

be used. This country managed to ensure the increase of level and quality of education for its population at the expense of foreign investments.

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АНАЛІЗ ІНОЗЕМНИХ ПРЯМИХ ІНВЕСТИЦІЙ У СФЕРУ НАНОТЕХНОЛОГІЧНИХ ІННОВАЦІЙ У КРАЇНАХ ЄВРОПЕЙСЬКОГО СОЮЗУ

Стаття присвячена дослідженню прямих іноземних інвестицій в інноваційні нанотехнології на прикладі країн Європейського Союзу. Проведений аналіз обсягів та напрямків інвестицій показав, що країни Союзу розглядають інвестиції в нанотехнології як інструмент прискорення економічного розвитку.

Ключові слова: нанотехнології, наноматеріали, інвестиції, екологія.

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АНАЛИЗ ИНОСТРАННЫХ ПРЯМЫХ ИНВЕСТИЦИЙ В СФЕРУ НАНОТЕХНОЛОГИЧЕСКИХ ИННОВАЦИЙ В СТРАНАХ ЕВРОПЕЙСКОГО СОЮЗА

Статья посвящена исследованию прямых иностранных инвестиций в инновационные нанотехнологии на примере стран Европейского Союза. Проведенный анализ объемов и направлений инвестиций показал, что страны Союза рассматривают инвестиции в нанотехнологии как инструмент ускорения экономического развития.

Ключевые слова: нанотехнологии, наноматериалы, инвестиции, инновации, экология.

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THE ENERGY COMPONENT OF THE ENVIRONMENTAL SECURITY: UKRAINE IN THE MIRROR

Energy security is important for any state. It is important for the state's environment and economy. Ukraine is an energy dependent state, as well as an import-energy dependent one. The paper is devoted to the statistical analyses of Ukrainian energy sector from the position of its world representation. The purpose of this research is on the base of statistical analysis of current internal and external trends in the energy sector of Ukraine to consider possible mechanisms to stimulate and accelerate environmental-friendly energy security of Ukraine. Main objectives: to trace the dynamics of world and Ukrainian main energy indicators in the synergy with the state energy security index; to cluster launched efficiency-targeted energy projects in Ukraine in geo-industry aspect. Analyses of dynamics of energetic vs environmental performance of Ukraine in 2000–2014 world ranks shows that being in low segment of world rankings on aspects of energy and environmental security, Ukraine shows positive tendencies to the improvement, however with slow steps. In order to identify the most promising and most attractive sector of the economy in Ukraine to investors we held grouping of current launching energy-efficient projects in the aspect of industries and sectors where energy-efficient technologies operate. The rank analyses depicted that the most popular among economic sectors for energy efficiency investments are enterprises of agriculture and consumer goods industry, and the most attractive regions of Ukraine for implementation of investments in energy efficient technologies are Ivano-Frankivsk, Luhansk and Kherson oblasts.

Keywords. Environmental security, energy sector, energy security, ranking.

Introduction. Nowadays there is no state that can be sure in its security. States and its inhabitants constantly are facing the novel challenges and straggling different threats. Currently energy, governance and security became hot topics of all international meetings, mass media news and political debates. XXI century had begun with war conflicts on the planet, which have as an initial cause – energy re-

sources. Energy security is on the top of concerns and a funding platform for all leading states and unions. For example, the EU interests in its strategic programme Eastern Neighborhood Partnership (including Ukraine) are reflected in the Platform #3 – Energy security – that supposes:

- approximation of the regulatory framework;
- development of electricity, gas and oil interconnections;

- energy efficiency and renewable energy;
- establishment and strengthening of a regulatory framework in nuclear safety [1].

Thus, Eastern European Partnership for Energy Efficiency and Environment is a part of the strategic response to energy problems. As to Ukraine, our energy security is an integral part of our economic and national security, a necessary condition for the existence and development. The evidence of recent few years obviously proved these theses. In modern concept the energy security is the attainment of a reliable, stable, cost-effective and environmentally acceptable supply of energy resources for econ-

omy and social sector; creation of conditions for the formation and implementation of policies to protect national interests in the energy sector.

Energy security is the association between national security and the availability of natural resources for the energy consumption. Ukraine is considered as a highly energy development country [2], as well keepings positions as not an environment-friendly state [3]. Ukraine occupied just the 95th position of 178 countries ranked on the 2014 Environmental performance Index (EPI) [4], having nevertheless mostly improving trend over the whole state independent period (Table 1).

Table 1. Dynamics of energetic vs environmental performance of Ukraine in 2000–2014
(↓ – Deteriorated, ↑ – Improved, 0 – No change)

Climate and Energy	Access to Electricity	Trend in CO ₂ Emissions per KWH	EPI	CO ₂ emissions	Energy Trilemma Index	Energy Security	Energy Equity	Environmental Sustainability	Energy Security Risk	Ecological footprint
0	↑	↑	↑	0	↑	↑	0	0	↓	0

Source: author's compilation based on [5-9]

The ranking representation shows that being in low segment of world rankings on aspects of energy and environmental security, Ukraine shows positive tendencies to the improvement, however with slow steps. So, it pushes the idea that Ukraine does not need some levers for the choosing direction on the improvement, but has a deficit of mechanisms to stimulate and accelerate positive trends. Such mechanisms are renewable resources and an effective usage of internal capacities of state energy security.

Literature review.

Having the aim to study the possibility to use alternative energy sources; to analyze the effectiveness of its application in Ukraine and environment-friendly aspect of its launching, we firstly follow the similar ideas and approaches raised in the scientific literature, particularly in:

- the analyses of types of clean energy that are available today and can be used in practice [10-11];
- the identification the major environmental and economic benefits of alternative energy sources over traditional [10, 12];
- the review of the effectiveness of non-conventional forms of energy by the example of the developed world [13-15];
- the assessment how promising renewable energy can be in Ukraine [16-20];
- the working-out the optimal portfolio of energy sources for Ukraine [21-22].

According to the Energy Strategy of Ukraine until 2030 declared on 24th July 2013 [Energy Strategy of Ukraine until 2030] it is expected to increase the share of renewable energy sources (RES) in the overall balance of the installed capacity to 12.6% by 2030, that the baseline is about 8 GW [23]. While, according to the International Energy Agency's 2030 the share of electricity produced using alternative sources will double compared to today's figures, which represent about 16% of total production [24]. In most developed countries, including the US, Germany, Spain, Sweden, of Denmark, Japan, there are plans to increase the share of renewable energy to 20-50% in the total energy [25]. The European Commission believes that by 2020 Europe will have fifth part of the energy produced from environmentally friendly sources – alternative renewable resource [26].

The arguments in favour of renewable energy can be considered:

- firstly, there is no need to fight for such sources, as wind, solar and bio-resources can be used only where they are. As well, there is mostly no lost while transferring [27];

- secondly, these resources are environmentally friendly, and their development provides an opportunity to invest in the local economy; increase standards of living for local population [28-29];

- thirdly, renewable energy is relatively cheap and inexhaustible [30].

Most of Ukraine's primary energy consumption is fuelled by natural gas (about 40%), coal (about 28%), and nuclear (about 18%). Only a relatively small portion of the country's total energy consumption is accounted by petroleum and other liquid fuels and renewable energy sources [6].

Herewith, the development of alternative energy requires significant investment. Thus, the country should attract investment funds for energy projects, that is quite impossible without insider (local) representative monitoring of its up-to-date energy security and attractiveness of energy sector [3].

The purpose of this research is on the base of statistical analysis of current internal and external trends in the energy sector of Ukraine to consider possible mechanisms to stimulate and accelerate environmental-friendly energy security of Ukraine. *Main objectives:*

- to trace the dynamics of world and Ukrainian main energy indicators in the synergy with the state energy security index;
- to cluster launched efficiency-targeted energy projects in Ukraine in geo-industry aspect.

Statistical analysis.

According to the report data of Ministry of Energy and mines of Ukraine [31] on electricity consumption in Ukraine for 9 months of 2014, consumers consumed 100.0 billion KWh of electricity, which is 4.4 billion KWh or 4.2% less than the same period of 2013. Structure of electricity consumption (net proportion) for 9 months 2014 compared to the same period in 2013 has not changed. The largest share in total power consumption of Ukraine belongs to the consumer group "Industry" – 45.9% and the group "population" – 28.5%. However, there has been marked some reductions of power consumption in the group "Industry" – from 46.7% to 45.9% in the total power consumption of Ukraine. These can be explained mainly due to the decline in the share of power consumption of the chemical and petrochemical industry – from 3.5% to 2.9%, as well as the engineering industry – from 3.6% to 3.2%, fuel industry – from 6.0% to 5.7%, and the group "Transport" – from 6.1% to 5.4%. This proportion increased power consumption by the group "population" – from 27.0% to 28.5%. Thus, we have declining tendency during 1990-2013 in the Ukrainian

energy efficiency picture (Fig. 1). While the environmental security depicted by CO₂ indicators is slowly increasing, during analyzed 1990-2013 (Fig. 2.).

However, these numbers are not representative without the comparison with sources of energy for such consump-

tion and the origin of these sources (domestic or imported), as well as the comparison with other states. Thus, World Energy Resources: 2013 Survey [10] reports that Ukrainian energy import is growing every year (Fig. 3).

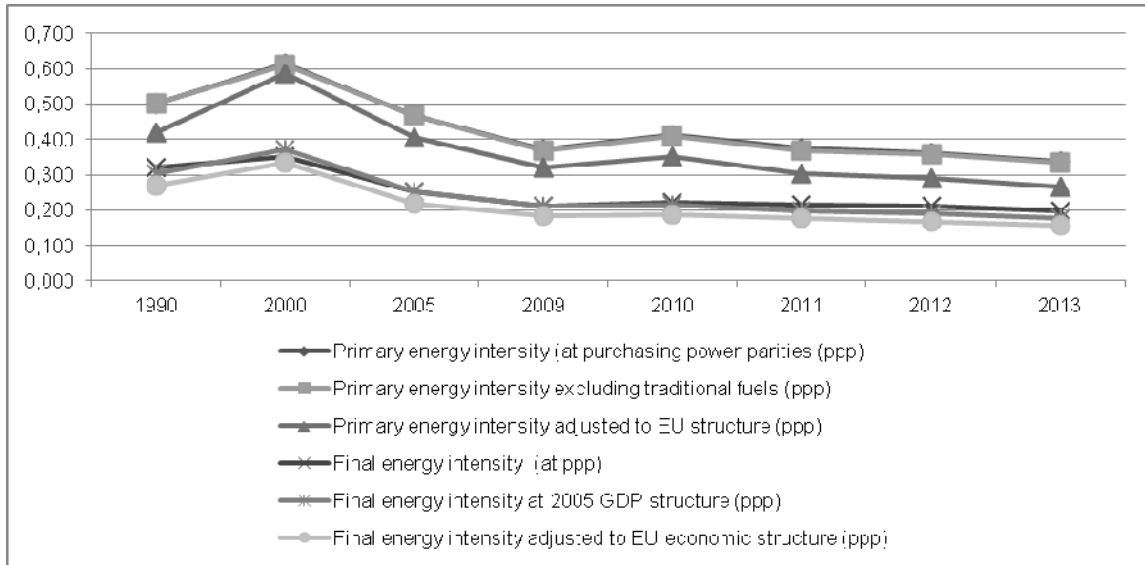


Fig. 1. Energy Efficiency of Ukraine (koe/\$05p)

Source: author's compilation on the base of Energodata [6]

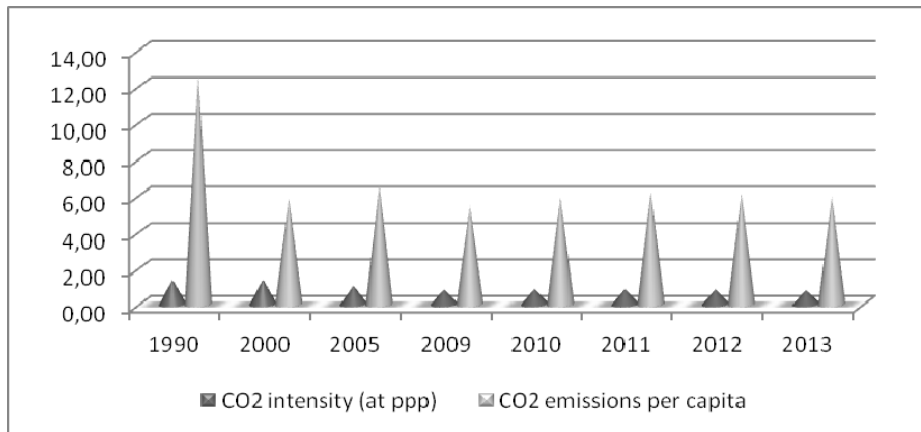


Fig. 2. CO₂ Indicators of Ukraine (CO₂ intensity in kCO₂/\$05p; CO₂ emissions in tCO₂/cap)

Source: author's compilation on the base of Energodata [6]

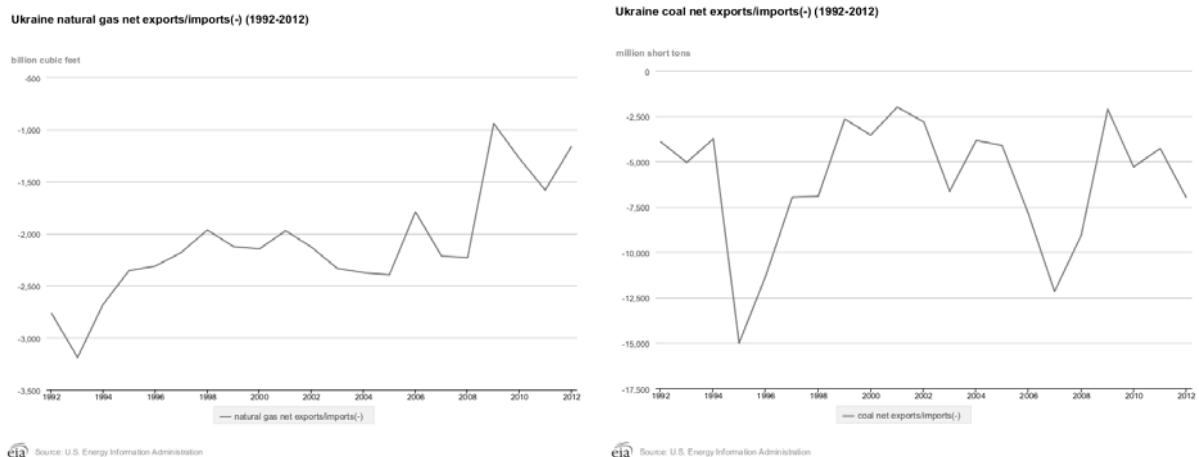


Fig. 3. Ukraine Natural Gas and Coal Net Export/Imports(-)

Source: <http://www.eia.gov/countries/country-data.cfm?fips=UP#ng>

Assessing the energy dependence of the country and the current state of the energy sector of Ukraine, we primarily analyze the volumes of domestic production and imports in simultaneous comparison with world indicators (Table 2-3). All considered trends support the only conclu-

sion – Ukraine is weak in the energy production and not comparable with world leaders in the energy sector. The state is deeply energy-import dependent, so cannot be for now ambitious energy player at the global energy scene.

Table 2. Energy production of Ukraine in comparison to the world (2008-2012)

	2008	2009	2010	2011	2012
Total Electricity Net Generation (Billion Kilowatthours)					
World	19157,25	19093,33	20436,99	21182,42	21531,71
US	4119,387	3950,332	4125,059	4100,14	4047,766
Europe	3622,685	3463,168	3621,545	3568,373	3581,738
Russia	982,5228	937,7736	980,8973	996,8391	1012,476
France	544,0015	507,3284	540,294	531,554	533,324
Ukraine	181,58	163,626	177,851	184,061	187,142
Total Renewable Electricity Net Generation (Billion Kilowatthours)					
World	3740,598	3880,737	4187,615	4423,522	4714,827
US	392,7357	429,652	440,2314	527,4897	508,3602
Europe	815,8029	847,4491	947,2352	934,3855	1040,108
Russia	166,129	175,552	168,101	167,512	167,938
France	75,052	71,032	79,693	66,294	82,776
Ukraine	11,442	11,86	13,072	11,322	11,129
Total Primary Energy Production (Quadrillion Btu)					
World	483,5603	480,9301	505,3679	518,5456	530,6832
US	73,23283	72,6724	74,79281	77,98651	79,21235
Europe	46,55348	44,84694	45,49784	43,70327	44,00391
Russia	52,52268	50,01447	53,7411	54,62955	55,29574
France	5,15679	4,81589	5,1031	5,10562	5,07565
Ukraine	3,20039	3,03946	3,06757	3,23656	3,27089

Source: <http://www.eia.gov/countries/country-data.cfm?fips=UP#pet>

Table 3. Energy Production* trends and forecast (million tones oil equivalent)**

	1990	1995	2000	2005	2010	2013	2015	2020	2025	2030	2035
Total Energy Production	8196,9	8570,4	9331,0	10791,8	12042,7	12816,5	13297,8	14677,3	15720,8	16647,6	17436,7
of which: OECD #	3442,1	3666,8	3842,2	3844,5	3901,7	4020,0	4261,2	4685,7	4879,6	5083,1	5194,1
Non-OECD	4754,8	4903,7	5488,7	6947,3	8141,0	8796,5	9036,6	9991,7	10841,2	11564,5	12242,6
European Union***	898,0	913,3	899,3	844,5	786,0	754,0	748,0	725,2	707,4	704,3	716,2
Europe	1095,4	1161,2	1194,7	1149,1	1081,5	1039,2	1039,1	1025,9	1011,4	1003,4	1006,6
Former Soviet Union****	1672,2	1226,5	1279,0	1571,4	1692,2	1766,0	1760,6	1840,1	1983,9	2030,7	2089,7
US	1664,4	1669,7	1676,4	1633,0	1749,8	1910,5	2108,9	2329,7	2441,3	2546,1	2518,0
China	720,7	892,4	934,0	1504,0	2100,5	2429,4	2516,4	3032,7	3243,2	3406,6	3576,4
India	153,4	190,4	213,8	253,7	342,2	350,5	374,6	443,6	530,4	638,9	761,5

*Energy production comprises commercially traded fuels, including modern renewables used to generate electricity.

**Oil Production is measured in million tonnes; other fuels in million tonnes of oil equivalent

***Memberships as at 1/1/2015.

****Excludes states now in the European Union.

Source: <http://www.bp.com/en/global/corporate/about-bp/energy-economics/energy-outlook/energy-outlook-downloads.html>

Thus, according to International Index of Energy Security Risk 2013 Edition [8] Ukraine's total energy, transportation, and oil intensities and its carbon dioxide emissions intensity scores are the weakest among the large energy user group. According this authoritative Institution, since 1992, Ukraine has displayed itself in the world as a country with the worst energy security index scores that any country in the large energy user group can be, both nominally and compared to the OECD. Ukraine's scores over the period averaged about 195% higher than those for the OECD, while its overall risk has been trending downward [8]. As net importer of oil, natural gas, and coal, the state energy import and expenditure risk scores are low, and its energy use is very inefficient.

While we coincide this statistical trends with the level of energy security as it is seen from the inside look – according to calculation methodology of the Ministry of Economic

Development and Trade of Ukraine – we see quite stable tendency, but of low security level (Fig 4). Remind that latter used method of index calculations determines the list of the main indicators of energy security of Ukraine, their optimal thresholds and the algorithm for calculating [32].

The rapid increase in this indicator in 1998 (Fig. 4) had been caused by a decrease in fuel imports by 5% and the tendency to reduce the energy intensity of GDP. Since 1998 till 2003 the integral index of energy security had a climbing trend, reaching its maximum value of 0.55 in 2003. The fall of the index in 2005 had been caused by the fall in the energy intensity of GDP. Between 1996 and 2011 the energy intensity of GDP decreased from 0.9 to 0.07 kg c.p./USD. Between 2005 and 2011, the energy security index was at the same level, with a slight fall in 2010. Tendencies of 2012 and 2013 kept the same level 0.46.

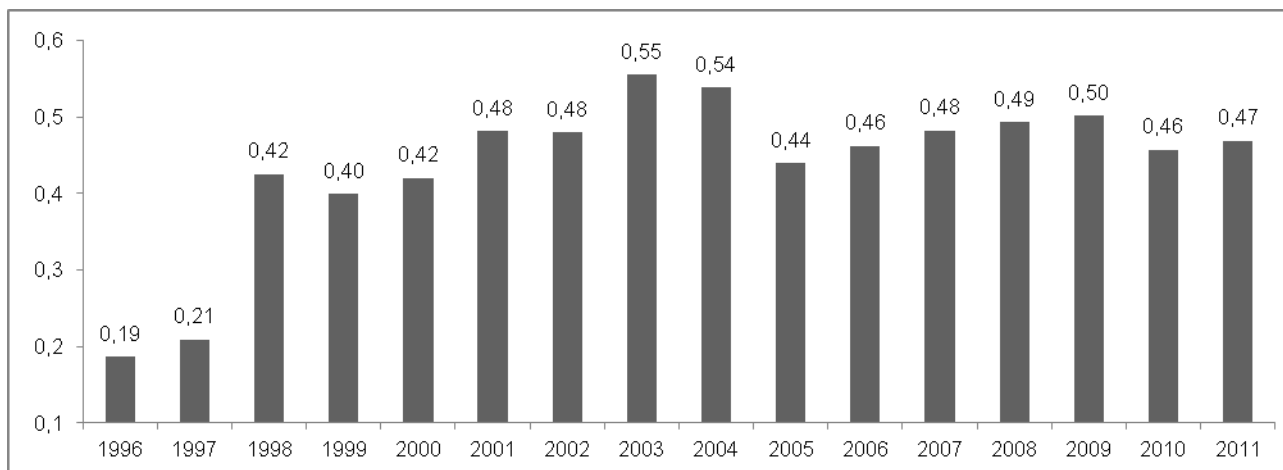


Fig. 4. The integral index of energy security of Ukraine

Source: calculated by the author and V. Nesterenko (bachelor degree student) on the base of data [5, 33]

Methodology. Despite ascertaining of not optimistic tendencies in the energy sector of Ukraine, there are still possible routes for improving. Thus, one of the most important current tasks for improving the energy balance structure can be seen as to increase energy efficiency. This requires some adjustments in all sectors, especially widespread implementation of energy-efficient equipment and technology, improvement of standards, increasing of the responsibility for overruns. These adjustments are quite costly, so investments are in demand to move on.

There are already first steps in this direction. The Programme for Energy Saving and Energy Efficiency had been developed by the European Bank for Reconstruction and Development (EBRD) specifically for Ukraine – the credit product UKEEP. The Programme is specifically designed for Ukrainian private companies of any sector that want to invest in energy efficiency or renewable energy. The result should be in the reduced energy consumption, increased production of domestic energy resources and more efficient use of it [34].

As part of the Fund of the Eastern European Partnership for Energy Efficiency and Environment (ESP) there was approved the allocation of grant funds in the amount of 35.0 million euro to finance 11 Ukrainian projects namely [35]:

- the project "Modernization of central heating system in Ternopil" (total EBRD loan – 10 million euro, grant – \$ 5 million);
- "Energy Saving in Zaporizhzhya" (total EBRD loan – 13 million euro, grant – up to 5 million euro);
- the project "Modernization of central heating system in Lviv" (total EBRD loan – 21 million euro, grant – 10 million euro);
- "Development of water supply and wastewater treatment in Mykolaiv" (EIB loan – 15.54 million euro, grant – 5.1 million euro);
- "Modernization of central heating system in Zhytomyr" (EBRD loan – 10 million euro, grant – \$ 5 million);
- "Investing in energy efficiency of central heating companies in 10 Ukrainian municipalities of medium scale" (NEFCO loan – 4 million euro, grant – 0.5 million euro);
- "Investing in energy efficiency of central heating companies in 10 Ukrainian medium-sized municipalities-2" (NEFCO loan – 4 million euro, grant – 0.4 million euro);
- "Energy efficiency of public sector facilities in Dnepropetrovsk" (Energy efficiency in public buildings with the

use of "Energy Performance Contract" (pilot project)) (total EBRD loan – 20 million euro, grant – 2.5 million euro);

- Grant for national utilities for:
 - developing regulations for tariff regulation system (regulatory reporting forms, procedures and regulations, control orders, etc.);
 - development and implementation of benchmarking;
 - development of software for online collection and analysis of regulatory reporting licensees (grant – 1.65 million euro);
- "Improved efficiency of utilization of energy resources in public sector institutions in Kyiv" (NEFCO loan – 5 million euro, grant – 1.5 million euro);
- "Energy efficiency increasing in public sector facilities in Zhytomyr" (NEFCO loan – 3 million euro, grant – 1.35 million euro).

And this is not the whole list.

For triggering the objectives of the paper we try to consider these project-investments in the energy efficiency in the workplace. Statistical base – Ukrainian Energy Efficiency Programme web-site [36]. The attractiveness of the project in terms of investors can be formalized by the following function that is quite classical:

$$u = f(inv, IRR, PP) \tag{1}$$

where *inv* – the amount of the initial investments; *IRR* – internal rate of return; *PP* – payback period of the project. The amount of initial investments directly affects decisions to invest in a particular project. Obviously, it depends on the investor's financial strength, but, nevertheless, in terms of macroeconomic indicators at the aggregated level, we assume that on average the larger the amount of initial investment, the less attractive is the project. The internal rate of return on investment – the main indicator of the investment plan; interest income is the main measure of attractiveness. As to payback period – under the current unstable economic situation, the payback period is an extremely important factor, especially in Ukraine, where long-term investment projects are an abnormal phenomenon.

Results. In order to identify the most promising and most attractive sector of the economy in Ukraine to investors we held grouping of projects in the aspect of industries and sectors where energy-efficient technologies operate. The calculation results are given in Table 4.

Table 4. Cluster grouping of investment projects by industry

Industry	Number of completed projects	Average amount of initial investment, \$	Average IRR, %	Average PP, years
Energy sector	1	5 000 000	23	7
Agriculture sector	14	1 781 343	25	7
Consumer goods industry	13	3 830 462	42	4
Large-scale industry	6	19 153 667	65	5

Source: compiled by the author and V. Nesterenko (bachelor degree student) on the base of data [36]

The analysis presented that among the most promising economic sectors for investing is a large-scale industry (the largest rate of return and payback is small). However, only financially powerful investors can afford to invest in this industry (the average amount of the initial investment – 19 mln. USD). Consumer goods industry requires smaller in-

vestment funds and has the lowest payback period, while ensuring a high level of income. The lowest initial investment is required for the agriculture, but there is a significant payback period and the average percentage of profits.

While holding a similar grouping by region characteristics we obtained following picture (table 5):

Table 5. Cluster grouping of investment projects by regions

Region	Number of completed projects	Average amount of initial investment, \$	Average IRR, %	Average PP, years
Kharkiv oblast	8	911 600	28,5	7
Ivano-Frankivsk oblast	4	23 272 500	30,0	5
Mykolaiv oblast	3	7 850 000	26,5	5
Zaporizhzhya oblast	3	2 306 500	24,3	6
Lviv oblast	2	3 020 000	20,5	7
Kherson oblast	2	2 608 500	95,0	4
Dnipropetrovsk oblast	2	8 350 000	23,5	5
Luhansk oblast	2	615 750	54,4	7
Khmelnitsk oblast	1	215 000	25,0	5
Cherkasy oblast	1	601 000	32,0	5
Chernihiv oblast	1	1 050 000	53,0	3
Donetsk oblast	1	1 700 000	54,0	3
Kirovograd oblast	1	12 000 000	28,0	4
Kyiv oblast	1	900 000	45,0	3
Poltava oblast	1	1 000 000	155,0	1
Crimea	1	20 000 000	45,0	3

Source: compiled by the author and V. Nesterenko (bachelor degree student) on the base of data [36]

For further ranking of regions on the feature of attractiveness for investments in energy efficiency, we used the following classic formula:

$$RANK_i = \frac{inv_i - \min(inv_i)}{\max(inv_i) - \min(inv_i)} \alpha_1 + \frac{inv_i - \min(IRR_i)}{\max(IRR_i) - \min(IRR_i)} \alpha_2 + \frac{inv_i - \min(PP_i)}{\max(PP_i) - \min(PP_i)} \alpha_3, \quad (2)$$

where $RANK_i$ – index of investment attractiveness of i region; i – region number; α_i – weights, $i = \overline{1,3}$. Analytical method and correlation analyses based on the statistical information had decided for the calculations the following weights: $\alpha_1 = 0,25$; $\alpha_2 = 0,4$; $\alpha_3 = 0,35$. Taking in account that as the investors appeared to be Ukrainian banks, we assume that they are provided with financial resources. So the amount of initial investment is the least significant. This assumption let us to rank regions of Ukraine on the aspect of investment attractiveness in energy-efficient projects (Fig. 5).

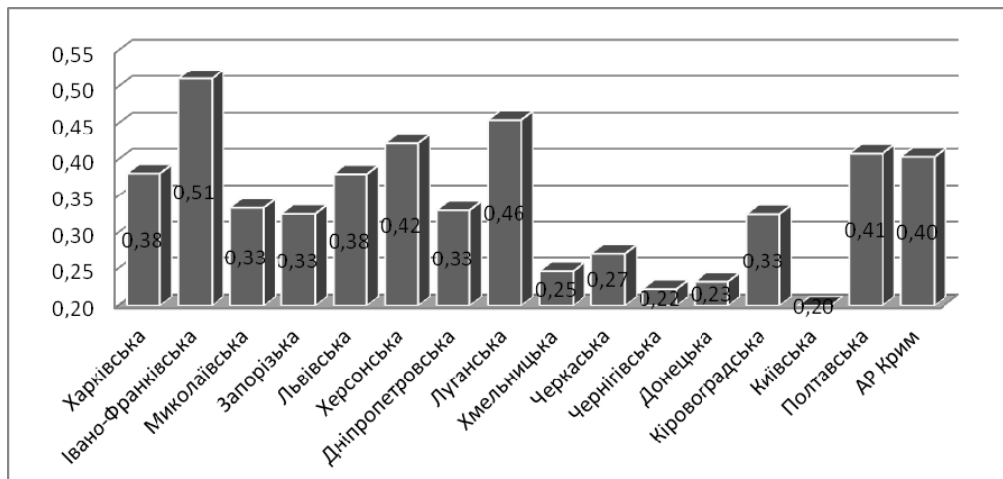


Fig. 5. The ranked index of investment attractiveness of regions

Source: calculated by the author and V. Nesterenko (bachelor degree student) on the base of data [36]

So the most attractive regions of Ukraine for implementation of investments in energy efficient technologies are Ivano-Frankivsk (0.51), Luhansk (0.46) and Kherson (0.42) regions. The least attractive – Donetsk (0.23), Chernihiv (0.22) and Kiev (0.20) regions.

Conclusion & discussion. Having such not optimistic situation in the energy sector Ukraine faces the necessity to draft the optimal possible portfolio of energy sources for Ukraine, and this portfolio should be oriented in the direction to the renewable future. From the definition of renewable energy sources it is quite obvious that for maintaining their production there is no need of raw materials and utilization of wastes. Therefore, most indicators used to determine the effectiveness of innovations and new technologies in production are not quite suitable. However, in the system of parameters for the research it should be used technological, economic, social and environmental efficiency indicators.

Energetic component of ecological security of Ukraine showed that the main energy resources are the nuclear (47%) and coal (37%), which is a bad thing for the country's energy security through outdated production technologies and a significant negative impact on the environment. Another problem in this respect is not only environmental but also economic: 35% of state import is import of energy consumption. Using the methodology for calculating the integral index of energy security we showed that the situation is unstable. Comparison of energy indicators of Ukraine with the same world levels had proved quite weak position of Ukraine. While the analyses of 34 projects for implementation of energy efficiency in Ukraine we proposed rank function for the evaluation of projects' attractiveness in the aspect of industries and regions of Ukraine. The rank analyses depicted that the most popular among economic sectors for energy efficiency investments are enterprises of agriculture and consumer goods industry, and the most attractive regions of Ukraine for implementation of investments in energy efficient technologies are Ivano-Frankivsk, Luhansk and Kherson oblasts. The analysis of modern ecological situation in Ukraine found that it remains consistently high air pollution in large cities and industrial centres. To solve priority problems of modern ecological situation in Ukraine the state should ensure full funding of measures provided by national, regional and local programs to develop effective mechanisms of economic enterprises and improve production technology. The movement to the better energy future for Ukraine is impossible without renewable strategies and mathematically ground calculation of energy portfolio for very particular future year.

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ЕНЕРГЕТИЧНА СКЛАДОВА ЕКОЛОГІЧНОЇ БЕЗПЕКИ: УКРАЇНА У ВІДОБРАЖЕННІ

Метою даного дослідження є на основі статистичного аналізу поточних внутрішніх і зовнішніх тенденцій в енергетичному секторі України розглянути можливі механізми для стимулювання і прискорення екологічно дружньої енергетичної безпеки України. Основні завдання: простежити динаміку світових та українських основних енергетичних показників в синергії з державним індексом енергетичної безпеки; кластеризувати в гео-галузевому аспекті запуснені енергетичні проекти, орієнтовані на підвищення енергоефективності в Україні. Аналіз динаміки енергетики та екологічної діяльності України в 2000-2014 на рівні світових рядів динаміки та рейтингів показує, що, будучи в низькому сегменті світового рейтингу з різних аспектів енергетичної та екологічної безпеки, Україна показує позитивні тенденції до поліпшення, проте повільними кроками.

Ключові слова. Екологічна безпека, енергетика, енергетична безпека, рейтинг.

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ЭНЕРГЕТИЧЕСКАЯ СОСТАВЛЯЮЩАЯ ЭКОЛОГИЧЕСКОЙ БЕЗОПАСНОСТИ: УКРАИНА В ОТРАЖЕНИИ

Целью данного исследования является на основе статистического анализа текущих внутренних и внешних тенденций в энергетическом секторе Украины рассмотреть возможные механизмы для стимулирования и ускорения экологически дружественной энергетической безопасности Украины. Основные задачи: проследить динамику мировых и украинских основных энергетических показателей в синергии с государственным индексом энергетической безопасности; кластеризовать в гео-отраслевом аспекте запущенные энергетические проекты, ориентированные на повышение энергоэффективности в Украине. Анализ энергетики и экологической деятельности Украины в 2000-2014 на уровне мировых рядов динамики и рейтингов показывает, что, будучи в низком сегменте мирового рейтинга по различным аспектам энергетической и экологической безопасности, Украина показывает положительные тенденции к улучшению, однако медленными темпами.

Ключевые слова. Экологическая безопасность, энергетика, энергетическая безопасность, рейтинг.