

Actions to meet the needs for sustainable reconstruction of Ukraine

from

iiSBE, the International Initiative for a Sustainable Built Environment and
several individual experts

to

The Government of Ukraine, Ukrainian professional associations, UNEP and the European Union

14 August 2022



Contents

Introduction	3
1. Current conditions and issues	6
2. Local and regional proposals for sustainable reconstruction of Ukraine	26
3. Actions for sustainable reconstruction proposed by iiSBE	40
4. Conclusions	65
Appendix	
Local proposals for Sustainable reconstruction of specific urban regions	66

Authors and Contributors

Author / editor: Nils Larsson, Architect and Executive Director of iiSBE, Ottawa, Canada

The following individuals, most of whom are iiSBE members, have contributed to this draft.

Dr. arch. Andril Koniuk, National University Yuri Kondratyuk Poltava Polytechnic, Ukraine

Dr. arch. Kajetan Sadowski, Wroclaw University of Science and Technology, Poland

Dr. Antonin Lupisek, University Centre for Energy Efficient Buildings, Czech Technical University in Prague

Nika Trubina, University Centre for Energy Efficient Buildings, Czech Technical University in Prague

Dr. André Ullal, Scientific Collaborator, Laboratory of Construction and Architecture FAR, Fribourg, Switzerland

Dr. John Harker, LL.D, Nova Scotia, Canada

Boguslaw Witkowski, Architect, Brussels

Dr. Greg Foliente, President of iiSBE, University of Melbourne, Vic, Australia

Ann Edminster, M. Arch., California USA

Dr. arch. Woytek Kujawski, ISG, Ottawa, Canada

Brian Hierlihy, Heritage Architect, Ottawa, Canada

Dr. Ruben Paul Borg, University of Malta

Anatoli Nikoula, Ottawa, Canada



For further information, contact Nils Larsson larsson@iisbe.org

www.iisbe.org

Introduction

The *International Initiative for a Sustainable Built Environment* (iiSBE) is a small international non-profit networking organisation with main locations in Australia, Canada, and Italy. We have 196 members in 31 countries who are primarily experienced academics and professionals with strong interests in building research, the environment and climate change.

The invasion of Ukraine by Russia has aroused almost universal condemnation and the conflict has led to widespread destruction of urban infrastructure, transport networks and buildings, despite Russia's stated aim of focusing on military targets.

When hostilities cease, Ukraine will face the task of rapidly launching a massive reconstruction process.

Major international efforts are underway to raise funds for this purpose and we have no doubt that this effort will succeed. However, there is a danger that in the understandable haste to begin reconstruction efforts insufficient attention may be paid to the need to integrate energy, environmental and climate change factors with these plans. Our intent is to remind decision-makers that such issues must be taken seriously at the outset if the country is to cope with energy supply and climate change impacts in the future.

This is not just a matter of minimising negative outcomes. The integration of energy, environmental and climate change considerations into this process will have major long-term benefits for the Ukrainian people and economy, including improved living conditions, a stronger competitive position in the region and conformity to EU policies.

Introduction

In view of such factors we have prepared this file to address several key issues: to recognize the severe human and physical damage caused by the Russian invasion of Ukraine, to identify a few of the urgent and long-term reconstruction needs, to outline some views and initiatives of domestic organisations, and to emphasise key energy and environmental principles that must, in our view, be considered during reconstruction in the face of climate change impacts. The emergence of climate change is a slow-moving but huge and inevitable factor that looms in the background.

Even our limited knowledge of Ukraine's history and current situation is enough to make us aware of the country's historical dependence on Russian gas imports and the low priority given to energy and environmental factors in the past.

Energy, environmental and climate change impacts must be tabled in advance if they are to be considered when decisions related to planning, funding and implementation are made. We therefore hope that those placed in charge of reconstruction efforts will recognise the facts and issues that we bring to their attention in this document.

1. Current conditions and issues

Urban areas in Ukraine, 2022



Historical energy problems in Ukraine

Issues related to natural gas imports to Ukraine from Russia have varied over time and are exceedingly complex, involving not only energy costs and agreements, but also trade-offs with other non-energy issues. The following excerpt from Wikipedia provides some excerpts which underline the need for Ukraine to become more independent of Russian supplies in the future.

Ukraine's own annual gas consumption in 2004–2005 was around 80 billion m³, of which around 20 billion m³ were produced domestically, 36 billion m³ were bought from Turkmenistan, and 17 billion m³ were received from Russia in exchange for transport of Russian natural gas. The remaining 8 billion m³ were purchased from Russia.

The gas trading system differed substantially from the gas sale to the European Union and caused problems in the form of large-scale deliveries of relatively cheap Russian gas causing an increase of energy-intensive industries and supporting **Ukraine's status as one of the world's least energy-efficient countries and largest gas importers...**

https://en.wikipedia.org/wiki/Russia–Ukraine_gas_disputes

Major urban areas under attack, March 2022



Ukraine - Complex Emergency Fact Sheet #17, Fiscal Year (FY) 2022

Format Situation Report: Source: [USAID](#), Posted: 27 May 2022, Originally published: 27 May 2022

SITUATION AT A GLANCE

4,031 Civilian Deaths Resulting from the Conflict OHCHR – May 2022

6.7 MILLION Refugees Fleeing Ukraine to Neighboring Countries UNHCR – May 2022
MILLION People Internally Displaced Across Ukraine IOM – May 2022

8.7 MILLION People Identified to Receive Humanitarian Assistance in Ukraine UN – April 2022

6.9 MILLION People Reached by Humanitarian Actors in Ukraine UN – May 2022

The GoRF invasion of Ukraine displaces nearly 15 million people, bringing the total number of individuals displaced globally to approximately 100 million people for the first time in recorded history.

Persistent GoRF bombardment of Luhansk Oblast's Severodonetsk city and nearby areas in eastern Ukraine hinders civilian evacuations.

The GoRF renews attacks on Kharkiv Oblast's Kharkiv city, as the countrywide civilian death toll surpasses 4,000.

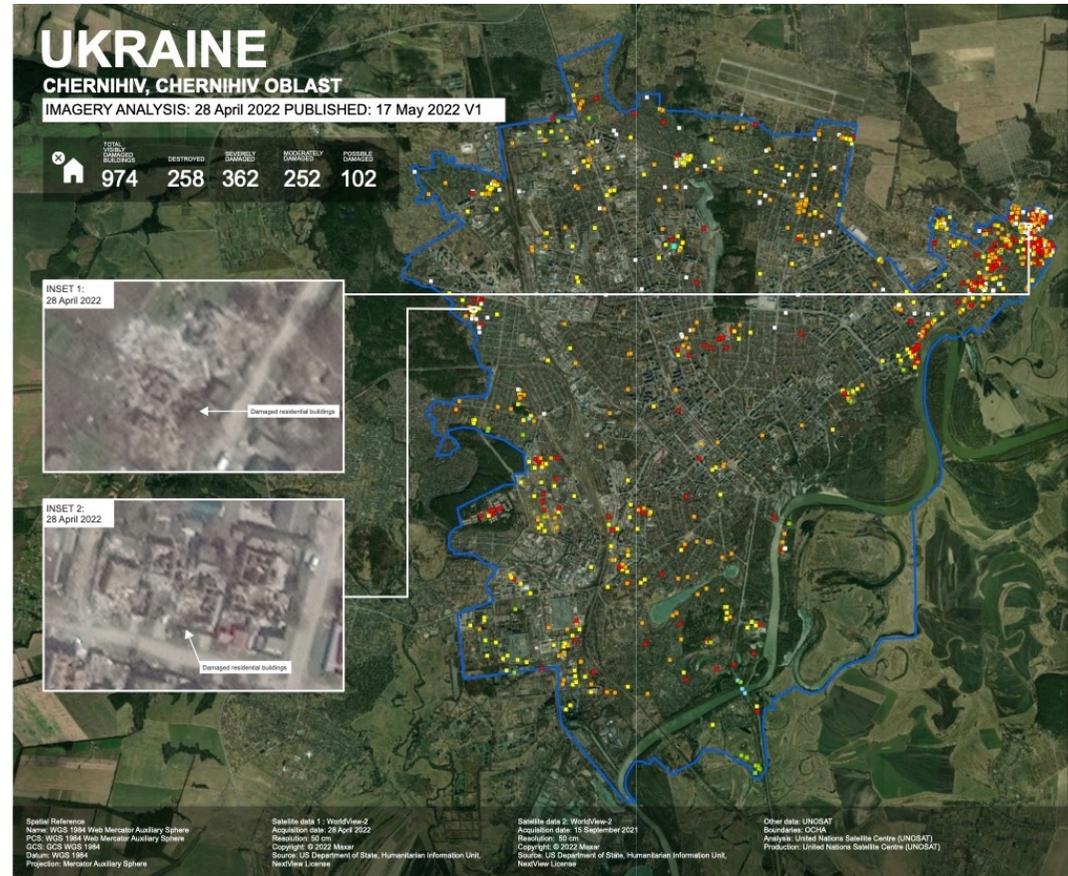
International donors—including the USG— mark three months since the GoRF invasion with a joint statement calling on parties to the conflict to protect civilians and humanitarian aid workers.

UNOSAT Damage Assessment Overview Map - Ukraine: Chernihiv, Chernihiv Oblast

Imagery Analysis: 28 April 2022 Published: 17 May 2022 V1 *

This map illustrates a satellite imagery based building damage assessment in the city of Chernihiv. Based on imagery collected on 28 April 2022, analysis shows that 974 structures sustained damage visible in the satellite imagery. Out of these, 258 are destroyed, 362 severely damaged, 252 moderately damaged and 102 possibly damaged. While no complete count of buildings for Chernihiv is available, an open source dataset which is visibly incomplete indicates at least 17,383 structures in the area.

This analysis is based on structures visibly damaged as of 28 April 2022 as seen in marginally degraded satellite imagery affected by light clouds and other limiting factors.



* This is a preliminary analysis and has not yet been validated in the field. Please send ground feedback to United Nations Satellite Centre (UNOSAT).

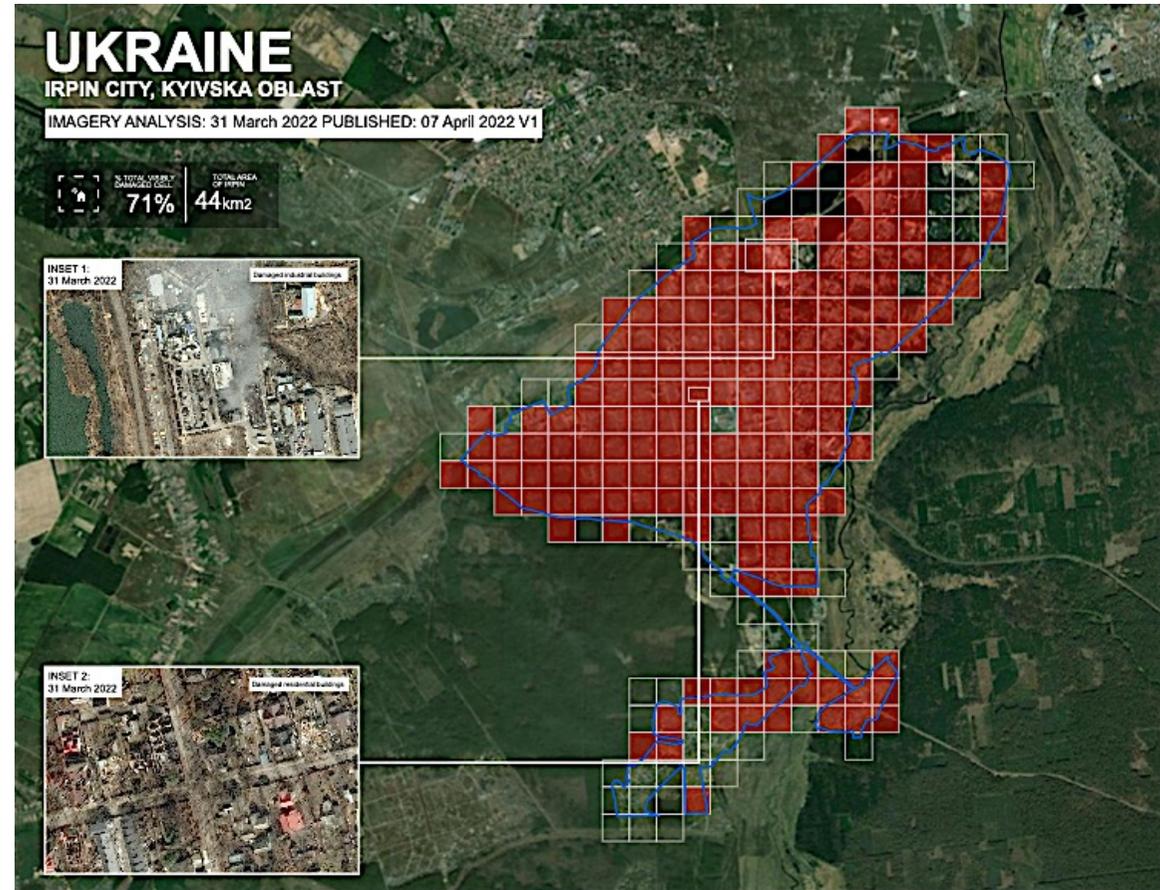
UNOSAT Damage Assessment Overview Map - Ukraine: Irpin City, Kyivska Oblast

Imagery Analysis: 31 March 2022 Published: 07 April 2022 V1 *

This map illustrates a satellite imagery-based Rapid Damage Building Assessment (RDBA) in Irpin City, Kyiv Oblast, Ukraine. The RDBA divides the city into 500m x 500m cells, each of which is analyzed to determine whether or not there are damaged buildings inside the cell.

Based on imagery collected on 31 March 2022, analysts found that 176 cells out of 246 in the City of Irpin sustained visible damage. This represents approximately 71% of the cells over the city.

This analysis is based on structures visibly damaged as of 31 March 2022 as seen in marginally degraded satellite imagery affected by light clouds and other limiting factors.



* This is a preliminary analysis and has not yet been validated in the field. Please send ground feedback to United Nations Satellite Centre (UNOSAT).

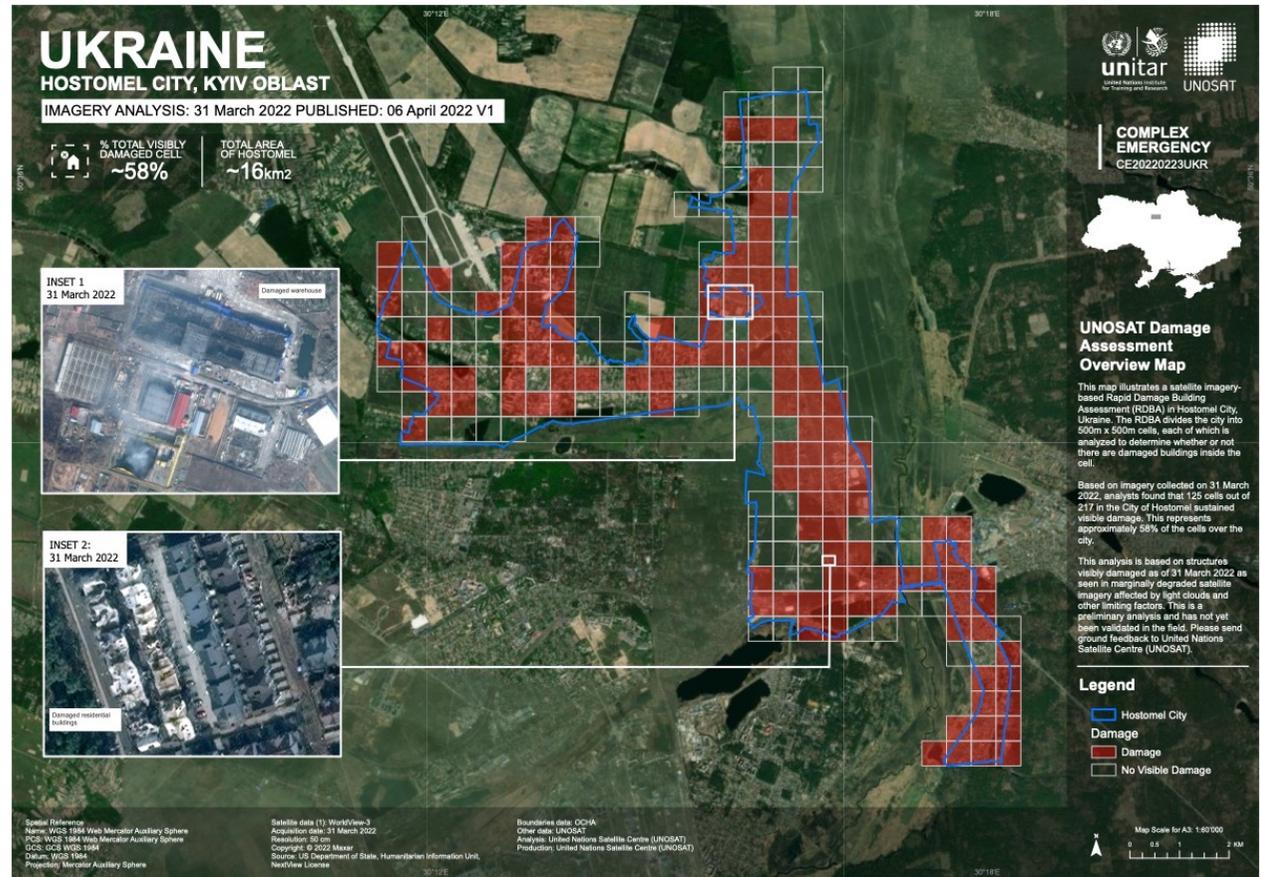
UNOSAT Damage Assessment Overview Map - Ukraine: Hostomel City, Kyiv Oblast

Imagery Analysis: 31 March 2022 Published:
06 April 2022 V1 *

This map illustrates a satellite imagery-based Rapid Damage Building Assessment (RDBA) in Hostomel City, Ukraine. The RDBA divides the city into 500m x 500m cells, each of which is analyzed to determine whether or not there are damaged buildings inside the cell.

Based on imagery collected on 31 March 2022, analysts found that 125 cells out of 217 in the City of Hostomel sustained visible damage. This represents approximately 58% of the cells over the city.

This analysis is based on structures visibly damaged as of 31 March 2022 as seen in marginally degraded satellite imagery affected by light clouds and other limiting factors.



* This is a preliminary analysis and has not yet been validated in the field. Please send ground feedback to United Nations Satellite Centre (UNOSAT).

Damaged urban areas

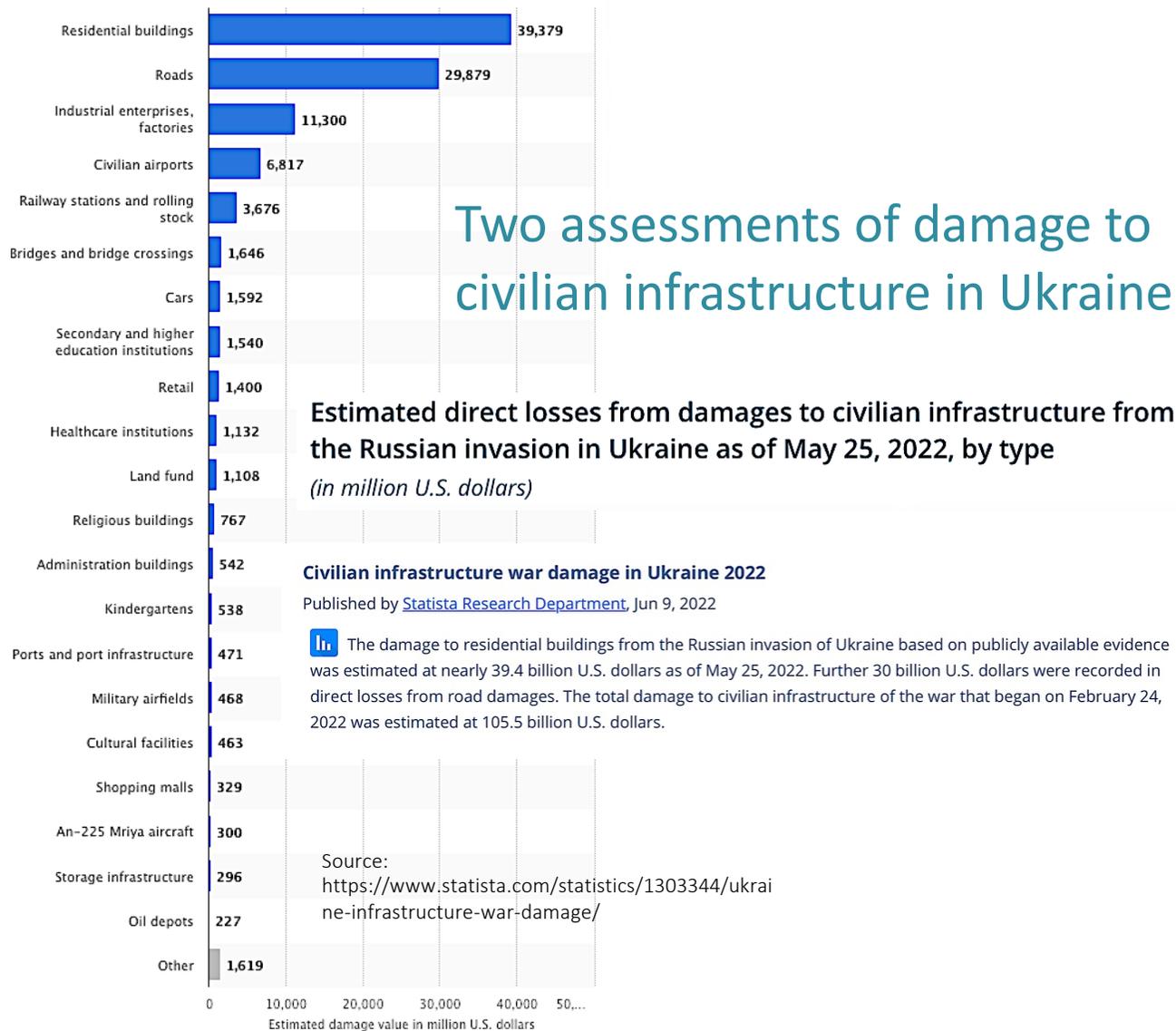


Damage in Mariupol, March 2022



The satellite images show widespread before- and after damage in Mariupol. Targets appear to be mainly residential areas, shopping centers and agricultural fields.

Credit...Satellite images by Google (before images), Planet Labs (after images)
- The New York Times



Infrastructure facilities	Number of items	Total damages, \$ mln
Roads, km	8265	\$27 546
Housing *	4431	\$13 542
Civilian airports **	8	\$6 816
Industrial enterprises, factories	92	\$2 921
Healthcare institutions	138	\$2 466
Nuclear power plants (NPP)	1	\$2 416
Railway stations and rolling stock**	n/a	\$2 205
Bridges and bridge crossings	260	\$1 452
Ports and port infrastructure	2	\$622
Institutions of secondary and higher education	378	\$601
Administration buildings	35	\$574
Military airfields	10	\$390
An-225 Mriya aircraft	1	\$300
Shopping malls	11	\$188
Religious buildings	44	\$150
Cultural facilities	42	\$144
Kindergartens	165	\$133
Thermal and hydroelectric power plants	7	\$101
Other		\$412
TOTAL		\$62 889

Source:
<https://kse.ua/about-the-school/news/zbitki-naneseni-infrastrukturi-ukrayini-v-hodi-viyni-skladayut-mayzhe-63-mlrd/>

Assessment of physical damage to Ukraine's farms

Ukraine has 102.5 million acres of farmland, much of very high quality. Ukraine produces about 20% of the world's high-grade wheat. In 2021, it had 14% of the world wheat export market. Ukraine also supplies significant corn (15%), barley (15%) and rye to Europe and exports 60% of its large production of sunflower oil and seed.

<https://blogs.ifas.ufl.edu/fredept/2022/05/17/agricultural-impacts-of-russias-invasion-of-ukraine/>

High-resolution satellite imagery acquired on March 21, 2022, shows the damage inflicted by one such confrontation in agricultural fields to the south and west of Ozera, a village roughly 20 miles northwest of the capital of Kyiv. The Kyiv oblast [accounts](#) for approximately 8 percent of domestic soybean production, 7 percent of domestic corn production, 4 percent of domestic millet production, and 4 percent of domestic rapeseed (canola) production.

Satellite imagery acquired on April 15, 2022, and [video evidence](#) from March 31, 2022, suggest a deliberate attack on a major agricultural production facility: the Agromol dairy farm in Shestakove, a small agricultural village roughly 30 kilometers northeast of the city of Kharkiv..... The Agromol dairy farm is less than one mile from the T2104 highway, a major road leading directly into Kharkiv...six of the facility's 20 larger livestock or poultry sheds suffered catastrophic damage, and an additional five sheds received significant damage. It is likely that many of the remaining buildings also suffered damage that is not readily visible... Surrounding residential areas do not appear to have suffered damages, indicating that the farm was intentionally targeted by Russian forces.

<https://www.csis.org/analysis/spotlight-damage-ukraines-farms-amid-russia-ukraine-war>



Preliminary estimates for reconstruction

Polish Prime Minister Mateusz Morawiecki recently stated that the European Union should establish a EUR 100 billion fund to rebuild Ukraine. This may be a conservative estimate. If Russia continues to bomb Ukraine at the current rate, we can expect the costs of the war to be much higher, perhaps even reaching over USD 1 trillion. On March 18, the Ministry of Economy of Ukraine estimated that the infrastructure alone suffered \$119 billion in losses due to the war.

We assume that EU, other major western governments, World Bank and IMF will provide major funding for a reconstruction program, but this can only take place when Russia has left the scene, which does not look likely to occur soon.

<https://www.atlanticcouncil.org/blogs/ukrainealert/ukraine-urgently-needs-a-multi-billion-dollar-international-fund-to-survive/>

<https://rubryka.com/en/article/cost-rebuild-ukraine/> 18 March 2022



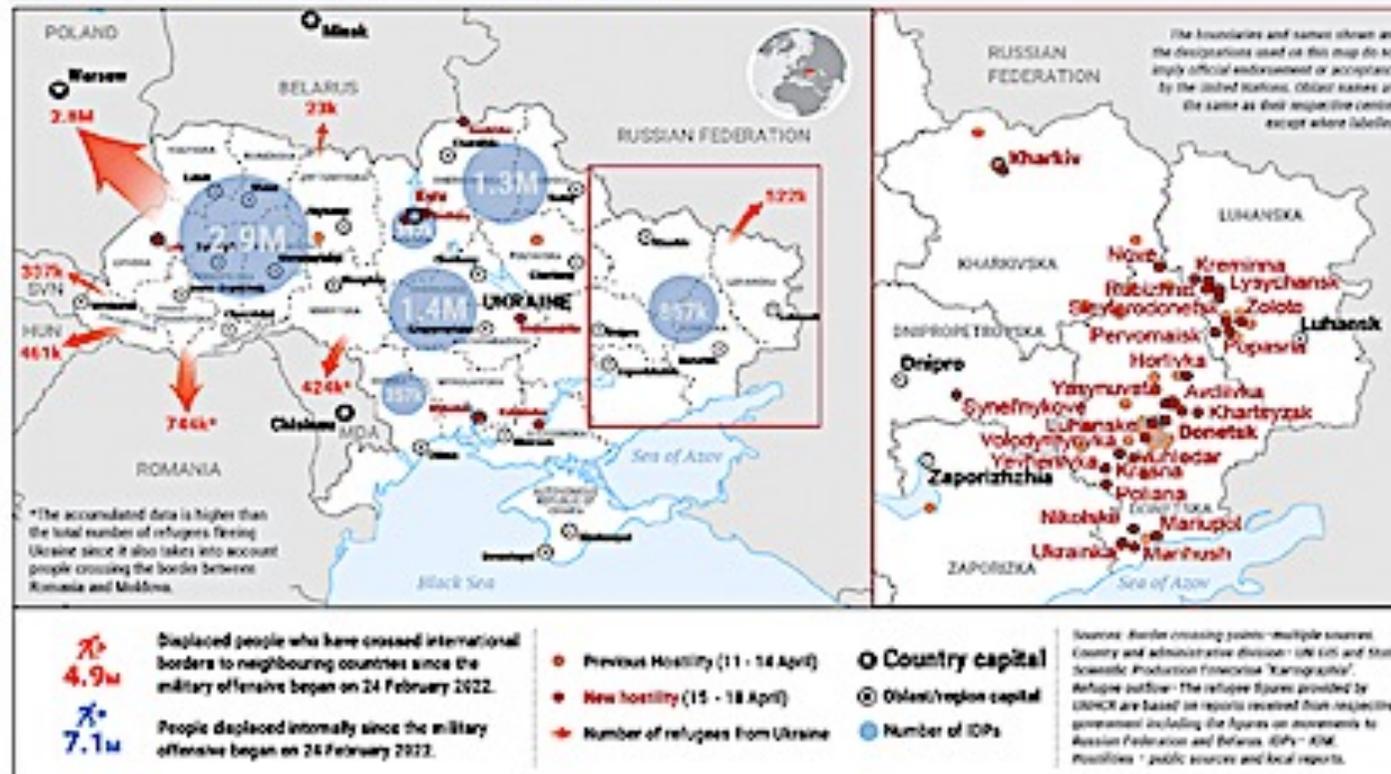
Ukraine: Humanitarian Impact

Situation Report

As of 12:00 p.m. (EET) on 18 April

This report is produced by OCHA Ukraine in collaboration with humanitarian partners. It covers the period from 12:00 p.m. on 15 April to 12:00 p.m. on 18 April. The next report will be issued on or around 21 April.

You can subscribe to receive OCHA's situation report here.



The number of people displaced by the ongoing fighting has now surpassed the 12-million mark: over 4.9 million people have crossed international borders and at least 7.1 million have been displaced internally since 24 February.



Ukraine: Humanitarian Impact

Situation Report

As of 12:00 p.m. (EET) on 18 April

Health Care:

- Attacks on health facilities continue... Cumulatively, between 23 February and 18 May, there have been 267 attacks reported, resulting in 131 reported injuries and 154 reported deaths.

.....

Water, Sanitation and Hygiene Needs:

- According to the UN Children's Fund (UNICEF), 1.4 million people are currently without running water across eastern Ukraine, and hostilities-related damage to infrastructure and power cuts put an additional 4.6 million people across Ukraine at risk of losing access to piped water.

* <https://extranet.who.int/ssa/Index.aspx>

Capabilities within Ukraine

International NGOs, including iiSBE, need to identify local Ukrainian design, production, and construction capacities for reconstruction to determine the extent to which outside organisations may be needed to contribute (NGOs, architectural/engineering firms, contractors, manufacturers).

The Architectural Chamber of the NSAU has established a Coordination Headquarters, which is working on a strategy for the reconstruction of cities and communities. A registration form (in Ukrainian) is available. The Chairman of the NAU Public Relations Commission is Kirill Chuyko at kyrylo.chuyko@gmail.com . A project of temporary housing «RE: UKRAINE SYSTEM» has been designed by an architecture and interior design studio in Kiev – Balbek Bureau. Housing will be made as modular residential blocks.

https://docs.google.com/forms/d/e/1FAIpQLSfglq0ddDe_iB2NccwSldlmJ_ZMqv-IOMQDyrp2EBPmBgaScw/viewform

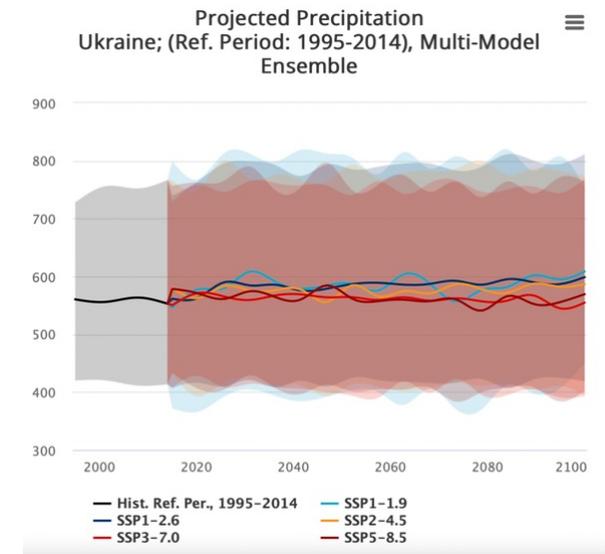
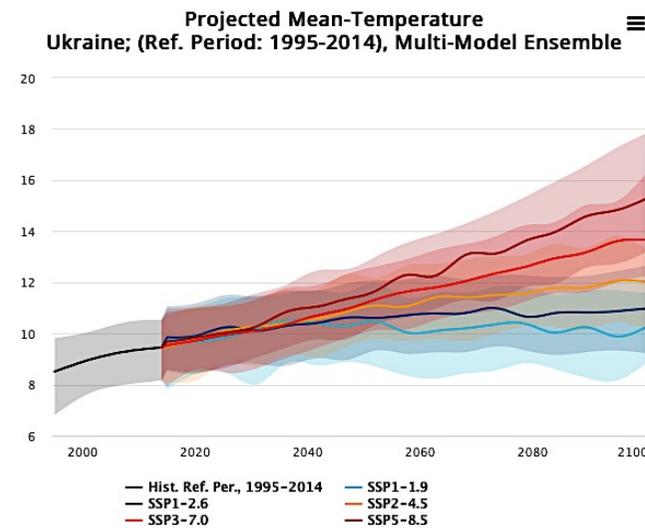
<https://www.balbek.com/reukraine-eng>

Anticipated Climate Change impacts for Ukraine

According to the World Bank ...Ukraine is highly vulnerable to the impacts of climate change from increase in temperature and increasingly variable precipitation patterns with an expected decrease for some areas of the country.... The attached graphic shows projected mean temperatures for the 5 projection models and the historical reference.

Detailed IPCC projections by region are not yet available, but the projections of mean temperatures are in line with other European countries, and precipitation has a stable outlook.

However, Ukraine is an important source of wheat and other agricultural products, and a diminution in agricultural output will have severe effects on world food supplies.



Refugee flows to adjacent countries (updated 18 May)

Temporary housing and service areas may also be needed in European countries that are receiving major flows of Ukrainian refugees. UNHCR estimates that over 6.3 million refugees have fled Ukraine since 24 February 2022. The top recipient countries are shown below:

Poland	3.396 million	Moldova	465,435
Romania	930,341	Slovakia	426,605
Russia	863,066	Belarus	27,308
Hungary	615,256		
Other Europe (approximate as of 05 May)			
Germany	250,000 +/-	Czechia	250,000 +/-

<https://data2.unhcr.org/en/situations/ukraine>



Impacts of the invasion on Poland

Currently (May 23) 3.551 million refugees from Ukraine have entered Poland. At the same time, 1.506 million people left Poland for Ukraine since February 24. Currently, more people are starting to return to Ukraine than are leaving it:

<https://www.npr.org/2022/05/23/1100085358/medyka-ukrain-refugees-border-humanitarian-aid>

<https://www.npr.org/2022/05/20/1099876370/ukraine-russia-poland-border-return>

It is estimated that about 1 million Ukrainians will leave Poland by the end of the year:

<https://data2.unhcr.org/en/situations/ukraine/location/1078>

Currently, refugees in Poland live mainly in large cities:

https://metropolie.pl/fileadmin/user_upload/UMP_raport_Ukraina_ANG_20220429_final.pdf

Camps for Ukrainians are not being set up in Poland and all over Europe because there is no need to keep them in place (the EU directive allows free movement), therefore there is no potential to build temporary shelters.

Refugees (we rather call them guests) use the existing housing stock. They live as guests with Polish families, with Ukrainian families, they rent apartments as well as specially adapted buildings managed by the administration or private buildings, such as hotels.

Impacts of the invasion on Poland

In Poland, there are subsidies for people admitting Ukrainians to their homes, and the Ukrainians themselves have access to work, access to schools for children and there are social subsidies:

https://ec.europa.eu/migrant-integration/news/poland-parliament-adopts-law-assistance-ukrainian-refugees_en

Taking the above into account, it seems that a large-scale temporary construction system in Poland will not be necessary. The citizens of Ukraine will return to their homes as soon as possible, and the system of the rapid reconstruction of Ukraine should encourage them to do so.

Of course, not everyone will come back soon and it is estimated (link above) that still over 2 million people will be in Poland at the end of the year, but the government is not planning to invest in temporary buildings, but rather hopes to increase the demand for rental or buy new apartments and professional activation. Ukrainians. In my opinion, the focus should be rather on temporary construction in Ukraine.

Kajetan Sadowski

2. Local and regional proposals for sustainable reconstruction of Ukraine

Ukraine Relief and Reconstruction; issued by European Commission, 18 May 2022

The following excerpts outline part of a strategy developed by the EC to support the reconstruction of Ukraine.

A major global financial effort is required to support Ukraine during this war, as well as to rebuild the country and provide new opportunities to its citizens. This is why it is important to design the main building blocks of this international effort already now, even while Russia's aggression continues.

In its conclusions of March 2022, the European Council agreed to develop a Ukraine Solidarity Fund, inviting international partners to participate. The European Council called on the Commission to continue developing technical assistance to help Ukraine to implement necessary reforms.

Four major pillars of reconstruction can already be envisaged:

- *Rebuilding the country, in particular infrastructure, health services, housing and schools, as well as digital and energy resilience in line with the most recent European policies and standards;*
- *Continue modernising the state and its institutions to ensure good governance and respect for the rule of law, by providing administrative capacity support and technical assistance, including at regional and local level;*

Ukraine Relief and Reconstruction; issued by European Commission, 18 May 2022

- *Implementing a structural and regulatory agenda with the aim of deepening the economic and societal integration of Ukraine and its people with the EU in line with its European path;*
- *Support the recovery of Ukraine's economy and society by promoting sustainable and inclusive economic competitiveness, sustainable trade, and private sector development, while contributing to the green and digital transition of the country.*

Establishing a clear link with the broad reform agenda will be vital for the success of the reconstruction effort...the financial needs for reconstruction are expected to be substantial and the reconstruction effort would potentially span more than a decade. The Commission will work in close cooperation with Ukraine, international partners and international financial institutions to assess the reconstruction needs, looking at how best to meet them.

A Blueprint for the Reconstruction of Ukraine (excerpts from CEPR*)

This 40-page document outlines institutional and financial issues that will be involved in the reconstruction of Ukraine, has been written by a team that includes prominent international economists*. The document includes the following chapters and we excerpt some sections that are related to energy and environmental issues in the built environment:

1. Introduction
2. Basic inputs for the analysis
3. The international financial system after Covid-19
4. Principles of reconstruction
5. Institutional design for funneling aid into Ukraine
6. Stage 0 (while hostilities last): “Minimizing the damage”
7. Reconstruction stage I (months 0-6): “rapid response”
8. Reconstruction stage II (months 3-24): Rapid revival of the infrastructure and economy
9. Reconstruction stage III: foundation for long-run growth
10. The cost of reconstruction

Excerpts: The economy has lost 30% to 50% of its productive capacity, with losses concentrated in Eastern Ukraine

Ukraine’s electric grid was connected to the EU grid in the early stages of the crisis. Pipelines for natural gas are largely operational, and Ukraine is connected to the EU pipeline network. Imports of natural gas, diesel, and gasoline flow from Poland and other countries. Ukraine currently has no critical shortages of energy. As of March 2022, Ukraine has around 11 billion cubic metres of gas (roughly 2.5 months of gas consumption in winter time) in storage owned by Ukrainian companies.

* Torbjörn Becker, Barry Eichengreen, Yuriy Gorodnichenko, Sergei Guriev, Simon Johnson, Tymofiiy Mylovanov, Kenneth Rogoff, Beatrice Weder di Mauro, Centre for Economic Policy Research, London UK, April 5, 2022: <https://voxeu.org/content/blueprint-reconstruction-ukraine>

A Blueprint for the Reconstruction of Ukraine (excerpts from CEPR)

Excerpts:

There is a strong case that Europe should have the lead in coordinating aid and making high-level decisions, given that its economic and social incentives are closely aligned with Ukraine's.

One should distinguish three stages of reconstruction:

- A. Emergency response (akin to the response to a natural disaster hitting a country)
- B. Rapid restoration of critical infrastructure and services
- C. Laying foundations for future growth and modernisation

Reconstruction stage II (months 3-24): Rapid revival of the infrastructure and economy

Investment in housing stock and social infrastructure (section 8.6) Post-WWII lack of housing took more than ten years to address. Lack of housing was a limiting factor for bringing people back to work. Lack of housing can also make the return of refugees less likely which can be costly for the long-term development of Ukraine (the outflow of high-human capital workers from East Germany slowed its convergence to West Germany). This problem may be easier to address with the modern technology of prefabricated houses, which may be privatised later. In a similar spirit, access to kindergartens and schools is key for bringing people back to the labour force.

Energy: The energy policy should be guided by three objectives. First, Ukraine should not try to rebuild its energy framework to the pre-war state. Instead, Ukraine should focus on reducing its dependence on fossil fuel and set a goal to decarbonise its energy. Apart from reducing pollution, this objective will minimise strategic reliance on Russia as a source of energy. Second, energy policy should aim to integrate Ukraine into the EU energy framework. For example, Ukraine's electric grid was connected to the EU grid on 16 March 2022. This step will diversify sources of energy, create more competition, and contribute to energy independence of Ukraine from Russia. Further steps in this direction (e.g. building liquefied natural gas (LNG) terminals, not buying nuclear fuel from Russia, reinstalling/modernising oil terminal capacities at the Black Sea) will create a solid basis for economic growth and energy security. Third, because Ukraine is highly energy inefficient (e.g. the energy intensity of Ukraine's GDP exceeds the European average by 2.5 times), energy efficiency programmes are vital.

A Blueprint for the Reconstruction of Ukraine (excerpts from CEPR*)

Excerpts (section 9.5):

Build back better. Although Ukraine has been gradually upgrading its productive capacity to modern technologies, a large share of its capital stock and production technologies were outdated. The reconstruction offers Ukraine an opportunity to leapfrog technologically. The most obvious possibility is to create a carbon-free economy, both as a way to coordinate on investments for the future, but also to show how to reduce reliance on fossil fuels as much as possible. Further examples are provided below.

- A. *Urban reconstruction.* Whole cities (Kharkiv, Mariupol, Chernihiv, etc.) will need to be rebuilt. Although there is a natural tendency to repair cities to their original form, one should not try to restore Soviet-style housing and other infrastructure. Reconstruction should focus on using modern technologies (especially energy efficiency), designs, and urban planning (e.g. public transportation should adopt electric buses, redesigned tram lines, etc.). A balance between 'old' and 'new'/'smart'/'green' cities will have to be struck. The agency should help develop guidelines to ensure that all new infrastructure and investments will move Ukraine to the frontier. This should apply to schools, apartment buildings, airports, etc.

.... preliminary estimates and examples suggest that the cost of reconstruction aid to Ukraine ranges from €200 billion to €500 billion.

* Torbjörn Becker, Barry Eichengreen, Yuriy Gorodnichenko, Sergei Guriev, Simon Johnson, Tymofiiy Mylovanov, Kenneth Rogoff, Beatrice Weder di Mauro, Centre for Economic Policy Research, London UK, April 5, 2022: <https://voxeu.org/content/blueprint-reconstruction-ukraine>

Ukraine Recovery Fund

Communications Department of the Secretariat of the CMU, posted 09 April 2022 21:42

[ECONOMY EMERGENCY GOVERNMENT SESSION PRIME MINISTER](#) (slightly edited)

Government has submitted for consideration by the President a draft Decree on the establishment of the Ukraine Recovery Fund, announced Prime Minister of Ukraine Denys Shmyhal at a Gov't session on April 9.

“The Fund will function as an advisory body to the President and is designed to coordinate the accumulation of financial resources for the postwar rehabilitation of our state,” noted the Head of Government.

According to the Prime Minister, the framework of the Fund envisages the setting up of 5 working groups responsible for various areas - from communication with international financial organizations, communication with partner countries to fundraising from individuals and large global corporations and companies.

“Our mission is to consolidate all possible sources for the reconstruction of our state,” stressed Denys Shmyhal.

The Government submitted for consideration of the Head of State a draft Decree on the establishment of the National Council for the Reconstruction of Ukraine, which will be responsible for the devising of a Plan for the postwar reconstruction and buildout of our country.

The Prime Minister added that the plan will comprise not only concrete steps to rehabilitate and build infrastructure and housing, but also to ensure structural modernization and jump-starting the economy in line with European standards and regulations.

“Ukraine aspires to join the EU. Ukraine must be the country with strong military and sound economy. Ukrainian social policy must meet the best world standards. The Ukrainian economy must be modern and competitive. Ukrainians have to return home from abroad because of better living conditions here. These are the main goals we set for Ukraine after the war,” Denys Shmyhal summed up.

Excerpts from report in Politico.eu

www.politico.eu April 19, 2022

Ukraine should be rebuilt as a clean powerhouse that spurs the EU's [Green Deal](#), according to the head of the Ukrainian parliament's climate subcommittee.

"We're essentially going to be starting from scratch with the amount of destroyed industrial sites, energy sites. We can be the breeding ground for new technology for pilot projects, for renewables projects," Lesia Vasylenko, an opposition MP with the pro-EU Holos party, said during a phone call last week from her home in Kyiv...

Vasylenko wants to reverse Ukraine's polluting legacy as the U.S.S.R.'s manufacturing base. In doing so, the country could become the engine for Europe's ambitions to reach net zero emissions by 2050, she said.

Even with the outcome of the war still very much in the balance, a project Vasylenko called a "Marshall Plan for Ukraine" is being developed between the office of President Volodymyr Zelenskyy and the chair of the parliament's economic affairs committee Dmytro Natalukha. Economists from the U.K. are supporting the work, said Vasylenko.

She said there are two working groups in Kyiv trying to estimate the costs involved but stressed that the idea was at a "very early" stage....

The investment needed for reconstruction is likely to be huge. Ukraine's Infrastructure Minister Oleksandr Kubrakov this week [estimated](#) that the Russian invasion has caused \$100 billion in infrastructure damage. The [Kyiv School of Economics](#) estimates the war's overall hit to the Ukrainian economy is as much as \$600 billion.

Excerpts from report in Politico.eu

www.politico.eu April 19, 2022

The homes Ukrainians return to should be repaired or rebuilt with the most energy-efficient materials and technologies, said Vasylenko. That alone could spur a huge new domestic industry and skills base that could be exported to an EU that [is short](#) of trained installers of heat pumps and insulation. “So again, this is an opportunity for Ukraine, but also for the world,” she said.

Ukraine could service growing demand for parts for electric cars, or heat pumps, or greener agriculture — the latter, she said, was a huge opportunity to reform farming in one of the world's breadbasket nations.

“It's essentially an appeal to the EU, to all of the donors that are going to be giving this money to Ukraine, for the renewal and rebuilding so that they don't go cheap on us that they actually invest in the greening of the planet,” she said.

The price tag of a green reconstruction will initially be higher than a quick and dirty rush job, Vasylenko said, but donors and Ukraine should agree a green constraint — similar to the earmark of 37 percent for climate projects that the EU placed on its pandemic recovery funding.

“There must be a precondition to all of the money that is going to be given to Ukraine ... that there is an environmental and climate change element to it,” she said. “That we're giving you all of this money, but you can only buy the green technology.”

Actions proposed by architects in Poland

Guiding students to design the reconstruction of individual residential houses in Ukraine.

The logic is as follows

1. Families that cannot take advantage of typical multi-unit housing projects (technical limitations or simply do not want to) want to have their house rebuilt according to their dreams.
2. Local authorities help them establish contact with students of Architecture Faculties around the world.
3. NCAU provides relevant knowledge about building codes, planning requirements or materials from which to design, knowing what are the possibilities of the Ukrainian economy and sustainability goals after the war.
4. Then the students, being in contact with “their” families, design concepts of building, under the supervision of academic teachers and during their courses, that would meet families’ expectations.
5. All works should be coordinated or carried out in agreement with the Architectural Chamber of the NCAU, which then submits the projects to professional Ukrainian architects.
6. Ukrainian architects legalize the projects.
7. And local contractors build houses.

The proposal has been prepared by arch. Kajetan Sadowski, Associate Professor, Wroclaw University of Science and Technology, Poland

Actions proposed by architects in Poland

Guiding students to design the reconstruction of individual residential houses in Ukraine.

Potential advantages of the system – it will:

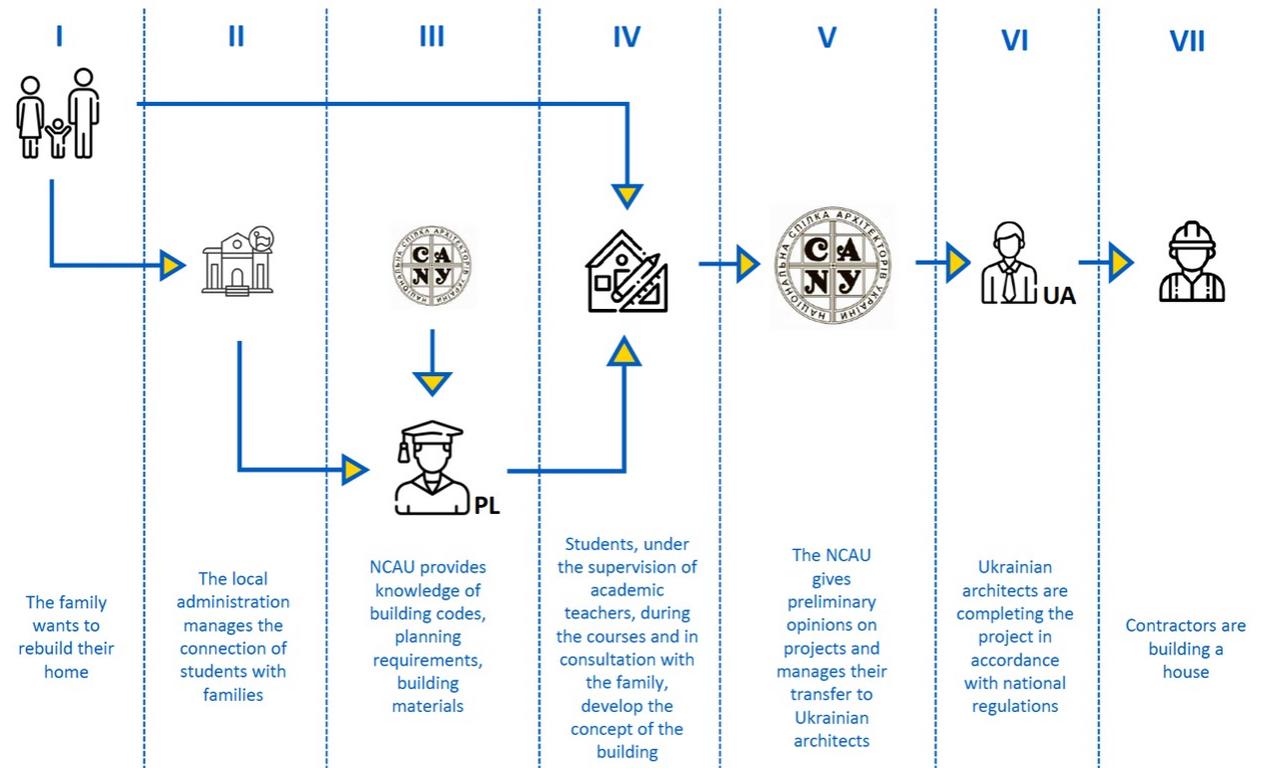
8. Support the reconstruction of houses for ordinary and poor people. Assuming that public buildings will be quickly rebuilt by professional design studios, most people will probably wait a long time for reconstruction. This process is expected to speed it up.
9. the system is aimed at families who will not be able to take advantage of the general social housing for various reasons, which will certainly be implemented in Ukraine
10. it will be a counterweight to prefabricated and repeatable buildings, which are definitely needed, but cannot be the only ones
11. the system will accelerate the leaving of temporary shelters by families, such as: <https://www.balbek.com/reukraine-eng>
12. will help Ukrainian architects to implement a large number of projects
13. it will be an excellent lesson for young adepts of architecture
14. it will allow human relations between the West and Ukraine to be established

The proposal has been prepared by arch. Kajetan Sadowski, Associate Professor, Wroclaw University of Science and Technology, Poland

Actions proposed by architects in Poland

Guiding students to design the reconstruction of individual residential houses in Ukraine.

One Student One Home



The proposal has been prepared by arch. Kajetan Sadowski, Associate Professor, Wrocław University of Science and Technology, Poland

Actions proposed by an expert group in Poland

Accommodating refugees in Wrocław, Poland.

A think tank composed of architects, developers and construction engineers was established in Wrocław. Its task was to work out solutions that would be helpful in creating permanent places of residence for refugees. This may be necessary, as everything indicates that the war in Ukraine will not end soon. The team of advisers consisted of about 20 people and a 20-page report was produced.¹

Refugees could be accommodated in existing buildings, e.g. uninhabited tenement houses, but also in empty office buildings or unused holiday centers. There are many such facilities in Lower Silesia.

The war caused madness in the flat rental market in Wrocław. Even those of the lowest standard are unavailable. Experts also agree that the problem of locating refugees cannot be solved locally, given its scale. Over 2.6 million Ukrainians came to Poland, of which at least 200,000 stopped in Lower Silesia. Therefore, the report does not indicate specific locations, and its authors focused on system solutions.

The group also presented a methodology on how to quickly and efficiently search for premises that are suitable for adapting them to housing needs. The inventories could be carried out by employees of the chambers involved in the work on the report, but also by architecture students, who could do it as part of obligatory internships.

1. The group was composed of representatives of the Lower Silesian Regional Chamber of Civil Engineers, the Lower Silesian Chamber of Architects and the Wrocław Branch of the Association of Polish Architects. Zbigniew Maćków, an architect, is one of the authors of the report.

Actions proposed by an expert group in Poland

.... refugees in Wroclaw, Poland...

An assessment of the technical condition of these facilities will also be needed. Sometimes ...reconstruction may be more expensive than erecting a new building - explains Maćków.

The team of advisers also proposed a number of changes to the law, including a ready-made act, which would simplify the procedures related to the implementation of investments serving refugees. It is not only building houses, but also schools, kindergartens and workplaces.

The presented model is based on the "premises for land" act. According to it, the commune may sell the plot for construction to the developer and receive part of the real estate receivables from the company in the form of ready-made flats, which would be added to the municipal housing stock.

Maćków also states that a number of discounts and incentives are being offered to harness private business in the implementation of such investments, since the state does not have the know-how and appropriate structures..... However, the entire development industry is hampered by 40-50 percent interest rates. Finally, the number of loans granted is low and thus the number of flats built may drop.

Actions proposed for university reconstruction

As Russia's invasion of Ukraine nears its fourth month, much of the focus remains on fighting and survival. When can we talk about the reconstruction of Ukrainian higher education?

"Now, I think, because we have to understand that reconstruction will be taking place in stages," said Inna Sovsun, a professor at the Kyiv School of Economics and the National University Kyiv-Mohyla Academy.

Alongside tens of thousands of deaths and millions forced to flee to the relative safety of western regions, or beyond Ukraine's borders, in the east at least four universities have been destroyed – in Luhansk, Donetsk, Kharkiv and Zaporizhzhia – and 25 damaged.

Kharkiv, the student capital of Ukraine, hosts 54 public and private higher education institutions, and it has been hit particularly hard. "In terms of physical damage, I think the most painful is the damage done to Kharkiv Karazin University, which is one of the best universities in Ukraine," said Professor Sovsun, a former deputy education minister....

How can Ukrainian universities be rebuilt?, by Ben Upton, 19 May 2022 ben.upton@timeshighereducation.com
https://www.timeshighereducation.com/news/how-can-ukrainian-universities-be-rebuilt?mc_cid=885a2917e8&mc_eid=5ad188c024

Actions proposed for university reconstruction

...Ukraine dwarfs the western Balkans in the size and development of its higher education system. It is also fighting a very different war. Perhaps instead, lessons should be learned from Russia's 2014 annexation of Crimea and its ongoing occupation of the Donbas.

In government at the time, Professor Sovsun said efforts to relocate universities have had mixed results. Donetsk National University has moved successfully, she said, but others had faced the “heart-breaking” prospect of uprooting again as front lines have shifted.

...In April the government estimated the cost of damage to schools, colleges and universities to be more than \$5 billion (£4 billion) and said the war could eventually cost the country at least \$1 trillion, five times the value of all the final goods and services it produced in 2021.

How can Ukrainian universities be rebuilt?, by Ben Upton, 19 May 2022 ben.upton@timeshighereducation.com
https://www.timeshighereducation.com/news/how-can-ukrainian-universities-be-rebuilt?mc_cid=885a2917e8&mc_eid=5ad188c024

3. Actions for sustainable reconstruction proposed by iiSBE

Proposals for sustainable reconstruction

General actions proposed proposed by iiSBE to meet the needs of post-invasion reconstruction and climate action are shown in the following categories.

- A. Urgent action
- B. National or regional policy actions
- C. Local government actions
- D. Building-related actions

A. Urgent action

1. Stop fighting, de-mine and clear up construction damage residue.
2. Provide short-term accommodations for population groups forced to move by climate change impacts.
3. Repair or rebuild critical facilities and infrastructure* and ensure future resilience to climate change impacts.
4. Local regional authorities should undertake a triage process to identify priorities for repair vs. reconstruction.

* harbours, airports, communication networks, water and wastewater systems, urban public transit, major roads, emergency services, hospitals, schools, etc.

B. National or regional policy actions

5. Adjust taxation systems and building regulations to:
 - a. move rapidly towards zero use of fossil fuels and to promote clean energy and renewables.
 - b. provide incentives to maintain and retain heritage buildings.
 - c. provide incentives for renovation and disincentives for new construction.
 - d. constrain provision of dwelling sizes or levels of service that greatly exceed functional requirements.
 - e. incentivise efficient use of non-primary dwellings.

B. National or regional policy actions

6. Identify major priority regions and urban areas for reconstruction.

Damage and destruction of civilian infrastructure varies according to specific urban regions and areas. There is an initial need to initial estimates of destruction or damage to transportation systems, infrastructure and buildings in each area.

- a. Priority urban areas and zones for reconstruction should be based on needs assessments, social and economic importance of the areas, as well as sample surveys or other community engagement methods
- b. In each priority area carry out needs assessments through preliminary surveys of properties to assess level of safety, repair and reconstruction needs. This should include the number of households likely to have problems with their housing due to the damage to or destruction of their homes and the coming winter.
- c. Identify local Ukrainian design, production, and construction capacities for reconstruction to determine the extent to which outside companies may be needed to contribute (NGOs, architectural/engineering firms, contractors, manufacturers).

B. National or regional policy actions

6. Identify major priority regions and urban areas for reconstruction.
 - d. Identify local Ukrainian design, production, and construction capacities for reconstruction to determine the extent to which outside companies may be needed to contribute (NGOs, architectural/engineering firms, contractors, manufacturers).

The Architectural Chamber of the NSAU has established a Coordination Headquarters, which is working on a strategy for the reconstruction of our cities and communities. A registration form (in Ukrainian) is available. The Chairman of the NAU Public Relations Commission is Kirill Chuyko (kyrylo.chuyko@gmail.com). A project of temporary housing «RE: UKRAINE SYSTEM» has been designed by an architecture and interior design studio in Kiev – Balbek Bureau. Housing will be made as modular residential blocks.

https://docs.google.com/forms/d/e/1FAIpQLSfglq0ddDe_iB2NccwSldImJ_ZMqv-IOMQDyrp2EBPmBgaScw/viewform

<https://www.balbek.com/reukraine-eng>

B. National or regional policy actions

7. Establish performance targets for major urban systems audited in (see 16), aiming for key dates such as 2025, 2030 and 2050.
8. Plan for zero use of coal or oil in repaired or reconstructed facilities, and for the national use of natural gas to decline to zero by 2050.
9. Integrate reconstruction, economic and climate actions so that social, economic goals and 2050 zero GHG targets can be met.
10. Limit future peak electrical demand through incentives and regulations to minimize need for new generating capacity.
11. Obtain major funding commitments for reconstruction from international financial institutions and identify major private sources of capital.

B. National or regional policy actions

12. Implement effective energy efficiency regulations in all key regions.
These regulations can be based on the EU Directives, the implementation of which will bring Ukraine closer to the EU. This could include an acceleration of implementation of EPC (Energy Performance Certificates) which are still under development in Ukraine. A key outcome for ecological and political stability is to employ this reconstruction process to achieve a radical transition from fossil fuel to clean, renewable electricity, while eliminating the need for Russian gas.
13. The target for operating energy consumption for all new buildings should be zero or nearly zero, with a maximum use of renewable energy. The *Passiv Haus* standard should be considered as a guide.
14. Establish public building performance databases so that progress can be measured and compared.

See Mapping of Existing Energy Efficiency Standards and Technologies in Buildings in the UNECE Region, published in 2018 by U.N. Economic Commission for Europe).

B. National or regional policy actions

15. Establish reconstruction and repair needs in each urban area.
 - a. Assess ecological damage in urban and urban fringe areas.
 - b. Assess condition of surface and sub-surface aquifers.
 - c. Assess the extent of soil contamination, giving priority to areas where liquid fuel or other pollutants were stored.
 - d. Establish priorities and performance targets for replacement of essential community services, including hospitals, schools, community centres / shelters, public housing and core shopping centres.
 - e. Identify all temporary infrastructure needs related to such developments considering design coordination needed for subsequent modifications for potential later use. Energy generation, provision of potable water and sewage systems are examples.

B. National or regional policy actions

15. Establish reconstruction and repair needs in each urban area

- f. Assess ecological damage.
- g. Assess the need to rebuild urban road and transit on original or modified routes, transforming roadways to the greatest extent possible to transit and active transportation modes.
- h. Establish neighbourhood, local infrastructure and building performance targets through use of urban performance assessment systems.

A useful tool is the iiSBE SNTool system that permits users to select from a list of possible performance criteria and then to adapt them to local conditions.

- i. Review urban conservation areas, cultural heritage cores area, cultural heritage building assets and monumental architecture, and address the essential needs for repair and reconstruction
- j. Prepare and continuously update initial approximate capital cost estimates for proposed action plan.

B. National or regional policy actions

16. Implement reconstruction in each urban area, according to priority

This work may provide an opportunity to establish a framework for the classification separation and recycling of building debris and material for use in the new materials produced for reconstruction to address the principles of low impact materials, minimise waste dumping and reduce consumption of new resources.

- a. Assess ecological damage and undertake remedial action where needed.
- b. Undertake remedial action to restore aquifer quality where needed and where possible.
- c. Carry out soil remediation where necessary.
- d. Replace and/or repair damaged surface and subsurface infrastructure.

B. National or regional policy actions

16. Implement reconstruction in each urban area, according to priority
 - e. Construct temporary housing for urban reconstruction workers, in both Ukraine and supporting European countries, separately from temporary housing for returning refugees.
 - f. Establish adequate and safe temporary housing and essential service facilities for displaced communities with adequate services until the longer-term urban infrastructure is in place.
 - g. Design new permanent housing areas, using professional firms and architecture faculties from Ukraine and supporting European countries, in consultation with owners, local people, local government officials
 - h. Evaluate the logic of rebuilding permanent new buildings on original building footprints or new sites, considering also solar orientation, mixed-use opportunities, densification, and intensification of uses where feasible and appropriate to the urban context.

B. National or regional policy actions

16. Implement reconstruction in each urban area, according to priority
 - i. Where installation of renewable energy and related storage is viable, undertake such projects and provide local education and training for contractors and/or residents.
 - j. Prepare an inventory of basic building materials after demolition and/or disassembly and consider techniques and materials that will minimize the embodied carbon associate with reconstruction.
 - k. Sort out and grade (for re-use or recycling) the materials from destroyed built assets and demolition of other assets (note that grading and sorting are crucial before 6.11 and other actions regarding the materials are undertaken). Need to develop practical strategy and plan for establishing circular construction, not just for the short-term but for the future of circular economy and sustainable business in the city/region.

B. National or regional policy actions

16. Implement reconstruction in each urban area, according to priority

- m. Develop techniques for reuse of demolished or disassembled materials, incl. concrete fragments and rebar embedded in concrete sections

Temporary housing and service areas may also be needed in European countries that are receiving major flows of Ukrainian refugees. UNHCR estimates that over 4.1 million refugees have fled Ukraine as of 05 April 2022. The top recipient countries, excluding Belarus and Russia, are shown below:

Poland	3.396 million	Moldova	465,435
Romania	930,341	Slovakia	426,605
Hungary	615,256		

Experience in European post-disaster zones suggests that such “short-term” needs in Ukraine and supporting western European countries may have to extend over several years. [An example is temporary housing in I-Aquila after the 2009 Earthquake in Abrizzo].

<https://data2.unhcr.org/en/situations/ukraine>

C. Local government actions

17. Ask local re-development authorities to establish their visions, priorities and to modify relevant regulations as needed.
18. Undertake urban area condition and performance audits of all major systems and issues that are relevant for anticipated climate change impacts*.
19. Use the UN Sustainable Development Goals to help identify relevant issue areas for action. SDG 11 (*Sustainable Cities and Communities*) and SDG 13 (*Take urgent action to combat climate change and its impacts*) are the key goals for the issues covered in this document

* land use, ecological systems, above- and below-grade infrastructure, public transport systems, buildings

SDGs: UN Sustainable Development Goals

The 17 interlinked SDGs adopted by the UN in 2015 provide useful guidance, but are not at the level of Goals, which are too general.

However, they do become meaningful at the subsidiary levels of Targets and Indicators, although still not regionally specific.

SDGs related to urban climate change



C. Local government actions

20. Allocate surplus and vacant urban fringe land for aquifer replenishment, urban forests, wildlife and biodiversity.
21. Mitigate urban heat island effect, reduce energy demand of buildings and increase the livability of the urban area by increasing effective areas of vegetation, parks and urban forests and by (in the long run) adjusting street design. All of this is highly dependent on regional characteristics.
22. *Freeze new construction activity* in areas that are vulnerable to climate impacts or are of high ecological value.
23. Support a shift from private vehicles to public transport to reduce waste of urban land, to reduce use of fossil fuels and to improve urban air quality.

C. Local government actions

24. Limit new construction in other areas that have potential value for agriculture.
25. Encourage urban agriculture for local residents to reduce transport emissions and to increase neighbourhood access to fresh produce.
26. Provide storm water management systems to accommodate anticipated variability in precipitation, especially more frequent occurrence of sudden storms or flash floods.

C. Local government actions

27. The preservation of existing buildings must be a priority, and this can best be done by launching "deep green" renovation programs that will upgrade the pandemic and climate performance of existing buildings.
28. Launch programs for affordable housing aimed at low-income populations as a major element of reconstruction social equity and economic recovery measures.
29. Support commercial retail business and ensure preservation of the remaining commercial building stock through renovation.

D. Building-related actions

The following section (30 to 42) contains suggestions that are applicable to multi-residential and commercial buildings.

30. In new buildings, specify a high degree of flexibility of internal systems, to facilitate changes in functions.
31. Provide all new dwelling units with private outdoor space, e.g. gardens, courts or balconies.
32. Minimize embodied energy and lifecycle emissions in new construction. One effective technique is to retain existing buildings and to provide for new marginal requirements with additions.
33. Require that submissions for building permits should include estimates of embodied GHG emissions in all permanent elements of the building.

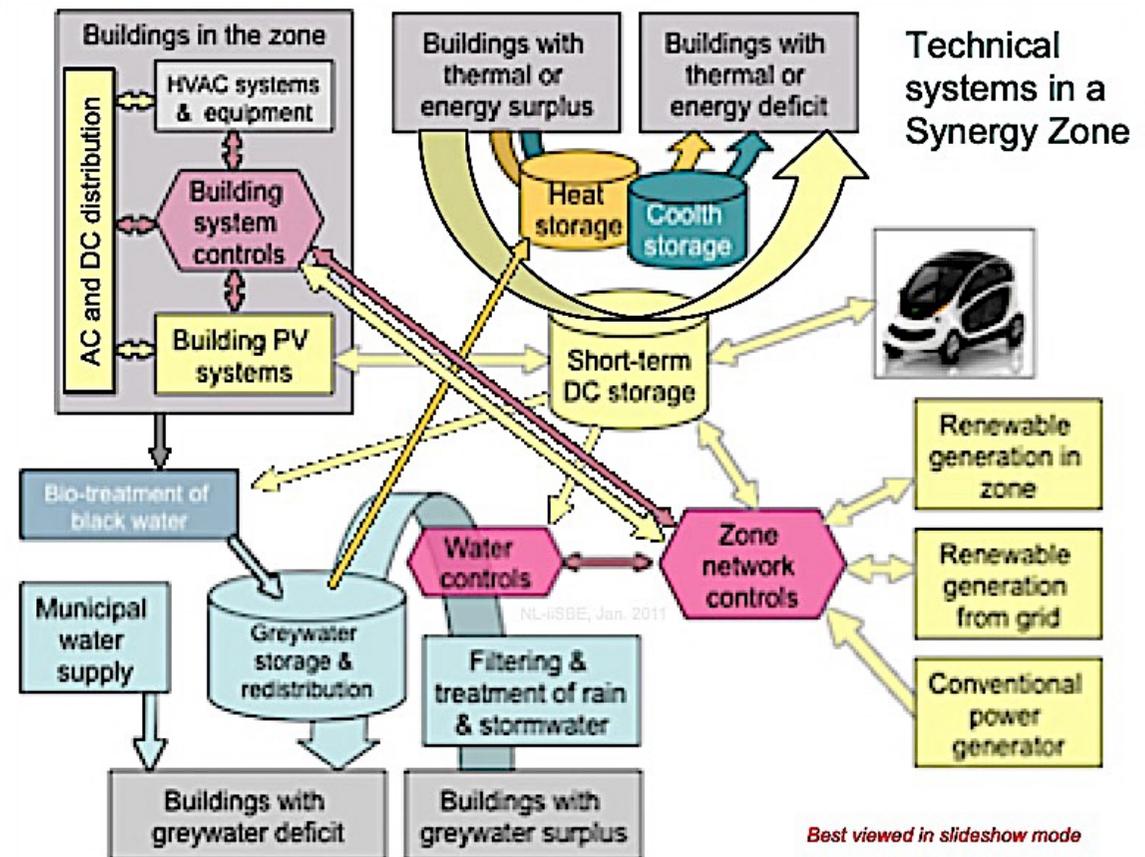
D. Building-related actions

34. Use local labour to the maximum extent possible and establish training programs to support all the initiatives outlined in this section.
35. In new and existing buildings, encourage natural and hybrid ventilation. In cold climates, this is a rare example of a conflict between health and climate action needs, but the problem can be minimized by use of heat recovery systems.
36. Operable windows provide the simplest and most direct source of outdoor air, but in regions with cold winters they tend to remain closed to avoid energy loss and cold drafts. Under such conditions the location of opening window segments is important to maintain comfort conditions.

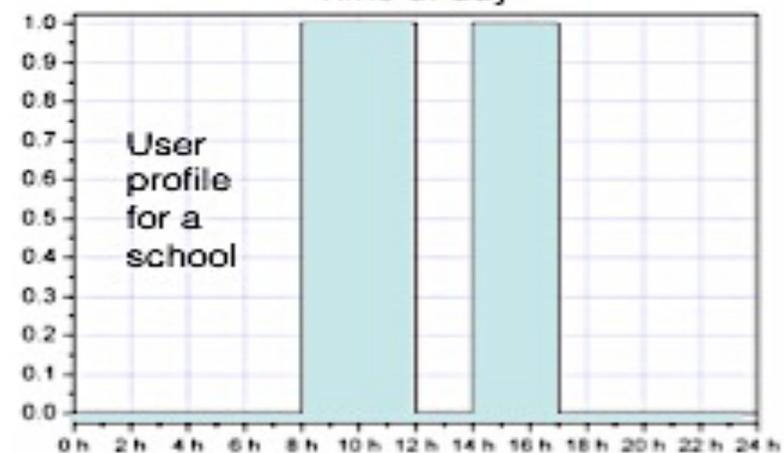
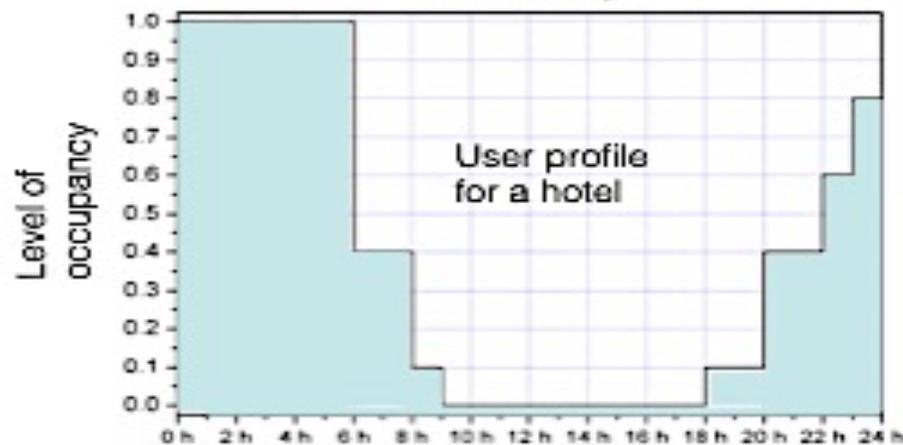
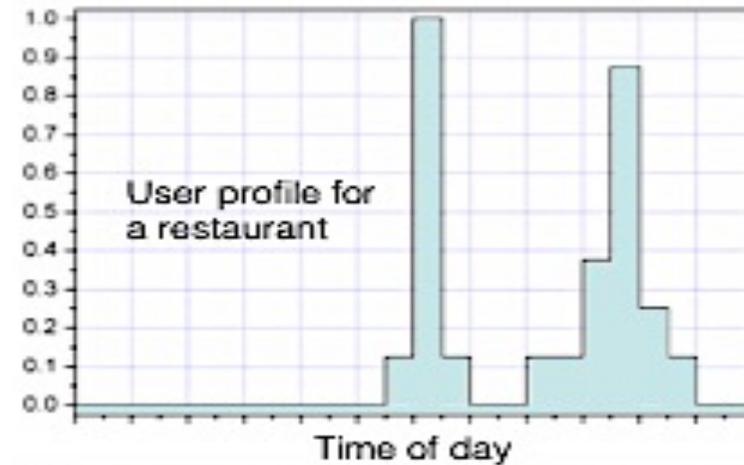
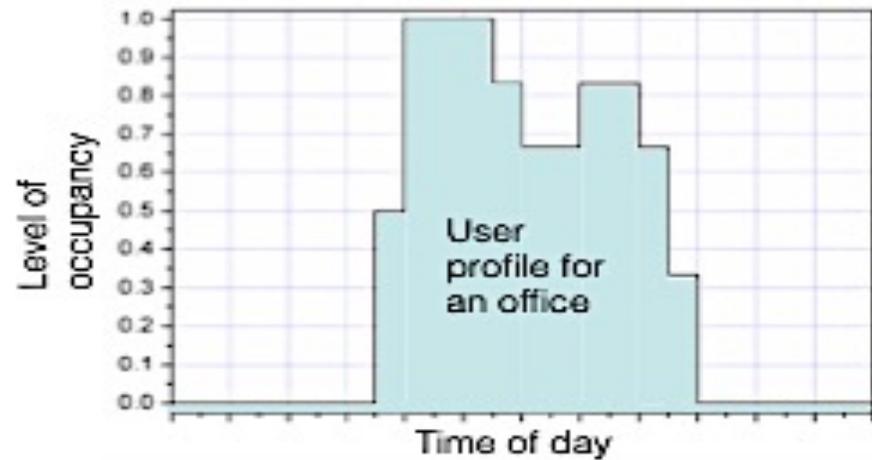
D. Building-related actions

37. Synergy Zones

Inter-building performance synergies are possible in clusters of buildings that have varied functions and configurations, by using storage and control systems to share surpluses and deficits in thermal energy, renewable power generation and greywater.



Diverse occupancy profiles provide opportunities for synergies in power, energy, water consumption and parking requirements



Source: Meli Stylianou, CANMET, NRCan, and BS EN 15232:2012: Energy Performance of buildings - Impact of building automation, controls and building management.

D. Building-related actions

38. Upgrade mechanical ventilation systems (increased ACH, filtration etc.) in long-term care facilities, schools and office buildings to reduce risks of Covid-19 infection.
39. Ensure that energy consumption, energy efficiency, GHG emissions, water consumption and wastes due to a building's operation conforms to design performance specifications. This can be ensured through application of a post-occupancy operating audit carried out 2 years after occupancy.
40. In multi-unit apartment buildings, provide entry systems, circulation spaces and public washrooms on ground floors that are accessible and usable by persons in wheelchairs.

D. Building-related actions

41. Ensure that a proportion of dwelling units have kitchens and bathrooms designed for use by disabled persons.
42. In large buildings with public access, establish building entry check-points, provide scanning and monitoring of occupants' health status and movements within the building.
43. Strengthen equipment and appliance efficiencies to at least A++ (U.S. or Canada) or equivalents (in EU, this is "A" as of 2021).
44. Monitor wastewater flows for Covid-19 and other viruses at the level of urban blocks or larger buildings. Intermittent monitoring and analysis of untreated sewage for SARS-2 residue is an indicator of the presence of Covid-19 in the community.

4. Conclusions

- An effort to simultaneously deal with post-invasion and climate action issues needs appears to be necessary and feasible.
- Specific actions will depend on the regional context and expertise.
- iiSBE must work to support local organisations in carrying out reconstruction activities.
- Immediate action is required.

Appendix 1:

Local proposals for Sustainable reconstruction of specific urban regions

Several major urban centres in Ukraine have suffered various degrees of war damage.

In this section we attempt to identify region-specific plans for reconstruction. More will be added as information becomes available.

Proposals for sustainable reconstruction of Irpin



On April 30, a summit devoted to the reconstruction of the city of Irpin in Ukraine was held, initiated by the Irpin Investment Board Chairman Volodymyr Karplyuk.

About 250 specialists met and were divided into 3 groups. In one of the groups, foreign planners, architects and engineers who want to help with the reconstruction met. The remaining meetings were intended for local specialists and the local community.

Before and during the meeting, [photographic documentation](#) of the partial damage in the city was made available as well as a list of 32 important facilities, such as museums, libraries, schools, shops, and a stadium, which urgently need to be rebuilt.

The meeting was devoted to the exchange of contacts and collecting declarations of readiness to help.

Notes by arch. Kajetan Sadowski, Associate Professor, Wroclaw University of Science and Technology, Poland

Proposals for sustainable reconstruction of Irpin

At the meeting of May 30, Mayor Michael Sapon emphasised that the reconstruction must start as soon as possible. This means that there will be no time for long and detailed planning considerations and that the default will be a rapid “business as usual” process.

- Italian architect Stefano Boeri provided a video stating that he was ready for action ...

- Marco Mari from GBC Italia presented the experience of GBC Italia and World GBC.

- Miguel Pinto Luz (Deputy Mayor of Cascais talked about valuable features of the future city, such as the "15-minute city", intelligent and public transport, data collected by sensors, etc.

A cautionary note was expressed by a Japanese architect who has worked for more than 10 years in Ukraine, and who reminded the other speakers that Irpin had only 62,000 inhabitants, and that was before the Russian invasion. Therefore some big-city examples might not be very applicable.

List of main Irpin building which urgently need to be rebuilt.

1. Irpin Museum of History and Local Lore
2. Irpin City Library
3. Romanivka microdistrict club.
4. PPM
5. Structural subdivision of Irpin CYSS
6. Institution of preschool education (kindergarten) "Little Red Riding Hood"
7. Kozyntsviv preschool institution (kindergarten) v9 "Ivasyk-Telesyk"
8. Preschool department of NGO "Education"
9. Institution of preschool education v12 "Smiley"
10. Preschool education institution №10 "Znayko"
11. Institution of preschool education №8 "Hummingbird"
12. Preschool educational institution (nursery-kindergarten) №7 "Bee"
13. Preschool educational institution (kindergarten) of the combined type№6 "Joy"
14. Preschool educational institution (kindergarten) №5 "Vinochok"
15. Preschool educational institution (kindergarten) of the combined type№4 "Fairy tale"
16. Preschool educational institution (nursery-kindergarten) №3 "Sun"
17. Preschool educational institution (kindergarten) №2 "Vesnyanka"
18. Preschool educational institution (nursery-kindergarten) "Forest song"
19. Mykhailivsko-Rubezhivsky institution of general secondary education of I-III grades.
20. Kozyntsviv gymnasium of Irpin city council of Kyiv region
21. Irpin Educational Association "Irpin Lyceum of Innovative Technologies - Small Academy of Sciences"
22. Irpin educational association "Education"
23. Irpin Academic Lyceum of the National University of Life and Environmental Sciences of Ukraine
24. Irpin comprehensive school of I-III degrees №17
25. Irpin Specialized Secondary School of I-III Grades №12
26. Per
27. Irpin specialized secondary school of I-III degrees with in-depth study of economics and law №2
28. Irpin specialized secondary school of I-III degrees v1 artistic profile
29. Sports school
30. Premises of the utility company "Irpinvodokanal"
31. Central Stadium
32. The area on the site of the old market

Proposals for sustainable reconstruction of Kharkiv

Norman Foster has revealed plans to co-ordinate architects in the rebuilding of Kharkiv, the second-largest city in war-torn Ukraine. The architect met **Ihor Terekhov**, the mayor of Kharkiv, on Easter Monday (18 April) to discuss the future reconstruction of Ukraine's second city and committed to assembling a team of world-leading experts through the Norman Foster Foundation to begin the process immediately.

The first step will be to draw up a masterplan that captures the mayor's vision for the rehabilitation of the city, its buildings and infrastructure, much of which has been destroyed by Russian attacks during the ongoing conflict.

The mayor wants to embrace the city's recent investment in technology and healthcare by creating a 'new high-tech architecture', as well as restoring the buildings and public spaces that are key to Kharkiv's cultural history.

Foster, the founder of Foster + Partners, shared a draft manifesto for the reconstruction of Kharkiv at Monday's meeting. In this, he pledged to 'assemble the best minds with the best planning, architectural, design, and engineering skills in the world', both from Ukraine and the rest of the world, to work on the project.

Terekhov worked with the United Nations Economic Commission for Europe Secretariat in Geneva to convene this week's meeting following initial discussions at the 2nd UN Forum of Mayors, which was held in the Swiss city earlier in the month.

However, not all are enthusiastic*: Officials from the Kharkiv School of Architecture have warned leaders to be wary of "intellectual colonisation". Speaking at an online event hosted by Architecture Today, the school's founder Oleg Drozdov and deputy vice chancellor Iryna Mastevko graciously welcomed the interest of a renowned architect like Baron Foster, but stressed the importance of involving local designers to avoid a rebuilding Kharkiv as a "copy-paste" metropolis. "There are a lot of architects who already have experience working in Ukraine and experts who already deal with post-war reconstruction."

* <https://www.standard.co.uk/news/londoners-diary/norman-foster-tom-kerridge-stanley-tucci-andrew-neil-b996541.html>

Proposals for sustainable reconstruction of Poltava and Poltava regions

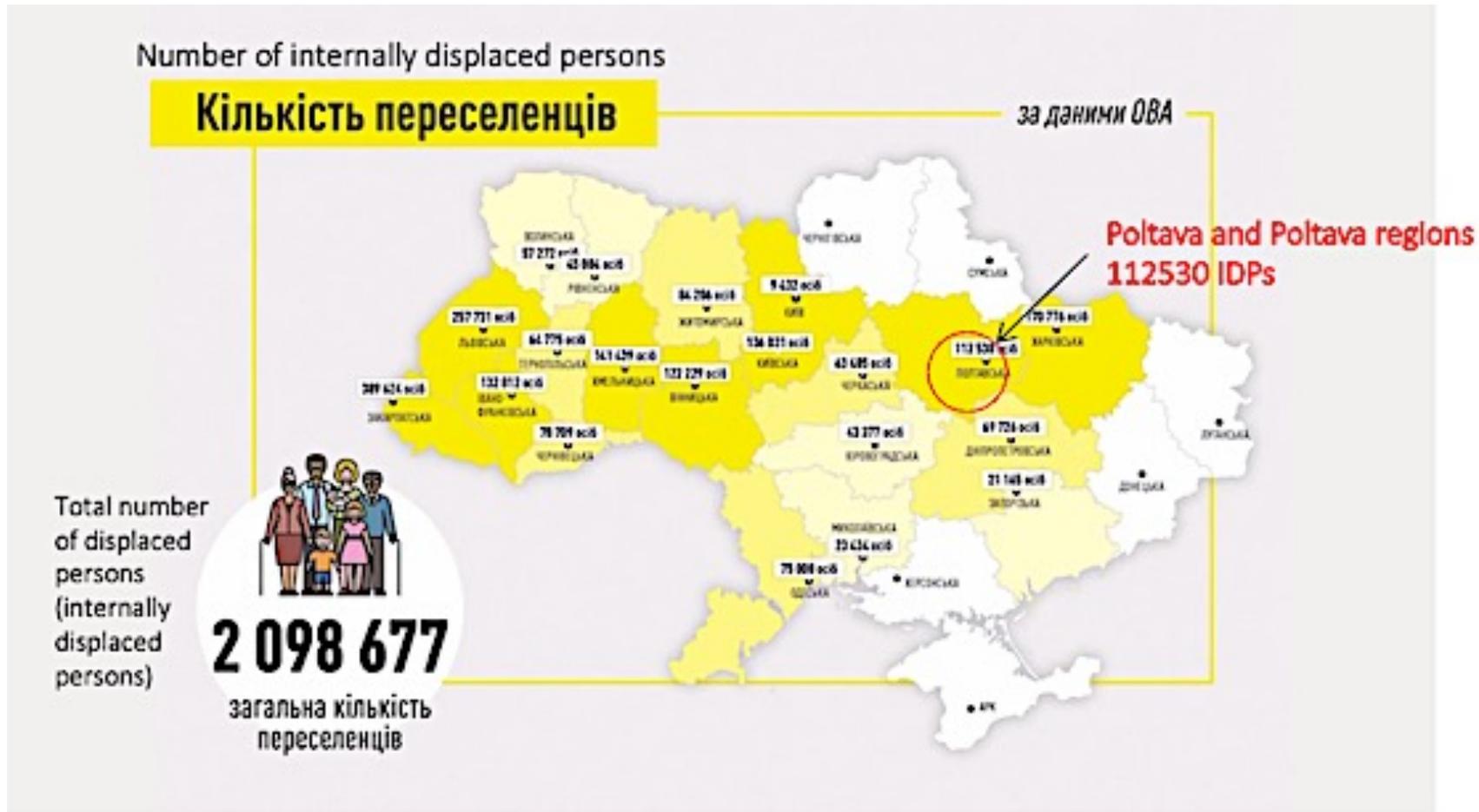
Andrii Koniuk, Professor of NATIONAL UNIVERSITY «YURI KONDRATYUK POLTAVA POLYTECHNIC». <https://nupp.edu.ua/en>

The Poltava region is one of the 25 regions of Ukraine, and is located on the left bank of the Dnieper. The region covers an area of 28.8 thousand square kilometers and has a population of about 1.7 million, with 1 million living in urban areas. Population density is 60 people per km².

There are 1858 villages and 36 urban settlements in the region. Poltava region is moderately populated and there are about 900 thousand people employed in the fields of material production. According to the structure of the economy, the Poltava region is classified as industrial-agrarian. The share of industry in the total gross output of industry and agriculture is about 60%.



Proposals for sustainable reconstruction of Poltava and Poltava regions



Proposals for sustainable reconstruction of Poltava and Poltava regions

The war has resulted in more than 2,000,000 people becoming Internally Displaced Persons (IDP), who will need about 600,000 apartments. Deputy Head of the Office of the President of Ukraine Kyrylo Tymoshenko has announced....

- Given the scale in Ukraine, they plan to buy ready-made apartments that are available in the regions and build new ones. It is planned to provide more than **53,000 apartments this year (2022)**, which will cover the needs of **186,000** IDPs.
- The order of providing apartments will be worked out jointly with local authorities.
- **New construction will take place in 15 regions of the country and Kyiv, 2,000 apartments per region.**
- By the end of the year it is planned to build **30,000 apartments with a total value of UAH 36 billion.**
- **Each new apartment house will have a bomb shelter with separate entrances, three to five floors high.**
- Apartments will be bought all over Ukraine only in finished form - with repairs, plumbing and furniture.
- The total cost of the project together with the purchase of apartments is almost **UAH 69 billion.**
- The recommended price from the state for a fully equipped apartment - no more than **24 thousand UAH per 1 m2.**

These apartments will be owned by the state. As soon as the housing of the victims is rebuilt, the apartment will be returned to the state and given to others.

Source: <https://censor.net/ua/n3337401>

Proposals for sustainable reconstruction of Poltava and Poltava regions



“Reconstruction of the quarter with the development of eco-housing in Poltava.”

Diploma project of the Bachelor of Architecture 2005

Author: Kateryna Smaznova.

Head: A. Koniuk, PolNTU.

Examples of projects for Poltava and the region, developed by students and teachers of NATIONAL UNIVERSITY "YURI KONDRATYUK POLTAVA POLYTECHNIC".

<https://nupp.edu.ua/en>

Proposals for sustainable reconstruction of Poltava and Poltava regions



Examples of projects for Poltava and the region, developed by students and teachers of NATIONAL UNIVERSITY "YURI KONDRATYUK POLTAVA POLYTECHNIC". <https://nupp.edu.ua/en>

Examples of eco-houses. Eco-house with load-bearing panels with insulation from pressed reed blocks, with clay plaster: Blocked residential building for 3 apartments on the street Lysenka 9 in Poltava.

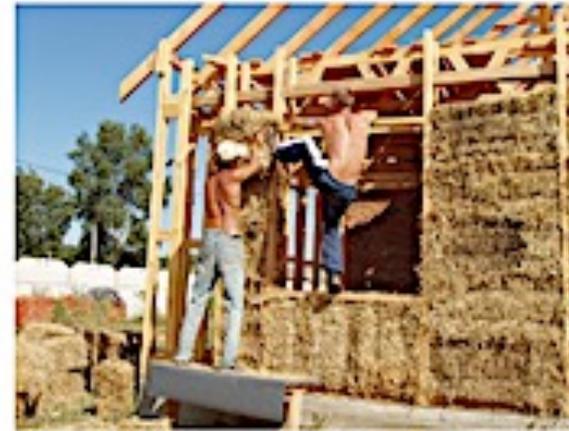
2017. architect A. Koniuk

<http://energy.nzeb.com.ua/article/view/143932>

Proposals for sustainable reconstruction of Poltava and Poltava regions



House with walls made of straw blocks in the village
of Krotanky 2010 (architect A. Koniuk)



Proposals for sustainable reconstruction of Poltava and Poltava regions



a)



b)



c)



d)



e)



e)

Examples of eco-houses with a load-bearing wooden frame construction, insulation of external walls from pressed blocks of rye straw, with clay plaster:

- a) v. Valya Kolonitsa, Moldova 2016,
- b) v. Shmyhli, Poltava district, 2015,
- c) v. Pisarenki, Mashiv district of Poltava region,
- d) v. Rusky Tyshky village, Kharkiv district, Kharkiv region, 2016,
- e) v. Petrivske, Boryspil district, Kyiv region, 2016,
there is a village Vyshenky, Boryspil district, Kyiv region, 2012

Author of projects: architect A. Koniuk

Proposals for sustainable reconstruction of Other urban regions

Information about other local conditions, needs and expert contacts to come.