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GLOBAL ENERGY SECURITY

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Abstract: This article analyzes the problem of energy security as a factor of global sustainable development. The energy sector faces new challenges, as well as expanding opportunities for both developed and developing countries.
The global nature of energy security increasingly requires the formation of an international energy strategy that allows us to look into the common energy future, and the further development of a broad dialogue on energy issues between various countries and relevant international organizations.
The relevance of this article is of interest to the entire energy community. The problem and the main components of energy security are in the field of view of summits, attract the attention of various international forums, and its solution is interlinked with sustainable development, climate change and the environment.

Keywords: global energy security, energy producer countries, transit countries, energy consumer States, energy transition, OPEC, GECF, World Energy Council, Group of (Eight) Seven, International Energy Agency, technological breakthrough.

In the foreseeable future, energy demand, as well as the degree of interdependence between producer countries, transit countries/ logistics companies, and consumer States will grow. It is impossible to ensure reliable energy security, especially for future generations, without global partnership, work according to common rules that are the same for all, and constructive dialogue between market participants based on mutual interests. If this is not achieved, there is a clash of interests, an aggravation of the economic struggle with all the negative consequences that will follow.

Today, we are exposed to new challenges and threats. They were partly predictable, but, in many ways, unexpected, including in terms of their breadth: they are faced by both developed and developing economies, countries with different social structures, different political structures, natural resources and energy potential. The speed and scale of overall global trends carry both huge opportunities and associated risks, including the need to constantly upgrade infrastructure, including energy sector, which will require significant investment in the future. Global changes in traditional markets and the emergence of new ones, especially the structure of the energy market, make it possible to increase the share of energy – efficient and environmentally modern energy sources[1].

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Major changes are shown as following:

- Shale oil and gas production; according to IEA Executive Director Fatih Birol, "The second wave of the American shale revolution is coming". "This will shake up international oil and gas trade flows and have serious implications for energy geopolitics"[2];
- accelerated growth in the production of liquefied natural gas (LNG), which, according to experts, will transform regional gas markets into a single global market and make natural gas a much more affordable fuel (gas consumption in the world will grow by about 1.8% per year)[3];
- dynamic development and introduction of renewable energy sources (they account for more than three quarters of all investments in the electric power industry)[4];
- increasing the volume of distributed generation[5];
- global trends related to innovative development, such as digitalization, introduction of the latest artificial intelligence systems, creation of energy storage and storage technologies, etc. lead to radical changes in the energy industry. Experts from the McKinsey & Company Center for Innovation believe that innovation is needed not only to accelerate the pace of development, strengthen leadership and break away from competitors, but also to protect the industry from damage in the event of radical innovations[6].

It should be noted that in the Russian economy, the oil and gas industry and the energy sector, in general, are promising in terms of innovation development, which can become a locomotive for the introduction of breakthrough technologies and can become a national center for innovation[7].

We are witnessing that the development of technologies and cost reduction have increased interest in resources located in difficult geological and climatic conditions, which were previously considered unprofitable. This includes, in particular, hard-to-recover reserves and offshore reserves, including those in the Arctic.

In fact, the world energy sector is undergoing a period of irreversible transformation. Energy transition is on the political agenda of many countries. This revolution can be represented in the form of digitalization of all major technological processes, the widespread introduction of artificial intelligence, robotics, the creation of "smart cities" and "smart networks", and breakthrough energy technologies. Such a leap can dramatically change the face of energy and allow hydrocarbons sector to adapt to the current climate and environmental agenda. It requires new approaches to management and training of new personnel.

But at the same time, we cannot say that the old problems of the energy market will disappear by themselves, and the most noticeable of them are:

- high volatility of oil prices with increasing demand for energy resources;
- ensuring access to electricity in developing countries (reducing energy poverty);
- growing dependence of many countries on energy imports;
- the need for huge investments in all parts of the energy chain;
- the need to protect the environment and address climate change;

- vulnerability of vital energy infrastructure;
- political instability, waves of geopolitical turbulence, armed conflicts, natural disasters and man-made disasters, etc.

Although the uncertainty of the international development trajectory is often perceived as a constant, competition and protectionism are increasing. At the same time, interstate cooperation and regulation in the global energy sector are being stepped up. Over the past two years, Russia and Saudi Arabia have managed to create a solid basis for cooperation between OPEC and non-OPEC in the future, not even within the framework of the Declaration on cooperation. As the experience of OPEC plus has shown, it allowed to avoid volatility and uncertainty (deep uncertainty) in the world oil market, preventing its unbalancing, and leveling the severity of unfair competition. One of the reasons for this interaction is related to the desire of a number of major players in the global oil market to minimize risks and threats to national security and its economic component; the well-being of the population depends on it.

Showing this dependence, I agree with those Russian experts who find that probably foreign multinational corporations are not so important threats to the national security of individual countries as the long – term stability of the economies of the "twenty" countries, the severity/clarity of trends in the world commodity market. Only the clarity and stability of trends allows us to successfully build a long-term corporate policy. On the contrary, increasing national protectionism increases nervousness in the global energy community.

In general, the list of new challenges and opportunities could be continued with the understanding that these and other challenges are not only interrelated, they create new ones and contribute to expanding the list of risks.

In this regard, it is worth recalling that the term "global energy security dates back to the 70s, when oil was used as a weapon"[8]. After the energy crisis of the mid-1970s, a number of countries developed functional areas of their foreign policy and diplomacy related to ensuring national energy security, which includes foreign energy policy and energy diplomacy. 'Under global energy security', says prof. Zhiznin, 'usually understood as a long-term, reliable and economically acceptable provision of an optimal combination of different types of energy for the sustainable economic and social development of the world, with minimal damage to the environment'[9]. The term "energy security" is undoubtedly a universal concept and covers both the global, regional, and country levels, as well as the corporate level.

It is worth mentioning that the Russian energy security doctrine (for the medium term), prepared by the Government of the Russian Federation on behalf of the Russian Security Council in November 2018, defines global energy security and energy-ecological efficiency as a necessary and sufficient condition for ensuring infrastructure for sustainable development of the world community[10].

The global nature of energy problems, their politicization, and the objective significance of energy industries for many countries determine the need to modernize the fuel and energy complex, ensure the physical security of the world's

energy infrastructure and maritime communications, and improve the international legal framework[11].

The second decade of the twenty-first century was a time of upheaval in the Middle East and North Africa, and the rapid growth of the terrorist threat in this region of the world, where huge reserves of hydrocarbon resources are concentrated. This is fraught with harmful consequences for the system of international relations, as well as for the world's economic and, first of all, energy security. After the September 2019 attacks on Saudi oil refineries and incidents with merchant ships, the situation in the Persian Gulf region has become more complicated. Along with the effect that is already noticeable at the global level, many experts complement the focus on threats of a military and political nature, which are reflected in the Russian Concept of collective security in the Persian Gulf zone. War and energy diplomacy characterize the Middle East and Africa. For a long time, this vast region has been leading the world in the number and scale of local wars, conflicts, revolutions, terrorist acts, coups and other forms of armed violence aimed at achieving political goals[12]. All this once again forces us to take a fresh look at solutions to security and geopolitical problems, at key issues related to international energy policy and diplomacy, and energy supplies to world markets. At the same time, addressing climate change and the environment is also inextricably linked to ensuring global energy security.

Today, this combination largely determines the parameters of the collective energy security system in the world, the main principles of which are the interdependence of producers, consumers and transit countries, energy efficiency, harmonization of energy relations, the fight against "energy hunger", the rejection of the use of energy weapons, and so on [13]. An important nuance is also the fact that the content of the concept of "energy security" is changing, for example, under the influence of the actualization of the problem of international terrorism and radical extremism, armed conflict. However, neither in the scientific literature, nor in practical politics and diplomacy, there is still no consensus on the concept of "global energy security". The point is that there is no (unified) generally accepted definition that would meet the interests of States that import energy or have excess reserves, as, however, among the interests of energy exporting countries. In general, from the existing definitions of energy security, we can distinguish those that reflect the main participants and trends in the international energy market.

This concept is multidimensional and includes economic security (ensuring a sufficiently high and stable growth of economic indicators; effective satisfaction of economic needs; state control over the movement and use of national resources; protection of the country's economic interests at the national and international levels)[14], environmental (Environmental security – the state of protection of the natural environment and vital human interests from possible negative impacts of economic and other activities, natural and man-made emergencies, and their consequences)[15], innovative (an integral part of economic or scientific and technical security; it is necessary to understand the state of the economy that ensures the competitiveness of science, high technologies, and high-tech products

on national, regional and global markets, and ensures sustainable development in the context of global competition)[16]. In my opinion, security/physical protection of energy facilities, energy infrastructure and transport/logistics communications (land and sea) could be added to this list.

According to the International Energy Agency (IEA), energy security is a comprehensive concept that aims to protect consumers from supply disruptions caused by emergencies, terrorism, or insufficient investment in energy market infrastructure[17]. "The IEA defines energy security as the uninterrupted availability of energy sources at an affordable price. Energy security has many aspects: long-term energy security is mainly related to timely investments in energy supply in accordance with economic development and environmental needs. On the other hand, short-term energy security focuses on the ability of the energy system to respond quickly to sudden changes in the balance of supply and demand"[18].

Thus, in the United States, energy security is understood as a guarantee of energy supplies due to the formation by the consumer country of the required certain political and economic conditions for the supplier countries, which form a favorable import policy for the consumer.

In the Asia-Pacific region, energy security is determined by conditions such as supply diversification and supplier responsibility. For these consumers, it doesn't matter who the supplier is, what their political regime is, or what their economic relations are with the countries of the region. Great importance is attached to emergency response measures that may occur in the event of a physical interruption of hydrocarbon supplies. At the same time, the focus is on the possibility of creating strategic oil reserves, which, in the event of an energy crisis, can be redistributed among the countries of the region[19].

In the post-Soviet countries, transparency of the rules of the game, i. e. clear regulation of the terms of energy supply to these countries, comes to the fore.

The World Energy Council [20] defines energy security as the assurance that energy will be available in the quantity and quality required under given economic conditions.

At the same time, the European Commission interprets it as security of supply. This means that the necessary energy needs will be met both from internal resources, including strategic reserves, and from accessible and stable external sources, supplemented if necessary by the strategic reserve[21]. Taking into account Russia's role as the largest supplier of natural gas to the European market, the Special Representative of the President of the Russian Federation for interaction with the Gas Exporting Countries Forum noted in early 2019 that the total volume of natural gas supplies from Russia to European countries, including Turkey, amounted to about 200 billion cubic meters. In cooperation with European partners, Russia is doing everything necessary to fully meet this demand now and in the future [22].

We are primarily interested in the definition of the term "global energy security", which, in my opinion, can be an independent scientific and practical task.

In any case, global energy security implies uninterrupted availability of energy sources at an affordable price. It is probably no accident that even at the Group of Eight (G8) Summit in St. Petersburg in 2006, Russia spoke about "energy resources as being critical for improving the quality of life and expanding opportunities for citizens of the world – both developed and developing. Therefore, ensuring an efficient, reliable and environmentally sound energy supply at prices that reflect the fundamental principles of a market economy is a challenge for all countries and for all humanity" [23]. In fact, this topic has never lost its relevance: its main feature is political realism.

Describing global energy security as a multidimensional concept, I propose to expand the gradation by introducing a "medium-term period". As a result, I give the following "temporary" understanding of energy security:

- in the long term (20 years or more) / 2040–2050,
- in the medium-term (10–15 years) / 2029–2035,
- in the short-term period (1–3 years) / 2020–2023.

The basis of this division is the implementation of substantial investments in exploration, energy production and building the infrastructure to meet the needs of a growing world economy. Long-term global energy security is mainly related to timely investments in energy conservation and improved energy efficiency [24], in line with economic development and environmental needs. In the long term, it seems that the problem of energy supply remains. By 2040 global energy consumption may increase by more than 25%. At the same time, according to the report of the International Energy Agency until 2025, the oil market will remain in a state of uncertainty, despite the fact that there are no unambiguously clear indicators of its development. The situation with US shale oil, whose jump in production was previously stimulated by high world oil prices, brings its share of uncertainty. The productivity of export projects in other non – OPEC countries remains uncertain.

Geopolitical and domestic political factors, in particular those related to the situation in the Middle East, Africa, Venezuela, and Latin America, are of particular importance for energy markets.

Among the main factors affecting energy supply, we should note the increasing needs of the world's largest economies, the potential depletion of non-renewable hydrocarbon reserves, and the lack of sufficient alternative energy sources.

Huge energy needs were caused by intensive industrial development mainly in Europe and the United States. If other countries of the world had developed in recent decades in a similar scenario, the volume of oil, gas and coal production would be many times higher than the current level. Growth in developing countries in South-East Asia, as well as in China and India, is forecast to remain robust. The level of GDP in developing Asia is expected to grow by 6.4% and will grow by an average of 6.3% annually over the period 2018–2022, according to the calculations of the OECD center for development of medium-term calculations. The leader until recently was China with an annual growth of 9%. However, its economic growth has been slowing recently and will grow by 6.2% per year. But India's growth will be approximately 7.3% between 2018 and 2022 [25]. The Problems

of global energy security in the short term have again become acute in the context of new geopolitical crises, conflicts, and attacks on energy facilities. An example is a drone attack on oil facilities in Saudi Arabia. After the incident, the largest oil exporter cut production by more than half. However, the rapid recovery of Saudi Arabia's oil capacity underscores its reliability as a major oil producer and supplier. As a result, the current situation in the oil market has stabilized, although the main factors affecting it remain, as stated by the Russian Ministry of Energy, the unpredictability of trade negotiations between the US and China and the slowdown in global GDP growth. Of particular importance is the protection of consumers from supply disruptions caused by emergencies. It is worth noting the ability of the global energy system to respond optimally to sudden changes in supply and demand. At the same time, we note that the "optimal response" may not be sufficient to ensure energy security. It is necessary to support such mechanisms at the micro-and primarily at the macro level, which will ensure a certain degree of reliability of "sustainable development" for the energy systems of both individual countries and the world as a whole. In this regard, transparency and predictability of energy policies of individual States are required. At the micro level, the issue of assessing and managing political risks is on the agenda not only for the short term, but also for the medium term.

According to the (average) OPEC forecast scenario, the world's population will grow from 7.550 million in 2017 to 8.551 million by 2030 and to 9.210 million by 2040, with 80% of the population living in developing countries [26]. The size of the World's population significantly affects energy consumption, but, to a greater extent, the energy balance depends on the pace of industrial development. For example, in the twentieth century, the world's population grew 3.6 times, while the world's energy balance increased more than 10 times [27].

In the medium term, "opposites" are becoming increasingly important in the desire to not depend on exports or imports, diversifying the structure of the energy balance, geographical and industrial markets. It may be necessary to point out more clearly the "opposites" of aspirations by making clear the opposition to environmental transparency, improving the investment climate, addressing the relationship between energy security, economic growth and the environment, encouraging greater use of renewable and alternative energy sources, increasing the volume of proven hydrocarbon reserves ahead of depletion, improving the management system of the energy industry and providing it with qualified personnel, taking into account the results of the shale revolution, development and implementation of new technologies.

An important task at this stage is to further stimulate the introduction of innovative technologies that ensure more efficient production of hydrocarbons and reduce the risk of negative impact of their production and use on the environment [28–29]. For China, in particular, one of the negative effects of rapid industrialization and developed industry, whose energy needs were provided mainly by coal, was the deterioration of the environment.

In these circumstances, the role of natural gas as an efficient and vital energy carrier in the global energy balance for achieving sustainable development goals is obvious. "The most important advantage of gas is its environmental characteristics, and we, as professionals in the gas industry," said Vladimir Zubkov, Special representative of the President of the Russian Federation for interaction with the GECF (Vienna, January 29, 2019),"must actively explain the environmental benefits of gas at all levels: from government and international structures to end users." [30].

The International Energy Agency (IEA), The Organization of the Petroleum Exporting Countries (OPEC), the Gas Exporting Countries Forum (GECF), the International Energy Forum (IEF), the World Energy Council, And the Organization of the Arab Petroleum Exporting Countries (OAPEC) can be considered key elements of the current system of global energy security. An integral part of maintaining this system is the Joint Data Collection Organization (JODI) (energy statistics).

Conceptual provisions and mechanisms for ensuring global energy security are also under review and are being developed by many regional organizations (primarily the EU, NAFTA, APEC, EurAsEC, OIC, LAS, ESCWA, the Association of Southeast Asian Nations, ASEAN, the African Union (AU), the Organization of American States (OAS), The organization for security and co-operation in Europe (OSCE), the North Atlantic Treaty Organization (NATO), the Council of Europe (COE), the Shanghai cooperation organization (SCO) [31], and others), as well as BRICS. But, at the same time, we are primarily talking about the security of the countries that are part of these associations.

Changes are taking place in the oil markets: price volatility, combined with constant and increasing instability in a number of producing basins, makes it difficult to make long-term forecasts, raises the question of new market management mechanisms, and brings to a new level the need for international cooperation to ensure fair and reasonable prices. In these conditions, the possibility of a new energy structure appearing in the future cannot be completely excluded from the oil market. This could be an important precedent, especially since the oil cartel is periodically criticized. In addition, according to a number of analysts, it should be taken into account that in conditions when the main rules of the game are beginning to determine the oil exporters-giants, participation in this organization may become less interesting for smaller producers [32].

Analysis of current energy problems in international and regional relations in the field of energy policy and diplomacy leads to the conclusion that there can be no separate energy security of consumers and energy security of suppliers.

It is obvious that in terms of creating a common energy space, we should be talking about a single global energy security, since the supply and demand of energy resources are interconnected.

Meanwhile, the energy market that is emerging in the world, and in particular in Europe, is highly distorted, over-regulated and politicized [33]. Take the battles around Nord Stream 2 and Turkish Stream.

The global nature of energy security puts on the international agenda the issue of creating a global system of energy balance management in the interests of the entire planet [34]. It is these problems that allow us to assess current and future trends in the world energy sector, as well as to understand the challenges that arise from their understanding, facing the world community, among them:

- developing partnerships between all stakeholders;
- creating efficient and competitive global energy markets (ensuring stability);
- establishing effective legal and regulatory frameworks, including obligations to comply with contracts;
- development of effective international mechanisms to prevent the introduction of unilateral sanctions against energy-producing countries;
- promoting dialogue and exchange of views among all stakeholders;
- diversification of energy supply and demand, energy sources, geographical and industry markets, transport routes and means of transportation of energy carriers;
- improving energy efficiency and energy saving;
- environmental responsibility in the development and use of energy resources;
- ensuring good governance in the energy sector;
- ensuring the security of vital energy infrastructure;
- improving the investment climate in the energy sector;
- addressing climate change and sustainable development;
- promoting greater use of renewable and alternative energy sources; building new, more efficient, and upgrading existing power plants to make greater use of renewable energy sources;
- increasing the volume of proven hydrocarbon reserves at a rate faster than their depletion and increasing the return of deposits;
- development of the global liquefied natural gas (LNG) market;
- creation or modernization of infrastructure for transportation and storage of energy resources;
- providing the energy sector with highly qualified personnel for the long term;
- development of safe nuclear power.

I agree with those experts who believe that solving these problems would allow us to achieve a sustainable development trajectory that consists of replacing energy-intensive goods with energy-efficient goods. This is not so much a problem of saving traditional renewable resources that will end sooner or later, but a problem of achieving balance with nature at a new level of development[35]. However, the Paris Agreement on climate change does not solve ambitious tasks on the way to reduce the rate of global warming. Forming a long-term energy security strategy under various development scenarios is a kind of search for the meaning of existence, this requires us to join forces in developing a conceptual approach to the international energy strategy, which is aimed at cooperation in the energy

sector, building a common energy space, modernizing the oil and gas sector and developing new energy sources[36].

And each country in it, apparently, can see its priorities and, accordingly, choose ways to achieve them. If we describe Russia's role in short, it is undoubtedly one of the world's leading energy powers: it guarantees the supply of the necessary volumes of energy resources to the world market and their reliable transit from the production sites to the main centers of consumption on its territory and the territory of neighboring countries, as well as carries out active organizational and diplomatic activities to ensure global energy security [37].

The analysis of modern approaches of various States of the world to solving the problem of international energy security shows that there is no common vision of ways to solve this problem for various reasons. One of the key issues at the global level is the divergence of interests between producer and consumer countries, as well as their associations – OPEC, the GECF and the IEA. Although many of them are sympathetic to measures to prevent political and institutional risks.

In my opinion, despite the complexity of finding a balance of interests in the field of energy, the formation of a global (international) energy strategy will contribute to the development of a broad dialogue on energy issues between various countries and associations, including joint efforts to form and verify long-term forecasts and assessments, including the development of energy policy priorities. First of all, this applies to the International Energy Agency (IEA), OPEC, the GECF, the World energy Council, the International Energy forum (IEF), as well as the largest participants in the world energy market – Russia, China, the United States, India, influential energy TNCs, activities through the UN and its regional organizations to promote economic cooperation.

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