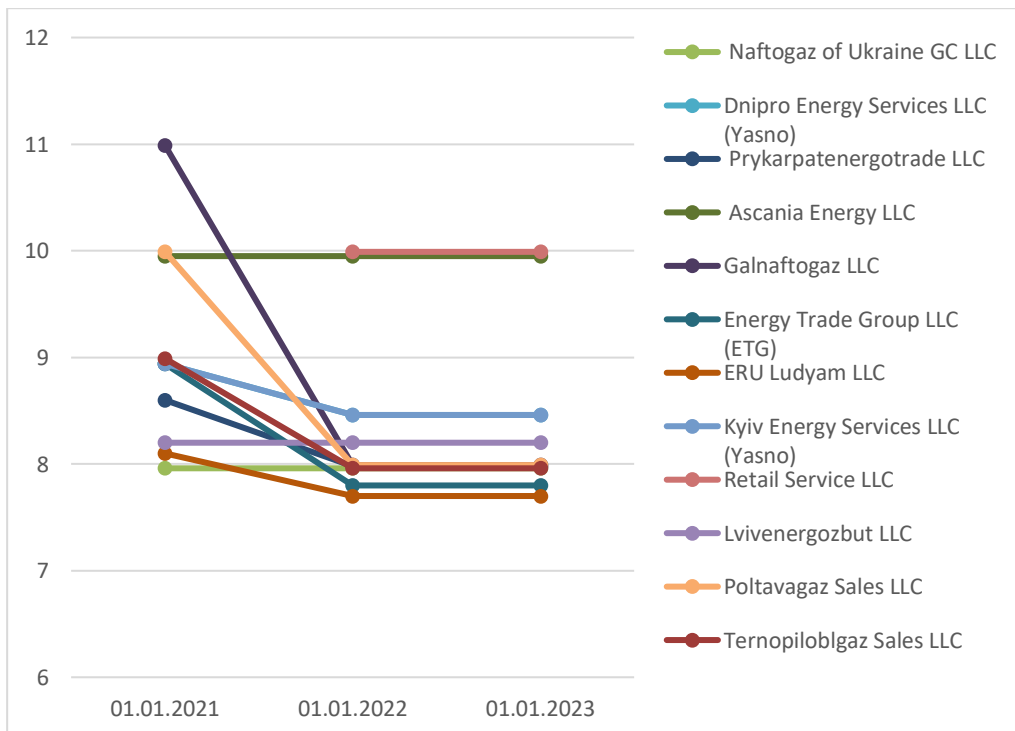


Fig. 3 – Dynamics of natural gas tariffs for the population of Ukraine
 Source: built by the authors based on (<https://index.minfin.com.ua/ua/tariff/gas/>)

So, according to the conducted studies, the prices on the world market for natural gas have decreased by 6 times, and the tariffs for enterprises and the population have not changed over the last year.

As it is known, in December 2019, the NKREKP changed the payment procedure for gas delivery. Therefore, starting from January 1, 2020, delivery services are excluded from the total payment for gas and are paid separately. Money for gas sales is received by the supplier, and the gas distribution company receives money for delivery. Therefore, let's consider how tariffs for gas delivery have changed over the past three years (Fig. 4).

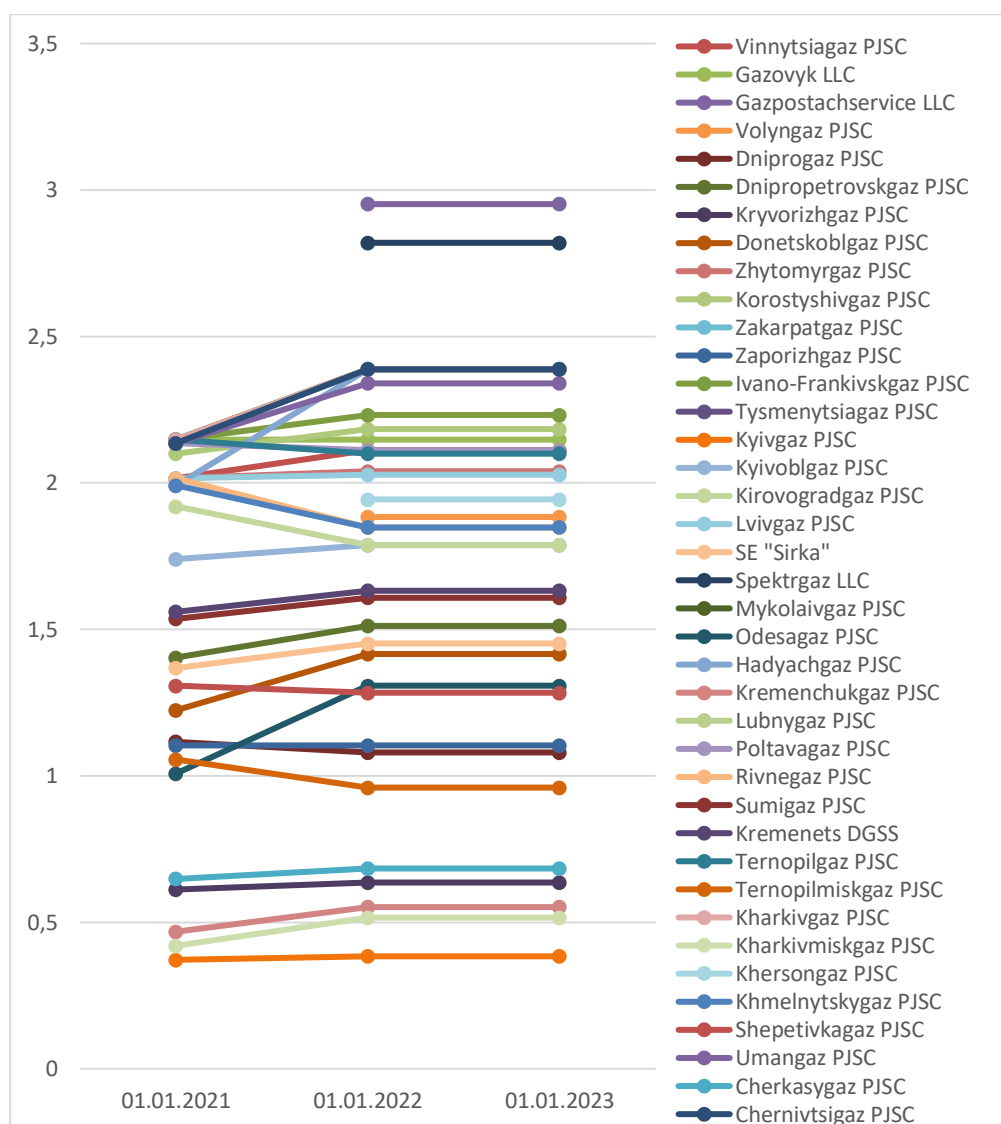


Fig. 4 – Dynamics of natural gas transportation tariffs for the population of Ukraine

Source: built by the authors based on (<https://index.minfin.com.ua/ua/tariff/gas/>)

As it is known, in December 2019, the NKREKP changed the payment procedure for gas delivery. Therefore, starting from January 1, 2020, delivery services are excluded from the total payment for gas and are paid separately. Money for gas sales is received by the supplier, and the gas distribution company receives money for delivery. Therefore, let's consider how tariffs for gas delivery have changed over the past three years (Fig. 4). As we can see, transportation tariffs vary in different regions from UAH 0.636/1000 m³ to UAH 2.95/1000 m³. The lowest tariff is at Kryvorizhgas PJSC, Kremenchukgaz PJSC, Kyvgaz PJSC, Kharkivmiskgaz PJSC, Cherkasigaz PJSC. Their value ranges up to UAH 1. Tariffs are high at Gazpostachservice LLC, Ivano-Frankivskgaz PJSC, Tysmenytsiagaz PJSC, Lubnygaz PJSC, Poltavagaz PJSC, Rivnegaz PJSC, Zakarpatgaz PJSC, Kharkivgaz PJSC, Ternopilgaz PJSC, Zhytomyrgaz PJSC, Umangaz PJSC, Chernivtsigaz PJSC, Korostyshivgaz PJSC, Mykolaivgaz PJSC, Lvivgaz PJSC, the amount of tariffs, which have more than UAH 2, which is almost 4 times higher the specified enterprises.

As you know, transportation tariffs can vary depending on various factors, such as geographical location, availability of natural resources, the degree of development of transport infrastructure, etc. Let's analyze the main determinants affecting the formation of tariffs.

Ukrainian and international practice offer different approaches to the list of technical and economic determinants of tariff formation in gas transport. As you know, in market conditions, tariffs are primarily influenced by gas supply and demand, competition in the gas transportation market, price trends, contractual conditions of service customers, regulatory policies and regulatory requirements of the gas market.

The analysis of publications (<https://index.minfin.com.ua/ua/tariff/gas/>, <https://energy-community.org/>, <https://gazpravda.com.ua/>, <https://theses.hal.science/>, <https://razumkov.org.ua/statti>.) made it possible to identify such determinants as costs associated with gas transportation, namely operating costs, investments in infrastructure development and maintenance, depreciation, management costs and other costs related with the functioning of the gas transportation system. The authors also note the influence of the efficiency of capacity utilization, optimization of the transportation schedule, gas losses during transportation, ensuring the reliability and stability of the system.

In (<https://gazpravda.com.ua/novyny/29>) it is stated that the tariff for gas distribution in Ukraine also depends on the number of consumers in the region, the length of networks and the specifics of consumption. The more consumers in the service area of a specific regional gas, the lower the tariff will be. Therefore, the tariff is lower in large cities than in sparsely populated areas, where gas pipelines stretch hundreds of kilometers to relatively small villages.

In (<https://theses.hal.science/tel>), the author proves the need for regulatory influence on the formation of the transportation tariff, in particular, the rate of profit must be regulated. The publication (<https://energy-community.org/dam>) also emphasizes the need to control tariff formation, particularly justified and unjustified costs, in order to avoid excessive and unnecessary costs that may be included in tariffs.

In addition, the political, energy and economic priorities of the country or region should also be taken into account, including stimulating the development

of alternative energy sources, ensuring energy security, reducing dependence on gas imports, etc.

Therefore, based on the above, all determinants can be both exogenous and endogenous. Economic, technical, regulatory, political, social or other factors that are important in setting tariffs for gas transportation can be attributed to exogenous factors that are beyond the control of the company itself and directly affect the tariff formation process.

Endogenous factors that are controlled and depend on the transport company, in turn, include such things as transportation volumes, the structure of the transportation network, technical equipment of the network, fuel costs, infrastructure costs, capacity utilization efficiency, regulatory policy, market conditions, contractual conditions of service customers, incentives for the development of alternative energy sources, etc.

In our opinion, technical and economic determinants have the greatest influence on gas transport tariff formation in Ukraine.

The economic costs should include transportation costs, namely the costs of operation and maintenance of the gas transportation system, including maintenance and repair, labor costs, depreciation of equipment and infrastructure. Constant investments are required to ensure the efficiency and continuity of the gas transportation system. The cost of these investments can influence the formation of tariffs. Inflation can also have a significant impact on tariff formation. Changes in the level of inflation can affect the prices of materials, wages, equipment and services used in gas transportation.

To ensure the long-term stability of the gas transportation system, the profitability and financial stability of gas transportation enterprises is important. This can include making a profit, paying off debts and securing investments.

The efficiency of the gas transportation system, namely optimal use of resources, minimization of losses, energy efficiency, and optimization of transportation processes, has a significant impact on the cost of gas transportation.

Technical determinants affecting the formation of tariffs for gas transportation both in Ukraine and abroad include:

1. State and capacity of gas transport infrastructure. In particular, the presence, placement and technical condition of pipelines, compressor stations, gas-receiving terminals and other elements of the system.

2. Transportation technologies, such as compression, distributed control, automation, and monitoring technologies, can affect the efficiency and cost of gas transportation.

3. Ensuring the safety and reliability of gas transportation, which is reflected in the costs of measures to maintain safety, prevent accidents, reserve and repair the system to ensure reliable functioning.

4. Implementation of innovative solutions and development of gas transport infrastructure, which includes costs for research, development, and implementation of new solutions to improve the efficiency and quality of transportation.

Based on the above, it should be noted that the formation of gas tariffs to ensure the sustainable development of the gas sector should include the following aspects:

1. Provide investments for innovation and development of gas enterprises. Sustainable development of the gas sector involves the introduction of new technologies that improve the efficiency, environmental friendliness and safety of gas production, transportation, and supply. This requires significant investment. The formation of adequate tariffs can stimulate investors to invest in the development and implementation of new technologies.

2. Cover infrastructure and modernization costs. Promoting sustainable development requires not only investment in new technologies, but also modernization and maintenance of existing infrastructure. The formation of tariffs, which reflect the costs of maintenance and development of infrastructure, helps to ensure the sustainability of the development of the gas sector.

3. Ensure balance between economic and environmental aspects. The formation of tariffs can reflect the cost of compliance with environmental norms and standards, contributing to the transition to more sustainable and environmentally safe gas production and transportation.

4. Reduce risks for investors. Creating a stable and transparent regulatory environment for setting tariffs can reduce risks for investors investing in the gas sector. This can be achieved by transparently justifying tariffs and ensuring their stability in the medium and long term.

5. Stimulate the development of alternative energy sources. The gas sector can interact with alternative energy sources such as renewable energy. The formation of tariffs should reflect the interests of the development of alternative sources, promoting their implementation and ensuring a balance between different sources of energy.

6. Demonstrate flexibility and adaptation to changes. The process of formation of tariffs should be flexible, with the possibility of adaptation to changes in technological, environmental and economic conditions. This will ensure the development of the gas sector in accordance with changing requirements and conditions.

7. To exercise social influence and provide guarantees for consumers. The formation of tariffs should take into account the interests of consumers, providing them with gas availability and guaranteeing the quality of service and prices.

Consistency between the process of formation of tariffs and the needs of sustainable development of the gas sector is important to ensure the economic efficiency, balance and sustainability of the gas infrastructure. Transparency, adaptation to changes, taking into account the interests of various stakeholders and supporting innovation are key aspects that help to build a mutually beneficial relationship between sector development and tariff policy.

Conclusions. Summarizing the research, it should be noted that the sustainable development of the gas sector is of great importance for solving complex problems related to energy, ecology and economy. Improvement of technologies, expansion of alternative energy sources contributes to the creation of a stable and sustainable energy future. However, an equally important issue affecting the sustainable development of the gas sector is the formation of tariffs for gas consumption and transportation.

In European countries, as in other regions of the world, tariffs for gas transportation are formed taking into account the cost of production, transportation and distribution of gas, as well as taking into account the general

costs of maintaining and developing the gas transportation system. In most European countries, tariffs for gas transportation are regulated and formed in accordance with the principles of price regulation established by state regulatory bodies.

Ukraine has a rather complex system of tariff formation in the gas industry, which is regulated by a number of legislative and regulatory documents that complicate the system of tariff formation in the gas transport of Ukraine. Therefore, it is necessary to ensure the harmonization of the system of tariff formation in the gas industry with European standards and principles. This will allow Ukraine to get closer to European partners and create favorable conditions for integration into the European gas market.

In general, the sustainable development of the gas sector and the formation of tariffs are closely interconnected, namely, adequate and stable tariffs stimulate investors to develop new technologies and infrastructure, which in turn contributes to the sustainable development of the gas sector. Adequate tariffs reflect the cost of implementing new effective technologies, improving environmental standards, infrastructure development and modernization. This contributes to the implementation of strategic goals, such as reducing emissions, increasing energy efficiency and ensuring sustainable development.

In further studies, a methodology for the formation of tariffs in Ukraine will be proposed, based on the experience of European countries, national characteristics and factors affecting the process of tariff formation.

Conflict of Interest and other Ethics Statements

The authors declare no conflict of interest.

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ВПЛИВ ТАРИФОУТВОРЕННЯ НА СТАЛИЙ
РОЗВИТОК ГАЗОВОГО СЕКТОРУ УКРАЇНИ

Анотація. Сталий розвиток газового сектору та формування тарифів тісно взаємопов'язані між собою, а саме, адекватні та сталі тарифи стимулюють інвесторів до розвитку нових технологій та інфраструктури, що в свою чергу сприяє сталому розвитку газового сектору. Адекватні тарифи відображають вартість впровадження нових ефективних технологій, вдосконалення екологічних стандартів, розвитку інфраструктури та модернізації. Однак питанням тарифоутворення у газовому секторі, як елементу сталого розвитку, не надається належної уваги. Саме тому метою дослідження є дослідження впливу тарифоутворення на сталий розвиток газового сектору України.

У дослідженні окреслено значення тарифоутворення для сталого розвитку газового сектору України. Зокрема, зазначено, що правильно сформовані тарифи мають забезпечувати достатній прибуток для підтримки інвестицій у розвиток і модернізацію газової інфраструктури. Це допомагає забезпечити надійне постачання газу споживачам та розширити можливості для розвитку енергетичного сектору. Встановлення диференційованих тарифів може стимулювати споживачів до меншого використання газу та переходу на більш екологічно чисті види енергії. Врахування викидів та впливу на довкілля сприяє зменшенню викидів парникових газів та інших негативних ефектів. Також тарифи на газ мають вплив на соціальний стан населення та підприємств.

Також у дослідженні проаналізовано нормативно-правову базу, що регулює сталий розвиток у країнах світу та Україні, та їх взаємозв'язок із нафтогазовим сектором економіки. Розглянуто особливості тарифоутворення у країнах Європи та Україні та виділені різні методології, що застосовуються у країнах Європи, а саме що базуються: на регульованих витратах (cost-of-service); на регульованих нормах доходів (revenue-cap regulation); на відповідальності оператора газопроводу (incentive-based regulation).

Проведений аналіз динаміки продажу газу на ринку та для українських споживачів, а також динаміку тарифів на транспортування газу. Який показав суттєве зниження цін на ринку та відносно незначне зниження тарифів для споживачів України. Однак тарифи для населення залишаються нижчими за ринкові ціни за рахунок власного видобутку.

Визначені основні детермінанти, що впливають на формування тарифів у транспорті газу, серед яких географічне розташування, наявність природних ресурсів, ступінь розвиненості транспортної інфраструктури, попит і пропозиція газу, конкуренція на ринку транспортування газу, цінові тенденції, договірні умови замовників послуг, регуляторні політики та регулятивні вимоги ринку газу, витрати, пов'язані з транспортуванням газу, інвестиції у розвиток і підтримку інфраструктури тощо.

На підставі проведених досліджень встановлені основні аспекти формування тарифів на газ задля забезпечення сталого розвитку газового сектору, а саме забезпечення інвестиції для інновацій та розвитку газових підприємств, покриття витрат на інфраструктуру та модернізацію, збалансованість між економічними та екологічними аспектами, зниження ризиків для інвесторів, розвиток альтернативних джерел енергії, гнучкість та адаптацію до змін, соціальний вплив та надавати гарантії для споживачів.

Ключові слова: газований сектор, тариф, тарифоутворення, сталий розвиток, детермінанти, ціна.