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В девятом выпуске сборника научных статей представлены работы белорусских авторов в области экономических отношений, возникающих в сфере национальной экономики, бизнеса, логистики, моделирования экономических систем, цифровой экономики и бизнес-образования. Рассмотрены современные методы, механизмы, инструменты и технологии управления экономическими системами, процессы управления социально-экономическим развитием и другие актуальные направления экономики и бизнеса.

Издание адресовано научным работникам, исследователям, преподавателям, аспирантам и докторантам, студентам, а также представляет интерес для менеджеров и предпринимателей.

Сборник научных статей включен Высшей аттестационной комиссией Республики Беларусь в Перечень научных изданий для опубликования результатов диссертационных исследований по экономической отрасли науки, входит в базу данных Российского индекса научного цитирования (РИНЦ).

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ESG APPROACH TO ENERGY SECURITY

The article explores the approach to ensuring energy security taking into account ESG (environmental, social, and governance) principles. The paper examines the evolution of the concept of energy security, analyzes the indicators of primary energy consumption per capita, carbon dioxide emissions in the energy sectors, and the structure of energy consumption in the CIS countries. The analysis of these indicators testifies to certain successes in reducing energy intensity and CO₂ emissions, but also indicates the need to reduce dependence on non-renewable resources to enhance the energy security of the CIS countries. The article also briefly reviews the development of the ESG agenda in the CIS countries and provides its own definition of energy security in the context of ESG principles. The conclusion is drawn about the need for global coherence in energy security strategies to realize the benefits of transitioning to a sustainable energy system.

Keywords: energy security, ESG-principles, energy transition, sustainable development. transition, sustainable development

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ESG-ПОДХОД К ОБЕСПЕЧЕНИЮ ЭНЕРГЕТИЧЕСКОЙ БЕЗОПАСНОСТИ

Статья посвящена исследованию подхода к обеспечению энергетической безопасности с учетом принципов ESG (экологических, социальных и управленческих). В работе рассматривается эволюция понятия энергетической безопасности, анализируются показатели потребления первичной энергии на душу населения, выбросов углекислого газа в энергетических секторах и структуры энергопотребления в странах СНГ. Анализ этих показателей свидетельствует об определенных успехах в снижении энергоёмкости и выбросов CO₂, но также указывает на необходимость уменьшения зависимости от невозобновляемых ресурсов для повышения энергетической безопасности стран СНГ. В статье также кратко рассматривается развитие ESG-повестки в странах СНГ и дается собственное определение энергетической безопасности в контексте ESG-принципов. Делается вывод о необходимости глобальной согласованности в стратегиях энергетической безопасности для реализации преимуществ перехода к устойчивой энергетической системе.

Ключевые слова: энергетическая безопасность, ESG-принципы, энергетический переход, устойчивое развитие

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Introduction

The principles of sustainable development, also known as the ESG principles, are a dialectical combination of social, environmental and governance factors that countries and organizations should take into account in their activities.

Environmental factors involve caring for the environment, reducing greenhouse gas emissions, efficient use of natural resources, and sustainable use of energy and water.

Social factors include attention to human rights, anti-corruption, safe working conditions, diversity in the working environment, and engagement with local government and self-governance.

Governance factors involve the business' adherence to ethical principles, transparency in company management, compliance with laws and standards, and effective risk management.

The ESG-principles in their modern form were first formulated by former UN Secretary General Kofi Annan. He suggested that managers of large global companies should incorporate these principles into their strategies, primarily to combat climate change. Compliance with ESG principles helps companies create long-term value for stakeholders, enhance their reputation, attract investment and reduce risks. More and more companies and foundations are now incorporating ESG practices into their sustainability strategies.

ESG principles and energy security are closely linked as they aim to ensure sustainable development and environmental conservation.

Research Methodology

The article analyses the indicators of primary energy consumption per capita, carbon dioxide (CO₂) emissions in the national energy sectors and energy consumption patterns in the CIS countries over a 10-year period. Time series analyses reveal trends and changes in these indicators over time.

The performance of the CIS countries is compared with the world average and that of OECD countries. The comparative analysis helps to determine the relative effectiveness of CIS countries' energy policies and practices compared to other countries.

The paper also briefly analyses the development of the ESG agenda in the CIS countries and provides its own definition of energy security in the context of ESG principles. This analysis is based on a review of existing literature and research on these topics.

Thus, the research methodology combines quantitative and qualitative analyses for a comprehensive study of the ESG approach to energy security in the CIS countries.

Results and its discussion

The term energy security was first used in the early 20th century, and became widely used with the onset of the oil crisis in the 1970s [1]. OPEC countries imposed an embargo on oil exports in response to the support of some Western countries for Israel during the Arab-Israeli conflict. This led to a sharp rise in oil prices and instability in the global energy sphere. Since then, the problem of energy security has become a global issue attracting the attention of all countries.

In 1974, the Organization for Economic Cooperation and Development (OECD) established the International Energy Agency (IEA) to co-ordinate measures to ensure energy security, stable prices for oil and other resources, develop energy saving plans and develop alternative energy sources. In its guidelines, the IEA defines energy security as guaranteeing the stability of energy supplies, ensuring reasonable prices for consumers, and protecting energy infrastructure from possible threats [2].

Mason Willrich, author of numerous books on energy policy, views energy security through the lens of the interests and interactions between importing and exporting countries. Importing countries are interested in securing reliable access to energy resources to support their economic growth and development, while exporting countries seek to ensure stable market conditions for their energy resources, as well as to protect their interests in investment, technology, and security of supply. The interplay of these interests drives the political, economic and geostrategic agenda related to energy security at the international level [3].

The Asia Pacific Energy Research Centre (APERC – Asia Pacific Energy Research Centre) in 2007 defined energy security as the ability of a nation to ensure continuous access to the necessary amount of energy resources at an affordable price. At the same time, APERC for the first time took this concept beyond the purely economic aspect and proposed the concept of energy security «4A» [4]:

1. Access: The ability to access available energy resources. Barriers to accessibility are various economic, political and technological factors.

2. Availability: The continuous availability of energy resources sufficient to meet the needs of society. Studies addressing this issue use the ratio of reserves to production of different energy sources or the degree of dependence on imports and the diversity of the energy mix.

3. Acceptability: Environmental sustainability, the measures of which include increasing the share of renewable energy, improving energy efficiency and reducing greenhouse gas emissions.

4. Affordability: ensuring affordable energy prices, i.e. the ability of an economy or society to access energy resources at a reasonable cost.

The «4 A's» concept of energy security is summarized in Figure 1.

Thus, the «4A» concept for the first time incorporated the requirement of environmental sustainability into the general definition of energy security.

Let us analyze some aspects of energy security in the CIS countries in the context of energy availability, sufficiency of energy resources, as well as environmental sustainability and economic efficiency.

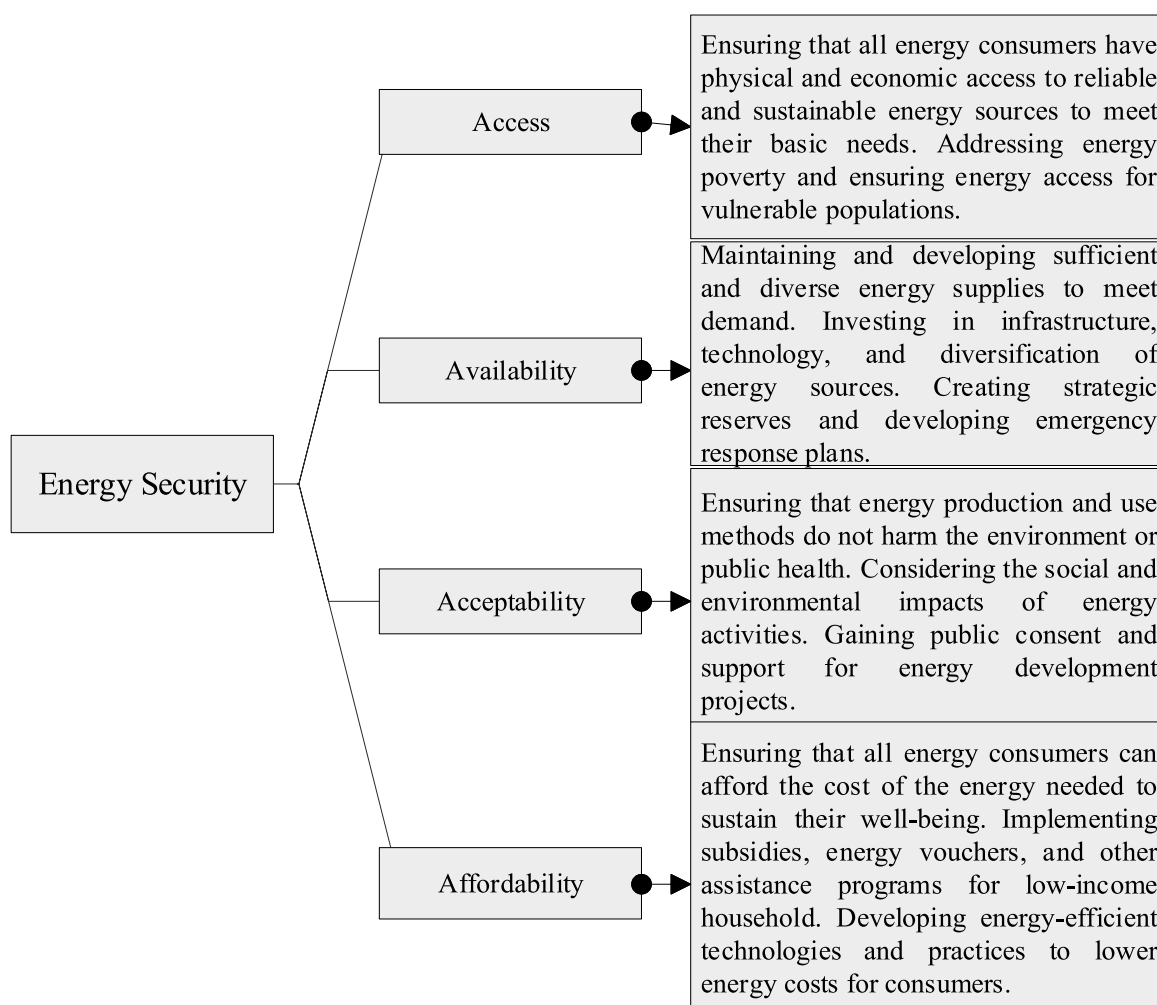


Fig. 1. Energy Security Concept 4 «A»: Access, Availability, Acceptability and Affordability
Source: author's developed.

First, let us analyze the dynamics of primary energy consumption per capita in the CIS countries (Table 1).

Primary energy consumption per capita in CIS countries (gigajoules per capita)

Table 1

Countries	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022
Azerbaijan	57,9	58,1	62,8	61,5	59,8	60,8	63,2	64,1	68,3	67,5
Belarus	109,5	109,5	99,1	101,2	103	114,1	114,9	107,2	114,9	112,1
Kazakhstan	152,8	158,2	129,6	143,7	152,7	156	156,3	142,5	152,8	160,9
Russia	200,9	201	197,3	200,8	201,5	208,6	207	199,6	217	199,7
Turkmenistan	173,7	176,7	207,8	202,2	196,7	215,5	208,7	243,5	255,1	256,9
Uzbekistan	65,5	66,7	62,6	58,9	59,9	59,2	58,4	57,1	59,6	60,9
Other CIS countries	36	36,5	35,9	35,8	36,9	39,8	38	37,5	37,7	36
Total CIS	155,9	156,4	151,7	154	154,9	160,2	158,6	153,3	165	154,9
OECD average	178,3	175,7	175	174,8	175,5	177,1	174,6	161,8	169,1	169,9
World average	74,1	74	73,7	73,7	74,4	75,6	75,6	72,2	75,5	75,7

Source: [5, p. 11].

A significant increase in this indicator during the analyzed period occurred in Turkmenistan and Azerbaijan. In the CIS countries as a whole, the indicator decreased slightly. In 2022, compared to the previous year, the CIS countries reduced per capita primary energy consumption by 5.8 per cent. For comparison, in the world as a whole, total primary energy consumption per capita increased slightly in 2022.

An important indicator of energy security is the indicator of carbon dioxide (CO₂) emissions in the national energy sectors, reflecting not only the country's energy consumption and level of industrial activity, but also the country's environmental policy. Global carbon dioxide emissions from fuel combustion and methane (carbon dioxide equivalent) continued to rise, increasing by 0.8 per cent in 2022 (Table 2).

In the CIS countries, CO₂ emissions in the energy sector decreased by 5.1 per cent in 2022 compared to the previous year. The reduction of CO₂ emissions in the energy sector can be explained both by a decrease in economic activity and by the transition to cleaner and more sustainable energy sources, improved energy efficiency, and the introduction of cleaner technologies and processes. It is therefore important to analyze the structure of the types of energy consumed. The most important indicator here is the share of renewable energy used in the country, which reflects the energy sustainability of the country and the degree of its environmental impact (Figure 2). The higher the share of renewable energy, the lower the country's dependence on traditional energy sources, and the lower the emissions of carbon and other harmful substances.

The energy consumption of CIS countries is dominated by natural gas, which accounted for 51.7 per cent of primary energy consumption in 2022. Overall, non-renewable natural resources – natural gas, coal and oil – accounted for 88.14 % of energy consumption. The share of renewable energy sources such as solar, wind, hydropower, biomass and geothermal energy is extremely low. The share of renewable energy sources (excluding hydropower) in primary energy consumption globally has reached 7.5 %, increasing by almost 1 % year-on-year, and the share of fossil fuel consumption in primary energy in 2022 is 82 % [5, p. 3].

Since natural gas dominates in the consumption structure of the CIS countries, world prices for natural gas are an important factor affecting the energy security of these countries. Figure 3 shows the dynamics of world gas prices.

The graph shows that since 2013, gas prices on global markets have experienced significant fluctuations, including a drop in prices in the late 2010s and an increase in the early 2020s. The drivers of gas pricing during this period were technological changes, increased trade in liquefied natural gas (LNG), and freight tariffs. In the 2020s, factors contributing to higher gas prices were geopolitical factors,

Table 2

CO₂ emissions in CIS countries (million tonnes)¹

Countries	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022
Azerbaijan	30,7	31,4	33,9	33,4	32,4	33,8	34,4	35,2	37,6	37,5
Belarus	60,2	59,2	54,9	55	55,7	60,6	60,9	56	57,1	55,9
Kazakhstan	211,9	219	176,7	199,3	214	221,8	220,5	202,8	217,2	230,2
Russia	1 548,8	1 551,4	1 520,8	1 531,1	1 518,5	1 575,8	1 559,2	1 459,8	1 584,2	1 457,5
Turkmenistan	58,3	60,5	71,5	70,9	70,1	77,6	76,4	89,7	95,2	97,2
Uzbekistan	111,1	114,4	108,8	104,1	106,9	109,7	109,5	111,2	117,6	122,2
Other CIS countries	25,5	27,4	28,4	29	29,4	33,1	31,2	31,3	33,2	32,4
Total CIS	2 046,4	2 063,2	1 995,1	2 022,9	2 026,9	2 112,3	2 092,1	1 986	2 142	2 033
OECD countries	12 779,1	12 559,3	12 463,2	12 385,8	12 416,8	12 502,3	12 119,7	10 857,8	11 485,6	11 585,6
World	32 676,8	32 779	32 773,7	32 818	33 306,2	34 013,9	34 044	32 284,9	34 052,2	34 374,1

¹The carbon emissions shown reflect only the emissions associated with the consumption of oil, gas and coal for fuel combustion activities.

Source: [5, p. 12].

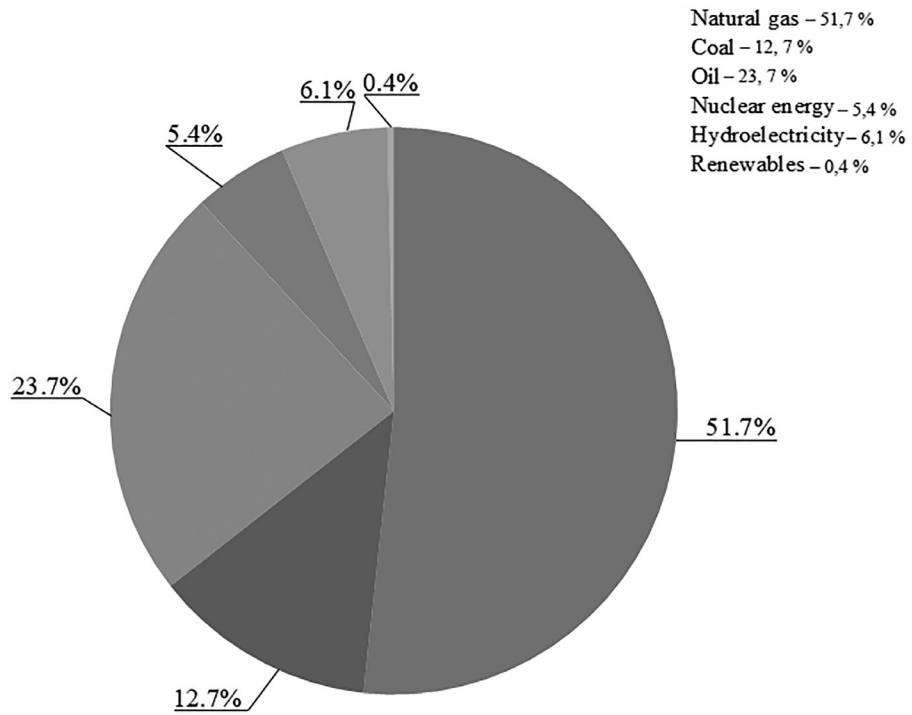


Fig. 2. Share of energy consumption in CIS by type

Source [5, p.9].

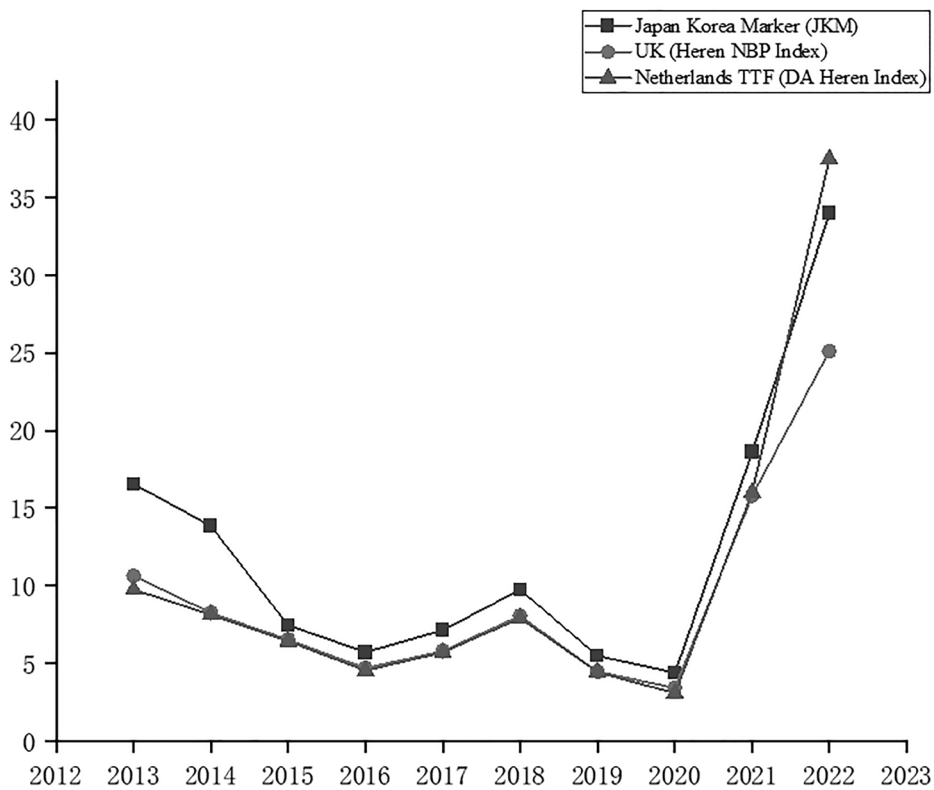


Fig. 3. Natural gas price indices of major exchanges, USD per million BTU

Source: [5, p. 34].

in particular conflicts in regions with large natural gas reserves, and changes in the global economy, including the trend towards recovery from the COVID-19 lockdown.

Based on the analyzed data on energy consumption, CO₂ emissions, share in consumption of non-renewable natural resources and world natural gas prices, the following conclusions can be drawn regarding the energy security of the CIS countries:

1. The reduction in the indicator of primary energy consumption per capita and CO₂ emissions in the energy sector over the period under consideration indicates a positive trend of decreasing energy dependence and improving environmental performance. However, both indicators have decreased significantly in 2022, which may indicate their unsustainable dynamics.

2. Despite the decline in primary energy consumption and CO₂ emissions, the share of non-renewable natural resources in total energy consumption remains high and almost unchanged over the period under review. This indicates that the CIS countries remain highly dependent on traditional non-renewable resources.

3. The volatility of world natural gas prices may affect the economic stability and energy security of the CIS countries, as the predominance of natural gas in the consumption structure makes these countries vulnerable to fluctuations in energy prices.

The analysis of these indicators shows relative success in reducing energy intensity and CO₂ emissions, but also the need to reduce dependence on non-renewable resources in order to strengthen the energy security of the CIS countries.

The ESG programme in the CIS countries is developing with varying intensity. Kazakhstan stands out in terms of developing sustainable development regulation, committing to increase the share of solar and wind energy in the country to 46 % and 33 % respectively by 2060. Uzbekistan aims to produce at least 25 per cent of its electricity from renewable sources by 2030 and plans to switch to carbon-free electricity generation by 2050. Armenia and Kyrgyzstan intend to reach «net zero» by 2050. The CIS countries' decarbonisation plans are presented in Table 3.

Table 3

Emission reduction plans in CIS countries

Countries	Purpose decarbonisation	Emission reduction target relative to the base year*
Azerbaijan	—	Reduction of greenhouse gas emissions by 40 per cent relative to the base year by 2050
Armenia	2050	Reduction of greenhouse gas emissions by 40 per cent relative to the base year by 2030
Belarus	—	35 % reduction of greenhouse gas emissions relative to the base year by 2030
Kazakhstan	2060	Reduction of greenhouse gas emissions by 15 per cent relative to the base year by 2030 (25 per cent assuming external financing and access to technology)
Kyrgyzstan	2050	Reduction of greenhouse gas emissions by 16.63 per cent relative to the base year by 2025 and an additional 15.97 per cent by 2030 (36.61 per cent by 2025 and 43.62 per cent by 2030, assuming external financing and access to technology).
Tajikistan	—	Not exceeding the level of greenhouse gas emissions of 60–70 per cent of the base year by 2030
Turkmenistan	—	Reduction of greenhouse gas emissions by 20 per cent relative to the base year by 2030
Uzbekistan	2050	Reduction of greenhouse gas emissions by 25 per cent relative to the base year by 2030
Russia	2060	Under the baseline scenario – reduction of greenhouse gas emissions by 36 % (from the 1990 level) to 2 billion tonnes of CO ₂ equivalent by 2050. Under the intensive scenario – reduction of emissions by 36 % by 2030, and by 48 % by 2050, to 1.6 billion tonnes of CO ₂ equivalent.

* base year: Armenia, Azerbaijan, Belarus, Kazakhstan, Russia, Tajikistan – 1990, Turkmenistan, Uzbekistan – 2010, Kyrgyzstan – 2017.

Source: [6].

Thus, an increasing number of countries are considering environmental constraints in energy development, choosing clean, low-carbon and efficient forms of energy to reduce environmental impacts. Nevertheless, national and global energy security may be at odds due to countries’ competition for resources, differences in energy systems and other reasons. National strategies may focus on economic benefits and energy affordability for their citizens, which may be accompanied by a lack of attention to global environmental aspects such as climate change and resource sustainability. Therefore, the implementation of ESG principles in the context of energy security requires coherence between the strategies of different countries.

The implementation of ESG principles in the energy sector can be not only beneficial from an environmental point of view, but also cost-effective. Investments in energy efficiency and renewable energy can reduce operating costs and increase the competitiveness of businesses and economies. The transition to clean energy will create new jobs in renewable energy production, low-emission construction, and other high-tech industries. In addition, adopting ESG principles and reducing dependence on fossil fuels reduces risks associated with price fluctuations and geopolitical instability.

But there are also serious costs of implementing ESG principles in the energy sector. For example, the transition to clean energy requires significant upfront investments, which can place a financial burden on a country and lead to temporary increases in energy prices. In addition, a clean energy transition can increase a country’s dependence on the availability of critical materials such as cobalt and lithium, creating new vulnerabilities in the supply chain.

Therefore, only global co-operation can help to ensure an even distribution of benefits and mitigate the possible negative effects of a global economic transition to clean energy.

According to Article 4 par 19 of the Paris Agreement, all parties to the agreement should endeavour to formulate and communicate long-term low greenhouse gas emission development strategies, «taking into account their common but differentiated responsibilities and respective capabilities, in the light of different national circumstances» [7, p. 7].

Thus, energy security in the context of ESG principles is about achieving sustainable and equitable access to reliable, affordable and clean energy sources at the global level by harmonizing national strategies. In this regard, the main factors and indicators of energy security are diversification of energy sources, efficiency of energy consumption, availability of modern infrastructure and advanced technologies contributing to reliable and efficient energy supply, environmental sustainability, and economic efficiency (Figure 4).

Energy security in the context of ESG principles		
Environmental sustainability (Environmental): use of environmentally friendly energy sources, reduction of greenhouse gas emissions, etc. indicators.	Social responsibility (Social): energy accessibility for all social strata, ensuring jobs and labour safety in the energy sector.	Effective governance and transparency in the energy system, including compliance with laws and standards, consideration of stakeholder interests, and effective risk management.

Fig. 4. Key aspects of energy security in the context of the ESG – agenda

Source: author’s developed.

Here is a brief description of our proposals on energy security in the context of the ESG agenda (Table 4).

Table 4

Development of energy security in the context of the ESG agenda

DIRECTIONS	CHARACTERISTICS
Diversification of energy sources	Sustainable development encourages the use of renewable energy sources such as solar, wind and hydro power. This reduces dependence on finite resources and the risk of power outages

Ending of the table 4

DIRECTIONS	CHARACTERISTICS
Reducing dependence on energy imports	Producing and transporting conventional energy sources usually requires significant imports, putting countries at risk in terms of energy supply. Promoting green development means that countries can rely more on their own renewable energy sources and reduce their dependence on energy imports
Encouraging technological innovation and improving energy efficiency	Sustainable development focuses on improving energy efficiency through technological innovation and energy management measures.
Green transformation of industry to create new points of economic growth	The development of a renewable energy industry can create new employment opportunities and economic growth opportunities through the development of high-tech industries

Source: author's developed.

Conclusions

Global coherence in energy security strategies is necessary to realize the benefits of the transition to a sustainable energy system. However, an inadequate energy transition can have a negative impact on economic growth and development. Moreover, sustainable economic development risks shifting energy dependence from resource dependence to technology dependence.

However, it is sustainable development in the context of the ESG agenda that provides the path to achieving long-term energy security.

Achieving energy security requires diversifying energy sources, reducing import dependence, promoting technological innovation and improving energy efficiency. The development of clean technologies and green industry can create new points of economic growth and be cost-effective.

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СОДЕРЖАНИЕ

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