

Favorable Prospects for Green Recovery and Sustainable Development in Ukraine: Cases and Directions of Research

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ABSTRACT

In 2015, UN member states announced their commitment to accelerate the implementation of measures necessary to achieve the Sustainable Development Goals (SDGs). At the national level, these goals must be achieved by 2030. Ukraine was also one of those countries that introduced approaches to the participation and integration of the SDGs into national policy. There are 17 SDGs in total. The basic principles of green construction contribute to the achievement of 9 of the SDGs. Considering the significant destruction caused by the war in Ukraine, as well as taking into account a significant number of buildings and structures that did not meet the requirements of any modern standards of energy-efficient and ecological construction even before the start of hostilities, our cities, both now and after the end of the war, can become an attractive platform for foreign investment for the widespread adoption of green building technology and sustainable development, with a special emphasis on meeting high standards of inclusivity, safety and accessibility. This is what opens wide and favorable prospects for Green Recovery and Sustainable Development in Ukraine. At the same time, at all stages of Green Recovery, domestic design engineers and builders must adhere to the "Build Back Better" approach, as well as intensively implement the latest technologies of design, recovery, reconstruction, repair, restoration and new construction using advanced and already proven results of scientific research in construction and architecture. In addition, experts in the construction industry should maintain close contact with colleagues and scientists from other countries of the world to adopt the best practices and experience of recovery of buildings and structures, as well as to implement a sustainable circular economy of construction based on a comprehensive assessment of the life cycle of architectural objects and structures.

Keywords: Green Recovery, Sustainable Development, Sustainable Development Goals (SDGs), "Build Back Better" approach, life cycle of architectural objects, circular economy, inclusivity, safety, accessibility.

1. INTRODUCTION

In 2017, the Institute of Socio-Economic Research, with the support of the United Nations Development Program (UNDP), published the results of an analytical assessment of state strategic documents regarding the inclusion of the Sustainable Development Goals (SDGs) adapted for Ukraine until 2030 [1]. This document, among other things, outlined the challenges for Ukraine in relation to the SDGs, as well as the investment advantages of our homeland, as the 2nd largest European country. Among these advantages, the following were also noted: 1) competitive, well-educated, qualified personnel; 2) Ukraine's strategic location at the crossroads of East-West and North-South trade routes; 3) Ukraine is and will always be a profitable platform for production and export, taking into account the extensive transport infrastructure with the railway system, Black Sea ports and Pan-European transport corridors; 4) developed industries with strong technical capabilities; 5) high concentration of specialized knowledge in the network of universities and research institutions, which ensures high innovation potential; 6) large volumes of natural resources: 1/3–1/4 (according to various estimates) of the world reserves of chernozem (black earth), 5% of minerals from the world volume (more than 200 types of raw resources - coal, iron and manganese ores, sulfur, mercury, titanium, uranium, granite, marble, mineral salts, gypsum, alabaster, etc.) and many others.

Unfortunately, due to the start of the war, Ukraine temporarily lost part of its territories, natural resources, production capacities (in the eastern and southern regions) and personnel potential (due to the outflow of the population to western countries and the loss of people who died as a result of the war) [2]. However, even in spite of this, all the above-mentioned advantages in general still remain to a large extent and in themselves are a powerful base for the development of many branches of industry, science and technology, and especially the construction industry.

In 2023, UNDP, in cooperation with the Kyiv School of Economics, prepared the Guiding Principles and Tools of the Green Restoration of Ukraine [3]. This analytical document is aimed at the systematization and generalization of the guiding principles of achieving a common vision of the recovery process of Ukraine and its components. According to him, the main tool currently used by Ukrainian and international stakeholders in reconstruction is the concept of "Build Back Better", which primarily involves the implementation of the principles of sustainable and green recovery/reconstruction.

It should be noted that the construction sector, being not only the biggest consumer of energy and material resources, but also one of the branches of industry that is developing very rapidly and needs the involvement of the most modern technologies and the results of scientific research, should become, in the literal sense, the flagship of Green Recovery. And it is the construction industry that has the most favorable prospects for this.

2. PURPOSE OF THE WORK

Highlight all favorable prospects for Green Recovery and Sustainable Development in Ukraine now and after the end of the war. To demonstrate the most successful examples of the implementation of the "Build Back Better" concept in Ukraine in the field of design and construction.

3. MAIN PART

By definition, Green Recovery is the process of overcoming the consequences of various emergency situations and/or war by improving the living conditions of both the current and future population of the affected area in a way that mitigates climate change, helps adapt to climate change, and reduce the negative impact on the environment, preserve biodiversity, ensure clean air, water and soil. The construction sector plays a special role in

the Green Recovery of Ukraine. And in order to understand why this is so, it is worth simply looking at the balance of the average consumption of thermal energy by various industries. The volume of thermal energy production in Ukraine over the past 10 years averaged about 270 million MWh (232 million Gcal), of which about 182 million MWh (156 million Gcal) were produced in boiler centralized heat supply systems, which accounted for more than 67% of total consumption. That is, 67% was consumed by residential and public buildings. Energy consumption during production, delivery, installation in the design position, dismantling and disposal of construction materials and equipment should also be taken into account separately.

Green Recovery can only be realized through the introduction of a circular economy, which is largely based on the achievement of all 17 SDGs. And at the same time, the basic principles of green construction contribute to the achievement of 9 of the SDGs. The basis of green construction itself is the assessment of the Life Cycle of the Buildings. In the last century, in the framework of buildings designing, architects and engineers did not assess life cycle of the construction objects. Such an assessment of life cycle allows taking into account the potential for improvement, integrity and effectiveness of the projects. In addition, the construction regulatory framework of Ukraine has practically no requirements that would ensure compliance with the principles of green construction and sustainable development (with the exception of energy efficiency requirements).

One of the first initiatives in the direction of creating a regulatory framework for compliance with green construction standards was the development of the first national Standard of the Organization of Ukraine (SOU) "Public Buildings. Ecological criteria and method of life cycle assessment at the stages of design and construction" (08.002.41.032:20XX), developed in cooperation between the Kyiv National University of Construction and Architecture (KNUCA), the NGO "Living Planet" and the national technical committee for standardization TS 82 "Environmental Protection". This SOU is currently undergoing public discussion and the procedure for its entry into force will begin in the near future. The development of this standard became a good example of successful cooperation between representatives of science, education, industry, international donors and technical regulation in the field of construction and architecture.

Today, despite all the difficulties and challenges, Ukraine has favorable prospects for a Green Recovery:

- A. The presence of a large number of outdated, damaged or destroyed buildings, as well as damaged public spaces, in the restoration of which the basic principles of green construction can be applied.
- B. A nationwide course on integration with the European Union, including the transition to European Union's standards in construction and architecture.
- C. Priority of energy efficiency, energy and environmental safety, as well as independence in the energy supply of buildings and structures.
- D. Growing interest in green topics both among professionals and the general public.
- E. The possibility of developing and re-applying unified (typical) design solutions with improved environmental indicators and a high level of energy efficiency.
- F. The possibility of practical application of the results of scientific research and modern construction technologies in the reconstruction of territories affected by the war.
- G. The need to place a large number of protective shelters in buildings and public places, which requires a comprehensive rethinking of project decisions both in civil construction and in urban planning.

Already now, within the framework of international technical support projects and development programs in Ukraine, the

development and implementation of green construction concepts is being carried out not only in relation to buildings, but also public spaces and centralized energy supply systems for districts and entire cities. Safety and accessibility play one of the key roles in these concepts. Just a few examples.

The UNESCO and UNDP demonstrates a very effective approach to the restoration of educational institutions and inclusive resource centers (IRCs). As part of their project this UN agencies repairs schools, kindergartens and IRCs, that were damaged as a result of the war. However, UNESCO and UNDP not only performs restoration work according to the results of the technical inspection, but also conducts energy audits of buildings in order to maximize the level of energy efficiency of the buildings through their partial thermal modernization.

One of the most demonstrative cases of the implementation of green restoration projects in Ukraine is the development of typical (reuse) projects of energy-efficient schools and kindergartens with improved environmental performance. The project is implemented jointly with the Ministry for Restoration of Ukraine, the German Agency for International Cooperation (GIZ), NGO "Living Planet" and KNUCA. The main idea was to design maximally energy-efficient and ecological projects of schools and kindergartens using the most successful experience of implementing similar projects of the past years, but applying the most modern architectural, constructive and engineering solutions and technologies, including alternative energy sources. In the design process, there were used complex numerical modeling of the building's energy balance and optimization of its global architectural solutions using AI and computer modeling tools based on discrete applied geometry.

Another project of green recovery, related to providing the safety of public spaces, was implemented within the framework of the technical support Project "Good Neighbors – One Country" of USAID with the participation of the NGO "Municipal Development Institute". One of the tasks of this project was the development of concepts for the reconstruction of buildings and public spaces that were damaged as a result of the war. The recovered locations had to have a high level of energy efficiency, low operating costs and an increased level of accessibility and safety of people. Developed concepts for the reconstruction of public spaces included placement of underground and above-ground shelters on their territory. At the same time, the modeling of the trajectory of people's movement were performed in order to minimize the length of the pedestrian roads leading to the shelter.

4. CONCLUSIONS

The demonstrated examples further testify to the perspective and effectiveness of the implementation of Green Recovery and Sustainable Development measures in Ukraine both before and after the end of the war.

Reference list

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