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**PROVISION OF ENERGY SECURITY OF THE REPUBLIC OF
MOLDOVA ON THE BASIS OF THE CONCEPT OF
SUSTAINABLE DEVELOPMENT IN THE CONTEXT OF THE
INTEGRATION INTO THE EUROPEAN ENERGY SYSTEM**

**SPECIALTY: 521.02. WORLD ECONOMY; INTERNATIONAL
ECONOMIC RELATIONS**

SUMMARY

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The dissertation and the summary can be found in the Library of the Free International University of Moldova and on the official website of the university (<https://ulim.md/doctorat/sustinerea-tezelor-de-doctorat/>) and of the National Agency for Quality Assurance in Education and Research (LINK <http://www.cnaa.md/>).

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I. CONCEPTUAL ASPECTS OF THE RESEARCH

Relevance and significance of the subject under research. At the end of the 20th century, the main interest of the international community was the research of the globalization processes. However, at the beginning of the 21st century, the situation in the international arena changed significantly. The countries realized the acute problem of the resources depletion and gave high priority to the problem of the energy security. Over time, this problem has become global and included all members of the world community to solve it. At present, the leaders of the most countries of the world, leading international organizations and integration structures, as well as many scientific research institutes are actively working to solve the problem of the national and global energy supply.

The modern energy issues are of high relevance and are explained by several factors. One of them, especially important for the countries dependent on the import, consists in the possible oil shortage, which could lead to the significant increase in the world prices for the energy resources. In the context of the perceived oil shortage, the humanity is forced to seek and extract these resources in the hard-to-reach areas. The second factor, which follows directly from the first, is connected with the geopolitics. As the world shortage of the energy resources increases, the countries with the insufficient or absent reserves of the energy resources become more dependent on the individual suppliers. Both factors undoubtedly have a significant impact on the stability of the international relations system. The third significant factor is the ecological aspect. Obviously, the use of the fossil fuel, especially of oil and gas, results in the high greenhouse gases emissions, causing the greenhouse effect and the problem of the global warming. In this regard, the dilemma occurred for the international community: on the one part, it is necessary to develop the technologies that will reduce the ecological risks in the process of the extraction, transportation and use of oil; on the other part, there is the commitment to the complete refusal of such fossil resources in favour of the alternative, more environmentally friendly energy sources.

The degree of knowledge of the research topic. At the moment, the energy security issues are becoming increasingly relevant in the light of the ongoing world events, as well as within the developing international economic relations. Therefore, there is a significant number of the scientific works that contain the definitions of the basic concepts, in which it is established the framework of the research of the process of the energy security provision in the context of the integration, globalization processes and the sustainable development processes. However, the theory does not reveal fully the economic aspects of the direct integration of the fuel-energy complex of the Republic of Moldova into the European energy system, which was the basic vector of the research in the given scientific work.

The study of the issues of the evolution and formation of the concept of the energy security was carried out by the following authors: Yergin D., Kalicki J.H., Goldwyn D.L., as well as by the researchers who studied the development of the international relations of the Republic of Moldova with the countries that supply and transit the energy resources: Mihailescu V., Gribincea A., Coreakin S., etc.

The issues of the sustainability of the energy security development of the countries are fully disclosed in the works of Meadows D., Randers J., Harris J., Timothy M., Dreier O.C., Losi V.A., Calasnicov T.V., etc. The author analysed also the current strategies in the field of the development of the energy complex of the countries at the global and regional levels. This demonstrates a rather high degree of knowledge of the issues and the problems of the energy security provision. The issues of the strategic development are indeed given a great attention in a number of the countries of the world, and in the European countries structurally the strategies are practically unified. This proves the existence of the single and complex approach to the given issue.

The most important theoretical concepts, approaches, conceptual framework in the field of the establishment of the international relations for the purpose of the effective integration processes in the field of energy are disclosed in the works of the domestic and foreign authors: Muntean M.A., Sumilo P.S., Princen T., Finger M. and several others.

The purpose of the research consists in the formation of the strategic approaches to the provision

of the energy security of the Republic of Moldova on the basis of the concept of the sustainable development in the context of the integration into the European energy system.

The objectives of the research: to define the concept of the energy security in the modern theories of the international relations; to reflect the concept of the sustainable development in terms of the energy security; to present the characteristics of the international energy cooperation at the present stage of the integration processes development; to define the process of the design of research methodology structure; to explain the essence of the methods and tools of the scientific researches; to present the approaches to the formulation of the conclusions and recommendations, as well as to the execution of the scientific research work; to analyse the problems and the prospects of the strategic development of the world energy system; to research the economic aspects of the energy security of the EU and CIS countries in the field of the energy security provision; to identify the trends in the development of the international relations in the context of the integration of the fuel-energy complex of the Republic of Moldova into the European energy system; to develop and to substantiate the strategy of the integration of the fuel-energy complex of the Republic of Moldova into the European energy system; to form the complex of the strategic initiatives for the development of the energy cooperation of the Republic of Moldova in the context of the energy security; to develop the assessment of the effectiveness of the strategy for the integration of the fuel-energy complex of the Republic of Moldova into the European energy system.

Research hypothesis. The scientific working hypothesis of the given research consists in the assumption of the author that the strategic approach to the process of the integration of the fuel-energy complex of the Republic of Moldova into the energy system of the European Union is the most effective and will contribute to the increase in the promotion of the activity within the specific measures that will be combined into the relevant strategic directions. It is a separate strategy that will become the practical tool and will allow avoiding the vague and superficial plans in the field of the provision of the energy security and sustainable development in the field of energy of the Republic of Moldova. The most probable and promising scenario, according to the author, is the establishment of the fruitful international relations with the countries of Europe and, in particular, of the European Union for the minimization of the risks associated with the energy security, energy efficiency and the availability of the energy resources to the population of the country.

The generalization of the methodology and the justification of the selected research methods. The research methodology is enclosed in the certain structure designed by the author, the purpose of which is to give an idea of the phases of the research and their directions: the phase of the research program design, the phase of the issues research, the phase of the solutions elaboration. Such approach allowed the author to use the research algorithm as the road map in the process of the study of the subject of the dissertation work and its issues.

The research methods used by the author in the given scientific work were combined into the theoretical and empirical, practical researches. The theoretical research methods became the induction, deduction, description, concretization, systematization, comparison, generalization, classification. The empirical methods became the observation, measurement, experiment, expert interview, statistical data analysis method, modelling. However, the author did not limit himself to these two categories of researches and chose the abstraction, analysis and synthesis as the methods of general nature. The given methods of universal nature were chosen proceeding from the subject and object of the research.

Scientific originality and novelty consist in the:

- specification of the definition of the sustainable energy security in terms of the state of stability of the energy systems under the conditions of the influence of the internal and external factors;
- development of the strategy of the integration of the fuel-energy complex of the Republic of Moldova into the European energy system;
- formation of the complex of the strategic directions of the development of the international energy cooperation of the Republic of Moldova in the context of the energy security provision that implies three

strategic directions – the development of the sustainable energy security, the preservation of the environment, the improvement of the population life quality;

- proposal of the comprehensive strategic plan of the development of the energy cooperation of the Republic of Moldova in the context of the energy security, including the preparatory, targeted and evaluation activities;

- developed comprehensive methodology of the integration strategy implementation effectiveness assessment in terms of the improvement of the energy security of Moldova.

The summary of the chapters of the dissertation with the emphasis on the conducted researches and the reflection of their necessity for the achievement of the purpose of the research.

In the **introduction** it is presented the relevance and the degree of knowledge of the research topic, it is reflected the purpose, objectives, hypothesis, methodology of research, it is presented the summary of the chapters of the dissertation. The introduction allows to get a general idea of the content of the work and to emphasize its most important constituent parts.

In the **chapter I, “Theoretical fundamentals of energy security within international relations”** it is explored in detail the concept of the energy security in the context of the modern theories of international relations, it is presented the evolution and the modern understanding of the essence of the given definition. The approaches to the solving of the problems in the field of the energy security from the theoretical and practical regional positions are determined. In addition, the content component of the concept of the sustainable development in the aspect of the energy security is explored, thereby demonstrating their interconnection and mutual influence at various levels: state, industry and the level of energy enterprises. The most important part of the theoretical research is the study of the approaches to the international energy cooperation at the present stage of the integration processes.

In the **chapter II, “Methodological fundamentals of researches”** it is explored the essence of the designed research algorithm, which was independently developed by the author for the achievement of the purpose of the given research. It is demonstrated the process of data processing and the obtainment of the theoretical and practical results of the scientific research. It is also presented the content of the methodology and are presented the specific research methods and tools with their description and form of application within the research.

In the **chapter III, “Analysis of the situation on the world market in the field of the international cooperation and energy security”** it is conducted the analysis of the world energy system, aimed at the identification of the problems and the prospects of the strategic development. The author conducted the study of the representative sample of the countries of the world for the presentation of the most complete energy image of the production, consumption and means of transportation of the energy resources. Also, in the given research chapter are explored the features of the energy security provision in the region of the countries of the European Union and the Commonwealth of Independent States in the context of the international cooperation. The final part of the given chapter is the study of the energy market of the Republic of Moldova and the identification of the trends and prospects of the energy sector of the country.

In the **chapter IV, “Strategic directions of the integration of the fuel-energy complex of the Republic of Moldova into the European energy system”** it is presented the substantive part of the strategy of the integration of the fuel-energy complex of the Republic of Moldova into the European energy system. It is proved its prospectivity and relevance, as well as are substantiated the directions included in its structure. It is also explored the complex of the strategic directions of the development of the energy cooperation of the Republic of Moldova in the context of the energy security within the short-term and long-term scenarios of the development of the energy industry of the country as a result of the introduced changes and impacts. In addition, it is presented the three-level system of the assessment of the effectiveness of the strategy of the integration of the fuel-energy complex of the Republic of Moldova into the European energy system.

In the **conclusions and recommendations** the generalized results obtained by the author in the form

of the conclusions and recommendations addressed to the direct executors are presented.

II. CONTENT OF DOCTOR'S THESIS

In the first chapter “**Theoretical fundamentals of energy security within international relations**” are presented the results of the theoretical study on the scientific approaches to the study of the research issues. The national security of any country includes the totality of the spheres of life of the state. An important component is the economic security, one of the significant parts of which is considered the energy security. Therefore, it can be argued that the energy security is directly interconnected with the national security of the state. Historically, the energy resources play a crucial role in the improvement of the living standards of the population of the countries, the development of their possibilities, the use of own potential, new prospects opening for the states, both the developed and the developing. In the modern world, it is the energy that is the main and currently the only resource that ensures the civilizational existence on the planet Earth. The world energy needs are mainly met by the extraction of the oil, natural gas and coal. However, not in all countries are distributed evenly the natural resources that meet the energy needs. Such states are forced to import the vital resources that accordingly increases the acceleration of the depletion process in the places of their extraction. This forms the energy problem of the global nature, in connection with which the provision of a safe, efficient, reliable and environmentally friendly energy supply at the prices that reflect the fundamental principles of the market economy and within the principles of the sustainable development is the challenge for the individual states and the world community as a whole.

The author analysed the essence of the concept of the energy security from the point of view of various authors and sources, are emphasized the key aspects of their definitions that is reflected in the table 1.

Table 1. The essence of the concept of the energy security [it is developed by the author]

Author/source	Definition of energy security	Key aspects
Kalicki J.H., Goldwyn D.L.	The provision of the access to the energy resources necessary for the progressive development of the national power (state). ¹	development of state power
Yergin D.	The provision of the adequate, reliable energy supplies at the reasonable prices in the manner that does not jeopardize the basic national values and goals. ²	reliability of supplies
Mihailescu V.	The umbrella definition that does not have one accepted unified concept, but includes the economic, environmental, social dimension ³	economic, ecological, social dimension
Expert Group of the World Bank	The stable production and use of the energy by the country at the adequate prices for the increase of the rates of the economic growth, the reduction of the poverty level, the improvement of the population life quality through the access to the relevant services in the field of energy. ⁴	contribution to economic growth, improvement of life quality
Energy strategy of the Republic of Moldova for the period up to 2030	The establishment of the safe and sustainable supply of the energy to the consumers. ⁵	sustainable provision
Energy strategy of the Russian Federation for the period up to 2030	The level of the protectability of the state and its citizens, the society of people, the country and the economy from the threats to a reliable energy supply. In this case, the threat is conditioned by the external (geographical, macroeconomic, conjunctural) factors and the state of	protectability state of country

¹ KALICKI, J.H., Goldwyn, D.L. *Energy and Security: Toward a New Foreign Policy Strategy*. Baltimore: Woodrow Wilson Center Press, 2005. 295 p. ISBN 978-0-8018-8278-4.

² YERGIN, D. *Energy security in the 1990s*. In: *Foreign Affairs*, 1988, nr. 67 (1), p. 111- 130. ISSN 9781446276082.

³ MIHAILESCU, V. *Securitatea energetică a Republicii Moldova în contextul aderării la comunitatea energetică*, 2010, Chișinău: Bons Offices, ISBN 978-9975-80-338-0.

⁴ Вопросы энергетической безопасности. [cited on January 22nd, 2021]. Available: <http://www.allbeton.ru/upload/iblock/e54/voprosienergeticheskoy-bezopasnosti-doklad-gruppi-vsemirnogo-banka.pdf>.

⁵ Энергетическая стратегия Республики Молдова на период до 2030 года. [cited on January 22nd, 2021]. Available: <http://lex.justice.md/viewdoc.php?action=view&view=doc&id=346670&lang=2>.

	the energy sector of the country. ⁶	
Document “Global Energy Security” G-8	The energy resources of all countries of the world must be provided at the prices acceptable to both the consumers and the producers of these resources, with the minimization of the environmental damage, in order to ensure the sustainable socioeconomic development of the world community. ⁷	reasonable prices, minimal environmental damage, socioeconomic development

Throughout the historical period under consideration generally the consumer countries demonstrate the best results of the adaptation of their energy policy to the external threats.

The subjects play the most important role in the establishment of the international relations. The energy security issues are the issues discussed within the international relations therefore it is advisable to define the energy security depending on the subject. Considering the positions of the subjects in relation to the energy security, the author identified the pattern – the regions set for themselves different tasks on the energy security provision. In its turn, this forms the originality of the definitions of the energy security from the subjective positions that is presented in the table 2.

Table 2. The definition of the energy security from the position of the regions [it is developed by the author]

Subject of energy security	Countries	Objectives on energy security provision	Definition of energy security
Importing countries	China, Japan, India, South Korea, Germany, Turkey, Italy, France, Taiwan, Spain, Thailand, Great Britain, Republic of Moldova, Ukraine, Bulgaria, Greece, Belarus, etc.	- to maintain the power supply continuity; - to diversify the sources of energy resources transfer.	the provision of the continuity and sustainability of the energy resources supplies for the needs of the economy of the importing countries and the population as a whole.
Exporting countries	Russian Federation, Australia, Canada, Indonesia, Norway, UAE, Kuwait, Algeria, Kazakhstan, USA, Saudi Arabia, Iran, etc.	- to resist in the strategic markets due to the favourable pricing; - to have sufficient funds for the further extraction of the energy resources; - to ensure the stable functioning of the authorities, institutional subdivisions, the system of production and supply of the energy resources of the consumer countries.	the stability of the export deliveries, taking into account the needs of the economy of the country in the energy carriers, as well as the favourable conditions for the creation of the conditions for the competition of the energy companies of the country in the global energy market.
Transiter countries	Ukraine, Poland, Slovakia, Turkey, Azerbaijan, Hungary, Romania, Georgia, etc.	- to receive benefits from the transportation of the energy resources on own territory.	the provision of the uninterrupted transit (operation of infrastructure and elimination of any kind of risks) and the obtainment of the stable profit.

In connection with the objectives and positions of three regions-players in the global energy market, the energy security is acceptable at the creation of the environment of the mutual cooperation of the presented three parties of the energy exchange that emphasizes the importance of the application of the neoliberal approach and the neorealism approach in combination.

According to the factors-determinants of the energy security problems, the author proposes three main theoretical approaches to the finding of the solutions of the global energy security problems, the content of which is presented in the table 3.

⁶ Энергетическая стратегия Российской Федерации на период до 2030 года. [cited on January 22nd, 2021] Available: <http://www.infobio.ru/sites/default/files/Energostategiya-2030.pdf>.

⁷ ЕРШОВ, Ю.А. *Россия и глобальная энергетическая безопасность*. В: Российский внешнеэкономический вестник, 2006, № 9, с. 8-19. ISSN 2072-8042.

Table 3. The approaches for the search for the solutions of the energy security problems [it is developed by the author]

Name of approach	Essence of approach	Risks of approach
Interdependence approach	The establishment of the balance in the structural and economic relations between the producer and the consumer of energy, because the problems of the creation of the supply process between the countries often occur namely because of the vulnerability in the structural issues. This, in its turn, can lead to the imbalance in the national economy of the countries.	The record exclusively of the relations between the suppliers and the consumers, disregard of the transiter countries.
Institutional approach	The determination of the degree of the efficiency of the work of the international organizations and institutions on the issues of the energy security provision (IEA, OPEC, OECD, etc.).	The consideration of the energy security from the point of view of the functioning of the organizations and institutions that can bureaucratize the practical activity in terms of the energy security provision.
Supply diversification approach	The understanding of the energy as the complex system involved in the process of the trade relations, in which the main threatening factor is the pricing system. In addition, it is expected the conduct of a number of studies of the problems of the energy availability, in view of the development of new technologies, the market deregulation, the possibility of the obtainment of international investment and the close relationship of the energy market participants.	It is paid attention to the price factor as the threat to the energy security, which is often not associated with the search for new opportunities for the energy security provision (access, production, transportation, infrastructure).

It is clear that in the current conditions, all presented approaches are not opposed, in view of the presence of certain risks. The possible risks can be minimized through the harmonious combination of the directions of the approaches into a single strategic concept for the purpose of the security increase in the context of the trilateral relations. The concept of sustainable development (SD) passed in its development three conditional stages. The origin of the concept began with the ecological fundamentals. In the capacity of the landmark events, the UN Stockholm Declaration on the Environment (1972) and the Reports to the Club of Rome (1970's) are mentioned that became the source of the occurrence of the discussions and disputes in the scientific, political, economic and public environment. At present, the arguments of ecological nature in favour of the sustainable development remain significant in almost all areas of activity. Many scientists give significant eco-arguments that the existing bases of the economic, social, natural, institutional nature cannot meet the modern challenges.

The concept of sustainable development is closely related to the energy trilemma. The energy trilemma is necessary for the provision of the balance through the mutual integration of the energy systems. This is obvious, because, for example, the achievement of the exclusively energy security in isolation from the ecological sustainability and energy equality does not make sense and does not meet the requirements of the modern world, and vice versa. The achievement of the balance between the components of the trilemma is possible under the ideal conditions of the international cooperation at various levels and with the developed integration processes in the energy field. In other words, each state needs to maintain the balance in three directions of the trilemma. The energy trilemma is necessary for the assessment and change of the effectiveness of the actions within each of its directions. For these purposes, the index of the world energy system was developed, the objectives of which are presented in the table 4.

Table 4. The parameters of the world energy trilemma index⁸

Component of trilemma	Measurements	Scope
Energy security	- the ability to meet the present and future demand for the energy	- the degree of the efficiency of the management of the internal/external energy sources;

⁸ Trilemma Index, 2021. [cited on March 03rd, 2021]. Available:

https://www.worldenergy.org/assets/downloads/WE_Triangle_Index_2021_-_Executive_Summary_-_Russian.pdf.

	resources; - the ability to withstand the systemic disturbances and to respond to them.	- the level of the reliability and stability of the energy infrastructure.
Energy equality	- the ability to provide everyone with the access to the reliable, affordable energy resources in the sufficient volume.	- the basic access to electrical energy and clean types of fuel and technologies; - the price affordability of the energy supply.
Ecological sustainability	- the ability to mitigate and to prevent the consequences of the environmental degradation and climate change.	- the productivity and efficiency of the generation and transmission of energy; - the distribution, decarbonization and quality of air.

According to the author for the achievement of the leadership in this index the governments need to continue the evolution of the energy sustainability in the following directions: the transformation of the energy supply, the expansion of the energy access, the cost effectiveness, the increase of the energy efficiency and the improvement of the demand management, the decarbonization of the energy sector. For the minimization of the impact of the barriers and the continuation of the progress in the development, in accordance with the directions of the energy trilemma, it is necessary to develop the appropriate energy regulation policy and to create the regime of the fuel-energy complex support that will contribute to the achievement of the strong energy trilemma, regardless of the resources, geographical location of state. The progress in this regard must be carried out according to the principles of the safety, fairness, environmental friendliness, sustainability, competitiveness, in order to meet the modern consumer demands. On the basis of these directions, the conceptual three-level model of the sustainable energy development was built, graphically presented in the figure 1.

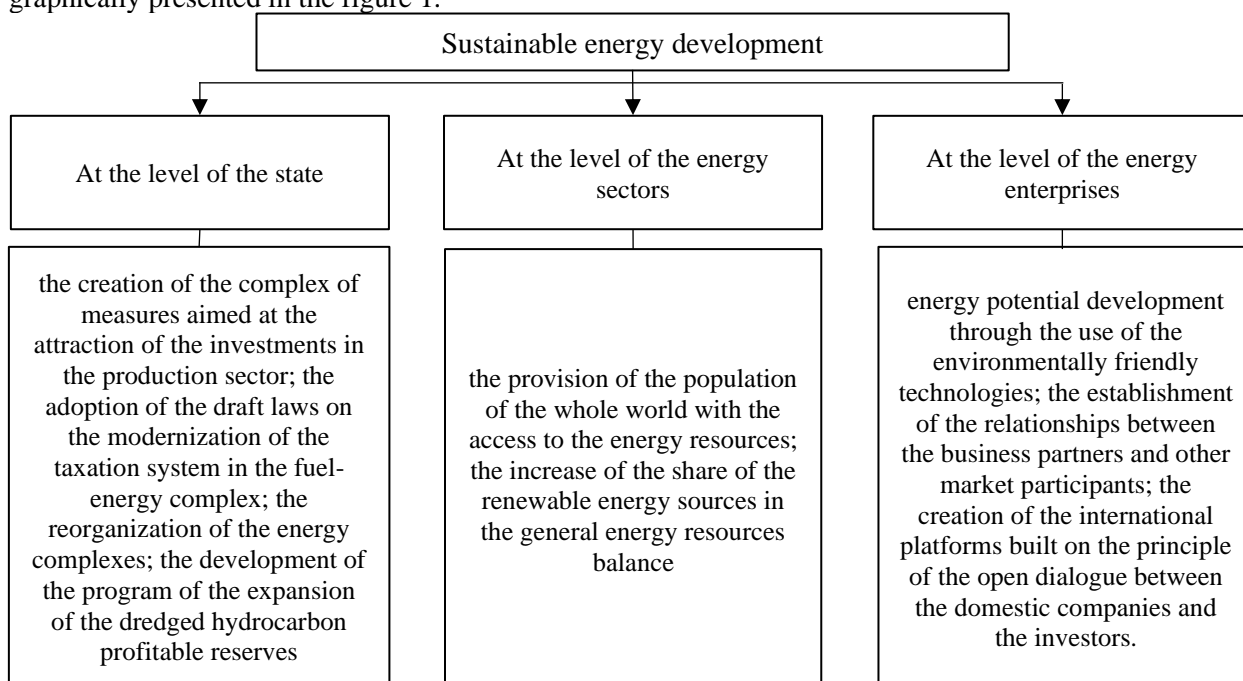


Figure 1. Scheme of sustainable energy development levels⁹

The understanding of the energy sustainability at the state level depends on the enterprises in the energy field and their work. At the moment, in the scientific sources there is no clear definition of the state energy SD, however, some researchers are making attempts to consider this definition indirectly.

The safe, reliable and affordable energy supply is the key of the provision of the possibilities of the economic and social development of the country. At the same time, it must be taken into account that the integration processes have an impact on the energy market. The countries, in response to these trends and

⁹ ШИЛЕЦ, Е.С., КРАВЧЕНКО, В.А., ЛУКЪЯНЕНКО, Т.В. *Энергетическая трилемма - основа устойчивого развития топливно-энергетического комплекса*. В: Вестник Института экономических исследований, 2017, № 3 (7), с. 27-34. ISSN 2519-2019.

challenges, seek to form or participate in the regional integration associations, to develop and implement the common regional energy policies, the strategies and the strategic plans. The adjustment and implementation of the energy strategies is carried out more efficiently with the well-established international energy cooperation.

The international dialogue between the countries and the international institutions on the energy issues is becoming more active that increases the mutual dependence. Accordingly, the international relations are strengthened, the ideas of new ways of the further effective development of the world through the joint efforts appear. The distancing and relying solely on own resources in the energy issues does not lead to the positive results for any country in the world. In this regard, often the basis of the international cooperation becomes not only the energy in the general sense, but the energy security issues related to it.

Despite the existing developed network of international organizations and their prospects, at the moment there is no centre or special platform for the settlement of various international disputes in the energy issues. The author proposes, for the coordination of the efforts in the energy field and the regulation of the complex issues at the international level, the creation of the regulator of the supranational level. This will increase significantly the degree of the objectivity in relation to the participants, will set the common vector for the development of the energy complexes of the states, will lead to the creation of the unified normative-legal documents regulating the energy security issues at the global level. At the moment, according to the author, the misunderstanding and the disagreement of the positions of the suppliers, consumers and transmitters is the threat to the energy supply security. In addition, the author noted that the comprehensive consideration of the issues of the trade in the energy resources at the international level is not carried out within the existing international organizations. This proves the need for the supranational regulation manner, covering all aspects of the energy diplomacy and interaction.

In the **chapter II, “Methodological fundamentals of researches”** it is reflected the sequence of the conduct of the scientific research. The process of the given scientific research, according to the author, was expedient to be divided into certain sequential and interrelated stages, which are linked to a certain time period allotted for the research. Such approach made it possible to form the sequence of the works within the research and to present it schematically.

The design of the structure of the research methodology included the construction of the scheme, its testing and the description of the essence of the stages. Three phases of the research methodology represent the unique way to achieve the concrete results on the energy issues in general and the energy security in particular. The given structure of the methodology was compiled proceeding from the necessity of the adjustment of the research activity, the limit of the resource possibilities and the terms allotted for the work. The structure reflects the logical chain at the setting and solving of the problems according to the topic and purpose of the research.

The author-developed research methodology ensures the compliance with the following principles characteristic of the scientific research: the completeness, reliability, objectivity, reproducibility, conclusiveness, accuracy. The research process in the given dissertation work was determined by three successive phases: the design of the research program (1 year), the research of the issues (2 years) and the development of the solutions (1 year).

The first phase “Design of research program” was aimed at the achievement of the result in the form of the choice of the research area, the formulated topic, the working hypotheses, the goals and objectives of the research. To the given phase was allotted one year, since in the process of the achievement of the mentioned results, various theoretical sources were simultaneously studied, which became the basis for the theoretical research. The design of the research program includes four stages: formation of conception; formulation of hypotheses; technical and technological preparation; development of research algorithm.

The second phase “Research of issues” is aimed at the verification of the established hypothesis through the conduct of a series of studies structured in the logical sequence. This phase is the longest and consists of six stages of the step-by-step research and data processing plan.

The third phase “Development of solutions” is the so-called reflective phase, the objective of which is to formulate the obtained findings into the concrete and understandable results of the researches, as well as to formulate the specific set of the innovative solutions and to prove their effectiveness. This stage is not final, it can generate new directions of the researches or deepen the already conducted ones. The research process, according to the author, should be cyclical, helping to update the existing developments, to improve the obtained results.

The author mentioned that the methodology is not limited to the simple complex of the scientific research methods. The methodology is a much more complex and broader concept, covering the whole essence and process of research from the setting of the goal and the formulation of the research topic to the obtainment of the specific applied results and the development of the solutions based on them. At the development of the research methodology structure within the given dissertation work, the author adhered to a number of methodological principles: brevity, accuracy of landmarks, target orientation, diversification of research methods. In the course of the design of the methodology, the approaches of the consistency, complexity and interdisciplinarity were used. The author developed his own research algorithm, which includes the successive steps. The algorithm served as a kind of the canvas, thanks to which it was possible to build logically the course of the research and to obtain the results that are significant for the theory and practice. The author set the specific benchmarks (the target points) and the resource limitations. This made it possible to conduct the research in a more concentrated and consistent manner, deeply studying each side of the problem under consideration and its aspects. The characteristics of the components of the research methodology were also provided. The author formulated the theoretical research structure scheme, presented in the figure 2.

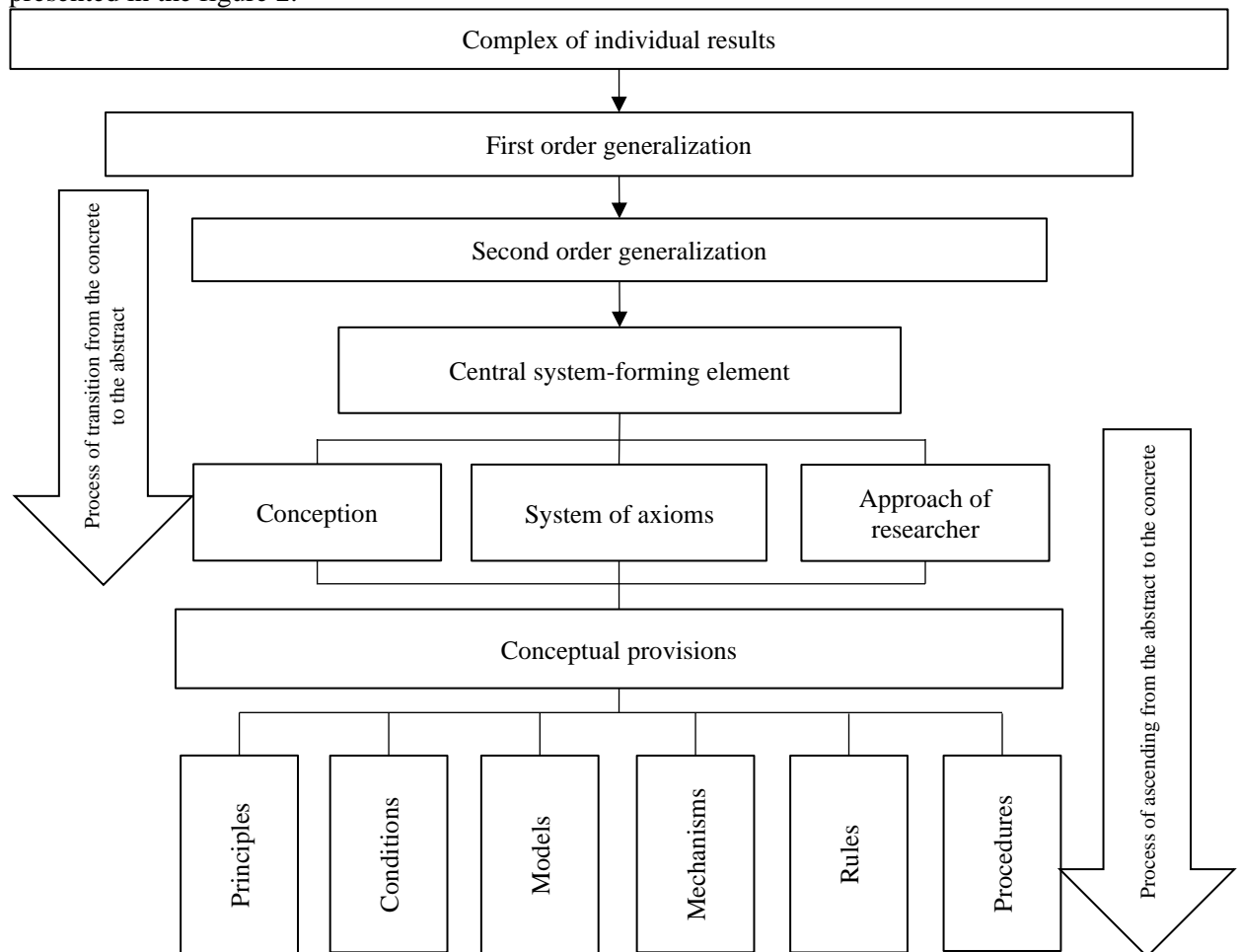


Figure 2. Structure of theoretical research logic [it is developed by the author]

The process presented in the diagram consists of two stages. The first stage is the induction, that is, the transition from the concrete to the abstract, where the author determined the central system-forming element of the theoretical part of the research: conception, system of axioms, single methodological approach. The theoretical research requires the empirical support. As in any scientific work, theoretical researches alone are not enough for the provision of the evidence base of the conclusions and the substantiation of the recommendations. The author compiled the structure of the empirical research logic, presented in the figure 3.

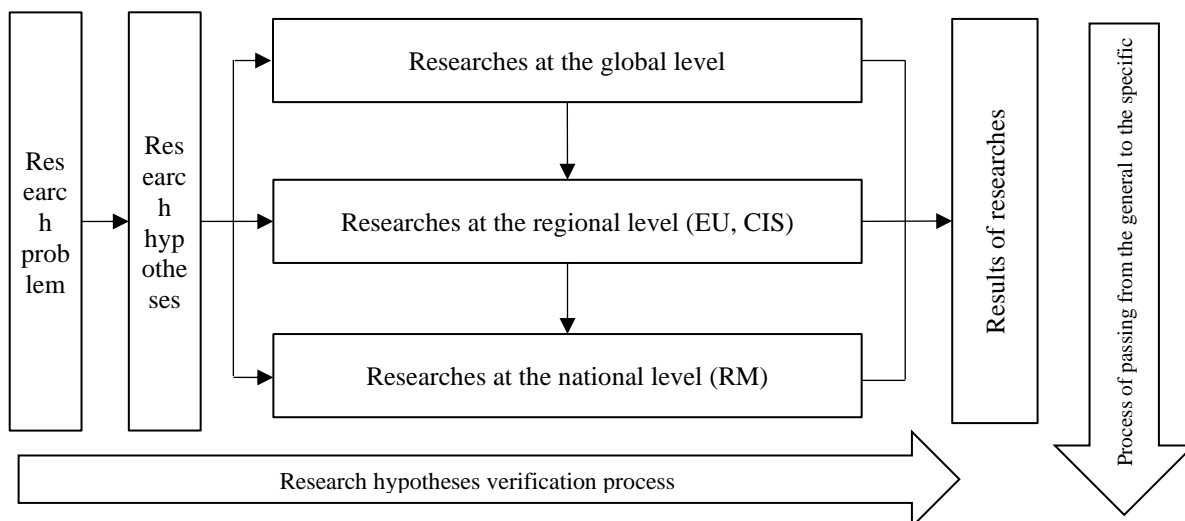


Figure 3. Structure of empirical research logic [it is developed by the author]

The logic of the empirical research is established by the author on the basis of its three components: the analysis of the global energy market and of the processes; the study of the situation in the regional markets representing the strategic interest for the Republic of Moldova – the region of the European Union and the CIS region; the researches at the national level (the fuel-energy complex of the Republic of Moldova). At each level, a certain research work was carried out, and the results were obtained that verified the hypotheses and formulated the conclusions.

The theoretical and empirical researches are interconnected in the context of the scientific search, reflecting the forms of the scientific and cognitive activity, the structural components of the research process. By the author it is traced a clear relationship between the theoretical and empirical components of the scientific research and it is proved their unity.

The author adhered to the principles of the brevity, clarity, scientific character in the formulation of the conclusions and recommendations in the dissertation research. The section of the general conclusions and recommendations made it possible to highlight new and significant results, as well as are proposed the solutions and are identified the ways for the further researches.

In the **chapter III, “Analysis of the situation on the world market in the field of the international cooperation and energy security”** are presented the results of the researches of the practices of the domestic and foreign experience within the provision of the energy security in conjunction with the international integration processes.

The problems of the energy supply and energy security have recently become of great relevance for the leaders of the most countries of the world, international organizations, integration structures and research institutions. The author carried out the quantitative and qualitative analysis of the world energy system. The forecasts of various world specialized organizations are analysed, the regularities are revealed and the conclusions are drawn on the existing problems of the world energy systems. The qualitative analysis was the study of the content of the policies or strategies of the countries representing the regions of the world. The complex of studies allowed the author to suggest the prospects and problems of the strategic development of the world energy system. At the moment, the world remains on the unsustainable path. The COVID-19 restrictions are eased in many countries of the world and the economic activity is recovered, the energy consumption is escalating, increasing the demand for the available energy resources and exposing the vulnerabilities in the system. For the solving of these numerous problems and uncertainties it is required the analysis of the objective and comprehensive data. The author conducted the comparative analysis of the production and consumption of energy in the world¹⁰ during the period from 2000 to 2021 that is presented in the figures 4 and 5.

¹⁰ GRIBINCEA, C., SANDU, M. *Dinamica consumului de energie pe glob*. In: *Materialele Simpozionului Științific Internațional - Perspectivele dezvoltării durabile a spațiului rural în contextul noilor provocări economice*, dedicat aniversării a 85 de ani de la fondarea Universității Agrare de Stat din Moldova, nr.50, 2018, p. 126-132. ISBN 978-9975-64-299-6.

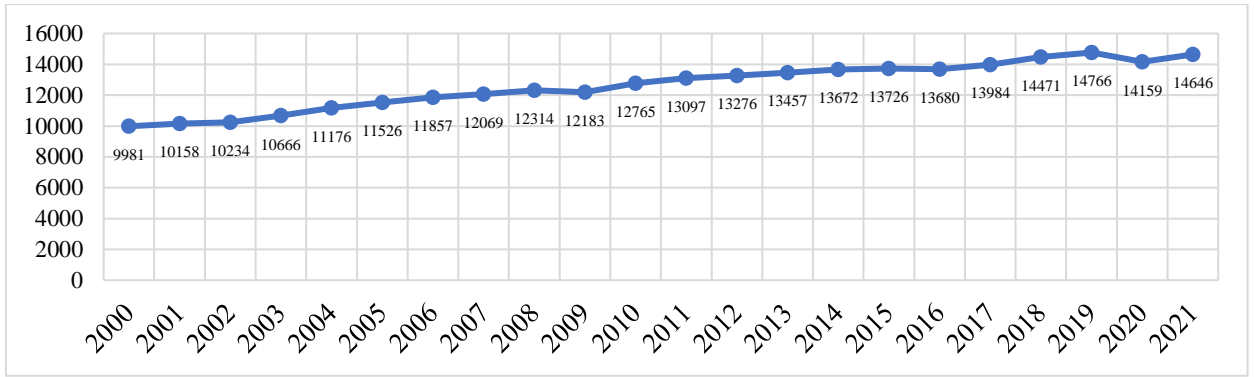


Figure 4. Total energy production in the world, 2000-2021, mln tonnes of oil equivalent¹¹

The given graph demonstrates the steady dynamics of the growth in the cumulative energy production over the past 20 years. This suggests that, despite certain obstacles, such as the crisis of 2009 or the COVID-19 pandemic in 2020, the general trend of the increase in the energy production continues. The explanation for this is the general growth of the world GDP that requires the increase in the necessary production capacities, and, consequently, the additional energy resources.

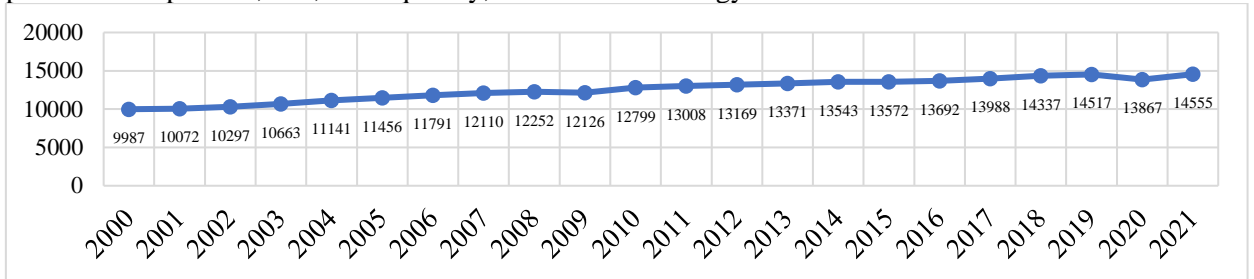


Figure 5. Total energy consumption in the world, 2000-2021, mln tonnes of oil equivalent¹²

From the presented diagrams, a generally stable growth in the production and consumption is noted. Assessing the current situation, it may be noted that the data demonstrate a sharp recovery of the global primary energy in 2021, being increased by almost 6% and more reversing the sharp decrease in the energy consumption in 2020 as the major part of the world is on lockdown. The sharp increase in the energy demand is the sign of the global success conditioned by the rapid recovery of the economic activity as the widespread availability of the effective vaccines allowed to ease the COVID-19 restrictions in many parts of the world and to return to the daily life. The energy foreign trade balance of the world regions is presented in the figure 6.

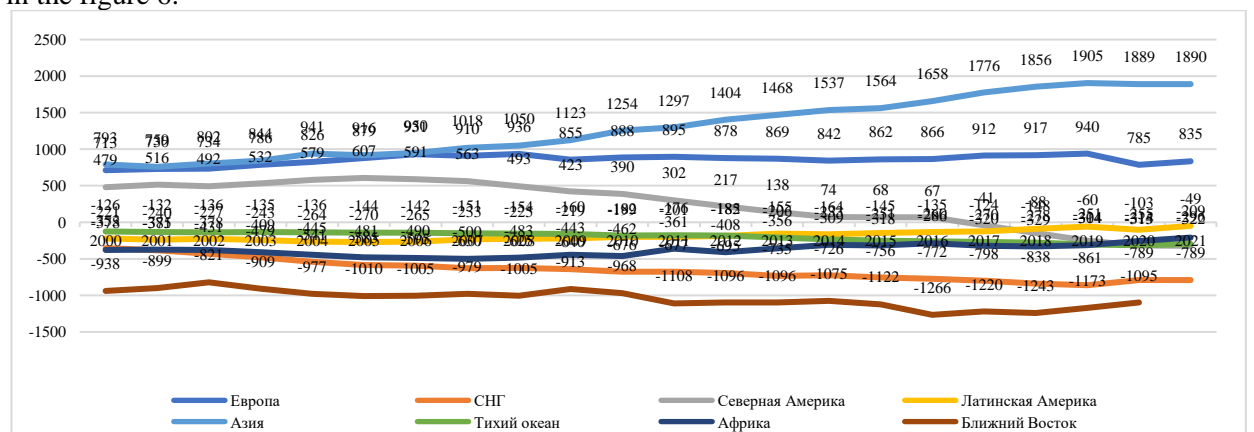


Figure 6. Energy foreign trade balance of the world regions, 2000-2021, mln tonnes of oil equivalent¹³

¹¹ Official site Enerdata. [cited on May 10th, 2022]. Available: <https://yearbook.enerdata.ru/>.

¹² Ibid.

¹³ Official site Enerdata. [cited on May 10th, 2022]. Available: <https://yearbook.enerdata.ru/>.

The presented data clearly demonstrate over the past twenty years a clear regional division into the importers and exporters of the cumulative energy product¹⁴. The first are Europe and Asia. The second are the CIS, the Middle East, Africa, the Pacific basin. The existing groups of the exporting regions have the largest reserves of the cumulative energy resources and are provided with the appropriate capacities for their production. A special place, apparently, is occupied by the North American region, which over the past five-seven years has quickly become the importer that is conditioned by the technological successes of the countries of this region in the oil-gas industry. The author considered also the current world energy situation and the prospects for its development within the production, consumption and trade of the oil products, natural gas, coal, electrical energy¹⁵.

The author conducted the comparative qualitative analysis of the policies, strategies, plans of the development of the energy complex of the countries of the world. For this, the sample of the countries, the most significant representatives by the regions of the world, was selected. The current documents presented in the official sources were analysed, from which the main goal and the strategic priorities for the development of the energy system were singled out. The coverage of the groups of the directions in the energy strategies of the regions of the world is presented schematically in the figure 7.

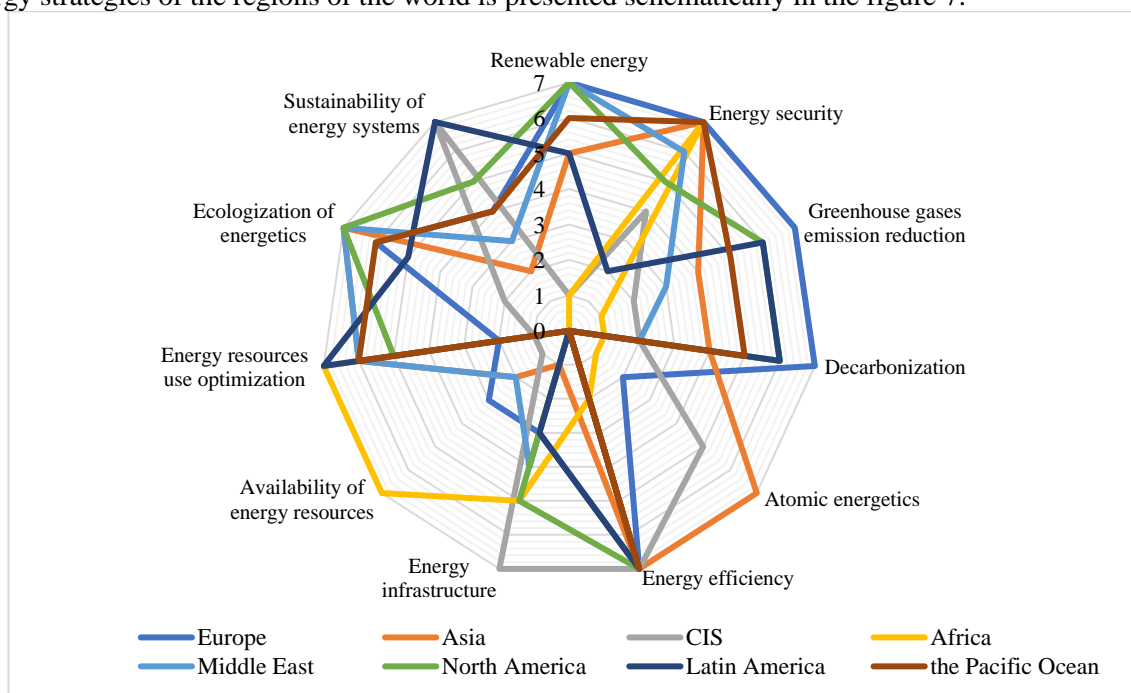


Figure 7. Coverage of groups of directions in energy strategies of the regions of the world [it is developed by the author]

The analysis demonstrated that each region is characterized by its own priorities of the strategic development of the energy system, which are supported by the countries included in it¹⁶. Among the features of the European region, the following recurring goals can be distinguished: the development of the renewable energy sources, the provision of the energy supply safety, the greenhouse gases emissions reduction, the decarbonization. In general, the European countries are striving within the strategies to the development of the energy sector under the conditions of the sustainability, as well as to find the ways of the provision of the availability and diversification of the routes and energy resources for the provision of the energy security. Such aspirations are explained by the fact that the countries of Europe do not have the large-scale reserves of the energy resources compared to other regions.

¹⁴ SANDU, M., GRIBINCEA, A. *Depășirea problemelor globale: resursele energetice și consumul*. In: Materialele conferinței științifică națională cu participare internațională Integrare prin cercetare și inovare, nr. 1, 2019, p.378-381. ISBN 978-9975-149-46-4.

¹⁵ SANDU, M. *Forme de organizare a comerțului internațional cu materii prime*. In: Materialele conferinței științifice internaționale - Asigurarea viabilității economico-manageriale pentru dezvoltarea durabilă a economiei regionale în condițiile integrării în UE, nr. 1, 2018, p. 209-212. ISBN 978-9975-50-215-3.

¹⁶ SANDU, M., GRIBINCEA, A., GRIBINCEA, A.A. *Trends on the global energy market*. In: Journal of Research on Trade, Management and Economic Development, nr.6, 2019, p. 50-62. ISSN 2345-1424.

The author assessed also the progresses of the regions of the world in terms of the energy trilemma in order to assess the social, economic and ecological consequences of the possible development of the energy landscape until 2050¹⁷. The definition of the energy sustainability is based on three basic dimensions: energy security, energy equity and energy sustainability. The author analysed these three dimensions in the context of the future scenarios of the regional energy development. In addition, the author analysed the development ways of the countries taken into account in the strategic documents on the energy. Thus, the qualitative analysis of the energy strategies helped to determine the degree of the achievement of the objectives within the energy trilemma. The degree of the achievement of the objectives within the energy trilemma by the regions of the world is presented in the figure 8.

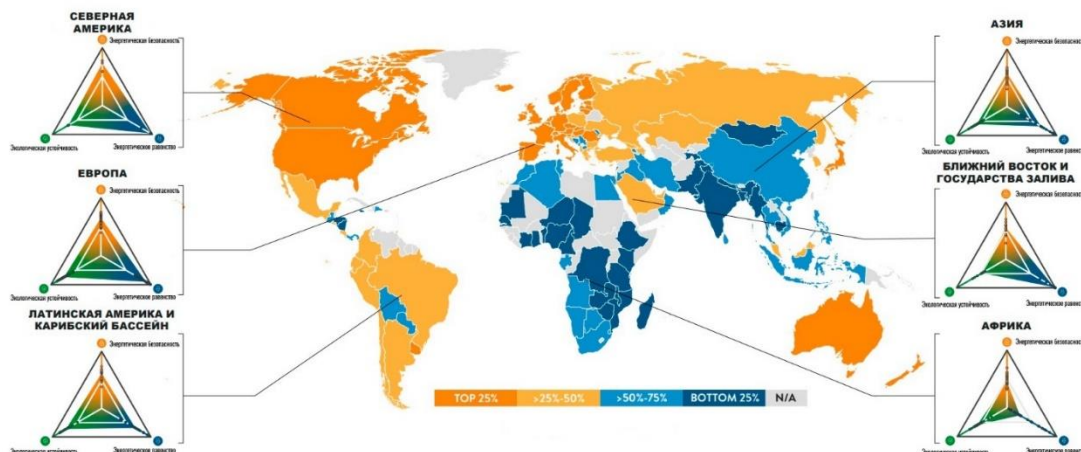


Figure 8. Implementation of energy trilemma by the regions of the world [it is developed by the author on the basis of¹⁸]

5. The significant changes are expected in the world fuel-energy balance that is presented in the table

Table 5. Forecast of structure of world consumption of primary fuel-energy resources until 2030, %¹⁹

Type of resources	2006	2015	2030	Average annual growth rate (2006 – 2030)
fuel-energy resources, total	100	100	100	1,6
<i>including:</i>				
coal	26	28	29	2,0
oil	34	32	30	1,0
gas	20	21	22	1,8
atomic energy	6,2	5,8	5,3	0,9
hydropower	2,2	2,3	2,4	1,9
biomass and waste	10,1	9,7	9,8	1,4
other renewable resources	0,6	1,1	2,1	7,2

First of all, it should be mentioned that the fuel-energy balance will maintain the same share of fossil fuels (about 80%). The share of coal will increase from 26% in 2006 to 29% in 2030. This will be related to the increase in the prices for the competitive natural gas and the introduction of the technologies that reduce sharply the harmful ecological consequences of the use of coal. At the same time, the demand for coal and natural gas (from 20% in 2006 to 22% in 2030) will continue to grow. Despite the reduction in the role of oil in the energy balance (from 34% to 30%), it will remain the leading type of fuel by 2030. In general, the share of nuclear energy in the world will decrease (from 6,2% to 5,3%), and the use of the

¹⁷ World energy scenarios: composing energy futures to 2050. [cited on May 10th, 2022]. Available: <https://www.worldenergy.org/publications/entry/world-energy-scenarios-composing-energy-futures-to-2050>.

¹⁸ World Energy Council. [cited on May 10th, 2022]. Available: <https://www.worldenergy.org/>.

¹⁹ World Energy Outlook, IEA, 2021. [cited on May 10th, 2022]. Available: <https://www.iea.org/reports/world-energy-outlook-2021>.

renewable energy sources will be popularized in many countries. The renewable energy sources will contribute to the alleviation of the problems in the global energy, but will not offer the final solution. In a general sense, the traditional oil, gas and coal will remain the leaders in the energy resources in prospect until 2030 (they will account for up to 79% of the demand growth during the period of 2006-2030, including for coal – 35%, for gas – 24% and for oil – 20%). The share of the renewable energy sources, nuclear energy, hydropower by 2030 will be only 19%. During the period up to 2030, the changes are expected in terms of the consumption of the primary energy sources by the energy consumption sectors.

The regional maps, on which the main problems were noted, made it possible to compile and reflect the world situation. The generalized map is presented in the figure 8.

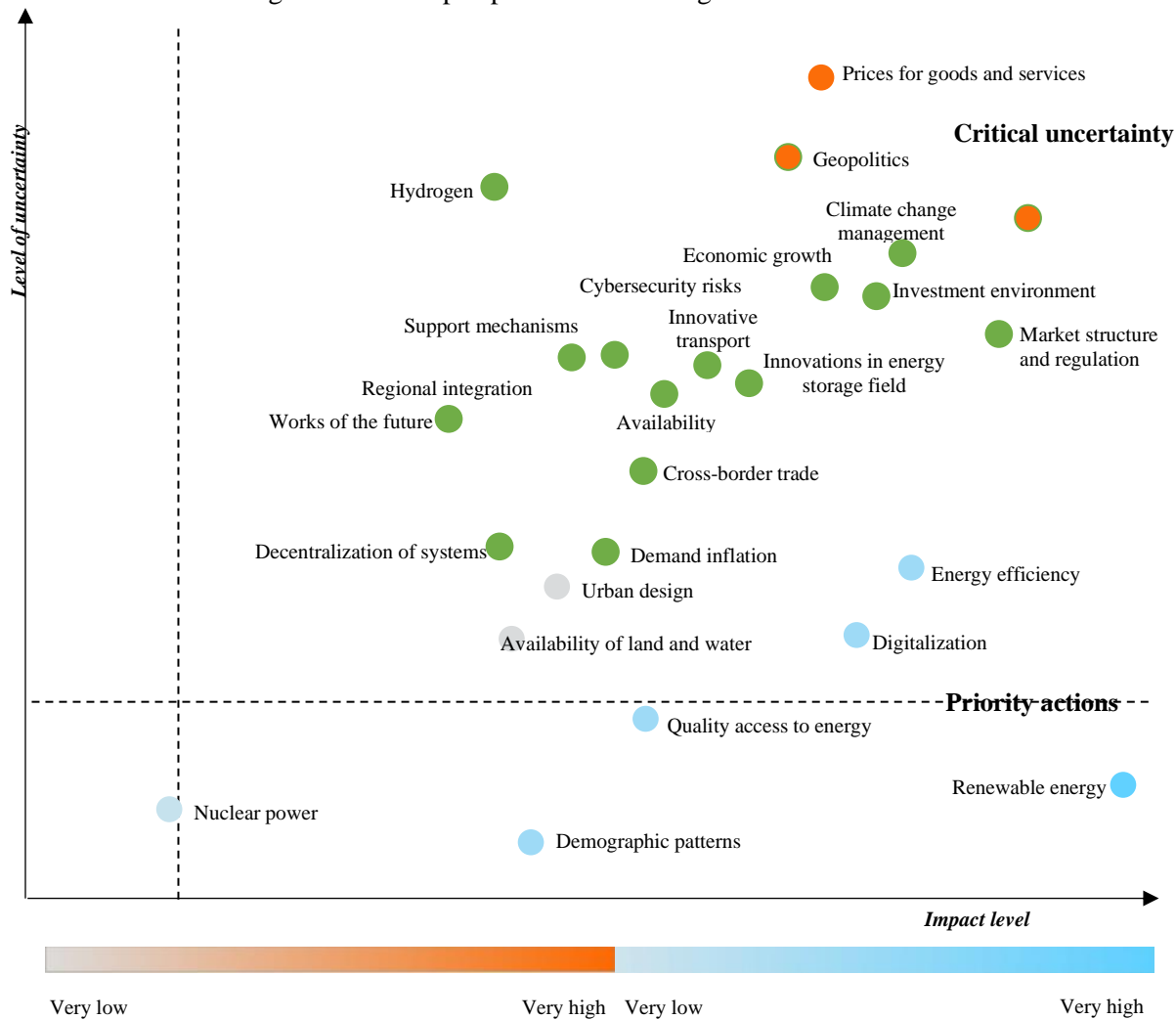


Figure 8. Map of problems of the world energy system [it is developed by the author]

The maps of the global energy problems demonstrate a high degree of uncertainty on almost all problems, and few of them are in the action priority area that demonstrates the difficulty of the clear orientation and prioritization of the actions on the most issues. The author estimated the trend of the development of the uncertainty from 2020 to the current moment of 2022 for the problems demonstrated on the map on the basis of his own conclusions made after the study of the results of the WEC survey. The uncertainty trend is presented in the figure 9.

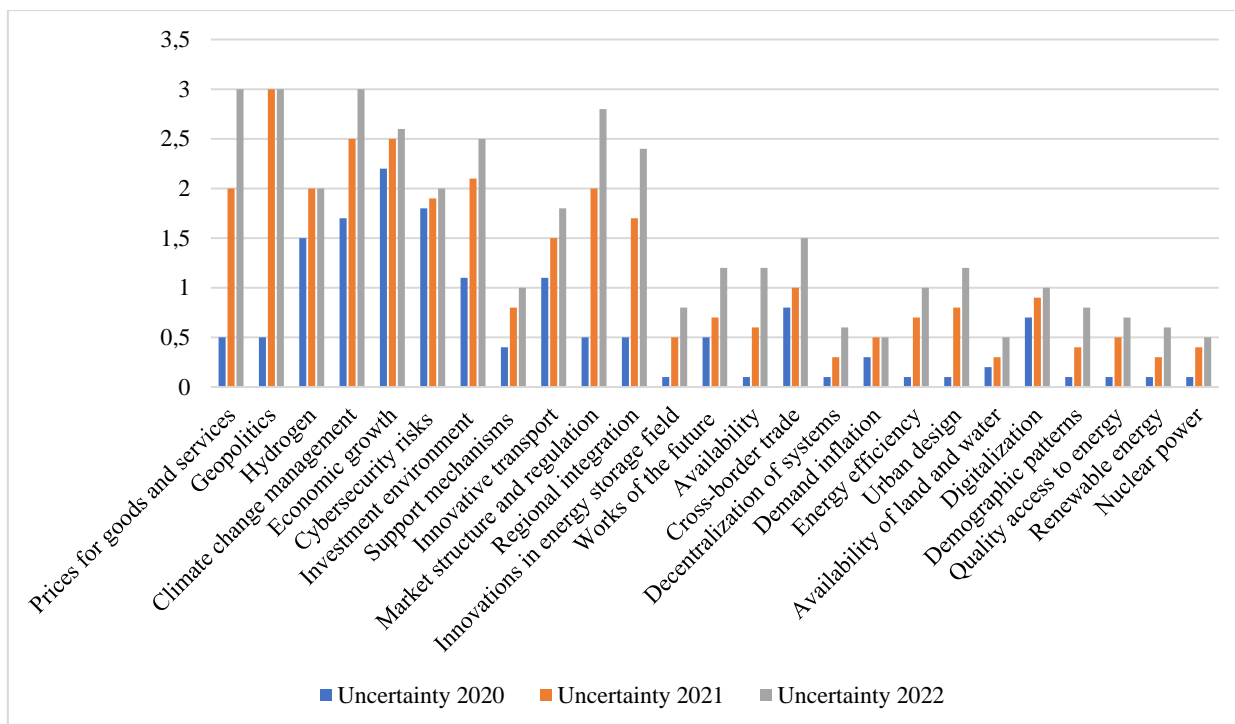


Figure 9. Uncertainty development trend in relation to world energy problems, 2020-2022 [it is developed by the author]

The global energy image of the world demonstrates the general trends in the development of the globalization processes. The given research would be incomplete without a more detailed study of the energy security of the integration associations of the European Union (EU) and the Commonwealth of Independent States (CIS). The choice of the comparative analysis of the energy policies of the EU and the CIS is conditioned by two basic factors. The traditional infrastructural relationships of the Republic of Moldova with the countries of the post-Soviet area (CIS) certainly have the potential for the further development in the future. On the other part, given the strategic course of the Republic of Moldova aimed at the broad European integration and the status of the EU candidate country, it is necessary to analyse carefully the European trends in the energy field and the prospects of the Republic of Moldova as the participant in these processes. The results of the researches of the policies and strategies of the provision of the energy security in the EU and the CIS demonstrate the importance of the international cooperation context.

Summarizing the results of the analysis of the EU and the CIS in terms of their decisions on the provision of the energy security against the background of the international cooperation, the following main conclusions can be drawn. The CIS, as the structure of the international cooperation in the energy field, demonstrated its inconsistency, despite the presence of the significant reserves and deposits of the energy resources. Having failed to overcome a number of the stereotypes of relationships that had developed during the USSR era, the organization has not formulated or implemented its development strategies and goals over the past 30 years. The energy industry of many CIS member countries has become the hostage to the political pressure of the individual “partners”. This negative outcome was not predetermined initially. After the collapse of the USSR in the CIS states was the significant potential for the development, as well as the economic relations that were established in the previous decades. However, all this was lost to a large extent and it is hardly possible to talk about the restoration and development of this potential. Unfortunately, the political ambitions, as the events that have taken place over the years demonstrate, prevailed over the economic and energy prospects, and the interests of one or several large countries had a negative impact on the development of others within the CIS. Thus, it can be stated that the future of the CIS as of the organization and its energy projects are very illusory, without the significant changes affecting the sociopolitical and economic processes of the main member countries of the organization.

The analytical review of the energy sector of the Republic of Moldova, carried out by the author, indicates the presence of the stability trends, but the absence of the significant growth. The energy policy agenda of the country is determined by several interrelated factors.

The energy self-sufficiency of the Republic of Moldova is one of the lowest in the world, as the country does not have the endogenous fossil fuel resources. The need to import most of the consumed energy makes its energy security a priority. As the country that obtained the EU candidate status in 2022, it must adopt the EU core legislation and to develop its energy markets for the further integration at the regional and European level. In addition, Moldova has the obligations to ensure the sustainability of the energy sector and the climate change consequences mitigation.

Moldova has made significant efforts for the diversification of its supply sources. The stable and reliable gas and electricity supplies was the major problem for Moldova, and the country has taken the notable steps for the improvement of the supply security. Despite all these notable achievements, the energy sector of Moldova still faces the significant problems that need to be solved in the timely manner for the improvement of the energy security, the acceleration of the transition to a more sustainable, clean and efficient energy system and the support of the development of the competitive energy markets.

The Government of the Republic of Moldova should, in the near future, consider the possibility of the provision of the basic funding of the scientific research institutes and the project funding for the increase in the efficiency and the increase in the practical relevance of the scientific work in the field of energy. It is also important to strengthen the international relations and the intrastate cooperation between the scientific institutions and industries for the solving of the specific energy problems that require the scientific justification and developments. It is also relevant for the country to support the involvement of the local experts in the field of energy in the funded technical assistance and grant projects.

In the **chapter IV, “Strategic directions of the integration of the fuel-energy complex of the Republic of Moldova into the European energy system”**

The analysis of the current state of the fuel-energy complex of the Republic of Moldova, the results of which are presented by the author in the previous chapters of the given work, clearly demonstrates the need and timeliness of its deep modernization.

The main problems for the energy security of the country are the certain degree of the electrical energy shortage, the lack of the energy resources in the country at the significant potential for the development of the “green energy”, the significant degree of the deterioration of the equipment, appliances of the energy sector, low investment activity, increasing energy dependence and low energy efficiency. It should be recognized that without the achievement of a certain modern level of the fuel-energy complex, its integration into the European energy system seems unlikely. In the given context it is necessary the strategic approach, including the complex of measures within the current directions for the achievement of the energy security.

A number of initiatives have already been taken in the Republic of Moldova, which are reflected in the form of the legislative acts, energy strategies, projects and programs. However, there is currently no complex of the promising strategic and tactical measures focused on the provision of a high degree of the energy security. In the separate documents it is mentioned the importance of the coordination of the actions in this direction, but this is not enough for the establishment of the targeted ways for the achievement of the energy security of the entire country.

The prerequisites for the development of the strategy of the integration of the fuel-energy complex of the Republic of Moldova into the EU energy system become the urgent need to solve the problems in the field of energy in the light of the military-political events taking place in Europe in 2022. The reaction to these changes was the formulation of the application of the Republic of Moldova for the accession to the European Union of March 03rd, 2022²⁰.

The author developed the algorithm of the development of the strategy, presented in the figure 10.

²⁰ Заявка Республики Молдова на членство в ЕС: последующие шаги и вызовы. [cited on April 10th, 2022]. Available: <https://eu4moldova.eu/ru/zajavka-respubliki-moldova-na-chlenstvo-v-es-posledujushhie-shagi-i-vyzovy/>.

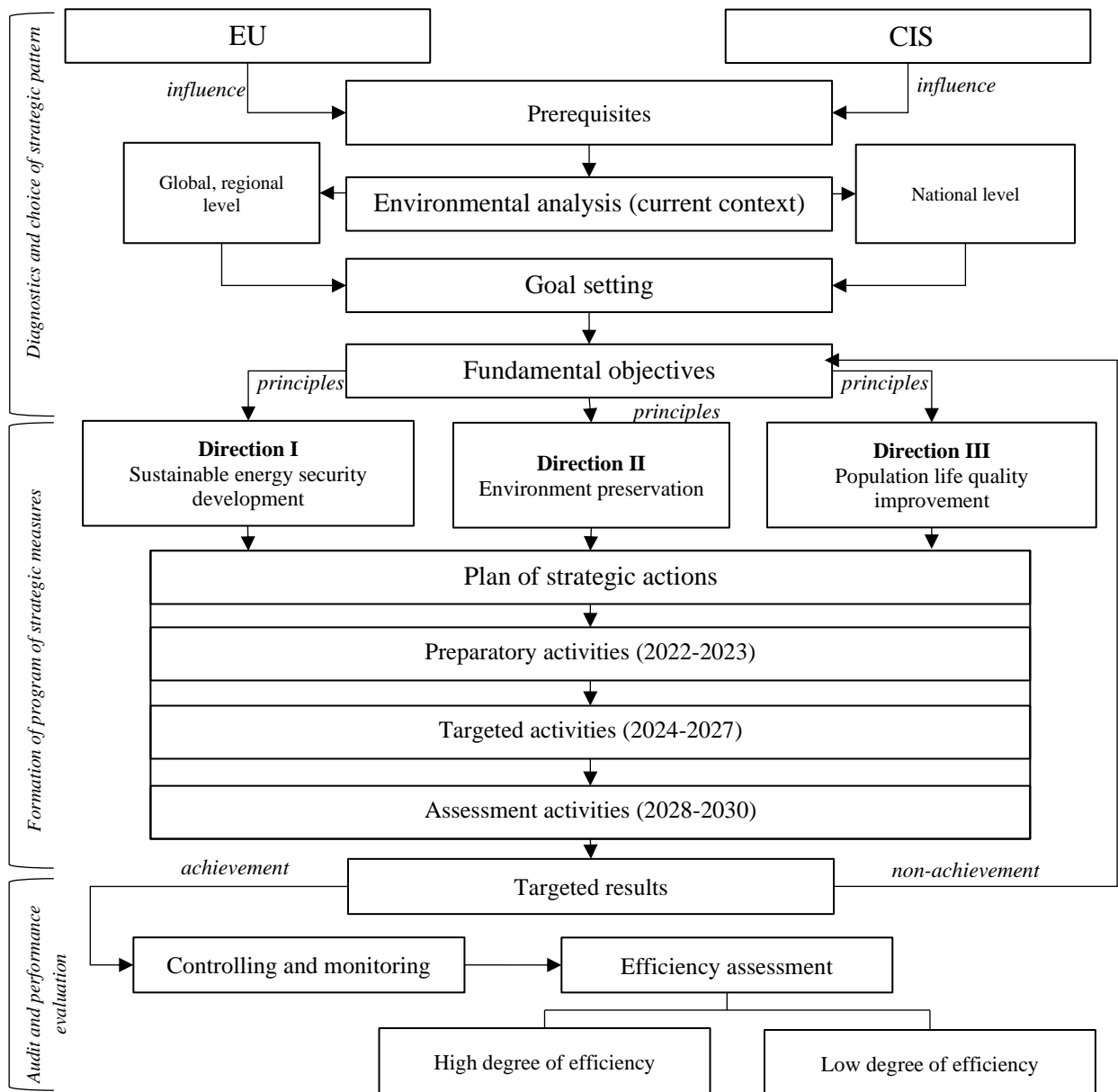


Figure 10. Algorithm of development of strategy of integration of fuel-energy complex of the Republic of Moldova into the European energy system [it is developed by the author]

The presented algorithm is the scheme that allows to form the strategy and to determine its structural elements. The work on the development of the strategy consisted of three stages: diagnostics and selection of strategic path; formation of program of strategic measures; audit and performance evaluation. For the correct and effective choice of the specific ways of the rapprochement of the Republic of Moldova and the European Union in the field of integration of the fuel-energy complex into the European system, a clear understanding of the currently emerging context of international relations in the region and the world as a whole is necessary. The context was evaluated by the author in the course of the research activities that led to the need to develop the appropriate strategy. The strategy implies the development and deepening of the energy cooperation while striving to the achievement of the energy security. In this regard, the directions were proposed: the development of the sustainable energy security, the preservation of the environment and the improvement of the quality of life of the population of the country. Each of the above-mentioned directions includes the range of the consistently implemented activities, divided into the preparatory, target and evaluation, which should lead to the desired general result – the integration of the fuel-energy complex of the Republic of Moldova into the European energy system. The author presents the main characteristics of the direction “Development of sustainable energy security”, including the essence and content, purpose, objectives, long-term and short-term scenarios of the development of the given direction.

I. The direction “Development of sustainable energy security”. The essence and content of the direction: the sustainable energy security consists in the stable and long-term provision of the country with the energy resources for the functioning of the economy and guaranteed access of the citizens to their consumption. At the same time, it is also necessary to take into account the political and technogenic factors. The political one consists in the reduction of the energy dependence on the unreliable supplies. The technogenic factor implies the minimization of the risks associated with the operation of any energy facilities for the population and the environment.

II. The direction “Preservation of the environment”. The essence and content of the direction: the given direction involves the complex of the measures aimed at the limitation of the negative impact of the objects of the fuel-energy complex of the Republic of Moldova on the environment and the citizens of the country.

III. The direction “Improvement of population life quality”. The essence and content of the direction consists in the pursuit of a high level of the socioeconomic development of the country by the provision of the universal access to the clean, reliable and inexpensive energy.

The author identified the basic strategic initiatives and specific practically applicable measures for the convergence and integration of the energy complex of the Republic of Moldova into the energy system of the European Union. The evaluation of the effectiveness of their implementation seems to be the most important element of the sustainable development of the fuel-energy complex of the Republic of Moldova. Any strategy adopted as the mechanism for the achievement of a particular goal requires the development of the system of the monitoring and evaluation of its results. In other words, we are talking about the formation of certain criteria and indicators that allow to present the objective picture of the ongoing processes and, if necessary, to correct them.

The general scheme of the strategy effectiveness evaluation is presented in the figure 11.

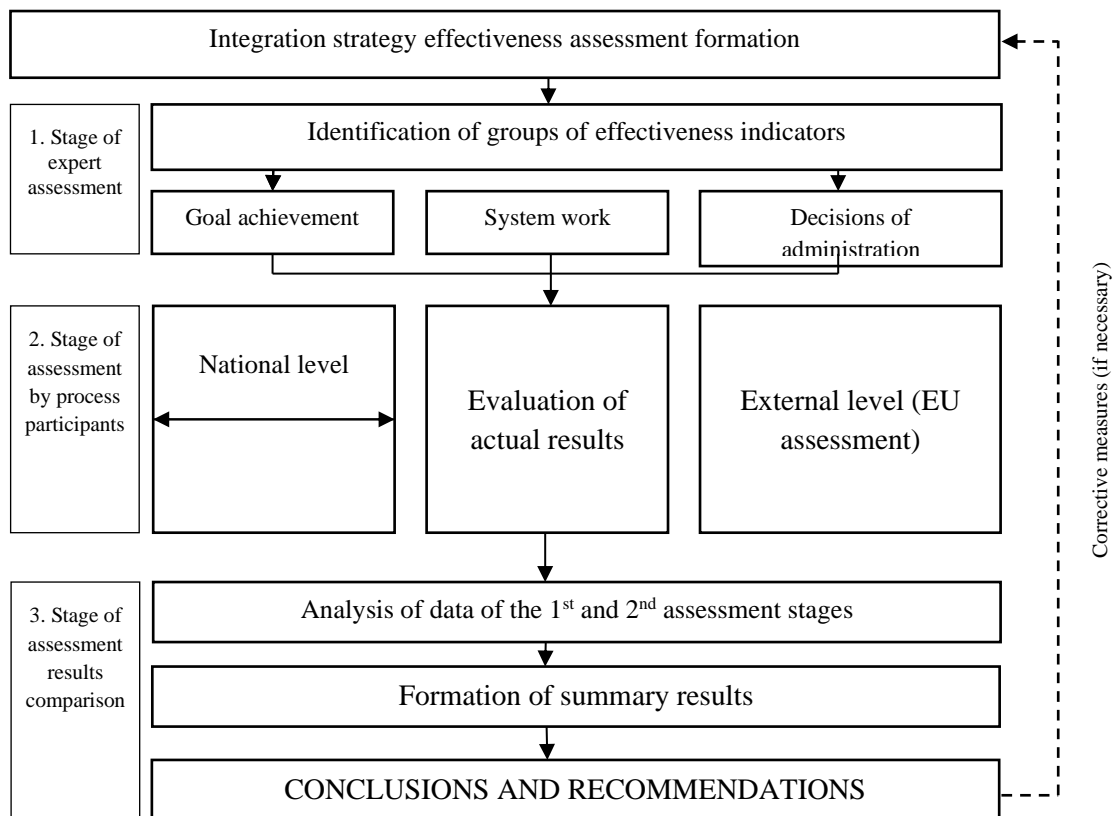


Figure 11. Algorithm of assessment of effectiveness of strategy of integration of fuel-energy complex of the Republic of Moldova into the energy system of the European Union [it is developed by the author]

The proposed algorithm, which consists of 3 main stages, allows to assess objectively the effectiveness of the implementation of the measures of the strategy of the integration of the fuel-energy complex into the energy structures of the EU. At the same time, the systematic implementation of the

measures at each stage of the integration strategy implies the deepening of their directions, which should also be reflected in the features of their assessment. The presented algorithm, according to the author, systematizes the effectiveness evaluation process both in terms of the sequence of the conduct of the evaluation, and in the division of the competences of the participants in the process.

The approach proposed by the author to the assessment of the effectiveness of the implementation of the strategy of the integration of the fuel-energy complex of the Republic of Moldova into the energy system of the European Union is of systemic nature and can become the effective element of management throughout the entire calculation period. The results of the assessment of the effectiveness of the individual stages of the strategy allow to respond promptly to the changes in the internal and external conditions for the implementation of the specific measures provided for by the strategy, as well as to identify both the positive and negative trends, and individual factors affecting the final result. The proposed strategy effectiveness evaluation system is recommended by the author as one of the basic mechanisms in the process of the conclusion of the international agreements in the energy industry.

III. GENERAL CONCLUSIONS AND RECOMMENDATIONS

The conducted theoretical and empirical studies allowed the author to formulate the following **conclusions**:

1. At the moment, there is no universal general definition of the term “energy security” in the theoretical studies. This fact is the significant obstacle in the settlement of the energy security issues in the individual countries, does not allow adapting and generalizing the existing successful practices in the given area. The definition of energy security varies significantly depending on the specific conditions and the context in which it is used. However, in a general sense, energy security should be understood and defined as a certain state in which the sustainable, reliable and safe operation of the energy systems that meet the needs of the economy and society for energy is ensured, with the minimal impact on the environment and public safety.

2. The relationships were determined between the theoretical conceptions that define the energy security and the factors that influence the energy security issues, such as the participation of the large companies, financial groups and transnational corporations in the solving of the problems, the lack of the international mechanisms for the solving of the energy security problems and the connection of the energy security with the general security of the state. On the basis of these relationships, the author developed three approaches to the search for the possible solutions of the energy security problem: the approach based on the interdependence, the institutional approach, and the supply diversification approach. These approaches cannot be taken into account separately, but demonstrate their effectiveness in the complex joint use.

3. It is impossible to achieve the absolute level of the energy security, since this process is not static and it is characterized by the risks owing to the influence of the external and internal factors. The energy security is formed in the context of various dimensions (political, economic, technological and ecological) that proves the absence of the static character, emphasizing the presence of the dynamic development processes.

4. The energy of the sustainable development is traditionally characterized in the theoretical studies through the prism of the economic, ecological and social aspect at three levels: state, industry and fuel-energy complex enterprises. In this regard, there is no uniform definition of the sustainable energy development at each of the mentioned levels taking into account the above aspects that complicates the essential understanding and leads to the use of the definitions that do not cover the totality of three mentioned aspects.

5. The study of the international energy relations made it possible to formulate the conclusion that there is a natural strengthening of the independence of the countries and organizations in the field of energy. However, the modern prospects and forecasts are that in the near future, with a greater degree of probability, a shift in the emphasis towards the global and regional organizations is possible due to the strengthening of

the integration processes in the world.

6. The universal approach to the solving of the existing global energy problems at the moment does not exist in the practice of the countries and the world energy organizations. There are the development paths included in the energy strategies of the individual countries and regions, which in their totality can become the single base for the targeted actions on the energy stability provision in the global sense.

7. The comparative study of the practices of the provision of the energy security and the pursuing of the sustainable development goals by the Commonwealth of Independent States and the European Union demonstrated that their approaches are extremely different. The CIS, as the structure of the international cooperation in the energy sector, demonstrated its inconsistency, despite the presence of the significant reserves and deposits of the energy resources. The organization turned out to be unable to ensure the productive interaction between the participating countries and was unable to resolve a number of the sociopolitical and economic problems that had a negative impact on the energy security of the region. At that time, the European Union, as the international structure, demonstrated throughout the evolution a high level of sustainability and stability that can be attributed both to the characteristics of its economic development in general and directly to the energy industry in particular. The EU energy complex is one of the most developed and diversified in the world. The EU has strong national companies engaged in the production of energy and its distribution to the regions. In addition, many institutions have been created within the EU aimed at the provision of the security of the supplies and the development of new technologies in the energy field. However, at the moment, the pressure of the basic problems, such as the lack of the investments in the industry, high dependence on the energy resources imports and the problems in the field of the climate and environment, has increased. The solving of these problems requires the complex approach and the strengthening of the cooperation between the EU member states.

8. In the short term, the Republic of Moldova will have to consider the possibility of the provision of the basic funding of the scientific research institutes and the project funding for the increase in the efficiency and practical significance of the scientific work in the field of energy, to continue to strengthen the international relations, domestic cooperation in order to resolve the energy problems in a comprehensive and focused manner within the strategic directions.

9. Due to the inclusion in the common energy system of the EU, the Republic of Moldova will be able to improve the stability and predictability of its energy supply costs, as well as to stabilize the purchase and consumption of energy. This will provide the economy of the country with the competitive access to the necessary resource for the economic growth and the wellbeing of the citizens.

For the purpose of the improvement and increase of the efficiency of the process of the integration of the fuel-energy complex of the Republic of Moldova into the European energy system, as well as proceeding from the obtained results of the study and the identified issues, the author formulated the following **recommendations**:

1. The Government of the Republic of Moldova is recommended to amend the definition of the energy security in the “Energy Strategy of the Republic of Moldova until 2030”. The author made up for the lack of an accurate and universal definition of the energy security by the compilation of a comprehensive concept: provision of the state of sustainability of energy systems under the influence of internal characteristics and external factors, threats and problems, in order to guarantee access to a sufficient amount of energy resources on favourable terms and conditions and for the prices for the normal operation and sustainable development of the economic, social, environmental and technical systems of consumer, producer and transit countries. It is recommended to unite the Energy Efficiency Agency and the General Department for Security and Energy Efficiency and the Energy Efficiency Fund, as well as the creation of a joint authority with the EU for the continuous monitoring of the energy situation in the country in order to identify promptly the problems affecting the energy security.

2. It is recommended to the Parliament of the Republic of Moldova in the relevant laws in the field of energy, as well as to the authors of the strategies in the energy sector, to use the definition of the

“sustainable energy security” proposed by the author. The “sustainable energy security”, according to the author, is the state of energy, in which the conditions are provided for a stable, predictable and long-term supply of industry and individual consumers with the necessary energy resources, taking into account the directions for the improvement of the level and quality of life of people in the context of the establishment of harmony with the environment.

3. The Government of the Republic of Moldova is recommended to consider the basic principles of the strategy developed by the author for the integration of the fuel-energy complex of the Republic of Moldova into the European energy system. The process of integration into the internal European energy market has a number of significant advantages that were used by the author at the development of the principles that became the basis of the strategy.

4. To the National Agency for Energy Regulation of the Republic of Moldova it is recommended to assign the responsibility for the implementation and conduct of the activities in three strategic areas: the development of the sustainable energy; the preservation of the environment; the improvement of the population life quality.

5. The Government of the Republic of Moldova is proposed to consider the developed system for the evaluation of the effectiveness of the strategy for the integration of the fuel-energy complex of the Republic of Moldova into the European energy system. The given recommendation will allow to form timely the certain criteria and indicators that allow presenting and monitoring an objective image of the ongoing processes and, if necessary, adjusting them depending on the changing conditions, factors influencing the development of the international relations in the energy sector of the country.

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ADNOTARE

la teza de doctorat în științe economice a dlui Sandu Maxim „ASIGURAREA SECURITĂȚII ENERGETICE A REPUBLICII MOLDOVA PE BAZA CONCEPTULUI DE DEZVOLTARE DURABILĂ ÎN CONTEXTUL INTEGRAȚIEI ÎN SISTEMUL ENERGETIC EUROPEAN”,

Universitatea Liberă Internațională din Moldova, Chișinău, 2023

Structura tezei: introducere, patru capitole, concluzii și recomandări, bibliografie din 306 de surse, 160 de pagini de text principal, 28 de figuri și 10 de tabele, 63 de anexe.

Cuvinte-cheie: relații internaționale, integrare, securitate energetică, dezvoltare durabilă, sistem energetic european.

Domeniul de studiu: 521.02. Economia mondială; Relațiile economice internaționale.

Scopul tezei este de a forma o abordare strategică pentru asigurarea securității energetice a Republicii Moldova pe baza conceptului de dezvoltare durabilă în contextul integrării în sistemul energetic european.

Obiectivele lucrării: dezvăluie conceptul de securitate energetică în teoriile relațiilor internaționale; reflectă conceptul de dezvoltare durabilă în ceea ce privește securitatea energetică; prezentați o descriere a cooperării internaționale în domeniul energetic; analiza problemelor și perspectivelor de dezvoltare strategică a sistemului energetic global; explorarea aspectelor securității energetice a țărilor UE și CSI în domeniul securității energetice; identificarea tendințelor de dezvoltare a relațiilor internaționale în contextul integrării complexului de combustibil și energie al Republicii Moldova în sistemul energetic european; elaborarea unei strategii de integrare a complexului de combustibil și energie al Republicii Moldova în sistemul energetic european și formarea unui set de măsuri strategice; elaborarea unei evaluări a eficacității strategiei de integrare a complexului de combustibil și energie al Republicii Moldova în sistemul energetic european.

Noutatea și originalitatea științifică. Conceptul de securitate energetică a fost clarificat din punctul de vedere al stării de stabilitate a sistemelor energetice sub influența factorilor interni și externi; a fost elaborată o strategie de integrare a complexului de combustibil și energie al Republicii Moldova în sistemul energetic european, care presupune trei direcții strategice - dezvoltarea securității energetice durabile, conservarea mediului și îmbunătățirea calității vieții. al populației; a propus un plan strategic cuprinzător pentru dezvoltarea cooperării energetice a Republicii Moldova în contextul securității energetice, inclusiv activități pregătitoare, direcționate și de evaluare; a elaborat o metodologie cuprinzătoare pentru evaluarea eficienței implementării strategiei de integrare în ceea ce privește îmbunătățirea securității energetice a Moldovei.

Rezultatele obținute care contribuie la soluționarea unei probleme științifice importante constă în elaborarea unei strategii și a unui set de măsuri în cadrul a trei direcții, care să permită corectarea acțiunilor la nivel național și evaluarea eficacității procesul de integrare a complexului energetic al Republicii Moldova în sistemul energetic european.

Semnificația teoretică constă într-o legătură detaliată a prevederilor și conceptelor, în cadrul diferitelor dimensiuni (politică, economică, tehnologică și de mediu), care a permis precizarea problemelor din domeniul construirii cooperării internaționale pentru asigurarea securității energetice în contextul dezvoltarea proceselor mondiale de integrare a sistemelor energetice.

Valoarea aplicativă este legată de nevoia tot mai mare de a asigura securitatea aprovizionării cu energie, de a reduce dependența de importurile de energie și de a asigura dezvoltarea durabilă în Republica Moldova. Strategia elaborată pentru integrarea complexului de combustibil și energie al Republicii Moldova în sistemul energetic al UE poate contribui la determinarea gradului optim de integrare, precum și prin implementarea măsurilor practice pentru dezvoltarea securității energetice durabile, conservarea mediului și îmbunătățirea calitatea vieții populației, contribuie la creșterea nivelului de securitate energetică a țării.

Implementarea rezultatelor științifice. Rezultatele cercetării științifice teoretice și aplicative ale autorului au fost prezentate în cadrul unor conferințe științifice și în reviste și au fost, de asemenea, recunoscute ca relevante și oportune în vederea îmbunătățirii și optimizării direcțiilor strategice de integrare a complexului combustibil și energetic al Republicii Moldova în sistemul energetic european.

АННОТАЦИЯ

к диссертации на соискание ученой степени доктора экономических наук Санду Максима
**«ОБЕСПЕЧЕНИЕ ЭНЕРГЕТИЧЕСКОЙ БЕЗОПАСНОСТИ РЕСПУБЛИКИ МОЛДОВА НА
ОСНОВЕ КОНЦЕПЦИИ УСТОЙЧИВОГО РАЗВИТИЯ В КОНТЕКСТЕ ИНТЕГРАЦИИ В
ЕВРОПЕЙСКУЮ ЭНЕРГЕТИЧЕСКУЮ СИСТЕМУ»**,

Международный Независимый Университет Молдовы, Кишинэу, 2023

Структура диссертации: введение, четыре главы, выводы и рекомендации, библиография из 306 источников, 160 страниц основного текста, 28 рисунков и 10 таблиц, 63 приложений.

Ключевые слова: международные отношения, интеграция, энергетическая безопасность, устойчивое развитие, европейская энергетическая система.

Область исследования: 521.02. Мировая экономика; Международные экономические отношения.

Цель диссертации заключается в формировании стратегического подхода по обеспечению энергетической безопасности Республики Молдова на основе концепции устойчивого развития в контексте интеграции в европейскую энергетическую систему.

Задачи диссертации: раскрыть понятие энергобезопасности в теориях международных отношений; отразить концепцию устойчивого развития в аспекте энергетической безопасности; представить характеристику международного энергетического сотрудничества; проанализировать проблемы и перспективы стратегического развития мировой энергосистемы; исследовать аспекты энергетической безопасности стран ЕС и СНГ в сфере обеспечения энергобезопасности; выявить тенденции развития международных отношений в условиях интеграции ТЭК РМ в европейскую энергосистему; разработать стратегию интеграции ТЭК РМ в европейскую энергосистему и сформировать комплекс стратегических мероприятий; разработать оценку эффективности стратегии интеграции ТЭК РМ в европейскую энергосистему.

Научная новизна и оригинальность. Уточнено понятие энергетической безопасности с точки зрения состояния устойчивости энергосистем в условиях влияния внутренних и внешних факторов; разработана стратегия интеграции ТЭК РМ в европейскую энергосистему, подразумевающая три стратегических направления – развития устойчивой энергобезопасности, сохранение окружающей среды, повышение качества жизни населения; предложен комплексный стратегический план развития энергетического сотрудничества РМ в контексте энергетической безопасности, включающий подготовительные, целевые и оценочные мероприятия; разработана комплексная методика оценки эффективности внедрения стратегии интеграции с точки зрения повышения энергобезопасности Молдовы.

Полученные результаты, способствующие решению научной проблемы, заключаются в разработке стратегии и комплекса мероприятий в рамках трёх направлений, что позволит скорректировать действия на национальном уровне и осуществить оценку эффективности интеграционного процесса энергокомплекса РМ в европейскую энергосистему.

Теоретическая значимость заключается в подробной увязке положений и концепций, в рамках различных измерений (политическое, экономическое, технологическое и экологическое), что позволило конкретизировать проблемы в области построения международного сотрудничества по обеспечению энергетической безопасности в условиях развития мировых процессов интеграции энергосистем.

Практическая значимость связана с растущей потребностью в обеспечении безопасности энергоснабжения, снижении зависимости от импорта энергоресурсов и обеспечении устойчивого развития в Республике Молдова. Разработанная стратегия интеграции ТЭК РМ в энергосистему ЕС может помочь определить оптимальную степень интеграции, а также через реализацию практических мер по развитию устойчивой энергобезопасности, сохранению окружающей среды, повышению качества жизни населения способствовать повышению уровня энергобезопасности страны.

Внедрение научных результатов. Результаты авторских научных теоретических и прикладных исследований были представлены на научных конференциях и в журналах, а также признаны актуальными и своевременными в целях совершенствования и оптимизации стратегических направлений интеграции ТЭК РМ в европейскую энергетическую систему.

ANNOTATION

to the doctoral thesis in economics by Sandu Maxim

„ENSURING THE ENERGY SECURITY OF THE REPUBLIC OF MOLDOVA ON THE BASIS OF THE CONCEPT OF SUSTAINABLE DEVELOPMENT IN THE CONTEXT OF INTEGRATION INTO THE EUROPEAN ENERGY SYSTEM”,

Free International University of Moldova, Chisinau, 2023

Structure of the thesis: introduction, four chapters, conclusions and recommendations, bibliography from 306 sources, 160 pages of main text, 28 figures and 10 tables, 63 appendices.

Key words: international relations, integration, energy security, sustainable development, European energy system.

Research area: 521.02. World economy; International economic relations.

The aim of the thesis is to form a strategic approach to ensure the energy security of the Republic of Moldova based on the concept of sustainable development in the context of integration into the European energy system.

Objectives: reveal the concept of energy security in the theories of international relations; reflect the concept of sustainable development in terms of energy security; present a description of international energy cooperation; analyze the problems and prospects for the strategic development of the global energy system; explore aspects of the energy security of the EU and CIS countries in the field of energy security; identify trends in the development of international relations in the context of the integration of the fuel and energy complex of the Republic of Moldova into the European energy system; develop a strategy for integrating the fuel and energy complex of the Republic of Moldova into the European energy system and form a set of strategic measures; develop an assessment of the effectiveness of the strategy for integrating the fuel and energy complex of the Republic of Moldova into the European energy system.

Scientific novelty and originality. The concept of energy security has been clarified from the point of view of the state of stability of energy systems under the influence of internal and external factors; a strategy for integrating the fuel and energy complex of the Republic of Moldova into the European energy system has been developed, which implies three strategic directions - the development of sustainable energy security, the preservation of the environment, and the improvement of the quality of life of the population; proposed a comprehensive strategic plan for the development of energy cooperation of the Republic of Moldova in the context of energy security, including preparatory, targeted and evaluation activities; developed a comprehensive methodology for assessing the effectiveness of the implementation of the integration strategy in terms of improving the energy security of Moldova.

The results obtained, contributing to the solution of the scientific problem, consist in the development of a strategy and a set of measures within the framework of three directions, which will make it possible to correct actions at the national level and assess the effectiveness of the integration process of the energy complex of the Republic of Moldova into the European energy system.

The theoretical significance consists in a detailed linkage of provisions and concepts, within the framework of various dimensions (political, economic, technological and environmental), which made it possible to specify the problems in the field of building international cooperation to ensure energy security in the context of the development of world processes of integration of energy systems.

Practical significance is linked to the growing need to ensure the security of energy supply, reduce dependence on energy imports and ensure sustainable development in the Republic of Moldova. The developed strategy for integrating the fuel and energy complex of the Republic of Moldova into the EU energy system can help determine the optimal degree of integration, as well as through the implementation of practical measures to develop sustainable energy security, preserve the environment, and improve the quality of life of the population, contribute to increasing the country's energy security level.

Implementation of scientific results. The results of the author's scientific theoretical and applied research were presented at scientific conferences and in journals, and were also recognized as relevant and timely in order to improve and optimize the strategic directions for integrating the fuel and energy complex of the Republic of Moldova into the European energy system.

SANDU MAXIM

**PROVISION OF ENERGY SECURITY OF THE REPUBLIC OF MOLDOVA ON THE BASIS
OF THE CONCEPT OF SUSTAINABLE DEVELOPMENT IN THE CONTEXT OF THE
INTEGRATION INTO THE EUROPEAN ENERGY SYSTEM**

**SPECIALTY 521.02. WORLD ECONOMY;
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