

Chapter 6
ENERGY SECURITY PROVIDING IN THE CONTEXT
OF THE FOSTERING THE INNOVATION
AND INVESTMENT BUSINESS ACTIVITIES

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INTRODUCTION

Modern society is a witness and participant of the balance disruption between humanity and nature, resulting in the development of productive forces, leading to an increase in the number of negative environmental phenomena and trends and disproportion between the dialectical unity of its components. The global contradictions between the growing needs of the population and the decline and degradation of the environment indicate the necessity of a harmonized combination of economic, social and ecological components of development, change of emphasis of the world economy in favour of the environmental component, which requires a significant adjustment in the activities of all economic entities and policy.

In modern conditions of functioning and dynamic development, the business environment is characterized by the involvement of intellectual resources, which are the basis for innovative entrepreneurial activity. In the conditions of globalization processes, the priority mission for innovative business development is the vector of the so-called industrial breakthrough. That is, the effective functioning of the market relations subjects is possible through the identification of key factors for the enterprises development in the current circumstances. It should be noted that the fourth industrial revolution, or Industry 4.0, describes processes at the enterprise as a chain of “organization – production – distribution – consumption – utilization – recycling”, which components` interaction is based on the principles of the application of interaction between human, devices and technologies, and provides overcoming the human-machine barriers as well as their integration.

That is, a model of “smart” production is being formed, where computerized systems control physical processes and are able to make decentralized management decisions based on the principles and mechanisms of self-organization. The application of the latest

technologies in the organization of such an interaction allows to save resources, including time, to minimize the operating expenses, to diversify production of goods or services based on sophistication of human needs and mass individualization of the supply.

The other characteristics of Industry 4.0 are the formation of an information society; reforming of the educational system and taking it to a fundamentally new level; accelerating mergers and acquisitions of companies; widespread application of artificial intelligence; greening the production, in particular its ecological-oriented development and implementation the concept of the “without people production”. In this aspect, it is advisable for domestic enterprises not to adapt to it, but to use the so-called resource asymmetries effectively, in order to achieve competitive advantages in a dynamic market environment.

Resource asymmetries are proposed to be understood as the disproportion of the unique resource combinations that contribute to the formation of sustainable competitive advantages of the enterprise in the sectoral market during a certain period of time. Resource asymmetries can be considered as rare competitive resources, which are not owned by other enterprises and cannot be copied even with the proper allocation of expenditures. Therefore, intellectual resources that other enterprises do not have are key resources able to provide competitive advantage to the enterprise, together with material resources.

Most of the competitive advantages in an innovative economy depend, first of all, on the successful use of knowledge. One of the key success criteria is the ability to create and deliver innovation, in the context of profits maximizing. The pace of technological change implementation is increasing more rapidly than previously thought possible in the energy sector.

All the aspects of the value chain are involved in this process: starting from electricity generation and power grid management, in other words, “over the counter.” Most frequently, businesses operating in the energy sector have to develop completely new manufacturing processes, technological moves, customer service platforms and business models. Note that instead of a centralized and standardized energy model, a digital, distributed and personalized system is coming.

The driving force for changes has become, on the one hand, the economic impact from the use of new technologies, and on the other, changes in customer behaviour that make a significant adjustment to the relationship as between the supplier and the consumer.

Businesses aware of this systemic shift will surely ensure themselves excellence and will become valuable suppliers of innovative solutions for customers and partners. At the same time, those who fail to appreciate the benefits of the new technology-driven model of the market in time will lose their natural rights to develop and strengthen their relationships with the customers. Creating an innovative ecosystem is a sophisticated and complex process that creates the conditions for increasing energy security.

The feasibility of its creation and development is confirmed by the successful experience of the numerous companies in many countries of the world. In the conditions of the created innovative ecosystems, the application of complex approaches to management becomes possible, leading to ensuring the efficient use of energy resources of enterprises operating in the conditions of innovative ecosystems. Most scientists actualize the concept of “innovative ecosystem”, where in their works draw analogies between natural ecosystems and the innovation system.

The theoretical and methodological basis of the research is the elaboration of domestic and foreign scientists on the functioning of different innovative ecosystems in the economy, in general, and energy, in particular. The paper uses a systematic approach – to analyse the key prerequisites for the establishment of an innovative energy security ecosystem, as well as a method of profound analysis to justify the need to develop an innovative ecosystem.

6.1. The fostering of the innovation and investment activities

The attention is focused on the issues of system-wide determination of managerial innovation. It should be noted that the determination of peculiarities of organizational innovation in business is a relatively poorly researched problem in domestic science. The strategic goal of public policy for improving innovation activity should be the formation of an innovative economy based on the accumulated intellectual capital and involved investment resources. The beginning of an effective process of forming a unified universal approach to the organization of an innovative economy for any country is the study of existing experience in this field, for Ukraine, in particular, it is the experience of EU countries.

It is generally recognized in a market economy, that innovations are mostly implemented at the level of private enterprises. In today's economic realities, business is actually obliged to increase the innovation and efficiency of its own activities, which is of particular

importance in times of economic volatility. The everyday evolution of a society is determined by a set of the most essential trends, which effect inevitably causes large-scale social transformations, in business in particular. At the same time, a complex mechanism of innovation implementation plays the most significant role in their initiation and ensuring successive and large-scale implementation in this system¹.

The volatility of the economic environment requires that domestic companies use adequate management methods, implement innovations and efficiently apply their innovative capabilities. In today's conditions of European integration, we can observe a high level of competition, so that in order to maximize profits Ukrainian enterprises have to create a genuinely original competitive advantage of their products, which involves the application of an effective method of competition, that is the use of innovation. Undoubtedly, the innovative development strategy in modern conditions of economic activities provides for the construction of scientific and technical policy of enterprises of the industry, oriented to promoting the development of advanced technologies, research, scientific and development elaborations of innovative nature. It should be noted that it is the innovation strategy that is the basis for the structural changes that must take place today in the economic activity of any enterprise and ensure their future economic development.

Radical managerial innovations in Ukraine are directly proportionally related to the deterioration tendencies of the situation in the society by a set of indicators and are the response of the management subsystem to the requirements of stabilizing the situation and optimizing the forms of governance of the society experiencing turbulence. It can be also noted, based on the research, that the foundation for the widespread introduction of innovation in the enterprise activity, is assumed by funding. Indisputably, innovation cannot be reached without significant funding.

Hence, an important challenge is the financing of innovation, which is especially relevant in the context of the economic crisis and the high cost of financial resources (credits), which is now observed in Ukraine². Innovation activity development will only take place when all the finance sources are mobilized. Thus, innovative business development requires considerable financial resources, including those regarding

¹ Gugler, P. (2017). Emerging countries' country-specific advantages (CSAs) and competitiveness of emerging market multinational enterprises (EMNEs). *Competitiveness Review*, 27(3), 194–207. doi: 10.1108/cr-02-2016-0016

² Andersen, J. (2010). Resource-based competitiveness: managerial implications of the resource-based view. *Strategic Direction*, 26(5), 3-5. doi: 10.1108/02580541011035375.

small and medium-sized businesses. As was defined earlier, the implementation of policies to increase funding for development and innovation should become the major task of the state. Financing can be done either at the expense of own funds, or funds of investors, loans and funds from the state budget.

Namely, an important issue at the macroeconomic level is the participation of the state in the process of providing financial support to small and medium-sized enterprises: subsidies, preferential taxation and lending, allocation of funds for targeted lending, compensation of interest on lending. According to the study by Andriushchenko K., Rudyk V., Riabchenko O., Kachynska M., Marynenko N., Shergina L., Kovtun V., Tepliuk M., Zhemba A., Kuchai O.³, only 17.3% of the total number of operating enterprises in Ukraine can be considered as innovatively active, that is, introducing new technologies and updating the product range. If to compare it with foreign countries, where 60% of operating enterprises are actively engaged in innovative activity, we can assert that the level and pace of development of innovative activity in Ukraine is unsatisfactory.

A moderate improvement of the situation regarding the overall revival of innovation over the last few years does not solve the overall problem. The reasons for such a negative tendency are, among others, the lack of financial resources for the implementation of the innovative projects, as well as the imperfection of the financial and credit policy in the direction of stimulating innovation activity in Ukraine, that, in its turn, makes it impossible to ensure the transition of the domestic economy to an effectively new level, and therefore, to ensure its competitiveness in a globalized world.

Drawing on research by Sagaidak M., Tepliuk M.⁴, we analyse the comparison of state innovation policy instruments in both the EU and Ukraine, given in Table 1.⁵, noted that most of the developed countries

³Andriushchenko, K., Rudyk, V., Riabchenko, O., Kachynska, M., Marynenko, N., Shergina, L., ... Kuchai, O. (2019). Processes of managing information infrastructure of a digital enterprise in the framework of the "Industry 4.0" concept. *Eastern-European Journal of Enterprise Technologies*, 1(3 (97)), 60–72. doi: 10.15587/1729-4061.2019.157765

⁴Sagaidak M., & Tepliuk, M. (2018). Intellectual Determinants of adaptation of national enterprises to the Fourth industrial Revolution. In *International security in the frame of modern global challenges. Collection of scientific works* (pp. 358–366). Vilnius.

⁵Tepliuk, M. A., & Budiaiev, M. A. (2016). Investment Attractiveness of Enterprises in the Context of Effective Management of Resource Provision. *BIZNES INFORM*, (7), 114–118.

Terpstra, D. E., & Limpaphayom, W. (2012). Using Evidence-Based Human Resource Practices for Global Competitiveness. *International Journal of Business and Management*, 7(12). doi: 10.5539/ijbm.v7n12p107

apply a comprehensive approach in order to stimulate the activities of innovation-oriented companies, by using methods of both direct and indirect regulation.

Namely, the European Union countries use several tools of innovation policy and attracting investment for financing innovation. They incorporate direct public funding, firstly through grants, loans, subsidies, etc.; creation of infrastructure for innovation activity; tax incentives, special support schemes for risk financing, provision of state guarantees. He also justifies that the tools of innovation policy are different mostly in all countries of the world. For example, Portugal and Spain, apply a large set of fiscal incentives to all companies, whatever their size, and the UK only to small and medium-sized businesses. Such countries as Sweden, Germany, Finland, prefer to stimulate direct financial support, that in its turn results in the development of an innovative process.

Table 1

**Comparative characteristics of public policy instruments
in the EU and Ukraine**

EU	Ukraine
<i>Legislative instruments</i>	
1) a favorable institutional environment for innovation activity	1) unfavorable institutional environment for innovation activity
2) possession of an innovative development strategy is an essential prerequisite for obtaining regional funding for innovative EU funds projects	2) lack of innovative development strategies and programs in most regions of Ukraine
<i>Financial instruments</i>	
1) increase in public spending on science and innovation (2% of GDP on average)	1) reduction of government spending on science and innovation – from 0.47 to 0.33% of GDP
2) financial stimulation of supply and demand entities	3) most of the tax incentives for innovation activity have been abolished, in particular based on such Ukrainian laws as “On innovation activity”, “On special regime of investment and innovation activity of technological parks”, “On general principles of establishment and functioning of special (free) economic zones”

Table 1. (Continued)

<i>Financial institutions</i>	
1) venture funds; 2) innovation funds; 3) “seed” funds; 4) innovative stock exchanges; 5) innovative banks; 6) individuals – “business angel”	require development
<i>Production and technological structures</i>	
1) technological business incubators; 2) technoparks 3) science parks; 4) spin-off companies	1) business incubators: mostly lack technological specialization; 2) technoparks and science parks: governed in accordance with the relevant laws, but not widespread due to the benefits abolishment; 3) spin-off and start-up companies require development

Analysing the data in the table, we can say that Ukraine's innovation system is not developed enough and has no connection between its participants, namely: state policy, developers and consumers of innovation. Instead, European experience shows that all elements of the innovation system must be interconnected as between themselves by comprehensive public policy that is a promising fact for research.

At the World Economic Forum in Davos, 2016 the Fourth Industrial Revolution became the major issue for discussions, which can actually affect global changes in all the spheres of human life. It is characterized by the development and merger of automated production, innovative technologies and the exchange of data into a unified system, human intervention in which is reduced to a minimum or is entirely limited. Computer and intellectual service providers are the most interested in the Fourth Industrial Revolution, namely, they are inventors, programmers, investors, and shareholders. According to Gartner marketing company, the additional revenue for IT-related companies will be more than \$ 300 billion by 2020.⁶

Nevertheless, the knowledge and experience of people attracting innovation remain key in the fourth era of industrial development. Thus, the intellectual base remains a key factor in ensuring the quality of

⁶ Shvidanenko, G., Tepliuk, M., & Budiaiev, M. (2017). Developing An Innovative Model Of Resource Efficiency For Industry. *Scientific Journal of Polonia University*, 25(6), 19–27. doi: 10.23856/2502

innovation implementation and the process of their adaptation. They continue to be the only drivers of growth in the number of active innovative small businesses, including those at the cost of the emergence of new forms of entrepreneurship (freelancing, pulsating organizations, etc.), oriented on the development of scale of production of intangible products (all types of services and new technologies), which is the foundation of modern technological realities.

6.2. Development of an innovative ecosystem of energy security

It should be noted that, considering the scientific research, the disclosure of the “innovative ecosystem” concept should begin with the determination of the basic analysis element, in this case – “innovation”, which is the fundamental basis for the historical development of innovation systems as at the macro (on a scale of the national economy), and regional levels. It must also be noted that the term “innovation” is most vigorously used in the transition economy of Ukraine both independently and in order to designate a number of derivative concepts: “innovation activity”, “innovation process”, “innovation management”.

Most of all, different authors define the category of “innovation” as rather identical concepts, differing mainly in the degree of specification. It should be noted that the “ecosystem” concept combines different views on open innovations, crowdsourcing (search for executors without labour contracts), strategic management, economy, systems theory, as well as the biological analogies, metaphors and comparisons with the natural ecosystems.

The basis for functioning of the innovative ecosystem is not the energy moving, but the movement of capital and other economic resources, the mutual relations between economic entities intended to further technological development. In this context economic resources incorporate both material resources and intellectual capital. The main business entities of the innovation ecosystem are: corporations, universities, business schools, venture investors, research institutes, public authorities and investment funds. An innovative ecosystem is, in its essence, a combination of two different systems, namely, research and commercial. In domestic practice, two above-mentioned sectors ineffectively interact with each other, the task for our country is to increase the share of the commercial sector in the total amount of investment in research and development.⁷

⁷ Smyrnov, I., & Smyrnova, O. (2017). Energy Efficiency In The Evaluation Criteria Of Enterprises. *Scientific Journal of Polonia University*, 23(4), 78–84. doi: 10.23856/2309

An important feature of a properly organized innovation ecosystem is that the resources required for the research sector are complemented by the commercial sector as part of the profits generated from business conduction. Another distinctive feature is the tendency of ecosystem entities to concentrate in one geographical region, their strategic coherence with one another in order to focus on the development of a particular technology. Will also note that Silicon Valley is the most famous example of a geographically localized ecosystem. An innovative ecosystem can be considered as healthy and prosperous when resources invested in research from public, private or corporate sources are subsequently reimbursed by profit maximization due to sale of innovative products. In this case, both sectors of the innovative ecosystem – experimental and commercial – reach equilibrium state⁸.

The emergence of innovative ecosystems in the region, which apply the most up-to-date and advanced technologies in their daily activities, resulting in the increase of the social status of the region, which leads to an enchasing of social status. Determining the prerequisites for the development of an innovative ecosystem of the energy sector, primarily aimed at providing consumers with energy resources, improving the energy and environmental productivity of the fuel and energy complex, modernizing generating capacity, as well as creating conditions for ensuring the widespread use of renewable sources of energy (Figure 1).

A characteristic feature of innovative ecosystems is their ability to be the core of business ideas generation. In this regard, the presence of educational and scientific institutions is not simply important, but an essential prerequisite, based on the history of the innovative ecosystems development. Operating in the region of the technoparks, business incubators and other structures of commercialization of development create conditions for the emergence of new jobs and increase the income involved in the development process, and implementation of innovations.

The challenge for the national economy is its low level of energy efficiency and dominance in the economic structure of energy-intensive productions⁹. Ukraine requires to correct the deformations of the real sector in the direction of reducing the share of resource- and

⁸ Xiang, G., & Bo, W. (2010). Notice of Retraction: Research on enterprise human resource competitiveness based on BP ANN. *2010 3rd International Conference on Computer Science and Information Technology*. doi: 10.1109/iccsit.2010.5564907

⁹ Baran, M., & Kłós, M. (2014). Managing an intergenerational workforce as a factor of company competitiveness. *Journal Of International Studies*, 7(1), 94–101. doi: 10.14254/2071-8330.2014/7-1/8

energy-intensive activities, decreasing energy and ecological intensity of production by introducing up-to-date technologies, rationalization of resource use, optimization of territorial location of production, etc. The state continues to act on the inertia of stereotypes of existence of energy resources surplus, and economic and public entities expect it to cover energy costs partially and withdraw from actions of increasing energy efficiency, that's why the feasibility of developing strategy for an innovative ecosystem for energy security is being gradually applied, Figure 2.

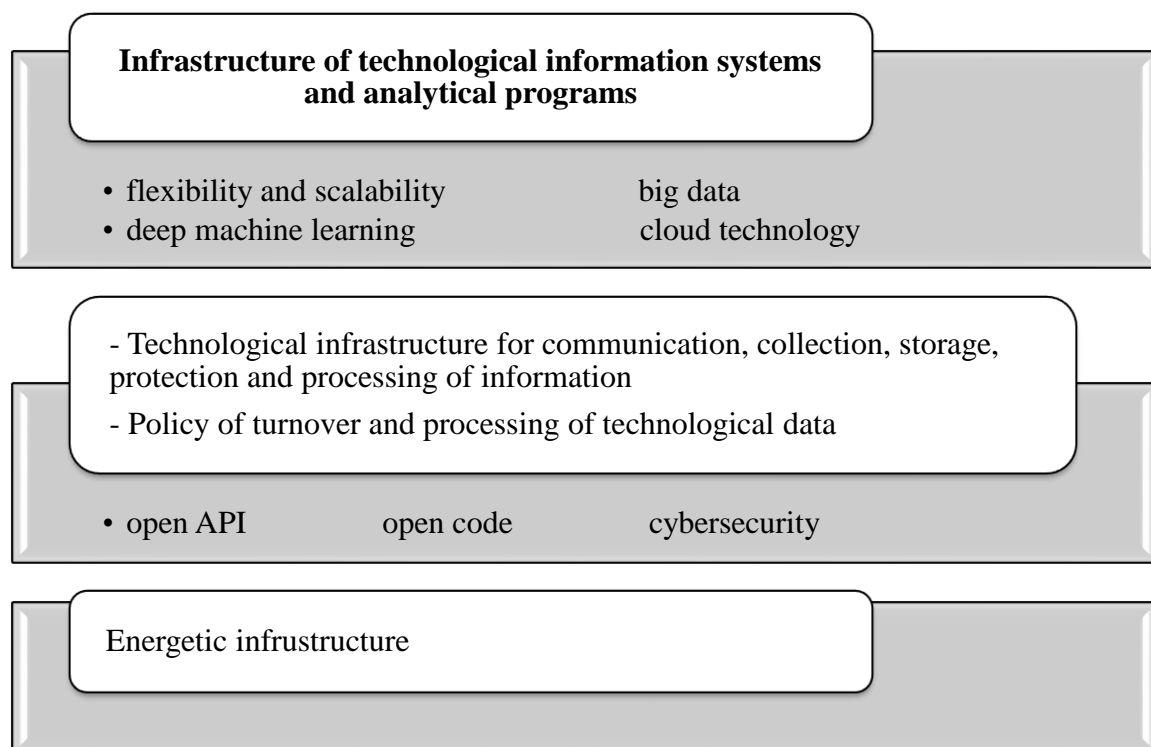


Figure 1. Schematic summary of key aspects of the innovative ecosystem of the energy industry¹⁰

Considering the strategic vision of the Ukrainian energy sector development, implementation of the relevant strategy will enable to increase the efficiency of production and use of resources, to obtain additional effects due to the emergence of new services and solutions based on a large amount of technological data, the construction of vertical and horizontal intra-sector and inter-sector interactions.

¹⁰ Araftenii, A. M. (2017). Problem of institutional provision of economic development of territorial communities in Ukraine. *Economic Innovations*, 19(1(63)), 18–22. doi: 10.31520/ei.2017.19.1(63)

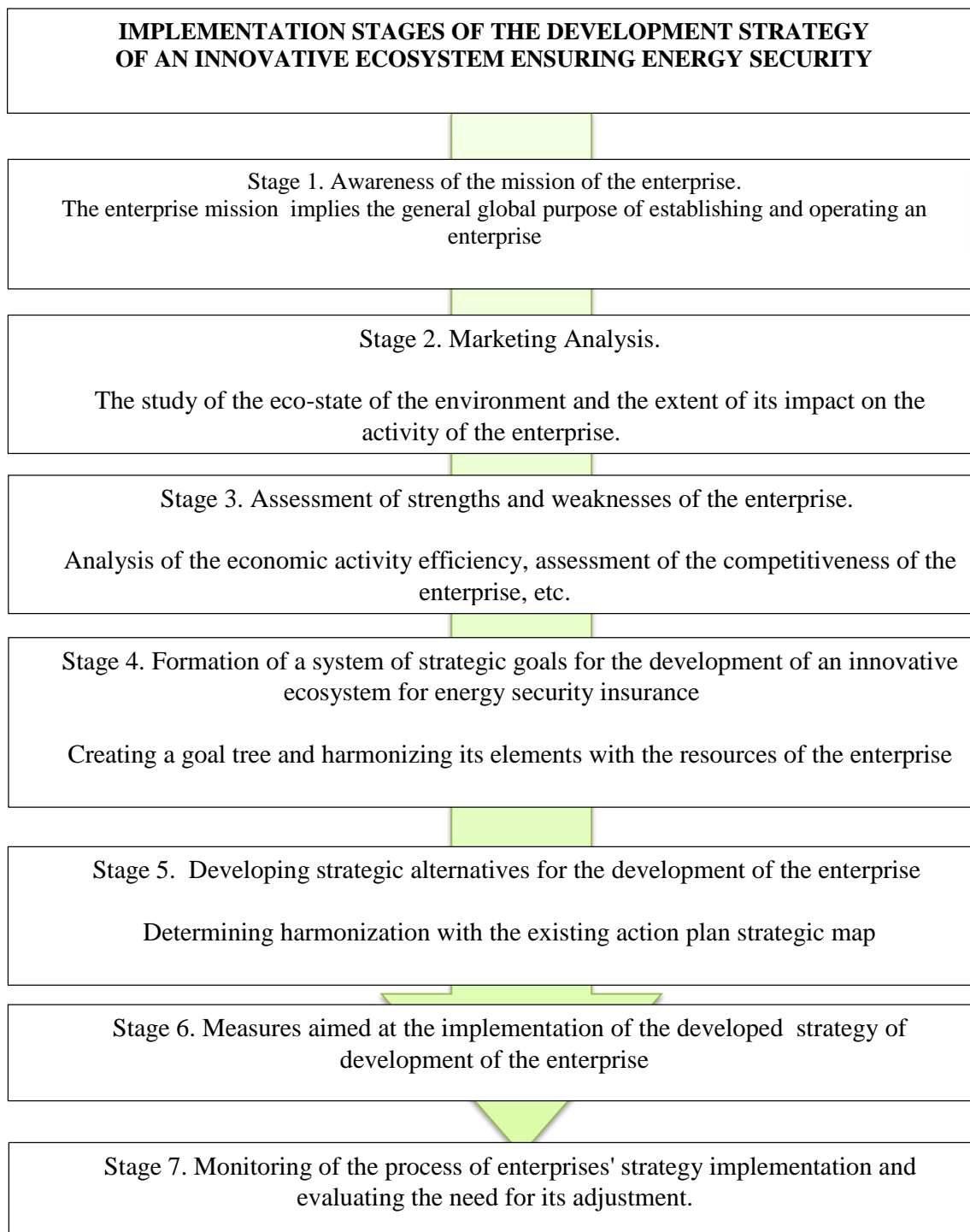


Figure 2. Developing a strategy for an innovative ecosystem for energy security

*Source: developed by the author*¹¹

¹¹ Andriushchenko, K., Rudyk, V., Riabchenko, O., Kachynska, M., Marynenko, N., Shergina, L., ... Kuchai, O. (2019). Processes of managing information infrastructure of a digital enterprise in the framework of the "Industry 4.0» concept. *Eastern-European Journal of Enterprise Technologies*, 1(3 (97), 60–72. doi: 10.15587/1729-4061.2019.157765

Table 2

Estimated target energy balance of Ukraine in 2035, thousand tons of oil equivalent

SUPPLY AND CONSUMPTION	Coal and peat	Crude oil	Oil products	Natural gas	Nuclear energy	Hydroelectric power	Wind, solar and environmental energy	Biofuels and waste	Electric power	Thermal power	Total
Production	33916	4500	-	34045	-	1250	5290	13020	-	1000	93021
Import	0	9500	2341	0	31898	-	-	0	0	-	43739
Export	0	0	0	-1716	-	-	-	0	-2582	-	-4298
Total primary energy supply	33916	14000	2341	32329	31898	1250	5290	13020	-2582	1000	132462
Electricity production	-18786	-	-53	-2907	-31023	-1250	-802	-3253	23810	-	-34263
Thermal energy production	-1213	-	-34	-13157	-875	-	-2963	-5149	-828	23632	-586
Oil refinery enterprises	-	-13969	13969	-	-	-	-	-	-	-	0
Own energy sector consumption	-63	-	-477	-540	-	-	-	-	-3064	-863	-5006
Transportation and distribution losses	-245	-6	-152	-399	-	-	-	-	-1674	-1803	-4279
Final consumption	13610	25	15594	15326	0	0	1526	4618	15662	21967	88327
Industry, including:	12175	-	1326	3183	-	-	-	403	7175	5208	29471
Metallurgy	10954	-	191	371	-	-	-	0	3045	894	15455
Chemical industry	15	-	25	387	-	-	-	0	339	1143	1909
Engineering	3	-	33	162	-	-	-	0	1147	203	1549
Food industry	102	-	148	124	-	-	-	378	536	1669	2956
Other production industries	1598	-	930	385	-	-	-	87	2108	1298	6406
Construction	2	-	181	21	-	-	-	0	90	55	350
Transport	27	-	3508	1567	-	-	-	223	1077	0	6402
Agriculture	16	-	1978	61	-	-	-	459	606	441	3561
Service and other consumers	188	-	1188	589	-	-	-	104	2298	6994	11360
Population	206	-	6310	7951	-	-	1526	3368	4416	9269	33045
Non-energy use	498	25	1102	3709	-	-	-	-	-	-	5334

Source: Formed by the authors on the Strategic Development Program of Ukraine
http://search.ligazakon.ua/l_doc2.nsf/link1/NT1513.html

In the course of the conducted research, it should be noted that serious challenges to the prospects of energy development arise due to the incompleteness of reforming the energy markets. In particular, precisely the existing models of functioning of the markets in Ukraine do not allow to form reliable sources of financial support, considering even the urgent needs of the energy sector.

Subsidies to producers, cross-subsidies between the consumer groups, preferential procurement of energy resources, lead to both reduce of motivation for save energy saving and deprive investment incentives to develop Ukrainian energy sector.

That is why, we assume that, overcoming the contradiction between providing social protection and introducing market principles of economic activity in the energy sector requires social policy improving. Maintaining the practice of guaranteeing social protection for particular categories of consumers through the use of resources of the fuel and energy complex actually blocks the possibility of accumulating resources for energy sector modernization¹².

To create sustainable energy in the long term, under the 2030 Innovation Development Strategy, it will be necessary to shift to zero-carbon energy sources, where exactly information technology will play a crucial role in providing an appropriate transition by supporting innovation developed through research activity in energy sector, and through optimal exploitation of increasing number of diverse energy sources connected to the power grids.

One of the problems associated with renewable energy sources is that they are not always available. Information technology can level such fluctuations in electricity production, by creating demand elasticity – switching demand from the time of day when electricity is not sufficient and it is supplied at a high tariff, to the time when electricity is sufficient and it costs less – to a level that will enable to integrate renewable energy into the power line.

Household appliances equipped with information technology, together with smart meters and informed subscribers are able to change the nature of electricity demand – instead of consuming it independently of the time of day, to organize consumption during the periods of the highest level of electricity production from wind or sun¹³.

¹² Hamel, G. (2000). *Leading the revolution*. Boston, MA: Harvard Business School Press.

¹³ Makarenko, I., & Sirkovska, N. (2017). Transition to sustainability reporting: evidence from EU and Ukraine. *Business Ethics and Leadership*, (1), 16–24. doi: 10.21272/bel.2017.1-02

The increasing potential of electric cars charging from the network makes the question of demand elasticity particularly acute. The software helps scientists to develop and enhance cleaner energy sources. For example, complex large-scale modelling, also called computational hydrodynamics, enabled significant improvement of the construction and deployment of air turbines in order to maximize their efficiency. Scientists apply computer modelling in order to improve the alloys used in solar photovoltaic batteries production.

That is, in order to switch to an economy based on clean energy production, it is necessary to create the capacity to track and regulate emissions of all producers wherever their location, and maybe even to track certain products along the supply chain throughout their useful life. Information technology tools ensuring such a potential will allow the manufacturers to set tasks to reduce carbon emissions and monitor their performance, and consumers to choose the products or services, which production is connected with the smallest carbon imprint¹⁴.

The introduction of innovative ecosystems creates the conditions for achieving the task of the technological breakthrough of the country. Furthermore, a number of problems arises during the process of creating innovative ecosystems. Such ecosystems and technoparks are often established from the ground up in our country. As a consequence, the obstacle to their rapid development is the lack at the initial stage of a sufficient number of areas suitable for the high-grade operation of residents, lack of infrastructure and experience in implementing such projects.

Due to the fact that the staff involvement is often associated with the need to change the place of residence in this case, it may cause difficulties in recruiting staff with the required qualification.

Continuous changes occurring in the process of innovative ecosystems formation directly influence the enterprises operating in them. Dynamic development of economic entities is a complex activity within which numerous challenges must be solved, in order to ensure energy security of Ukraine.

CONCLUSION

Summarizing all of the above-mentioned, it should be noted that the role of the state in the modern economy is very high; development and

¹⁴ Ustyomenko, V. (2017). Problems And Prospects For Implementing The Agreement On The Association With The Eu: Economic And Legal Aspects. *Economics and Law*, (3), 54–62. doi: 10.15407/econlaw.2017.03.054

implementation of innovations require intensive participation of the state (reflected in the allocation of funds from the budget, financing; preferential taxation; the development of legislation aimed at clear regulation of relations; the abolishment of restrictions). In the first place – financing, in different forms: direct financing of development, participation together with private capital in the specific project implementation. Thus, by introducing mechanisms for state support for innovation in Ukraine, or in any other country of the world, own specific conditions (legal framework, state of the scientific and technical sphere, level of economic development, etc.) must be taken into consideration.

Support for innovation should be one of the priorities for public policy, as innovation is a key factor in improving the competitiveness of the economy today. The experience of economically successful and high-tech companies underlines the feasibility of forming an innovative ecosystem that leads to achieving of the technological breakthroughs and energy security. At the same time, the development of innovative ecosystems helps to solve the problem of improving the life quality of the population, which is a consequence of the positive influence of a whole complex of physical, emotional and social factors. The creation of innovative infrastructure in the region plays an important role in this process. Formation of innovative ecosystems promote the increase of governability, facilitates the process of development and implementation by organizations of advanced innovative technologies, promotes their competitiveness, creates conditions for harmonized development in the conditions of active introduction of innovative technologies in everyday life of society. To ensure economically and environmentally sustainable growth in the long term, a fundamental change in our energy ecosystem is needed. We believe that information technology can play a crucial role in making such changes, significantly improving the efficiency of the economy and accelerating the innovation implementation required to create, zero-carbon renewable energy of the next generation. Creating a clean energy ecosystem requires the leveraging of the most powerful supercomputers in the world and widely available technologies.

SUMMARY

The article analyses the prerequisites for ensuring energy security in the ecosystem of the Ukrainian innovative entrepreneurship. The necessity of applying the comprehensive approaches to the management of the companies operating in the conditions of innovative ecosystems is

proved. It is noted that, despite the significant contribution made by scientists to the development of the theoretical provisions and practical recommendations in the field of study, the methodology for estimating the level of development of the innovative ecosystems is absent, resulting in difficulties in a thorough analysis of the regions where they are available, which in its turn makes the necessity for the development of the proposals for the introduction of the innovative ecosystems in energy particularly relevant.

The essence and characteristics of the innovative ecosystem are investigated in the article, which enabled to admit that the basis for functioning of the innovative ecosystem is not the energy moving, but the movement of capital and other economic resources, the mutual relations between economic entities intended to further technological development. It is proved that the development of a model of the innovative ecosystem in the energy industry will enable to ensure the energy independence of the country. The research conducted made it possible to indicate that the conditions created in the innovative ecosystems contribute to technological breakthrough and the increase of energy security. Meanwhile, the development of the innovative ecosystems facilitates solving the task regarding the improving the life quality of the population. It is a consequence of the positive effect of a whole set of physical, emotional and social factors. The creation of innovative infrastructure in the region plays a significant role in this process. Formation of the innovative ecosystems contributes to the increase in driveability, facilitates the process of development and implementation of the advanced innovative technologies by organizations, promotes raise in their competitiveness, creates conditions for harmonized development in the conditions of active introduction of the innovative technologies in everyday life of society.

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