The conclusions from this study and an insight into further research in this field.

In order to prevent the negative effects of climate change in Kyiv, avert climatic alterations or adapt to them it is necessary to strengthen and develop the socio-economic, environmental and information policy on formation of the climatic eco-friendly environment. Such a policy should comprise a set of measures to develop the city's programme of prevention of climate change and adaption to climate alterations, the programme of arranging green spaces in the city for its adaptation to climate change, the modernization of housing and communal services, buildings and structures, the arranging of the effective transport and logistics systems, the creation of green areas, the implementation of clean and resource-saving technologies, the use of renewable energy sources and the increasing public awareness of climate change issues. Implementation of these and other strategies will contribute to making Kyiv's environment closer to meeting the requirements and standards of the EU in the field of sustainable development, and in forming of a modern system to manage climate change in urban areas.

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SYSTEM PRINCIPLES OF THE SOCIALLY RESPONSIBLE INVESTING OF POWER PROJECTS OF UKRAINE

The new direction of modern investment projects was researched – socially responsible investing. We consider the system principles of social investment, including the selection of the best options for risk analysis, assessment and minimization. The methods of estimation of social projects in the energy sector of Ukraine for every type of risk were examined. The expert estimation of three power projects was analysed. The regressive model of estimation of competence of every expert was built and the type of projects according to environmental and social principles of analysis has been established.

Keywords: socially responsible investment, investment risk, responsible investment principles, strategies of modernization, investment projects, regression analysis.

Introduction. Modern society characterized by the new level of economic and social development. Recently, socially responsible investment (SRI) have increased significantly in popularity among investors worldwide. SRI investors combine financial objectives with their desire to contribute to the solution of social, ethical and environmental issues. Today the successful operation and development industry are largely dependent on the level of social responsibility.

Objective justification for the need of socially responsible development strategy requires proper study of the problem of social investment risks.

The market of social investment is relatively new ([1, 2], 2011). Risks relating to social investment opportunities may be uncertain, they are usually difficult to assess. Investors should carefully weigh the risks associated with investing in the social sphere, as they currently have a low level of regulation compared to other investments.

Despite the increasing urgency of the problem of social and investment activities in theory and practice prevails fragmentary analysis and selective approach to certain aspects of the coverage, including an approach to the study of social investment risks. As a result of particular relevance to the issues of building an integrated system of socially responsible investing, including the identification of risks and the selection of the best options for their analysis, evaluation and minimization.

In the classic sense, "social investment" – a long-term investment of financial resources in the social facilities to

improve the quality of life. But over the years, this definition is out of date and in need of clarification. So there are other approaches, according to which social investment to create and implement the reproduction of human capital, social investments are seen as a way to implement corporate social responsibility.

Association of Managers gave the following definition of the "social business investment" ([1], 2013): physical, technological, managerial and other resources, and financial resources of companies directed by the decision of the leadership for the implementation of social programs, tailored to the interests of the major internal and external stakeholders the assumption that the company will strategically certain social and economic impact.

It is proposed at risk: the possibility of loss arising from the specifics of the phenomena of nature and activities of human society.

The risks inherent in social investing the same properties as other investment risks ([4], 2012):

- Rejection of the intended purpose for which carried selected alternative (rejection of both negative and positive).
- The probability of achieving the desired result.
- No-confidence in achieving this goal.
- Material, moral and other losses associated with the implementation of the selected alternatives under uncertainty.

However, if the main criterion for investment risk is the possibility of failure to achieve the projected income, then the risk of social project are areas where things can go wrong investments may not achieve the intended social benefits.

Total social investment less risky and increases risk of organization. However, different from ordinary investment risks, they have a significant social and environmental value.

Investors of social investment often agree to lower financial returns in order to obtain greater social impact.

Now the main international standards in the field of responsible investment principles are the Responsible Investment (UN Principles of Responsible Investments/ UN PRI), developed by the United Nations and the principles of the Equator (Equator Principles), and based on the standards and guidance of the World Bank and International Finance Corporation (IFC).

One of the Equator Principles – Assessment and analysis of social risks. Namely, analysis and classification, in which each project is evaluated and classified based on the magnitude of its potential impacts and risks in accordance with the environmental and social criteria analysis, in accordance with applicable IFC project risks are divided into next categories ([8], http://www.equator-principles.com/ (Accessed in February 2014), [9], http://www.ftse.com/ index.jsp (Accessed in February 2014)):

Category A – projects with potentially significant adverse social and environmental impacts, which are diverse and irreversible (1-1,99 points).

Category B – Projects with potential limited adverse social and environmental impacts that are few in number, usually apply only to the location of the object and can be remedied by measures for their mitigation (2-3,99 points).

Category C – Projects with minimal social or environmental impacts or have social and environmental impacts (4-5 points).

The aim of the research is to analyze the social and environmental projects of modernization of heating Ukraine on the basis of the principles of socially responsible investing.

Literature review. In modern domestic science problems of social investments investigated Ye. Libanova, A.Vasilik, G.Poplavska, D. Bauyra, M. Natalenko [2, 14, 17].

Today the main international standards in the field of responsible investment principles are the UN Responsible Investment principles, developed by the United Nations (see http://www.ftse.com/index.jsp), and the Equator Principles (see http://www.equator-principles.com), based on the standards and guidance of the World Bank and the International Finance Corporation (IFC).

Donets L. ([4], 2012) describes the risk assessment of socially responsible investing (SRI).

Over the last years in Ukraine appeared a lot of new as specially adapted to national realities methods of estimation of investment strategy.

Barsola I., and Kosmynskaya ([1], 2013) give a definition of responsible investment and its importance. Bayura (Bayura, 2011) describes SRI as a highest level of corporate responsibilities.

Formation of the investment strategy of large financial groups with implementation of expert methods using systems analysis was examined in works of Slushaienko ([16], 2012).

Zlenko O. ([17], 2012) describes the role of SRI between entities. But Kaczynski, A., Egorov, Y. ([13], 2009) propose the principles of ecological security of Ukraine, for which it is desirable to choose investment projects.

Methodology for the risk assessment of social investment enterprises studied in the works [18, 19].

General formulation of the Problem. Using the above techniques in paper proposes to consider the social and environmental project "Strategy for modernization of Zaporizhia region heating system." The basis for the development of this strategy was the "Zaporizhia heat scheme", agreed with the Ministry of Housing and Communal Services of Ukraine ([12], 2010). The main threats to the reliability of heat supply in the period 2015 – 2025 is a rise in prices for natural gas and heat and high heat losses in housing and budget homes.

The aim of the Strategy is to develop training programs profound modernization of the district heating system of Zaporizhia substitution of natural gas local fuels and energy.

The basis for selection strategies of modernization of the district heating system of Ukraine on the period 2015 – 2025 the following main objectives:

- Reduction of heat loss of customers use by thermo buildings by 65-70 %.
- Multi shift to balance with the substitution of natural gas to local fuel and energy by 80-90 %, while the planned saving in the fuel balance of natural gas as a peaking and reserve fuel source.
- Reducing the environmental impact on the environment and reduce greenhouse gas emissions by 90%.
- Reduce the rate of growth of the tariff burden on the budget and the public at 30-40 %.

The proposed strategy requires the involvement of significant investments (over 1.3 million) in the 2015 – 2025 period.

As part of the proposed strategy, the implementation of the modernization program of the municipal region heating system is planned, which includes the following projects ([12], 2010):

- The investment project number 1. Reducing losses and irrational natural gas and thermal energy. Thermo isolation of 622 houses from Zaporizhia budgets.
- The investment project number 2. Reducing losses and unsustainable consumption of natural gas and thermal energy. 2500 thermo isolation buildings housing Zaporizhia.
- The investment project number 3. The replacement of natural gas by local types of fuel and energy. Transfer hot water residential buildings for electricity.

The proposed strategy is based on a newly developed energy balance heat systems in the 2015 – 2025 period.

This selection of projects for evaluation and modeling is not accidental.

Among the negative effects of recent decades, particularly for scientific and technical progress, scale becomes increasingly pollution of air, water, soil cover degradation, destruction of stockpiles of biological resources, violations of

stability of ecological systems, and many others, including as a result of military activity which adversely affects all components of ecological systems, disrupting their natural balance.

Analysis of research suggests that environmental issues are constantly aggravated. In general, the situation can be characterized by excessive pollution and degradation of the human habitat, limited vital natural resources, growing environmental awareness and concern for the peace community's future.

The cause of the unstable ecological situation in Ukraine is largely economic factors, such as:

- Structural deformation economy of dominance raw-intensive mining and production;
- Inadequacy of environmental study of plans and projects for economic development;
- Poor performance of existing administrative and economic mechanisms of environmental protection.

In general, Ukraine has more than 37 thousand different industrial facilities that annually emit more than 10 million tons of harmful substances. The bulk of emissions of air pollutants from stationary sources contribute energy industries and metallurgy (33 and 28 percent of total emissions). About 60 % of releases accounted for substances that are most prevalent: dust, bisulfur oxides, carbon monoxide, nitrogen dioxide, heavy metals, etc. High levels of contamination observed mainly in the Donets-Dnieper industrial area. In addition, in Ukraine there are about 10 thousand enterprises in industrial complex and farms that intensively use natural resources and pollute ground, water, thereby causing damage to the environment ([6], 2007).

In Ukraine, as in all civilized countries, the priority national interest is to ensure environmental safety in terms of potential and actual disasters, accidents and catastrophes.

According to Article 16 of the Constitution of Ukraine, the main directions of the state policy of Ukraine on environmental protection, natural resources utilization and environmental security declare that ensuring environmental safety and maintaining the ecological balance in Ukraine, Chornobyl disaster – a catastrophe of global scale, preserving the gene pool of the Ukrainian people are the responsibility of the state ([11], http://zakon4.rada.gov.ua/laws/show/254к/96-вр (Accessed in February 2014)).

Article 7 of the Law of Ukraine "On National Security" specifies that environmental safety is a component of national security. Together with the environmental safety of the national are included: foreign policy, government, military and security border of the state, the political, economic, social and humanitarian, science and information ([10], http://zakon2.rada.gov.ua/laws/show/964-15 (Accessed in February 2014)).

Obviously, for a more detailed coverage of the meaning of the term "environmental security" has to rely on scientific developments given that scholars are still not developed a consensus on its definition. Among the most common are:

Environmental security – a set of actions, states and processes that directly or indirectly lead to preventing serious damage (or the threat of such damages) that harms environment, individuals and humanity as a whole.

Environmental security – a set of states, events and actions that ensure the ecological balance of the Earth and all its regions at the level to which physical, socio- economically, technologically and politically ready (can adapt without serious loss) humanity.

Models and results. We consider three strategies of modernization investment projects of district heating system of Zaporizhia. It is proposed to consider the methodology for assessing the social project for each risk socially responsible investment ([4], 2012).

Table 1. **SRI risk assessment**

Type of risk	Questions to assess the likelihood of of risk	Methods of assessing the SRI risk
Financial	Is it reasonable design estimates documentation of social action? Which of the amount required for the development of Social Project has already found? Is it possible, if failure of one/several investors find an equivalent replacement?	From 1 to 5, where 1 is virtually non-existent risk, 5 – risk – very likely.
Informational	Do you have experience working with the media? Is it enough developed an episode?	From 1 to 5, where 1 is virtually non-existent risk, 5 – risk – very likely.
Management	Does your team the necessary expertise to develop and implement social project? Extent team members psychologically compatible with each other? Is there any support from the government, donors, etc.?	From 1 to 5, where 1 is virtually non-existent risk, 5 – risk – very likely.
Risk of reliability of members of the social project	Whether as part of your team of professionals specializing in social engineering specialists who understand the technology development final product/ services social project?	From 1 to 5, where 1 is virtually non-existent risk, 5 – risk – very likely.
Legal	Are there contradictions in your social project with applicable regulatory and legal framework?	From 1 to 5, where 1 is virtually non-existent risk, 5 – risk – very likely.

Source: Donets, L. I., 2012

By this method the experts evaluated the above investment projects № 1, № 2 and № 3 [15, 16]. Comprehensive assessment of projects is as follows:

Table 2. **Projects risk estimation**

	Project 1	Project 3	Project 3
Expert 1	4,7	4,5	3,9
Expert 2	4,5	4,2	4,3
Expert 3	4,5	3,9	4
Expert 4	4,3	4,2	3,7
Expert 5	4,5	3,9	3,9
Expert 6	4,3	4	4,1
Expert 7	4,2	4,1	3,9
Expert 8	4,1	4,3	4,4
Expert 9	4,5	3,7	3,8
Expert 10	4,3	4,2	4
Sum	**43.9**	**41**	**40**
Sum/10	**4.39**	**4.1**	**4**

Source: compiled by the authors.

Following the procedure equator principles, all projects can be classified as C, projects with minimal social and environmental consequences, which should be implemented.

However, in order to more accurately assess the risks of the projects will take into account the competence of experts $(E_i, i = 1...10)$.

Table 3. **Self-assessment and self-assessment of competence of experts**

E_1	E_2	E_3	E_4	E_5	E_6	E_7	E_8	E_9	E_{10}	E
7	7	7	9	4	8	8	7	7	8	7.2
7	9	5	10	4	10	10	9	9	9	8.2
6	9	9	9	8	10	10	9	9	9	8.8
9	8	9	10	8	10	8	4	5	8	7.9
4	10	7	7	9	10	9	10	8	10	8.4
9	8	6	10	7	9	10	7	9	10	8.5
7	10	8	8	7	10	9	8	9	10	8.6
8	10	9	9	8	10	9	3	4	9	7.9
10	10	7	9	7	9	9	6	6	10	8.3
7	8	6	10	7	9	10	9	9	8	8.3

Source: compiled by the authors

Competence is determined by self-estimation and self-assessment experts: one expert defines its competence and in other quantitative scale from 0 to 10 points. Averaging assessments of competence (Z), obtained by each of the experts, giving averaged expertise of each expert. The disadvantage of this method is the subjectivity resulting average competence, due, for example, experts belonging to different destinations.

Better suited documentary method, based on an assessment of the personal factors experts $(x_i, i = 1...10)$, as the experience of development issues directly connected with the subject expertise, practical experience in the field of specialization, participation in expert valuation or in the special commissions on issues close to the subject of this review and more. For Documentation was obtained by the following table.

Table 4. **Personal factors**

	x_1	x_2	x_3	x_4	x_5	x_6	x_7	x_8	x_9	x_{10}
E_1	0	0	0	1	88	14	4	1	0	60
E_2	0	0	0	1	62	6	4	0	1	44
E_3	0	0	1	0	6	0	4	0	0	68
E_4	0	0	1	1	101	16	10	1	0	62
E_5	0	0	1	0	0	0	4	0	0	58
E_6	0	0	1	0	28	2	5	0	1	42
E_7	1	0	1	0	49	4	4	0	0	36
E_8	1	1	0	0	92	6	12	0	1	59
E_9	0	1	0	0	62	4	6	1	0	56
E_{10}	0	0	0	1	37	2	4	0	1	59

Source: compiled by the authors

These factors (x_i) affect the quantitative assessment of the competence of the expert (C) based on influence coefficients (a_k), which can be reflected to some linear formula:

$$C = a_1x_1 + a_2x_2 + ... + a_kx_k .$$

Table 5. **Information about the experts. Adjusted values**

U_1	U_2	U_3	U_4	U_5	U_6	U_7	U_8	U_9	U_{10}	U
0	0	0	2.4	211.37	33.63	9.61	2.40	2.4	144.12	**17.29**
0	0	0	1.47	91.19	8.83	5.88	1.47	1.47	64.72	**12.06**
0	0	2.79	0	16.71	0	11.14	0	0	189.41	**24.51**
0	0	0	1.61	162.19	25.69	16.06	1.61	1.61	99.56	**12.69**
0	0	1.62	0	0	0	6.47	0	0	93.81	**13.59**
0	0	2.21	0	61.76	4.41	11.03	2.21	2.21	92.64	**18.75**
2.69	0	2.69	0	132.01	10.78	10.78	0	0	96.99	**23.17**
1.30	1.3	1.3	0	120	7.83	15.65	1.3	1.3	76.96	**10.30**
0	1.93	0	0	119.81	7.73	11.59	1.93	0	108.22	**16.04**
0	0	0	2.36	87.48	4.73	9.46	2.36	2.36	139.50	**19.62**

Source: compiled by the authors

Transforming the initial data Z, X in weighted V, U (Table 5) allows the device to use traditional regression analysis.

By means of a stepper regression, selecting regressors (variables, their squares or products of reciprocal) determine the most suitable model. Calculations are made using application package EViews.

$$C = a_0 + a_1 U_3^2 + a_4 U_8^2 + a_5 U_3 U_9 .$$

Table 6. **Modeling results**

Dependent Variable:	V			
Method	Least Squares			
Date	12/14/13	Time	12:16	
Sample	1 10			
Included observation	10			
Variable	Coefficient	Std. Error	t-Statistics	Prob
U_3^2	2.168141	0.159429	13.59944	0.0000
U_8^2	1.976546	0.221990	8.903767	0.0001
U_3U_9	-1.937605	0.268624	-7.21307	0.0004
C	7.610401	0.873039	8.717134	0.0001
R^2	0.968726	Mean dependent var	16.80200	
R^2_{adj}	0.953089	S.D. dependent var	4.766869	
S.E. of regression	1.032453	Akaike info criterion	3.190926	
Sum squared resid	6.395750	Schwarz criterion	3.311960	
Log likelihood	-1.15224E-05	Hannan-Quinn criter.	3.058152	
F-statistic	61.95101	Durbin-Watson stat	1.439858	
Prob(F-statistic)	0.000066			

Source: compiled by the authors

From the calculations it can be concluded that the model is adequate.

$$C_i = 7.61041 + 2.168141 U_3^2 + 1.976546 U_8^2 - 1.937605 U_3 U_9$$

Substituting the coefficients found in the model, we find the calculated values of competence.

$$C_i = [7.99; 6.21; 8.16; 9.94; 8.16; 6.72; 8.16; 6.21; 7.99; 6.21]$$

So, only take into account objective data on the competence of experts, allows you to get an objective assessment of the estimated (Table 7).

Table 7. **Assessment of projects risk based on the competence of experts**

	Estimated competence of experts (C)	Project 1	Project 2	Project 3
Expert 1	7.99	37.58	35.98	31.18
Expert 2	6.21	27.95	26.08	25.7
Expert 3	8.16	36.71	31.82	31.53
Expert 4	9.94	42.75	41.76	36.79
Expert 5	8.16	36.71	31.82	31.82
Expert 6	6.72	28.88	26.87	27.54
Expert 7	8.16	34.26	33.45	31.82
Expert 8	6.21	25.46	26.70	27.32
Expert 9	7.99	35.98	29.58	23.73
Expert 10	6.21	26.70	26.08	24.84
Sum	**75.75**	**332.99**	**310.14**	**292.27**
Sum/Sum(C)		**4.4**	**4.09**	**3.85**

Source: compiled by the authors

Using computational competence of experts based on a model that takes into account the documented data on individual experts, we got a few other estimates (Table 1 and Table. 7). Thus, the rank of the project 3 decreased from 4 to 3.85, and the rank of the project 1 increased to 4.4.

Thus, the method of the equator, 1st and 2nd projects can be classified as C, and the third-categorized as B, which means limited potential for adverse social and environmental risks. The first two projects – with minimal social and environmental consequences.

Conclusions. Now the main international standards in the field of responsible investing are the principles by which each project is evaluated and classified based on the magnitude of its potential impacts and risks in accordance with the environmental and social criteria analysis. The successful functioning and development industry is largely dependent on the level of social responsibility.

Activation of human factors in the enterprise is one of the decisive factors in the total social and economic potential subjects of facility management, because the underestimation of the value of social investments leadership local businesses largely inefficient work of the organization.

Socially responsible investment (SRI) have increased significantly in popularity among investors worldwide. Objective justification for the need of socially responsible development strategy requires proper study of the problem of social investment risks.

We have analyzed the social and environmental projects of modernization of heating Ukraine on the basis of the prin-

ciples of socially responsible investing. Expert method was used. Experiments have shown that the use of mathematical models to assess the competence of experts gives good results. This technique allows you to get more accurate results for the determination of the project category.

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СИСТЕМНІ ПРИНЦИПИ СОЦІАЛЬНО-ВІДПОВІДАЛЬНОГО ІНВЕСТУВАННЯ ЕНЕРГЕТИЧНИХ ПРОЕКТІВ УКРАЇНИ

Досліджується новий напрямок інвестування сучасних проектів – соціально відповідальне інвестування (СВІ). Розглядаються системні принципи соціального інвестування, включаючи вибір оптимальних варіантів аналізу ризиків, їх оцінки та мінімізації. Розглядається методика оцінки соціальних проектів в енергетиці України за кожним видом ризику СВІ. Проведено експертну оцінку трьох енергетичних проектів. Побудовано регресійну модель оцінки компетентності кожного експерта і встановлено категорію проектів відповідно до екологічних і соціальних принципів аналізу.

Ключові слова: соціально-відповідальні інвестиції, інвестиційний ризик, принципи соціального інвестування, стратегія модернізації, регресійний аналіз.

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СИСТЕМНЫЕ ПРИНЦИПЫ СОЦИАЛЬНО-ОТВЕТСТВЕННОГО ИНВЕСТИРОВАНИЯ ЭНЕРГЕТИЧЕСКИХ ПРОЭКТОВ УКРАИНЫ

Исследуется актуальное направление инвестирования современных проектов – социально-ответственное инвестирование (СОИ). Рассмотрены принципы построения целостной системы обеспечения, включающие выбор оптимальных вариантов анализа рисков, их оценки и минимизации. Рассматривается методика оценки социальных проектов в энергетике Украины по каждому виду риска СОИ. Проведена экспертная оценка трех энергетических проектов. Построена регрессионная модель оценки компетентности каждого эксперта и установлена категория проектов, соответствующая экологическим и социальным принципам анализа.

Ключевые слова: социально-ответственное инвестирование, инвестиционный риск, принципы социального инвестирлования, стратегия модернизации, регрессионный анализ.

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CASE STUDY IN OPTIMAL TELEVISION ADVERTS SELECTION AS KNAPSACK PROBLEM

Abstract : In this research paper, we shall consider the application of classical 0-1 knapsack problem with a single constraint to selection of television advertisements at critical periods such as prime time news, news adjacencies, break in news and peak times using the WINQSB software. In the end of this paper we shall formulate the task of investigation of the post optimality solution of optimal Television Adverts Selection with respect to time allocated for every group adverts.

Keywords: advertisements, integer programming, knapsack problem, fuzzy linear programming, sensitivity analysis.

Introduction. The Knapsack Problems are among the simplest integer problems. The problems in this class are typically concerned with selecting from a set of given items, each with a specified weight and value. Sum of weights a subset of items does not exceed a prescribed capacity and sum of selected items values is maximum.

Knapsack problems have been intensively studies since the pioneering work of Dantzig [1] in the late 50's, both because of their immediate applications in industry and financial management, but more pronounced for theoretical reasons, as Knapsack problems frequently occur by relaxation of various integer programming problems. In such applications, we need to solve a Knapsack problems each time a bounding function is derived demanding extremely fast solution techniques. The family of Knapsack problems all require a subset of some given items to cho-