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*Kyiv National University of Construction and Architecture, Kyiv***ANALYSIS OF FINANCING SOURCES OF PROJECTS DEVELOPMENT
FOR UKRAINIAN ENTERPRISES**

Abstract. *In today's conditions of entrepreneurial development, the issue of energy efficiency improvement is important and urgent. Due to the constant volatility of energy prices, a high dependence on energy imports requires a large-scale energy reorientation of entrepreneurship. This article explores the world markets and trends in financing energy efficient projects. The current level and dynamics of energy intensity of GDP for the period of 2012-16 have been studied. A comparative characteristic of interest rates for loans and the size of «green tariffs» in the case of energy saving in European countries and in Ukraine is carried out. The potential of the energy efficiency market in Ukraine by the types of energy, by the groups of the industrial sector and the population is presented. A detailed analysis of possible sources of financing of energy efficiency projects in Ukraine, both by international and national investors, has been carried out. The total level of the invested resources in energy efficiency projects is given.*

Key words: *project financing; energy efficiency; sources of financing; energy efficiency projects; analysis of financing sources*

Introduction

The development of the modern Ukrainian business sector is under harsh conditions. This is especially due to the high level of energy intensity of industrial, construction, processing and other enterprises of Ukraine. Taking into account the constant fluctuation of prices for energy resources and the critically dependent level of national energy from imported energy sources (gas, coal, etc.), the issue of transition to renewable energy projects is relevant and urgent. However, entrepreneurship is not able to independently carry out the transition to new energy equipment systems. There is a wide variety of financial carriers that can support business in the process of energy transformation. At the same time, international investments and the sector of bank lending may be among the key resources that will enable energy re-orientation of entrepreneurship.

The issue of improving the energy efficiency of enterprises came from Ukraine's acquisition of independence. The legal basis for solving the legal aspects of this problem is the Law of Ukraine "On Energy Saving" [1] and a number of other normative and legislative acts regulating the activities of banks in this area. At the same time, the issue of energy efficiency improvement of enterprises was reflected and got further

extensive research in the works of domestic and foreign scientists who are studying the theory and practice of financial support for energy projects, among them: I.V. Alekseev, U. Blis, O.D. Lovchak, G.G. Gasho, I.Yu. Yepifanova, A.S. Zaverbnyi, M.K. Kolesnik, N. Kostyuk, O.E. Kuzmin, O.G. Melnik, M. Saywidze and others. While paying tribute to the scientific developments of scientists, it should be noted that the issue of integrated research on sources of funding for energy efficiency projects is not yet sufficiently addressed, there is a lack of fundamental research on certain aspects of the practice of conducting direct financial investments in energy efficiency projects of enterprises (EEPE) of Ukraine.

The purpose of the article

The key objective of the paper is to study the theoretical and methodological provisions and applied principles of funding renewable energy projects in Ukraine, by studying existing sources of international and national origin of investment resources. In order to establish the current state of financing of the energy efficient sector, statistical data on energy investments and bank lending in the energy sector of Ukraine was researched, which clearly confirms the negative trends that

have become entrenched in the financial and banking sector of the state and require urgent attention of the society, proposals and concrete measures for their solution.

Presentation of the main research material

Ukraine's energy sector remains one of the most problematic sectors of the national economy throughout the period of independence. Most of the strategic goals of the reform are: energy efficiency, GDP energy intensity decrease, renewable energy development, increase of own energy production and renewal of fixed assets, formation of strategic reserves, creation of elements of the nuclear fuel cycle – have not yet been fully achieved.

Global trends in the energy sector are characterized by the fact that in 2015, global investments in this area set a record of 329 billion USD. Europe needs to invest € 60-70 billion annually to achieve its target of 20% of renewables in the EU by 2020, with which it is managing, reaching a result of \$ 58.5 billion in 2015 [6].

In exploring energy dependence and energy consumption in Ukraine, it should be noted that according to Table. 1, the energy intensity of GDP decreases each year, and by 2016 it is 0.02 t.n.e. / mln. UAH.

Table 1 – Dynamics of GDP energy intensity in 2012-16

Year	Nominal GDP (In millions of UAH)	Consumption thousand t.n.e.	Energy intensity of GDP Thousand t.n.e / mln. UAH
2012	1408889	73107	0,0519
2013	1454931	69557	0,0478
2014	1566728	61460	0,0392
2015	1979458	50831	0,0257
2016	2383182	49765	0,0209

Compiled by the author with the use of source [5].

At the same time, Ukrainian statistical materials do not allow to allocate a concrete share of investment resources directed to the sphere of energy saving among the total set of investments made in the country.

The reform of the energy sector in Ukraine was mainly due to the EU conditions for stimulation of closer economic ties with Ukraine, as well as a prerequisite for international financial assistance. These factors were aggravated by the growing pressure from civil society and EU technical support. Ukraine is the recipient of the largest microfinance assistance for a non-EU country. Since 2010, its size has reached 3.4 billion euros. For the European Commission, the focus of cooperation lies in energy efficiency measures, especially in the residential sector [6].

Renewable energy sources (RES) such as wind, solar power and water energy require significant capital

investment, after which the actual electricity production price will remain low for an indefinite time until the sun continues to shine on solar panels, wind and water will be Continue to rotate the turbine. This contrasts sharply with fossil fuels, which require large initial investments for the construction of power plants, and then the continued cost of extraction, transportation and combustion of fuel [4].

The peculiarity of financing the energy sector is the need to make capital investments at the initial stage of the project, which causes a number of additional financial risks on the part of the investor. In order to compensate for and pay for the risk, the cost of capital sent to the energy sector is increasing.

The risks to investors, first and foremost about the country's overall risks, including political ones, as well as the presence of certain barriers to doing business, affect the volatility of renewable energy projects in different European countries.

For example, Germany ranked 15th in Doing Business 2016, Greece 60th, and the weighted average cost of capital for wind energy in 2014 ranged from 3.5% in Germany to 12% in Greece.

According to Ecofys, the cost of equity for land-based wind projects in 2014 ranges from 6% in Germany and more than 15% in Estonia, Greece, Latvia, Lithuania, Romania and Slovenia. The cost of debt, that is, remuneration for debt instruments of banks, ranged from 1.8% in Germany and 12.6% in Greece [4].

In Ukraine, high political risks, instability of the economy, changing business conditions for developers of renewable energy projects, high interest rates of financial institutions and significant bureaucratization increase the investment risk of investors and the total cost of projects in Ukraine.

Table 2 – Average interest rates and "green" tariffs in Ukraine and the EU, 2016

Country	Interest rate, %	«Green» tariff, euro cent
Austria	2,4	3,23-19,5
Belgium	2,3	4,6-23,2
Greece	3,9	8-23
Ireland	4,1	6,95-15,7
Germany	1,9	3,50-27,7
Portugal	2,1	9,1-38
Slovakia	2,5	7,03-15,51
Slovenia	3,2	6,6-25,21
France	2,3	6,07-20
Average in eurozone countries	2,8	14,76
Average in Ukraine	8,6	18,2

Compiled by the author with the use of source [4].

As can be seen from the data, Ukraine, having a slightly higher average green tariff than in the EU (18.20 versus 14.76 euro cents), remains insufficiently

investment-attractive due to expensive loans for financing projects with RES. The average interest rate in Ukraine is 3 times higher than in the EU countries.

Despite the large number of risks inherent in energy efficiency projects, it is worth noting that the potential of the energy efficiency market is extremely high. In particular, according to the International Finance Corporation IFC [10], it is:

- UAH 75 bln (US \$ 2.7 billion) – the potential of investments in heat and gas and electricity consumption projects;

- 4.1 billion m³ (12%) – the potential for saving gas consumption;

- 8.9 billion kVt * hour / year (7.5%) – potential of saving of electric energy;

- 11.3 million tons / year – the potential for reducing CO₂ emissions.

If we analyze the capacity of the investment project market in the energy saving sector in the context of enterprises and population, then the potential of these financial investments is prevailing in the manufacturing sector (see Table 3)

Table 3 – Potential of projects of electricity consumption reduction

Indicators	Production sector	Population	Total
Annual energy savings, billions of kWh / year (% Of the total amount of energy consumed)	5,0	3,9	8,9 (7,5%)
Annual reduction of CO ₂ emissions, million tons / year	2,24	1,73	3,97
Investment potential, mln. US \$	633	416	1 049

Compiled by the author with the use of source [5].

Due to the great potential of investing in energy efficiency projects in Ukraine, let us dwell in detail on the existing sources of financing for these projects. A detailed list and analysis of financial sources are given in Table 4.

Table 4 – Analysis of sources of financing of energy efficient projects in Ukraine

Source of funding	Description of the source of funding for energy efficient projects
1. The Eastern Partnership in Energy Efficiency and Environment (E5P) [17]	The E5P is a multilateral donor fund managed by the EBRD, created on the initiative of the Swedish government during its presidency in the European Union. The fund aims to promote investment in energy efficiency in Ukraine and other energy-intensive countries such as Armenia, Azerbaijan and Moldova. E5P grants are allocated to several priority areas: energy efficient district heating, other energy efficiency projects, environmental projects. Also, other investments aimed at creating significant energy savings are supported. Projects under the E5D Fund should have local guarantees. The procedure for the provision of local guarantees is approved by a resolution of the Cabinet of Ministers of Ukraine
2. Nordic Environment Finance Corporation (NEFCO) [13]	The Nordic Environment Finance Corporation (NEFCO) is an international financial institution founded in 1990 by five Nordic countries: Denmark, Finland, Iceland, Norway and Sweden. The Nordic Environment Finance Corporation (NEFCO) through the Northern Fund for Environmental Development provides favorable loans under the Energy Saving Program designed to finance small energy saving projects at social facilities such as schools, kindergartens, hospitals, sports facilities. Under the terms of the program, NEFCO may cover up to 90% of the investment cost of the project in local currency. The maximum loan amount is equivalent to 400 thousand euros in local currency. To apply, you must first contact NEFCO by telephone or e-mail to find out the eligibility of the project for existing programs
3. UKEEP Ukrainian Energy Efficiency Program [18]	The Ukrainian Energy Efficiency Program is a credit line established by the European Bank for Reconstruction and Development in 2007. The purpose of the UKEEP program is to provide targeted financing for energy-saving and renewable energy projects to Ukrainian private enterprises. Loans are provided through partner financial institutions, namely, local commercial banks. To date, UKEEP has three partner banks: Raiffeisen Bank Aval, Ukreximbank and MegaBank. Reducing energy consumption or using renewable energy sources for your own needs is the key criteria for a program for projects. To apply for funding under the UKEEP program, small, medium and large enterprises of various sectors of the economy are invited

<p>4. European Bank for Reconstruction and Development (EBRD) [8]</p>	<p>The EBRD is an international financial institution that finances projects in 29 countries from Central Europe to Central Asia and is the largest single investor in the region. The main forms of direct financing that may be provided by the EBRD are loans, equity financing and guarantees. The EBRD supports a number of technologies related to wastewater collection and treatment, solid waste management, district heating, distribution of natural gas, urban public transport, biofuels, biogas, geothermal, hydroelectric, solar energy, solid biomass energy, waste energy, The energy of the wind</p>
<p>5. European Investment Bank (EIB) [9]</p>	<p>The European Investment Bank (EIB) is the financial institution of the European Union. Its shareholders are 27 member states of the European Union. Over the past 5 years, the bank has invested more than 5 billion euros in Ukraine. The EIB's activities within the framework of the Eastern Partnership are carried out in close cooperation with the European Bank for Reconstruction and Development (EBRD) and in cooperation with the European Commission. Investments in Ukraine will be carried out through the Eastern Partnership Facility financing instrument. The main areas of investment of the European Investment Bank are energy efficiency (eg district heating, modernization of energy companies), renewable energy sources (for example, solar energy, wind energy and biomass energy), water supply and wastewater collection and treatment, solid waste collection and recycling, Objects of protection against industrial waste, urban public transport</p>
<p>6. Financial program Demo Ukraine DH [19]</p>	<p>This funding institution was established by the Nordic Environment Finance Corporation (NEFCO) and the Swedish International Development Cooperation Agency (Sida), in cooperation with the Ministry of Regional Development, Construction and Housing and Communal Services. The program also works with the support of the Eastern European Partnership on Energy Efficiency and Environment (E5P). The project owner must be a state organization owned by the state, region or municipality. The purpose of the Demo Ukraine DH financing program is to support the development and financing of environmentally sound and energy efficient projects in the district heating sector in Ukraine. The project should lead to increased energy efficiency with a reduction in energy consumption of at least 30%, and should be environmentally sustainable</p>
<p>7. SIDA Swedish International Development Cooperation Agency [22]</p>	<p>The Swedish Environmental Protection Agency is the central government agency that is accountable to the Swedish government. Its task is to coordinate and promote environmental protection activities at the state and international level. The task of the Swedish Environmental Protection Agency is also to assist other countries in their environmental activities through the development and implementation of SIDA-funded projects in Eastern Europe and Asia. A grant for a project or program is usually issued for three years. There are no mandatory SIDA project proposals. The project proposal can be presented in any format</p>
<p>8. German Society for International Cooperation GIZ [11]</p>	<p>Deutsche Gesellschaft für Internationale Zusammenarbeit (GIZ) is a company owned by the Government of the Federal Republic of Germany. The company operates around the world, helping the Government of Germany to realize the goals of international cooperation for sustainable development and international education. GIZ offers effective solutions for political, economic, environmental and social development in a globalized world, and supports the processes of complex reforms and transformations, including in difficult conditions. The priority directions of the German-Ukrainian cooperation are sustainable economic development, energy efficiency improvement, and environmental protection</p>
<p>9. United Nations Development Program (UNDP) [15]</p>	<p>The United Nations Development Program is the UN's global development network. It supports the transformation and provides access to sources of knowledge, practical experience and resources to help improve the lives of the population. UNDP operates in 166 countries, interacting with them in developing their own solutions to global and national development issues. In developing their own potential, they build on the experience of UNDP and a wide range of our partners. The United Nations Development Program is working to build Ukraine's potential, in particular in the areas of sustainable development, the environment and energy, and aims to launch a series of new projects to improve the energy efficiency of the national economy</p>

10. Charles Stewart Mott Foundation [21]	<p>The Charles Stewart Mott Foundation supports efforts to create a just and sustainable society. The main areas are 4 program areas: civil society; The environment; Regional program; Ways to overcome poverty.</p> <p>Within the framework of the "Civil Society" program there is a subprogram for the countries of Central / Eastern Europe. Main directions: strengthening of the non-profit sector, rights and obligations of citizens (support of public activity), promotion of improvement of interethnic relations; Special initiatives.</p> <p>Grants are provided only to registered organizations (charitable, educational or public). Not funded by political or religious activities, capital expenditures, education, social services, humanitarian aid, travel, conferences.</p> <p>Applications are accepted continuously, but you must submit an application no later than 4 months before the planned start of work</p>
11. Heinrich Boll Foundation [20]	<p>The priorities of the Delegation in Ukraine include: promoting democracy and strengthening civil society, political education for citizens, rational energy use and climate protection. Its whole fund reaches through public discussions, conferences, seminars, roundtables, trainings, debates, etc., as well as through support of public initiatives.</p> <p>The Heinrich Boll Foundation in Ukraine is currently implementing the following programs: ecology, climate and energy (promoting energy efficiency, climate protection, environmental modernization of society)</p>
12. The Nordic Investment Bank (NIB) [14]	<p>The Nordic Investment Bank (NIB) is an international financial institution owned by Denmark, Estonia, Finland, Iceland, Latvia, Lithuania, Norway and Sweden. The Bank carries out lending both in its member countries and in emerging markets such as Ukraine. Environmental loans are provided, in particular, through special lending facilities: the Fund for the financing of projects related to climate change, energy saving and renewable energy sources (CLEERE) and Environmental protection, oriented to the countries of Eastern Europe. The PIB works closely with other financial institutions, such as the EBRD and the EIB.</p> <p>The main areas of investment are cleaner production and management of natural resources, environmental technologies, emission reductions and renewable energy sources</p>
13. World Bank – Sub-national Finance from IFC	<p>Subnational finances is a joint initiative of the World Bank and the International Finance Corporation (IFC). It provides the state, regions, municipalities and their enterprises access to financing and capital market without sovereign guarantees.</p> <p>The main sectors to be financed are: energy efficiency, power generation, natural gas distribution, district heating, water use and waste water treatment, the organization of the transport system, solid waste management and other important utilities.</p> <p>The financing governments are entitled to municipal, regional, state or local governments and their agencies</p>
14. City programs	<p>In many regions of Ukraine, the state through the authorities carries out a number of measures to finance energy efficiency projects:</p> <ul style="list-style-type: none"> partially reimburse residents for the amount of loans taken for the purchase of energy-efficient equipment, materials and non-gas boilers; competition of mini-projects on energy efficiency and energy saving for condominiums and housing stock; programs for stimulating the implementation of energy saving measures in ACMHs; programs for arrangement of multi-apartment buildings with modern instruments of water and heat and energy accounting and regulation; <p>Programs of partial reimbursement of interest rates on borrowed credits for energy efficiency measures</p>
15. Loans under the state program and commercial loans	<p>A number of state and commercial banks of Ukraine provide various types of financial support (loans and credit lines) with preferential terms of lending for energy efficiency projects. At the same time, special lending conditions can be obtained both by legal entities and individuals</p>

Compiled by the author according to [7].

Today, the EBRD lending program is an affordable and effective financial instrument for investing in renewable energy projects in Ukraine. Under the USELF financing program as an investment mechanism of the EBRD, for the period 2009-2016, the EBRD provided funding of 50 million euros, the Clean Technology Fund – 20 million euros, and developers – 30 million euros. Technical support of \$ 8.45 million was funded by the Global Environment Facility grant.

In 2016, additional financing was provided for BE projects: EUR 70 million for the EBRD Investment Facility and the Clean Technologies Fund, with a total amount of EUR 140 million. However, such support compared to the necessary for the development of Ukraine's potential equivalent to 81 mln. tpt. or 70 billion m. Cubic meters of natural gas is quite small.

Conclusions

Today, the state of the energy-saving industry needs better incentives, better state support, and legislation in the developed EU countries in terms of simplifying the procedures for introducing new capacities in order to create stable conditions for the development of an environmentally friendly industry, which in our country is one of the most promising as well as agriculture.

Taking into account the fact that carbon resources will run out in the near future and the RES market is growing rapidly and will continue to grow, as well as the presence of a significant renewable energy potential in Ukraine, as soon as possible, it is necessary to create all possible favorable conditions for attracting investments in the green sector: both in new generating capacities, and in the development of scientific and technological developments.

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**АНАЛИЗ ИСТОЧНИКОВ ФИНАНСИРОВАНИЯ ПРОЕКТОВ ДЕВЕЛОПМЕНТА
ДЛЯ ПРЕДПРИЯТИЙ УКРАИНЫ**

Аннотация. Исследованы мировые рынки и тенденции в вопросе финансирования энергоэффективных проектов. Изучен текущий уровень и динамика энергоёмкости ВВП за период 2012-16 гг. Проведена сравнительная характеристика процентных ставок по кредитам и размерам «зеленых» тарифов в сфере энергосбережения в европейских странах и в Украине. Рассмотрен потенциал рынка энергоэффективности в Украине с точки зрения видов энергии по группам производственного сектора и населения. Осуществлен подробный анализ возможных источников финансирования проектов энергоэффективности в Украине как со стороны международных, так и национальных инвесторов. Приведен общий уровень предоставляемых инвестиционных ресурсов в проекты повышения энергоэффективности.

Ключевые слова: финансирование проектов; энергоэффективность; источники финансирования; проекты повышения энергоэффективности; анализ источников финансирования

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АНАЛІЗ ДЖЕРЕЛ ФІНАНСУВАННЯ ПРОЄКТІВ ДЕВЕЛОПМЕНТА ДЛЯ ПІДПРИЄМСТВ УКРАЇНИ

Анотація. Досліджено світові ринки та тенденції у питанні фінансування енергоефективних проєктів. Вивчено поточний рівень та динаміку енергоємності ВВП за період 2012-16 рр. Проведено порівняльну характеристику відсоткових ставок за кредитами та розмірами «зелених» тарифів у сфері енергозбереження в європейських країнах та в Україні. Розглянуто потенціал ринку енергоефективності в Україні з точки зору видів енергії за групами виробничого сектору та населення. Здійснено детальний аналіз можливих джерел фінансування проєктів енергоефективності в Україні як з боку міжнародних, так і національних інвесторів. Наведено загальний рівень наданих інвестиційних ресурсів у проєкти підвищення енергоефективності.

Ключові слова: фінансування проєктів; енергоефективність; джерела фінансування; проєкти підвищення енергоефективності; аналіз джерел фінансування

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