

Forum: Special Forum on Ukraine (SFU)

Issue: Rebuilding housing and infrastructure in Ukraine

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Introduction

The conflict in Ukraine has resulted in the destruction of about 1.5 million dwellings, with direct losses to infrastructure and buildings estimated to be worth \$135 billion. Official laws prohibiting women from working in construction and other jobs deemed heavy or dangerous were in place from 1994 until 2018. However, after fifteen months of devastating war and with hundreds of thousands of men now serving in the armed forces, groups of women volunteers are dispelling persistent stereotypes and picking up tools to rebuild homes and communities (“Breaking Barriers”).

As a result, the United Nations Economic Commission for Europe (UNECE) is assisting the Ministry of Recovery in creating housing legislation and is collaborating with the Ministerial Working Group to create a bill outlining the principles of the state's housing strategy. UNECE is specifically assisting with the drafting of the law by bringing together top government officials from throughout the European Union through its Committee on Urban Development, Housing, and Land Management (“UNECE Helps”). Because of this procedure, Finland, Germany, Slovakia, and Albania have all provided the draft law with useful examples and policy recommendations that are specific to Ukraine's needs. Additionally, UNECE will help the Ministry establish a cooperative housing law in 2023–2024.

"We are dedicated to innovating contemporary housing solutions that comply with global human rights norms, gaining inspiration from the finest methodologies and European expertise," said Ms. Natalia Kozlovska, the deputy minister for the development of communities, territories, and infrastructure in Ukraine. "The Ukrainian government is steadfast in its commitment to promoting sustainable development in the context of urban planning and housing policy (“UNECE helps”). Important funding for our partnership comes from programmes like the UN for Ukrainian Cities Initiative. We sincerely thank you for your crucial assistance in creating master plans for Ukrainian cities, and we look forward to working with you in the future. Our combined goals are to support the government's achievement of the Sustainable Development Goals and restore impacted communities."

"There is no time to lose in addressing Ukraine's acute housing needs and supporting the government's long-term plans for affordable and sustainable housing at the center of urban reconstruction efforts," said Tatiana Molcean, the executive secretary of UNECE. One of UNECE's main areas of focus is bringing together national expertise to promote collaboration on urban development, and we are completely committed to supporting Ukraine's efforts in this regard (“UNECE Helps”).

This expands on the assistance provided by UNECE to create master plans for reconstruction in

Kharkiv and Mykolaiv starting in April 2022 and July 2022, respectively. A total of over €852 million has been estimated as damage to Mykolaiv's infrastructure by the Kyiv School of Economics, compared to an estimated US\$9 billion in damage to houses, administrative buildings, essential infrastructure, and social infrastructure in Kharkiv. The UN4UkrainianCities project, launched in June 2023 with funding from the German Ministry of Economic Cooperation and Development through GIZ, is assisting in the formulation of pilot projects that are specific to the city, city development strategies, and master plan concepts in areas like housing renovation and new construction, cultural heritage, innovative neighborhoods, industry, environment, and urban transportation. In addition, the project will help recruit funders and investors to help pilot project implementation. It will also disseminate information on urban development plans among European nations and other relevant parties in order to establish new alliances for the restoration and recovery of cities ("UNECE Helps").

Russia is spending a high amount of money and human resources on its war in Ukraine. However, the devastation also presents a unique chance to modernise Ukraine's economy through the construction of cutting-edge infrastructure. Building new roads and rail networks next to ports and airfields could spur economic reconstruction and connect the expansion of small and medium-sized enterprises (SMEs) to international supply chains and markets. Rebuilding hospitals, schools, and housing will be essential to resettling refugees. A unique combination of political and economic goals can be achieved through infrastructure investments, linking Ukraine to Europe and facilitating the country's strong industrial base and highly educated labor force to access international markets (Bandura et al.). Stated differently, the reconstruction of Ukraine's transportation and logistics infrastructure offers democratic leaders a chance to actualise the goals of the Group of Seven (G7) Partnership for Global Infrastructure and Investment (PGII).

One prerequisite for a successful restoration would be for Ukraine to be firmly established into the Euro-Atlantic community. With a sizable industrial base and a highly educated and competent populace, Ukraine has the potential to develop a manufacturing sector that is highly competitive and can supplement that of the European Union. But in order to realise this potential, Ukraine must construct high-quality transportation and logistics infrastructure that is connected to the West, including roads, bridges, ports, and civilian airports (Bandura et al.). The infrastructure of transportation and logistics will need substantial funding, priority, and coordination over the next ten years from the Ukrainian government and other international players (private sector, bilateral partners, and multilateral organisations). Large-scale projects and the provision of know-how to ensure that Ukraine has a world-class infrastructure foundation will also depend heavily on foreign direct investment (FDI), particularly through long-term public-private partnerships and concession contracts financed by the private sector (Bandura et al.).

According to the World Bank, the Ukrainian government, and the European Commission's most recent Rapid Damage and Needs Assessment, as of June 1, 2022, direct war damages are expected to

total \$97 billion, while indirect losses are estimated to be \$252 billion. This brings the total cost of recovery and reconstruction to \$349 billion. With demands of \$69 billion and \$74 billion, respectively, or more than 40% of the total, housing and transportation are the most critical sectors. The most severely impacted oblasts or areas are Kherson, Kyiv, Donetsk, Luhansk, Kharkiv, Donihiv, and Zaporizhzhia (Bandura et al.).

Given that 90% of Ukraine's grain exports and over half of its overall exports are routed via sea lanes, seaports are essential. Ports serve as the primary entry and exit points for petroleum imports, metals, chemicals, and fertilisers, as well as agro-industrial exports. 13 ports (Izmail, Reni, and Ust-Dunaisk) served the Danube Delta, the Black Sea, and the Azov basins prior to World War II. Four ports are currently out of Ukraine's control: Skadovsk and Kherson on the Black Sea, Mariupol and Berdyansk on the Azov Sea. Although they are blocked by Russia, the principal ports—Mykolaiv, Olvia, Odesa, Chornomorsk, and Pivdennyi—remain under Ukrainian authority. Russia has also blocked a portion of the Dnipro River in the areas of Kherson and Zaporizhzhia (Bandura et al.).

Definition of Key Terms

Infrastructure

Infrastructure refers to the fundamental physical structures of an area or country. Transportation networks, communication networks, water and sewage systems, and **health and** educational systems are a few examples of infrastructure.

Infrastructure projects are often expensive and capital-intensive, yet they are essential to the growth and success of an area's economy. Infrastructure improvement projects can be financed by the government, the private sector, or public-private partnerships (Team).

Maintenance

Incremental work to slow the rate of degradation or to repair or restore infrastructure to an earlier state. This is not the same as building and renovating, which aims to improve infrastructure beyond what it was before.

Asymmetric Warfare

A fight where the military prowess and capabilities of the parties involved are uneven. This might be the army of a great power against that of a lesser one, or it could be an insurgency against a conventional military force that uses non-traditional weapons and tactics, like improvised explosive devices or terrorist attacks, to take advantage of the deficiencies of its more formidable opponent.

Demilitarised Zone

A zone that opposing forces consent to keep out of the military. In order to provide a secure environment for diplomatic discussions or visiting civilian politicians, weapons and other military hardware are typically prohibited. DMZs in reality don't always live up to their moniker: two million

landmines once lay in the area separating North and South Korea, for example.

War Damage

Damage caused by enemy action or in response to it, as well as actions required to prevent the effects of such damage from spreading, are collectively referred to as war damage.

Background Information

A strategy for the rehabilitation of Ukraine's infrastructure must take several important factors into account. Following Russia's extensive and continuous aggression on Ukraine, efforts are being made to record the extent of damage. For instance, based on historical accounting values, the Kyiv School of Economics is building a database of damage reports with estimates that, as of mid-June 2022, surpass €100 billion (The Architecture). Even in the unlikely event that no further damage was sustained, replacing this infrastructure now would probably be much more costly. Considering the importance of infrastructure for fundamental services and its connections to global value chains, the economic cost of underperforming infrastructure is several times that amount.

A plan to institutionalise reconstruction at a high level is being considered. The European Commission (EC) has suggested a new joint entity called the Ukraine Reconstruction Platform, which would be jointly overseen by the EC and Ukrainian authorities, at the recommendation of the Center for Economic and Policy Research (CEPR). It is possible that there are other platforms available due to varying donor interests (The Architecture).

The Strategic Reconstruction Plan "Rebuild Ukraine," which includes foreign financial assistance, is anticipated to be coordinated by the Ukraine Reconstruction Platform. The National Reform Council of Ukraine, which was established recently, is intended to be the owner and developer of the plan. It is acknowledged that assistance from the European Union (EU) and other partners would boost the plan's efficacy (The Architecture). In order to expedite restoration, the Platform intends to encourage collaboration between locations inside the European Union and towns or regions in Ukraine.

Deep-rooted problems still exist, though, and they will limit Ukraine's capacity to maximise restoration funds. Serious problems with Ukraine's infrastructure could make it more difficult for it to prioritise, target, and coordinate infrastructure investments and reduce the efficacy and efficiency of the restoration effort. For instance, donor coordination structures and a multi-annual capital expenditure budgeting process are absent from Ukraine, which may result in project money that comes and goes. Prior to the war, there was no strategic infrastructure planning, and there are now no master plans for the various infrastructure sectors. Project performance monitoring primarily focuses on verifying financial expenditures rather than achieving project objectives; state ownership practices, disclosure, integrity, and corporate governance need to be significantly improved to conform to international best practices; capacity building will also be necessary for regional and local governments, who are in

charge of 68% of public investment in Ukraine; a project appraisal and selection methodology was implemented, but it was not widely used, and its effectiveness is unclear.

Transport

The population density of Ukraine, a large country, is only 73 people per square kilometre. It boasts a vast multimodal transportation network made up of pipelines, roadways, railroads, seaports, and airports. An export-oriented economy cannot function well without transportation. The industry, when combined with postal, courier, and storage services, contributed 6.5% of the GDP of the nation in 2021 (Kosse 9).

The road network in Ukraine spans more than 200,000 kilometres. A significant portion of "last mile" cargo, which includes heavy freight, agricultural products, and perishable items moved over relatively short distances by road, accounted for 41% of cargo (measured in tonnes) and 20% of volume (measured in tonne-kilometres) transported by road in 2021. Additionally, lorries are widely employed for the transportation of agricultural products to the ports as well as the importation of high-value goods from the EU, such as electronics, appliances, clothing, etc. In terms of people, Ukraine's road density is roughly one-third that of Europe; in terms of area, it is about a quarter that of Europe (Kosse 9).

With the exception of the temporarily controlled areas before the start of the full-scale conflict, Ukraine has a 19,800 km long railway network, of which 47% is electrified. In Ukraine, there are even more railways per million people than in Europe (496.27 km vs. 429.97 km). The railway system is utilised to move both passengers and merchandise between major cities, communities, and border crossings with neighboring nations. Prior to the conflict, the main uses of railroads were for the transportation of coal, iron ore, metal, building supplies, and people (Kosse 9).

With 19 airports, Ukraine's number of airports per million people (0.37) is nearly equal to one-third of the number of airports per million people in EU countries (0.95). 16.2 million people were flown by 21 passenger airlines and 19 mail and cargo carriers in 2021 before the war's closing of the airspace. There are eighteen seaports in Ukraine, thirteen of which are on its continental land and the remaining five of which are in the Autonomous Republic of Crimea's temporarily occupied area. Given that more than half of Ukraine's exports are carried by sea lanes—agricultural exports, which account for 90% of the country's grain exports—as well as exports of metals, chemicals, and fertilisers, seaports are essential to the nation's economy (Kosse 10).

Post-war Transport Infrastructure: as of February 2023, the estimated total damage was US\$35.7 billion, or 17.8% of the GDP for 2021. 344 bridges and overpasses as well as 25,000 km of roads had been destroyed as a result of the Russian Federation's invasion. The areas of Donetsk (26%), Kherson (15%), Luhansk (15%), and Zaporizhzhia (14%) had the largest losses. These are the areas that either saw prolonged positional fighting or were under Russian occupation. There were 126 stations and 507 km of damaged track in the railway system, which was also impacted. The areas of

Donetsk (36% of the total damage to the rail system) and Zaporizhzhia (23%) saw the most devastation. 12 of the 19 civilian airports that have sustained damage had their runways demolished as of February 2023 (Kosse 15).

Energy

With 17% of its GDP coming from the energy industry, Ukraine's economy was heavily dependent on it before the war. The majority of energy came from fossil fuels, which in 2020 made up 66% of the world's primary energy source. Nuclear energy made up 27.5% of the total, while renewable energy sources made up 6.5%. In that same year, 31% of Ukraine's gas, 48% of its coal, and 84.5% of its oil and oil products were imported to meet the country's energy demands. Four nuclear power facilities, thirteen thermal power plants, thirty-three combined heat and power (CHP) plants, eight hydropower plants, and three pumped hydropower plants are among the nation's energy resources (Kosse 11).

Ukraine has a sizable gas transportation system in addition to its infrastructure for producing and distributing energy. It has 31 billion cubic meters of subterranean gas storage facilities and 36,700 kilometers of gas pipes for delivering gas from Russia to Europe. The installed capacity structure and the structure of energy generation are not the same. The majority of the contribution comes from nuclear power plants (55%), followed by thermal and CHP plants (29%), hydropower plants (6.7%), and pumped hydropower plants (6.7%). The remaining 8% is produced using biofuel and renewable energy sources including the sun, wind, and solar. Ukraine's electrical grid was in sync with Russia and Belarus's Integrated Power System/Unified Power System until February 2022 (Kosse 11).

Post-war Energy Infrastructure: The World Bank estimates that the entire cost of the damage to the nation's gas, electricity, heating, and coal-mining infrastructure is US\$10.6 billion (or 5.3% of GDP from 2021) as of February 2023. The industries that have suffered the greatest losses are oil refinery facilities, gas distribution, power transmission, and electricity generation. The estimated post-war reconstruction needs in the energy sector are US\$41.3 billion, which is significantly more than the damage value. Of these, US\$34 billion is needed for the reconstruction of the power system, US\$3 billion is needed for the reconstruction of oil refineries, and US\$2 billion is needed for the reconstruction of the gas transportation system (Kosse 16).

In October 2023, a historic Memorandum of Understanding (MOU) was announced by the United Nations Development Programme (UNDP) and Ukrhydroenergo, the country's top hydropower producing company, to evaluate and repair the significant harm that the Russian invasion caused to Ukraine's energy infrastructure. The MOU also has clauses for evaluating the effects of the damaged energy industry on people and their long-term repercussions.

According to a new assessment produced by the Government of Ukraine and the UN, the demolition of the Kakhovka dam caused over US\$14 billion in loss and damage to Ukraine, exacerbating the already catastrophic effects of Russia's full-scale invasion ("UNDP"). The largest

losses, totaling more than \$5 billion, were sustained by the oil sector.

The MOU focuses on a number of important areas of cooperation. First, a detailed assessment of all current damages will be made by both parties. After that, in order to ensure alignment with Ukraine's National Energy Strategy, strategic discussions will be held to accelerate recovery and resilience development within the energy sector. The agreement also places a strong emphasis on obtaining participation in the reconstruction process from the public and private sectors. Finally, a concentrated effort will be made to set up procedures and methods that enable routine data gathering on the condition of the energy infrastructures and facilities (“UNDP”).

Housing

About 70% of people in Ukraine live in built-up regions, making it a moderately urban nation. This is greater than the percentage of people living in cities in Moldova, Poland, or Romania, but it is still somewhat below the EU average. Apartment buildings house the majority of urban residents (67% overall, and up to 79% in metropolitan cities). This is similar to the EU, where 71% of urban residents live in apartments on average (Kosse 12).

In 2021, the nation's housing stock numbered about 18 million dwelling units. Only 46% of people in that year lived in apartments, which is significantly less than in many other EU nations, like Greece and Malta (both 57%), Latvia (65%), Estonia (61%), Spain (66%), and Lithuania (59%). In 2021, around 53% of Ukrainians were homeowners, while 1% occupied alternative kinds of housing, like vans or houseboats. In Ukraine, single-family homes predominate in rural areas (Kosse 12).

According to data from the State Statistics Service of Ukraine, the average living space per person in metropolitan areas was only roughly 13 square meters in 2020. The quality of housing has also been poor and its availability is limited. Just 12% of Ukraine's multifamily apartment complexes were built after 1991, making the majority of them dilapidated and in need of renovation.

Post-war Housing: As of February 2023, the expected overall cost of damage to Ukraine's housing sector is USD 50 billion, or 25% of the country's GDP for 2021. Approximately 1.4 million residential units—of which over a third are completely destroyed and the other two-thirds are damaged—as well as 135,000 single-family homes and 39,000 dormitory units have sustained damage. According to World Bank estimates, the entire cost of post-war housing sector reconstruction will come to roughly US\$69 billion, of which US\$31.5 billion will be needed for short-term and immediate recovery needs and US\$37.1 billion for medium- to long-term recovery needs (Kosse 16).

Major Countries and Organisations Involved

Organisation for Economic Co-operation and Development (OECD)

The OECD has strengthened its cooperation with Ukraine since Russia began its full-scale aggression on that country in February 2022, building on three decades of efforts. The OECD provides broad policy support to Ukraine, a prospective member of the Organization, primarily through its Ukraine

Country Programme.

After starting operations in Paris in June 2022, the OECD-Ukraine Liaison Office opened in Kyiv during the visit of the OECD Secretary-General to Ukraine in February 2023. Currently housed at the Slovak Republic's Embassy to Ukraine, the Office is supported by the governments of the Slovak Republic, Latvia, and Poland in addition to being co-financed by them.

The main goal of the Office is to support OECD efforts by assisting in the implementation of the Country Programme and fostering engagement with important local stakeholders. Additionally, it guarantees that the Ukraine Plan and the Country Programme are well-matched. The staff's location in Kyiv facilitates effective coordination with OECD members and other international organizations while allowing them to stay in close contact with representatives of the Ukrainian government. By maximising synergies and minimizing duplications, this strategy eventually helps Ukraine (OECD).

World Bank

Working with development partners, the World Bank has raised \$38 billion in financial promises and commitments for Ukraine since February 2022; as of October 2023, more than \$29 billion of these had been disbursed. Building on a decade-long development cooperation, the World Bank's multi-sectoral support throughout the war paves the way for resilient reconstruction when peace returns.

These are the key highlights: The World Bank and its partners have committed to financing \$38 billion for Ukraine since February 2022; of that amount, \$29 billion has been disbursed by November 2023. The government nevertheless carries out its essential duties. Pensions were paid on time in 98.5% of cases. Most government workers—more than 90%—were paid on schedule (“The World Bank”).

European Union

In response to Russia's unprovoked and unjustifiable aggression as well as the Russian Federation's illegal takeover of Ukrainian land, the EU is united in its steadfast support of Ukraine. The EU is adamantly against this transgression of international law. Ukrainians escaping the conflict have been provided temporary refuge by the EU. Since the commencement of Russia's aggressive war, Ukraine has received up to €49 billion in financial, humanitarian, emergency budget, and military help from the EU, Member States, and European Financial Institutions as part of a Team Europe strategy.

To expand the Solidarity Lanes, €1 billion is being raised, with contributions coming from the World Bank Group, the European Investment Bank, the Commission, and the European Bank for Reconstruction and Development. The Commission will pay for the transportation of 40.000 tonnes of Ukrainian grain to vulnerable nations as part of the Grain from Ukraine project.

Timeline of Events

Date (start - end)	Name	Description
February 2014	Annexation of Crimea	In February and March 2014, Russia invaded the

		Crimean Peninsula, part of Ukraine, and then annexed it.
February 2022	Invasion of Ukraine	On 24 February 2022, Russia invaded Ukraine in an escalation of the Russo-Ukrainian War that started in 2014.
March 2022	Exclusion from SWIFT	The EU agreed to exclude key Russian banks from the SWIFT system, the world's dominant financial messaging system. This measure will stop these banks from conducting their financial transactions worldwide in a fast and efficient manner.
April 2022	Further Humanitarian Aid	The EU has allocated a further €50 million in humanitarian funding to support the people affected by Russia's war on Ukraine, including €45 million for humanitarian projects in Ukraine and €5 million for Moldova. This brings the EU's total humanitarian aid funding in response to the war to €143 million.
May 2022	Reconstruction Framework	The Commission set out plans for the EU's immediate response to address Ukraine's financing gap, announcing up to €9 billion of new macro-financial assistance for 2022, as well as the longer-term reconstruction framework.
October 2022	Annexation of Ukrainian Regions	Vladimir Putin signed final papers to annex four regions of Ukraine – Donetsk, Luhansk, Kherson and Zaporizhzhia.
November 2022	Solidarity Lanes	The European Commission and partners mobilise €1 billion for Solidarity Lanes to increase global food security and provide a lifeline for Ukraine's economy.
January 2023	Germany and US Official Military Help to Ukraine	As the war neared its 12th month of battle, the United States and Germany announced that they would send advanced battle tanks to aid Ukraine in its defense against Russian forces.
6 June 2023	Connecting Europe Facility	The European Commission further integrates Ukraine into the EU Single Market through the Connecting Europe Facility for infrastructure funding.
6 June 2023	Kakhovka Dam is Destroyed	Ukraine said Russian forces had blown up the Kakhovka Dam along the Dnipro River in Kherson Oblast, releasing a large amount of water, while the Russian-installed mayor of Nova Kakhovka blamed the destruction on Ukrainian shelling but said only the upper part of the structure was damaged.

23 June 2023	Wagner Group Coup Attempt	Tens of thousands of mercenaries with Wagner Group, a paramilitary organisation sponsored by Putin to do his bidding abroad, mobilised away from their fighting positions in Ukraine and marched toward Moscow in an apparent coup attempt. The attempt failed.
17 October 2023	UNDP and Ukrhydroenergo sign MOU	UNDP and Ukrhydroenergo announce a Memorandum of Understanding (MOU). The MOU includes provisions for assessing the damaged energy sector's human impacts and potential future consequences.

Relevant UN Treaties and Events

- 2 MARCH 2023 (**A/RES/ES-11/6**) - This resolution called for "a comprehensive, just and lasting peace in Ukraine" based on the principles of the Charter of the United Nations.³¹
- 31 OCTOBER 2023 (**S/PV.9464**) - This was a briefing on the humanitarian situation in Ukraine, requested by Ecuador and France.
- 15 NOVEMBER 2022 (**A/RES/ES-11/5**) - This was a resolution titled "Furtherance of remedy and reparation for aggression against Ukraine".

Previous Attempts to Solve the Issue

As for immediate action, the initial disaster reaction is in motion. There will be a need to prioritize vital reconstruction efforts and develop or sustain critical services while hostilities persist. To lay the foundation for the reconstruction, it will be necessary to first restore the essential power, water, and transportation links and to find temporary housing. The experiences of other developed economies that have gone through national tragedies and modified their backup plans for the future could be helpful to Ukraine. The 2010–11 earthquake in New Zealand is one such instance; there are also examples from the United States, Japan, Italy, and Mexico (The Architecture).

The National Recovery Plan for Ukraine was published by the government in July 2022, with an estimated cost of between \$750 billion and \$1 trillion. The investment plan is broken down into three phases: medium-term demands, long-term needs for a "modernisation phase," and current needs through 2022. It's an ambitious proposal, and major contributions have not yet been made by donors. However, funding for this project will need to come from a variety of sources, including grants, soft loans, and private-sector investments, as no one organization or donor would be able to cover the entire cost. In order to better control the contingent liabilities that arise from this kind of cooperation, the Ukrainian government is currently updating the legislation governing

public-private partnerships, or PPPs. Partnerships between the public and business sectors will be made possible and encouraged by these measures (Bandura et al.).

Immediate goals in the transportation and logistics industry (about \$2–3 billion in investments) include building new highways, reorganizing Danube ports to manage exports to Europe, and "debottlenecking" logistics with the European Union. Longer-term initiatives (estimated at \$120–160 billion) include expanding the Danube River's port capacity, constructing new warehousing and logistics facilities, building new roads and airports, and building a high-speed rail line to connect Warsaw and Kyiv. Significant cooperation with Ukraine's neighbours will be needed for this, particularly Romania, which is in charge of the Danube Delta and is a viable transit route (Bandura et al.).

Possible Solutions

With a realistic focus, Ukraine will need to begin creating sectoral, regional, and local master plans for infrastructure rehabilitation. Conventional methods of strategic infrastructure planning are based on data (e.g., a national transport model to forecast the flow of people and products on transportation networks) and an economic development vision for the nation, its regions, and its cities, which supplements the needs assessment. A high-level overview of measures, or projects and policies to be implemented, such as pricing and other infrastructure governance features, is frequently included in master plans. Master plans, which typically take several years to create, must be developed within a year in Ukraine due to urgency (The Architecture).

A review of the pre-war reform process should be part of the governance vision, in line with the G20 Principles for Quality Infrastructure Investment, OECD standards, and any relevant suggestions or guidelines. For example, the European Commission's DG Reform framework for Estonia allowed for the formulation of such plans with support from the OECD, which is still working with Ukraine to improve public investment and multi-level governance (The Architecture). Plans will also need to take into account the various ways that sectoral policies throughout the EU are coordinated, given the recent invitation to Ukraine to start the EU accession process (e.g., decarbonisation/environmental elements, safety, efficiency, etc.).

Transport Infrastructure:

In order to have a highly competitive, export-oriented manufacturing and agricultural sector, Ukraine must first establish a modern, effective transportation system. Improving the standard and capacity of highways, updating the ports, modernising the rail system, and creating inland waterways should be some of the primary objectives of the rebuilding. In order to guarantee the implementation of the "Build Back Better" strategy, we think the transportation sector's reconstruction program should follow

these guidelines:

- **Multimodality:** Ukraine should create a multimodal transportation system that enables the quick transition of commodities between modes of transportation, including using containers, in order to maximise the country's transportation industry. Building multimodal terminals that will function as integrated transport and logistics hubs and provide customs services will be necessary in the western and southern regions of Ukraine. To promote the growth of inland waterways and divert some freight traffic from the roads onto the water, the terminals should also include linkages between rail and water transportation. In order to facilitate smooth and convenient transfers, multimodal stations should be built and multimodal transportation should be used for passenger transit as well. High-speed link electrification should also be a part of the rebuilding of the rail system.
- **Flexibility:** Ukraine's transportation infrastructure needs to be flexible and resilient in order to meet the challenges presented by the conflict. To alleviate bottlenecks, alternate land transportation routes should be constructed in addition to repairing damaged infrastructure. In order to meet interoperability requirements and boost transshipment capacity, new logistical hubs and border crossings with the EU are required. The infrastructure of the seaport needs to be updated and enhanced. Following the partial closure of sea routes, road transport has begun to play a bigger role in Ukraine's international trade. As a result, building road infrastructure, such as border crossing points, agricultural product inspection stations, truck parking spaces, driver accommodations, and storage terminals, has taken precedence.
- **Connectivity:** Interoperability is severely hampered by the fact that the railway gauge used in Ukraine differs greatly from that used in the majority of the European Union. Ukraine should prioritise converting its railway lines to the European standard track gauge. In the long run, Ukraine ought to think about connecting its largest cities with railroads that have European track width.
- **Sustainable Mobility:** The EU's Guidelines for Developing and Implementing a Sustainable Urban Mobility Plan state that in order to successfully address the difficulties of urban transport across all modes, a transition towards sustainable mobility necessitates a comprehensive and integrated approach. Enhancing accessibility and quality while ensuring sustainability is the overarching goal of strategic planning for urban mobility, which is balanced with the requirements of social justice, economic viability, environmental quality, and health.

Energy Infrastructure:

Following the conflict, Ukraine needs to restore and update its energy infrastructure in a sustainable manner, which means encouraging the use of renewable fuels to cut down on air pollution and greenhouse gas emissions. Distributed generation and the advancement of renewable energy

sources are the cornerstones of the post-war restoration of the Ukrainian energy system. The objectives are to lower the likelihood of household power outages, assure the dependability of the local infrastructure, and improve the quality of energy received by industry and consumers.

- **Renewable energy sources:** Ukraine's energy mix should include more renewable energy sources and become less centralized in terms of energy production and distribution as a result of the energy sector's reconstruction. Movchan and Pindyuk demonstrate that when it comes to renewable energy sources, such as hydropower, biomass, offshore wind, solar, and wind, Ukraine offers excellent investment possibilities. Establishing infrastructure for geothermal and green hydrogen energy will enable the nation to emerge as a significant player in the European green energy market. Small solar power plants could potentially be installed on private or multi-unit buildings.
- **Distributed generation (should also be considered under housing solutions):** By building a decentralized energy system with several small-scale sources close to the point of consumption, the nation can lessen its exposure to possible enemy attacks and lower the possibility of blackouts and other disruptions that may happen when a central power plant goes offline. A decentralized system will also result in lower transmission losses and higher energy efficiency because electricity produced locally does not need to travel great distances before being used. In addition to opening doors for the growth of local energy cooperatives, distributed generation may also allow local individuals to take part in the production and use of energy within their communities.

Housing:

In addition to restoring damaged buildings and clearing the debris, strategies for sustainable urban growth should be created and new dwellings should be built with greater energy efficiency. Insulation, energy-efficient windows, and energy-efficient heating and cooling systems are all examples of characteristics that should be included in energy-efficient designs because they all contribute to lowering energy usage and homeowner costs. When rebuilding homes, adopting sustainable building materials and techniques should be given first priority. This could involve using resources that are obtained locally, using green areas and other sustainable design elements, and using eco-friendly building techniques. Adopting the circular economy's tenets will guarantee circular consumption, and managing urban resources will encourage the recycling, reuse, and refurbishing of current materials and goods (Kosse 16-18).

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