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Corina Gribincea,

PhD, researcher,

ULIM, Free International University of Moldova

Vlaicu Pircalab St 52, Chisinau, Moldova

Alexandru Gribincea,

PhD, Professor,

Free International University of Moldova

Vlaicu Pircalab St 52, Chisinau, Moldova

Alexandru A. Gribincea,

PhD Student,

Free International University of Moldova

Vlaicu Pircalab St 52, Chisinau, Moldova

“GREEN ECONOMY” – THE FUTURE OF WORLD ECONOMY

The most dynamically growing trend in the modern world is the development of green economy as one of the main conditions for nature preservation and the environment for future generations. Having polluted the planet for many years, the world community has reached the point of no return in the process of developing resources, extracting raw materials, and accelerated urbanization of territories. Year after year, the resource base of the planet is being depleted, while the amount of environmentally-friendly energy production based on natural renewable components increases. The electric power complex is a highly intelligent, large-format logistics system that can adequately respond to changes in the given stability parameters, therefore it is the scientific and applied tools of modern logistics and supply chain management are most effectively applied in the electric power industry. The chosen topic is of particular relevance due to the increased social and economic importance of energy, as electricity today is one of the primary conditions for the normal existence of the society, a necessity that can already be equated to our natural needs.

Keywords: economy; energy; alternative energy; green economy; ecology.

Introduction. The most dynamic trend in the current global space is the development of a gentle economy – “green” economy as one of the main conditions for nature conservation and the environment for the current population and future generations. In the last centu-

ries humanity has exploited nature very harshly, after having polluting the planet for many years, the world community has reached the peak of restoring the ecological process, urbanization and regeneration of the environment. Year by year, the resources of the planet have been used, and the volumes of ecological energy production based on renewable natural components are progressively increasing. The electricity complex – a very intelligent logistics system, is able to respond adequately to changes in the stability of parameters, so that modern scientific instruments and supply chain management are applied in the most efficient way in the energy industry. The selected problems are of particular importance due to the increased socio-economic importance of energy, as energy (including electricity) is today one of the primary conditions for society's normal existence, a necessity that can already be equated with the natural needs of humankind.

The essential task of the “green” economy is to increase the functioning efficiency of the organizational market of energy systems, to optimize the cost and quality parameters of the energy consumed, to ensure the freedom of consumers' choice as an indicator of a completely free energy market in the environment.

The degree of investigation of the problem. Active scientific studies regarding the crystallization of a common theoretical and methodological basis of logistics and management integrated in energy supply chains are the subject of concerns of local and foreign scientists, among which we mention the works written by the following authors: B. Anikina, V. Borisova, D. J. Bowersox, D. J. Klossa, J. F. Shapiro and others. The foundations of “green” economy and ecological logistics are presented in scientific works that minimize the ecological footprint that appears in both the process and the result of socio-economic development of systematic integrated links that ensure sustainable functioning of the states and regions' economic complex was fulfilled by S. Barykina, A. Brom, M. Grigorak, M. Zhuravskaya. The fundamental and applied theoretical developments published in the scientists' works form the scientific framework of logistics and management of the supply chain on the energy market. Currently, despite the scientific results obtained, mankind needs further development to minimize its dependence on energy raw materials.

Raising environmental demands and other changes in the market requires additional attention from the scientific community that is able to ensure implementation of efficient practice, improvement of scientific instruments and application of innovative tools of “green” economy in relation to energy industry, which confirms the relevance and opportunity of study.

The author **aimed** to investigate the development of traditional energy resources and the theoretical and methodological opportunities regarding the creation of “green” economy for the development of energy complex, which implies practical implementation in creation of an organizational and functional mechanism of economic development based on principles of ecological economy, foundation and development of management strategy on the energy market.

Research methods. The energy market is the basic pillar of the world economy and politics. For these reasons, it is difficult to make forecasts regarding market changes. Forecasts of changes in the energy market are appropriate. What tools and methods are applied in world practice? How effective are the methods used? Throughout the research the author the historical, statistical, extrapolation method, the method of exponential leveling, behavioral, imitation, induction and deduction, supervision, dialectics, etc.

Results. Efficient organization of energy resources, energy use, information flows, raw materials and electricity through the network of production, distribution and consumption channels from industrial structures to consumption areas can be represented by three groups of categories that characterize the flow, channel and infrastructure.

1. The dynamic part of energy flow includes composition and structure; the intensity of traffic or speed, the efficiency of the flow, the time spent on the road or the duration of the journey (insofar as it is possible to evaluate these characteristics within the electricity complex); services quality; reliability flow; the volume of resources.

2. Channel category or constant statistical part, because the purpose and functions of the channel in the energy industry are relatively stable (the use of equipment and the commissioning of new generation installations are not taken into account), the channel structure is the systems that produce and transmit energy, including intelligent computer

systems, a network of channels, given the broad geographical criteria and energy efficiency.

3. Infrastructure categories: financial resources and mechanisms that make up energy system at one level - the design and operation of logistics systems at micro-, meso- and macro-economic level.

It would be logical for the investment based on traditional and production technology to have a long-term effect and it seems to be an alternative direction of investments. At the same time, through the intervention of the state, it is possible to stimulate the use of an alternative generation, especially in the conditions of accelerated development of economy of the countries of growth models without sanctions. Support for energy and implementation of new smart technologies are extremely important as they open new horizons for the future. The efficiency of using smart energy resources depends on the economic methods and mechanisms of stimulating transition towards an innovative development path, which creates incentives to improve the scientific and technical level and the competitiveness of national economies [1]. The positions of the scientists are incorporated in the theories of economy computerization, hyper-economics, institutionalism, environment and social security of the energy industry and many others, suggesting a higher degree of competition restriction and a significant impact on the logistics processes in the industry. Thus, in the new models of development proposed, the macroeconomic balance in the electricity industry should be achieved more deliberately and consciously. World Energy Council - The World Energy Council (WEC) for nearly a century is the main player in energy industry investigations, attracting the global community's attention and stimulating sustainable action and estimating the balanced situation on the global energy market. The green economy, as the UNEP (United Nations Environment Program) Report defined it, aims at improving welfare and social equity, along with the significant reduction of ecological risks. The World Energy Council calculates the Energy Trilemma Index, which classifies the energy performance of countries in three dimensions: energy security, energy equity and environmental sustainability, based on global standards and national data [5].

The results show the impact of decisions and changes, which suggests policy coherence. Integrated political innovation can contribute

to the development of well-calibrated energy systems in the context of big energy transformation strategy. Robust energy systems are safe, equitable and environmentally sustainable, with a particular focus on management balance between the three dimensions [2]. Maintaining this balance can be achieved quickly by switching to decentralized, decarbonised and digital systems, which is a challenge: there are passive risks, compromises between important priorities. The 2018 *Energy Trilemma Index* report shows that many countries manage their balance successfully, and eight of the top nations achieve AAA balance. According to the investigations of the authors of *Energy Trilemma* Denmark, Switzerland and Sweden are leading, due to the balanced energy systems in these countries. Denmark achieved the highest results, the highest score for Energy Security, followed by Slovenia and Canada, all demonstrating safe, diverse and resilient systems. According to equitable energy that refers to energy capital, ranking is dominated by smaller countries, where connectivity is managed well and by countries where energy is accessible due to government policies: Qatar is at the top of the list together with Luxembourg, Bahrain and the Netherlands. The environmental sustainability ranking identifies countries with low carbon and energy emissions, which results in lower CO₂ emissions: this highlights less per capita energy users, including the Philippines, Costa Rica and Uruguay.

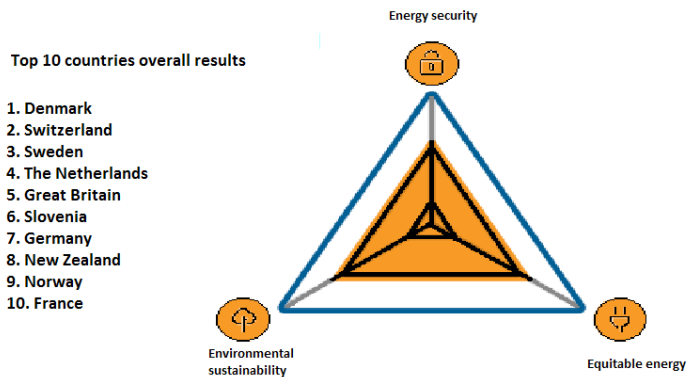


Figure 1. TOP 10 countries according to the World Energy Trilemma ranking for the global quarterly aspect, 2018

Source: [5].

The diversity of primary energy supply describes the flexibility of total primary energy supply (TPES), the balance of imported primary energy and products and the change of exports and stocks. A diversity of energy supply supports security through a robust and flexible power supply mechanism, resistant to shocks and natural disasters. An overload of any resource can make a system vulnerable to energy supply shocks [3]. As such, it is an important metric used to determine the energy of a security country and the overall Trilemma energy score. An analysis of the changes in the diversity of energy supply over the last three years indicates that developed countries, with mature energy infrastructure, tend to show a more consistent and well-established food systems year by year. Changes to scores on the diversity of primary power sources tend to be minimal between years. In contrast, developing countries tend to register more changes in scores over the years, as the delivery of critical infrastructure changes the balance of smaller systems. This could indicate greater stability in primary energy systems for developed countries compared to developing countries. However, many of these changes were insignificant and fluctuating, and often an increase in 2017 is followed by a decrease in 2018 or vice versa [6]. For diversity of primary energy supply, only 48 of 125 countries showed consistent downward or upward trends in the TPES in three years, only 15 reported more than a 5% change. Often, the primary changes of a country concerning energy diversity score were based on small changes of the primary energy supply mix. The data indicate that country-level changes in energy supply require a number of years. The development of the necessary energy infrastructure at national, regional or local level may require significant capital, effort and time. However, there are changes in primary energy supply, and countries are taking steps to improve their performance in the TPES Trilemma [5]. For example, the Council's European Region is made up of 32 committee member countries, including the top performing countries in the Trilemma Index 2018: Top 10 is made up only of European countries, except New Zealand, all of which are members of the European Economic Area. However, there are significant differences in the performance of countries in the region in different Trilemma dimensions. In general, the European region can be character-

ized as being oriented towards sustainability and accessibility of the energy sector, while long-term energy security and the harmonization of market models in national laws are addressed as challenges. The development of new regulations for the energy markets of the European Union has been difficult and difficult controversially, which continues to challenge political decision-makers. In practice, the 2004 European regulations on national energy markets continue to differ significantly, which hinders the potential of a common market on the European energy market and provides controversial signals in system operations and investments. The introduction of different types of national energy capacity markets supported investments in some strategic power plants, but created additional difficulties for integration of electricity into markets. It is necessary to manage the transition at national, sub-regional and regional level that would be aligned better by politicians.

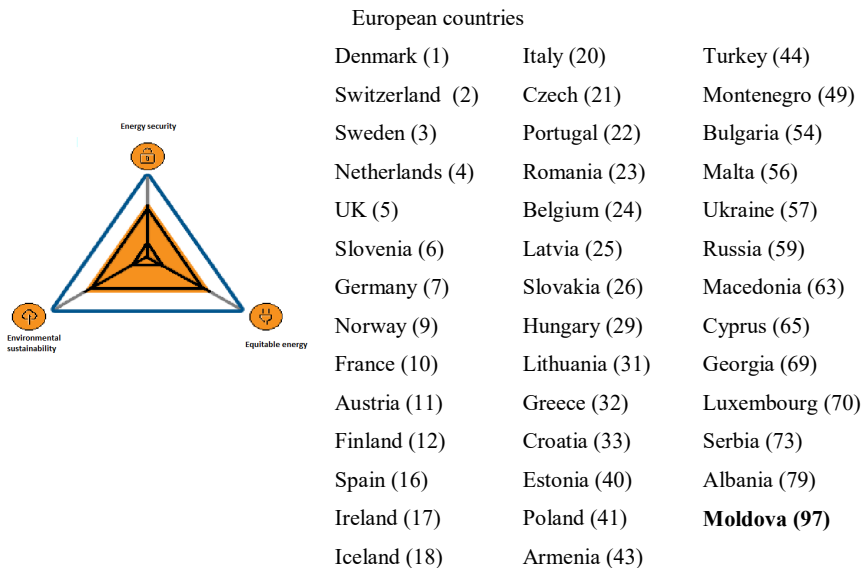


Figure 2. Trilemma balance in Europe region, 2018

Source: [5].

The accessibility and competitiveness of energy prices, however, remain strengths of the region, but records a slight decrease in the

final score. Energy prices remained low and supported the recovery of Europe's economy. Low prices of photovoltaic technologies and batteries have created investments in many European countries, in developing more decentralized solutions. In addition, digitalization projects involving demand response and sectoral coupling of new efficiencies have been carried out in European countries where they are well implemented. However, in many cases, opportunities are hindered by missing or incomplete regulations. European countries have also balanced their energy taxation systems quite well compared to their economic power systems. Despite taxing energy higher than in other regions of the world, the accessibility and competitiveness of energy in Europe has not been hindered. In addition, in some countries it is well coupled with investments in energy efficiency that have ultimately offered clear cut-offs in energy costs.

The European region includes the strongest players in the field of sustainable environment. However, it includes a number of countries that register much smaller growth in this regard. The 20-20-20 targets are strong political factors for countries of the European Union: it is likely that the Union will achieve the greenhouse gas emissions decrease and enhance its energy efficiency. Nevertheless, the renewable energy target seems to be more difficult to achieve for a number of large countries and may require statistical transfers. Also, the economic recovery and the weather conditions could influence in the short term the advances in the tendency to decrease the emissions. Despite the fact that the price of carbon dioxide emissions from the emissions trading system has begun to decline, investments in cleaner technologies still require additional support systems [4]. These schemes have been revised throughout Europe to reflect the significant cost reductions of clean technologies. In the long term, the European Union's sustainability goals for the 2030s and 2050s provide a strong policy framework for further progress [6]. The widespread introduction of biofuels and the development of gas infrastructure in the transport sector have reduced greenhouse gas emissions, while the share of electric vehicles has steadily increased in the region, being supported by the development of charging stations [2]. The main trends that will determine in this context the development of the global energy market in

the period 2035-2050 will be marked by the use of energy from traditional sources, but they will be less polluted, secured and come from alternative energy sources. We already have world races with *Electric GT, Formula E*.

Conclusions and recommendations. 1. Traditional energy resources are becoming more expensive and polluting. Humanity is intensively looking for sources to substitute traditional, inefficient resources. 2. Renewable energy is becoming more and more competitive compared to traditional energy. The cost of its production decreases constantly, the technology is improving, the subsidies in this energy segment are gradually decreasing. 3. Renewable energy gradually contributes not only to national energy security of the countries, but also makes the economy's dependence on unstable prices of energy sources part of the past. In the sector of renewable energy sources the interests of SMEs are harmoniously combined. 4. Because of the early implementation phase of alternative energy sources and of those from renewable sources, state aid is needed. 5. The World Energy Council has been trained in monitoring the situation on the world energy market with recommendations for improvement of the situation on the national markets. The investigations indicate that the most advanced in this area are the EU member states. The Republic of Moldova takes the 97th place. 7. To reduce fossil energy sources, the production of hybrid and electric cars is extended. *Formula E* races are an indicator of the scale of this process.

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К. Грібінча,

к.е.н., дослідник,

Вільний міжнародний університет Молдови

Вул. Влайку Пиркалаб 52, м. Кишинів, Молдова

А. Грібінча,

к.е.н., професор,

Вільний міжнародний університет Молдови

Вул. Влайку Пиркалаб 52, м. Кишинів, Молдова

А. А. Грібінча,

аспірант,

Вільний міжнародний університет Молдови

Вул. Влайку Пиркалаб 52, м. Кишинів, Молдова

“ЗЕЛЕНА ЕКОНОМІКА” – МАЙБУТНЄ СВІТОВОЇ ЕКОНОМІКИ

Найбільш динамічно зростаючою тенденцією в сучасному світі є розвиток зеленої економіки як однієї з головних умов збереження природи та довкілля для майбутніх поколінь. Забруднюючи планету протягом багатьох років, світова спільнота досягла точки неповернення в процесі освоєння ресурсів, видобутку сировини та прискореної урбанізації територій. З року в рік ресурсна база планети вичерпується, а кількість екологічно чистого виробництва енергії на основі природних відновлюваних компонентів збільшується. Електроенергетичний комплекс - це високорозумна логістична система великого формату, яка може адекватно реагувати на зміни заданих параметрів стабільності, тому саме наукові та прикладні інструменти сучасного управління логістикою та ланцюгами постачання найбільш ефективно застосовуються в електроенергетиці. Обрана тема набуває особливої актуальності через посилення соціального та економічного значення енергетики, оскільки електроенергія сьогодні є однією з першочергових умов нормального існування суспільства, необхідністю, яка вже може бути прирівняна до наших природних потреб.

Ключові слова: економіка; енергетика; альтернативна енергія; зелена економіка; екологія.

К. Грибинча,

к.э.н., исследователь,
Свободный международный университет Молдовы
Ул. Влайку Пиркалаб 52, г. Кишинев, Молдова

А. Грибинча,

к.э.н., профессор,
Свободный международный университет Молдовы
Ул. Влайку Пиркалаб 52, г. Кишинев, Молдова

А. А. Грибинча,

аспирант,
Свободный международный университет Молдовы
Ул. Влайку Пиркалаб 52, г. Кишинев, Молдова

“ЗЕЛЕНАЯ ЭКОНОМИКА” – БУДУЩЕЕ МИРОВОЙ ЭКОНОМИКИ

Наиболее динамично развивающейся тенденцией в современном мире является развитие зеленой экономики как одного из основных условий сохранения природы и окружающей среды для будущих поколений. Загрязнив планету в течение многих лет, мировое сообщество достигло точки невозврата в процессе разработки ресурсов, добычи сырья и ускоренной урбанизации территорий. Год за годом ресурсная база планеты истощается, а объем экологически чистого производства энергии на основе природных возобновляемых компонентов увеличивается. Электроэнергетический комплекс представляет собой высокоинтеллектуальную, широкоформатную логистическую систему, которая может адекватно реагировать на изменения заданных параметров устойчивости, поэтому именно научные и прикладные инструменты современной логистики и управления цепями поставок наиболее эффективно применяются в электроэнергетике. Выбранная тема имеет особое значение в связи с возросшей социальной и экономической значимостью энергии, поскольку электричество сегодня является одним из основных условий нормального существования общества, необходимость, которая уже может быть приравнена к нашим естественным потребностям.

Ключевые слова: экономика; энергетика; альтернативная энергия; зеленая экономика; экология.