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INVESTMENT MANAGEMENT AND FINANCIAL DEVELOPMENT IN INFRASTRUCTURE RENOVATION OF A SUSTAINABLE-BUILT ENVIRONMENT

Purpose. The paper substantiates the approach to managing the renewal of ecosystems of territories and the renovation of infrastructure using investment support and resource rationalization based on the financial development of a sustainable built environment.

Methodology. The methodology is based on a study of the investment and financial resources that can be used to rebuild destroyed infrastructure, and it was carried out using analytical methods to assess infrastructure renovation costs, statistical methods of data analysis on the state of the environmental and economic systems, as well as mathematical modeling and balance methods for the formation of a green city model.

Findings. The investment potential of Ukraine was analyzed, and a conclusion was made about the feasibility of implementing the project, increasing the economic efficiency of smart green cities, which creates prerequisites for further infrastructure renovation in Ukraine. The study reveals the key economic and environmental problems of Ukraine, suggests ways of overcoming them, and offers a model for developing the territories destroyed by military action. An approach to the renovation of the territory based on the restoration of the ecosystems of the regions and cities and the creation of comfortable conditions for the return of citizens to their homeland is proposed.

Originality. The article outlines the basic principles for renovating a destroyed infrastructure based on energy efficiency and environmental friendliness. The possibilities of financing environmental projects in the post-war restoration of the national economy are considered.

Practical value. The proposed approach makes it possible to evaluate investments in infrastructure renovation and ensure effective management of financial development in a sustainable-built environment.

Keywords: *investment management, renovation, infrastructure, green city, rational nature management*

Introduction. Green technologies and rational nature management have become the main paradigm of the 21st century, which is widely adopted in developed countries such as Switzerland, Germany, Sweden, Denmark, the USA and others [1, 2]. Currently, there are cities based on innovations and considered smart in terms of automation. It is possible due to the fast technological process and the availability of financial resources for both product development and usage. The smart city concept is primarily implemented in new buildings and new cities because of the high capital intensity. Besides, one of the constraints to the adoption of automated systems and renovation is the possibility of the long-term use of the outdated fund, which is difficult or impossible to upgrade due to technical barriers and high cost. After the beginning of military operations, Ukraine is facing the situation when it is impossible

to restore most housing stock and infrastructure of some cities suffering from active military actions. Therefore, it would be more viable to demolish destroyed buildings and infrastructure facilities, create a new city plan, taking into account the location of buildings and territories with historical houses that will be reconstructed and objects that can remain in the current state.

In this regard, it is advisable to use national funds and foreign investments to renovate destroyed cities, which should become an example of the introduction of advanced technologies and security integrated with automated systems, the critical difference of which is the maximum rationalization of natural resources and close location of infrastructure facilities to positively influence the quality of services and the population's well-being.

It will create positive climate for future investors, employers and inhabitants, which will provide them with comfortable living conditions, access to innovations and new jobs as a re-

sult of population growth and their constant involvement in infrastructure renovation and maintenance. Renovation based on the use of environmentally friendly solutions in the renovation of infrastructure destroyed by war and the consequences of natural disasters acts as the main tool for reducing the negative impact on the environment, especially in cities where there is a high density of population and buildings. In the post-war period, losses can be calculated not only by the destroyed infrastructure, but also by the deterioration of the ecology, therefore, in the period of renovation, it is necessary to introduce the latest technologies and standards that will increase the pace of improvement of society's life. Dividing renovation into two stages requires a renovation plan. The first stage is the analysis of the destroyed territories, the sorting of garbage and factions, the second is the direct renovation, which will be based on the introduction of a green economy that will minimize the consequences of the war.

Even before the war, many scientists were concerned about the state of ecology, while the war further affected the ecosystem and destroyed the connections that existed, creating conditions for the destruction of natural systems [3].

When rebuilding cities after the war, it is important to create a comfortable environment for local residents to return to their homeland and take part in its renovation. This can only happen with the stabilization of relations with the government, financial stability and taking into account the environmental component. When drawing up a recovery plan, an important direction will be to use the circular economy model in the first place to recycle waste (including construction waste) and reuse materials in order to save them and reduce pressure on the natural environment [4].

Literature review. According to analytical companies, San Francisco, London and Singapore are some of the world's technological cities that can be taken as a basis for the renovation of Ukrainian cities [5]. These cities have similar features, but the main one is innovativeness and comfortable living conditions for citizens, which have turned these regions into developing economic centers tending to the increasing financial capital. Constant production of military equipment and military operations result in global consequences that have a long-term negative impact and can lead to an ecological disaster [6]. Other military conflicts allow concluding that the renovation of premises may have higher operational risks than the construction of new buildings and infrastructure. At the same time, to neutralize harmful ecological effects, one should apply only cutting-edge technologies affecting the ecosystem in general, including soils, atmospheric air, biodiversity and water resources, which require considerable investments and should be recovered due to global environmental standards [7].

Military operations also result in the deterioration of the healthcare system and can increase the morbidity rate of the local population caused by emotional, ecological burden, worsening living conditions, economic decline. These problems are even of greater importance among soldiers and can cause premature deaths. Therefore, it is relevant to reorganize the healthcare system, build modern medical institutions, provide free access to treatment and neutralize the existing threats in the post-war period [8].

According to Lewis [9], such countries as the UK are paying more and more attention to environmental friendliness and energy efficiency in order to abandon non-renewable energy sources in the future and design eco-friendly cities that would combine the natural environment and urbanistic approaches, create places of idea implementation and comfortable living, which will improve public health and make these territories less dependent on external conditions and other countries.

The research by Brauch [10] focuses on anthropocentrism, which is impossible without taking into account the ecological factor in the post-conflict period where all stress factors have a much greater character and leave consequences that should be

mitigated by shifting society to a new innovative level, which should be adopted comprehensively to create proper conditions for future generations.

While developing modern cities in Poland, one focused on the involvement of citizens in city management, interactivity, activity of each member of society, creation of conditions for engaging the local community in joint development of smart solutions [11].

As the researchers write, it is necessary to take into account the patterns of sustainable consumption when rebuilding territories and to promote systematic implementation [12]. Military actions create a risk to the environment, which already worries European countries through indirect effects. To assess them, you can use questionnaire methods that showed concern about the ecological state of the land [13].

The motivation to improve the state of the ecosystem can be people's desire for rational use of nature and the introduction of a circular economy, which is altruistic and can save money [14]. Mental attitudes can become the cause of consumer behavior, so for many entrepreneurs returning from developed countries to Ukraine, rebuilding it will become the main goal of creating a stable environment for future generations [15]. Consumption of the product also creates conditions for further greening. Based on the experience of the countries, Ukrainian businessmen will start creating new systems that will be ecological. Important is the factor of saving time and materials, which now exists in the latest technologies, which it is desirable to use [16]. Actor of accumulation of electronic waste, which has a long decomposition period, has also become important in recent years, and the behavior of people in Ukraine contributed to their accumulation. Therefore, disposal during renovation and maximum recycling should be organized [17].

Unsolved aspects of the problem. Despite global experience of countries in city renovation after military actions, the restoration of cities based on the green economy concept remains an open issue because of the constant growth and introduction of new technologies and approaches to problem solution, which should be adapted to the Ukrainian realities.

Methodology. The research examines the concept of sustainable environmental management as the framework for further development of Ukrainian territories and the preferable method for improving living conditions. Analytical methods of information assessment allowed defining key areas of further activities for the government, businesses and society while reconstructing destroyed cities, developing principles of territorial restoration, taking into account their maximum efficiency and global trends, using analytical and statistical methods of data analysis [18, 19]. Using methods for estimating costs of city renovation and further resource consumption, they have developed the algorithm of efficient construction of the local infrastructure based on the analysis of contemporary scientific papers dedicated to architecture and technologies, research of modern startup projects and venture funds placed on crowdfunding platforms [12]. The assessment of further labor market functioning and fundraising is based on risk analysis methods, investment analysis and empirical research methods, allowing determining the main trends and preferences of business entities for the project implementation. Using statistical research methods and analysis of statistical data banks, a conclusion has been made about the state of the Ukrainian ecological and economic system before the beginning of hostilities, which allows providing recommendations about further development given the pre-war situation in Ukraine and the effect of negative impact accumulation. Using mathematical modeling and balance methods, they have developed a model of reconstructing Ukrainian cities according to certain features investigated by analytical methods of cognition. The methodology is based on the comprehensive study of destroyed Ukrainian cities and quantitative and qualitative correlations of available opportunities and resources that can be used for progressive restora-

tion of Ukrainian territories. The main objective of the project was to optimize desires of the Ukrainian population and innovative and investment possibilities for the project implementation, which allowed developing the further action program for all parties concerned. Legal experience of leading countries in sustainable growth was applied in research, encouraging the development of recommendations on its adaptation to the Ukrainian realities.

Empirical evidence. As a result of hostilities in Ukraine, almost all economic and production indicators of business and industrial activities have changed dramatically, leading to imbalances in supply and consumption of resources; the majority of large industrial facilities located in the territory of combat operations were destroyed or suspended. It would be viable to restore them by changing technologies and transforming the industrial process left over from the Soviet times. Such industries can include metallurgical production, manufacturing of finished metal products, except machinery and equipment, most mining companies (mainly located in Donetsk and Luhansk regions), chemical production, etc.

Due to the constant decrease in final energy consumption in Ukraine caused by economic and political instability, closing of large post-Soviet energy-intensive enterprises and shift to energy-saving technologies, we could see the gradual transition to renewable energy sources, but the impact on the ecosystem was substantial and insufficient for its self-recovery.

Meanwhile, there was the increase in air emissions caused by anthropogenic load, increase in garbage and landfill space, changes in soil chemistry because of the constant agricultural use of fertilizers and other chemical elements, deterioration of water resources, as well as the increase in carbon dioxide in the air, which causes global climate change.

Fig. 1 [20] show fluctuations of capital investment in environmental protection, which primarily depended on economic and political stability in Ukraine, conforming a direct moderate relation between the investigated indicators. Thus, 2009 and 2015 were the points of extremum (minimum), correlating with the change of the political regime in Ukraine and the economic decline as a consequence. When analyzing final energy consumption, we also can see the reduction in energy consumption due to decreasing industrial energy consumption as a result of political and economic changes. Despite a better situation with investment in environmental protection in 2012, Ukraine features the trend in investment reduction and decreasing expenses for environmental protection before the war, which was also accompanied by decreasing adoption of green technologies at Ukrainian enterprises due to the lack of funds and unwillingness of entrepreneurs to generate profit in the long run.

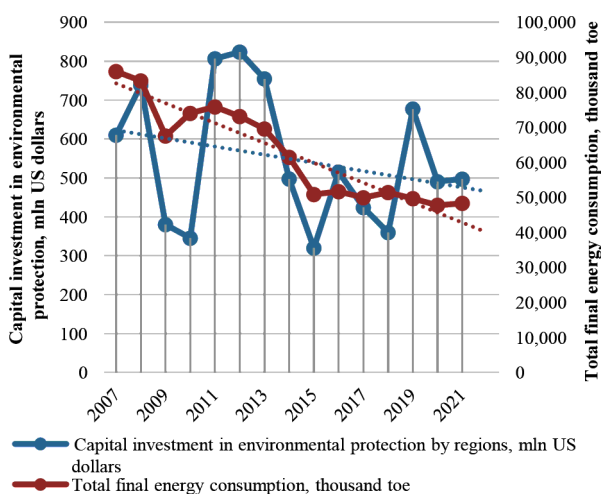


Fig. 1. Dynamics of capital investment in environmental protection and total final energy consumption in Ukraine at the time interval

In this regard, short-term projects that maximize profits are preferred along with the regular use of natural resources without their renovation. However, private enterprises closely cooperating with European countries and having access to cutting-edge technological projects strived for innovation-based changes.

Results. The unstable economic and political environment causes currency fluctuations that negatively affect Ukraine's macroeconomic performance, production level, wages and foreign economic balance, slowing down the adoption of green technologies, which took place before the outbreak of hostilities. In 2022, the old economic system was destroyed, which had a large percentage of the shadow economy, and a large number of industrial facilities that should be reconstructed using new technologies, introducing maximum automation and disposing useless equipment by sorting materials and recycling, which can help in solving the lack of primary resources in the post-war period. The key principles of green cities should include energy efficiency, manufacturability, environmental friendliness, rational nature management, usability, upgradeability, safety.

Fig. 2 shows that the adoption of basic principles of green cities is a priority area for Ukraine in the post-war period, as they will encourage the return of local inhabitants to Ukraine, which will allow increasing the labor potential, involving innovative systems and relying on fundamental aspects of green economy being implemented in developed countries.

The first stage of green city construction is complex designing according to the demands of local inhabitants, technological progress and facilities remaining after the military conflict and subject to renovation. It is reasonable to install a new system of providing housing infrastructure with the necessary communications fitted with sensors to monitor the quality of resource provision and accident prevention, options of autonomous operation or disconnecting a part of the communications network, keeping the operability of others. It is viable to use common tunnels combining several types of communications to save resources for the construction or repair of retention structures.

One of the aspects of smart city functioning is the automation of not only communications but also most of the economic infrastructure facilities designed for comfort living, which is based on energy saving and free access to the control of these structures by the local community. On the one hand, it can make automation systems less secure; on the other hand, automated systems should have control systems with the expectation of education and consciousness of local residents, enhancement of their cultural level and responsibility, which can be controlled

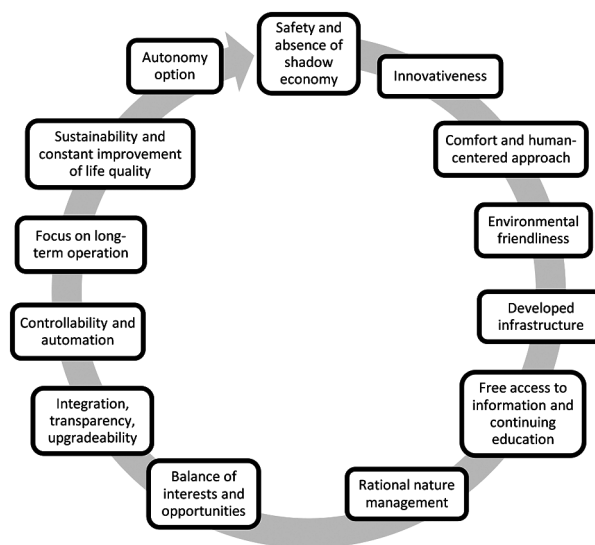


Fig. 2. Principles of green cities for Ukraine

at the initial stages of implementation by the corresponding local authorities and community leaders that have to create a system of rules and penalties in case of non-compliance.

The main areas of innovation adoption include communications networks, services sector, security and data protection services (Fig. 3).

Fig. 3 shows that strategic planning, state-of-the-art solutions and coordinated work of project managers and executives can substantially improve public welfare functions in all development areas, which will encourage the return of the population to home cities and attracting investment in projects.

Key financial sources of the renovation of Ukrainian cities can include local and state budgets of Ukraine, assistance of developed countries and experience of their leading masters (government sector, public services, ministries, etc.), support of private entrepreneurs worldwide that can provide both technological equipment and financial resources, donations, charity organizations, financial and currency institutions that can finance ecological projects (EBRD, World Bank, etc.), participation in grant programs and contests, crowdfunding, etc. To live in an innovative city, each resident will have to pay a donation to city renovation (no more than 100 USD per person) in order to increase the responsibility of all residents while constructing, adopting technologies and controlling the quality of work.

One of the factors in successful development and implementation of the project will be the active participation of citizens in city upgrading, public initiatives, the possibility to digitalize the majority of life spheres and apply artificial intelligence equipment, as well as the ability to use the maximum number of smart green city opportunities by most citizens, including people with inclusive and special needs.

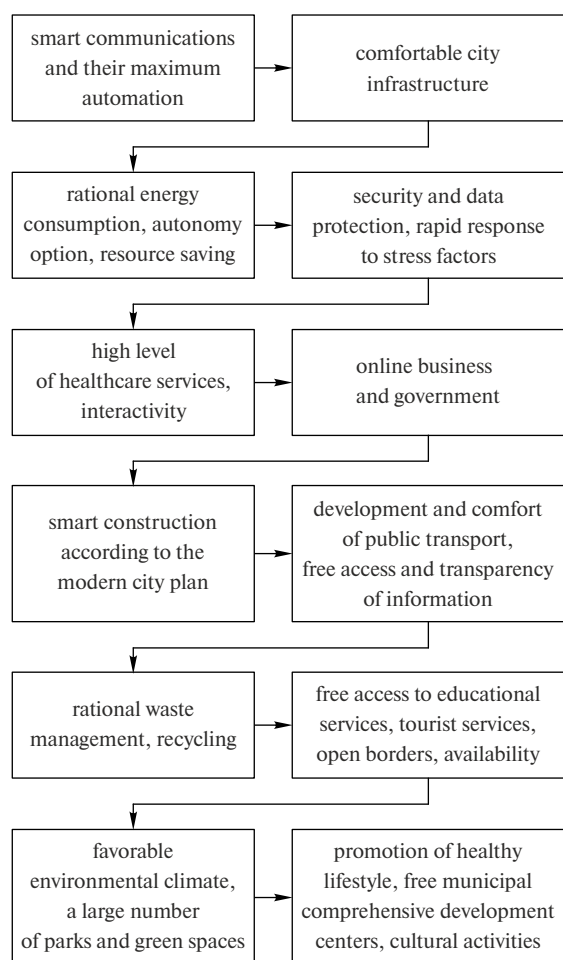


Fig. 3. The main areas of innovation adoption while reconstructing Ukrainian cities in the post-war period

Let us consider the example of an innovative green city with an estimated number of citizens of about 250 thousand people. In the model calculation, the comfortable population density in Ukrainian cities should be about 1700 people per sq. km. The calculated area of the city is 130 sq. km. To ensure comfortable coexistence of residents, the area of green spaces in the innovative city should be about 50 % of the city area or at least 50 sq. m. per local citizen. When calculating the area of green spaces for the green city in Ukraine characterized by good climatic conditions for various types of vegetation and favorable environment, it should be about 65 sq. km.

One of the particularities of Ukraine's future green cities should be enhanced safety of buildings and facilities. Thus, it is viable to equip each building with the underground shelter in case of danger, which should be maintained in proper conditions and fitted with all items required to exist for a long time, connection, free Internet access, stuff to overcome crisis situations. To improve the national economic state and comfort, one should allocate first floors and basement rooms for businesses that would be easily transformed into air-raid shelters and constantly monitored by local residents.

Automated systems for controlling climatic conditions and conditions for improving the reliability of life support systems are obligatory. Buildings of Ukrainian cities should be made of fireproof, reliable, long-lasting materials with protection systems against negative effects of noise, vibration and radiation, as well as adapted to Ukrainian climatic conditions. Developed countries with high risk factors use monolith-brick construction, which is quite long in building, but more reliable and better for living. The average height of buildings should be 5 floors to improve reliability, since buildings 9 floors and above create increased risks for habitation.

An obligatory condition for the innovative city is the use of autonomous natural energy resources by all residents. It can be the combination of solar and wind household power plants with the energy storage option located on the roof according to the European principle.

The integration of businesses, services and living spaces will increase comfort and reduce travel time, which will positively affect traffic congestion to make the road infrastructure convenient by designing roads given an increasing number of vehicles, bicycle lanes and separate lanes for municipal transport with the possibility to upgrade the infrastructure in case of introducing new means of public transport. The road surface should be constructed using state-of-the-art technologies, taking into account experience of leading countries in equipping roads with solar panels, smart light markings, magnetic sensors, heat storage systems, automated rapid response systems, etc. The development of suspended rail transport and modern subway line is also viable while developing the post-war construction project as an alternative to land-based electric vehicles and engine-based transport using hydrogen as fuel.

When planning the urban infrastructure, one should pay attention to the availability of takeoff and landing sites for helicopters in the city and promotion of lightweight and small-sized state-of-the-art eco-friendly flying vehicles for private use.

The green Ukrainian city should efficiently use available land areas to enhance their productivity in the country and use recreational areas and landscape parks as the best agricultural production alternative, which should be well maintained and widely popular in other territories of Ukraine similar to the Swiss principle, in order to restore the ecosystem after military actions and promote green tourism in Ukraine.

The smart city is an integrated model describing sustainable development and appropriate to use, which has four indicators changed by the time: population ($x(t)$), per capita production ($y(t)$), natural treasures ($z(t)$), emission of pollution per production unit ($p(t)$).

To reconstruct Ukrainian cities, this model can be supplemented by a generalized indicator of innovation introduction (I_n) characterized by the share of financial investment in the

structure of total investments in the development of science and technology (Na), which can be further determined by the number of patents, licenses and scientific works, innovativeness of constructing infrastructure facilities (Ii) that can be defined by calculating the share of innovative projects (patented within the past 10 years) in the general structure of infrastructure development, innovative business development (Bi) in the general structure of city entrepreneurship, freedom index (Si), which together form the innovativeness function (f) for a certain period of time (t).

$$In = \frac{\left(\sum_{i=1}^n (In + Ii + Bi + Si) f \right) df}{dt}$$

If x, y are $[0; \infty)$; z, p are $[0; 1]$, then state variables change in the discrete time according to a recurrence environment where the subsequent iteration of each indicator is characterized by certain changes (g), which can describe the consistency of the given populated area.

$$g(x, y, z, p) = \frac{z^{e^{dzp} - w f(x, y, p)} \cdot i}{1 - z}$$

According to the Wonderland model, the solution contains 15 other parameters, some of which are w, d, p , showing demographic changes in society and other indicators, although this model offsets innovative changes that are fundamental in designing the green city.

The function depending on the sum of the indicators analyzed above can describe the state of the populated area (E) where environmental degradation should be unprofitable while the use of outdated technologies should be taxed proportionately with the increase in their useful life for their prompt replacement and disposal.

$$E = f(In, g, s),$$

where s is a generalized indicator of political and economic stability in the country, showing the impact of external factors on this populated area. In the best-case scenario, $s \rightarrow \text{const}$, namely

$$\frac{\Delta S}{\Delta t} = \frac{f(s + \Delta s) - f(s)}{\Delta t} = 0.$$

Analyzing the global experience, we can say that in the model value, indicators of function $f(s)$ can be liquidity, inflation, capital adequacy, return on assets, risk sensitivity, international relations (export and import balance), political independence and availability of independent electoral procedures in local authorities and national government according to the stipulated schedule with maximum adequacy of obtained data [12]. When dividing indicators into directly proportional and inversely proportional to the economic growth, it is reasonable to take into account the inflation index that will reduce the economic efficiency of green city functioning and the net present value that will grow along with regional economic development in the favorable scenario [18].

When creating an innovative city, the basis of economic stability will be the sphere of services, science and research, the sphere of development of innovative, technology-intensive projects. According to the model, this will be able to reduce the load on the ecosystem by 73 % compared to the pre-war period, and increase capital turnover by 18 % when building an innovative city that would constantly create a product for both domestic and foreign markets, attracting investments.

At the stage of city development within the first ten years, indicators that will illustrate the economic growth can include the increase in the productive population, the increasing level of innovations, more green spaces, increasing per capita production rates, more or better natural treasures, increased freedom and transparency of data, etc. At the same time, inversely

proportional indicators will include pollution per production unit, external and internal instability, the growing level of the shadow economy, poorer access to education, public infrastructure facilities and other negative trends that will affect the macroeconomic indicators of the populated area.

The general strategy for green city construction, which includes the above-mentioned indicators at the model value, should maximize the public welfare function that will, in this case, exceed incomes from investment in the project.

$$W(U_1, \dots, U_n) = \sum_{i=1}^n U_i > II(E, r, tin) + I.$$

where U is the lever of usefulness for the individual in the populated area; II is investment improving urban stability, developing and adopting innovations, creating green spaces and modern recreational areas (r), reducing the shadow economy and increasing information transparency, reflecting promptly changes in the populated area (tin); I is other types of investments in green city construction, improving its competitive ability, rationalizing the use of resources and creating comfortable living conditions.

$$\left(\frac{\Delta W}{\Delta t} \right) > \left(\frac{\text{Profit} - (II + I)}{\Delta t} \right). \quad (1)$$

Inequality (1) shows that the coefficient of return on investment at the time interval (where Profit is the income of project investor) in green city construction can be less than the change in the public welfare function. Thus, it is appropriate to apply several methods of project financing, particularly assistance in national renovation without guaranteeing return on investment in order to improve the efficiency of the project strategy, as when relying only on a private investor's funds and local residents' contributions, there is a risk of stopping the project financing at a certain stage of construction or monopolization, shadowing of the project aimed at the public development of territories.

Analyzing the realities of the pre-war Ukrainian economic system, one suggests creating automated external resources with real-time access to most information about green city renovation for national governments and non-governmental organizations engaged in the building process to control work performance, ensure the transparency of all construction and purchase stages [13].

Developing the concept of trust between authorities, businesses and society is one of the key objectives of Ukrainian leaders. Therefore, the adoption of information common integrated systems in city management is one of the aspects of creating green cities, which can be exemplified by Barcelona that has successfully launched the Sentilo cross platform.

The responsibility of each resident supposes the creation of social cybersecurity combined with other systems of green city cybersecurity and protection based on increasing cultural and educational potential of citizens, their interest in improving life quality, creating opportunities for fulfilling their potential [19]. The launch of complex automated infrastructure facilities and systems will increase the number of people who have specialized education and obtain payment for improving the quality of city functioning, which will also affect public responsibility for actions in the city and can encourage the introduction of educational courses in the development, management and application of cutting-edge technologies.

The improvement of life quality is also accompanied by the increase in financial security and increase in the level of gross domestic product per capita.

Let us consider key tools for profit generation in the green city that will function in Ukraine in the post-war time (Fig. 4). The funds raised in the first five years are expected to remain in the local budget and be used to reconstruct the city.

Taxes (simplified tax policy, tax reductions zone)	Penalties and fees for non-compliance with specified rules and requirements of the city administration	Rental fee for the use of subsoil and resources	Excise taxes	Environmental fee
Transport fee (including payment for parking places)	Fees for patents, licenses and certificates	Rental fee for the use of public property	Fee for the importation of dangerous goods	One-off fee when employing citizens for city beautification
Profit from the sale of inventions, products by state innovation enterprises	Participation in grant programs, aid to the city and donations from other countries or organizations	Income from stable financial institutions (Swiss example)	Tourist fee	Development of state innovative services (own state exchange, creation of interactive city for those who are not at home game, etc.)
Saving of natural resources and costs due to rational nature management	Sale of environmental quotas	Reduced expenses for the healthcare system and ways to keep people employed by improving the environment and reducing stress factors	Income from a recycling and waste management company	

Fig. 4. Tools for filling the local budget of Ukraine's green city

Fig. 4 shows that unlike traditional cities, green cities have more possibilities for creating reserve funds of the populated area and financial opportunities that can be used for further development. Green technological cities will provide Ukraine with the inflow of investments enhancing its economic potential, more tools for implementing innovative projects, as well as proper conditions to return educated and initiative people.

Discussion. However, the renovation of Ukrainian green cities is possible only with the ideological and transparent authority system that will do its best to improve modern Ukraine. Since Ukraine had an increased level of shadow economy (31 % in 2021 according to the State Statistics Committee (2022)) and corruption, which indicates the prevalence of selfish values over public ones, it will be necessary for the authorities to impose a tough position and advanced legislation in the post-war period to increase the liability for economic offences. One should change cultural benchmarks aimed at the intolerance of corruption and the desire of each individual to increase the public welfare function due to democratization and transparency of relations between business entities. For example, each enterprise of the green city is expected to sign the Anti-Corruption Declaration when registering, non-compliance with which will result in administrative and criminal liability according to the system of fines and penalties. At the same time, one should create an incentive system for non-corruption enterprises by reducing the tax burden and proving special conditions for international development. All data on incomes and property rights of residents and employees should be publicly available and constantly updated in order to monitor economic activities. All of this should be accompanied by increasing trust in law enforcement and local authorities that would operate in the green city on the rights of autonomy to ensure better development of these territories within at least the first five years of the establishment of the populated area in the post-war period.

Conclusions. Renovation management can contribute to the achievement of sustainable development of war-torn urban infrastructure, taking into account economic, social and environmental aspects. Therefore, the direction of recreating on

the site of war-torn smart green cities, characterized by the increased level of innovativeness, transparency and rational nature management, which is relevant while restoring territories destroyed by military actions in Ukraine and is economically viable. Gradual degradation of the Ukrainian ecosystem in the pre-war period and destructions caused by military operations have created conditions for the beginning of the ecological disaster in destroyed cities and require the immediate solution by changing the principles of ecological, economic and social policy, stabilizing the environment and applying innovations to reconstruct destroyed populated areas. Using the concept of "smart green city", which has a number of advantages over the traditional city, will attract investment to the country and return the majority of citizens to Ukraine.

The main principles of building Ukrainian cities in the post-war period are based on reducing risks to society, strategic planning, cutting-edge solutions, coordinated work of authorities and residents, transparency, maximum freedoms and responsibilities for all business entities. The developed concept of future cities based on the Wonderland model is integral and has a long-term positive effect, which will increase benefits for each individual and contribute to the development of both a particular city and the state in general.

The possibility of continuous promotion and modernization is possible on the basis of autonomous management of a green city through the allocation of financial resources through the local budget of the settlement for the effective use of available funds. Global experience of leading countries and effective cooperation on the restoration of Ukrainian territories are providing favorable conditions for investment in the project and its successful implementation along with coordinated and transparent activities of the authorities, businesses, population, international organizations and government agencies.

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Інвестиційний менеджмент і фінансове забезпечення реновації інфраструктури сталого середовища

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Мета. У роботі обґрунтовано підхід до управління відновленням екосистем територій та оновленням інфраструктури з використанням інвестиційної підтримки й раціоналізації ресурсів на основі фінансового розвитку сталого середовища.

Методика. Методологія базується на дослідженні інвестиційних і фінансових ресурсів, що можуть бути використані для відновлення зруйнованої інфраструктури, і виконана з використанням аналітичних методів оцінки витрат на реновацію інфраструктури, статистичних методів аналізу даних про стан екологічної та економічної систем, а також методів математичного моделювання й балансу для формування моделі зеленого міста.

Результати. Проаналізовано інвестиційний потенціал України та зроблено висновок щодо доцільності реалізації проекту підвищення економічної ефективності «смарт» зелених міст, що створює передумови для подальшого оновлення інфраструктури в Україні. У дослідженні розкриті ключові економічні та екологічні проблеми України, запропоновані шляхи їх подолання й запропонована модель розвитку зруйнованих військовими діями територій. Запропоновано підхід до оновлення території, що базується на відновленні екосистем регіонів і міст, створенні комфортних умов для повернення громадян на батьківщину.

Наукова новизна. У роботі окреслені основні принципи відновлення зруйнованої інфраструктури на основі енергоефективності та екологічності. Розглянуті можливості фінансування екологічних проектів у післявоєнному відновленні господарського комплексу.

Практична значимість. Запропонований підхід дає змогу оцінити інвестиції в оновлення інфраструктури й забезпечити ефективне управління фінансовим розвитком в екологічно безпечному середовищі.

Ключові слова: інвестиційний менеджмент, реновація, інфраструктура, зелене місто, раціональне природокористування

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