



UNITED NATIONS  
INDUSTRIAL DEVELOPMENT ORGANIZATION



# UKRAINE

RAPID INDUSTRIAL DIAGNOSTIC STUDY



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## TABLE OF CONTENTS

<b>LIST OF ACRONYMS</b> .....	4
<b>LIST OF FIGURES</b> .....	5
<b>LIST OF TABLES</b> .....	6
<b>1. INTRODUCTION</b> .....	8
<b>2. NATIONAL DEVELOPMENT VISION</b> .....	10
<b>3. SOCIOECONOMIC BACKGROUND</b> .....	14
<b>4. INDUSTRIAL SECTOR</b> .....	17
4.1. BRIEF OVERVIEW .....	17
4.2. PROGRESS ON SDG 9.....	21
4.3. IMPACT OF THE WAR.....	25
<b>5. STRATEGIC PRIORITIES</b> .....	27
5.1. SME DEVELOPMENT AND JOB CREATION .....	27
5.2. CIRCULAR ECONOMY AND ENVIRONMENTAL PROTECTION .....	32
5.3. DECARBONIZATION AND SUSTAINABLE ENERGY .....	35
5.4. AGRIBUSINESS AND INFRASTRUCTURE DEVELOPMENT .....	40
5.5. COMPETITIVENESS, QUALITY AND COMPLIANCE .....	45
<b>6. RECOMMENDATIONS AND OPPORTUNITIES FOR ISID</b> .....	50
<b>LIST OF REFERENCES</b> .....	53



## LIST OF ACRONYMS

<b>AA</b>	Association Agreement
<b>CE</b>	Circular Economy
<b>CEN</b>	European Committee for Standardization
<b>CENELEC</b>	European Committee for Standardization in Electrical Engineering
<b>DCFTA</b>	Deep and Comprehensive Free Trade Agreement
<b>EBRD</b>	European Bank for Reconstruction and Development
<b>EU</b>	European Union
<b>EUR</b>	European Union Euro
<b>FAO</b>	Food and Agriculture Organization of the United Nations
<b>GDP</b>	Gross Domestic Product
<b>GEF</b>	Global Environment Facility
<b>GHG</b>	Greenhouse Gas
<b>IDP</b>	Internally Displaced Person
<b>ILO</b>	International Labour Organization
<b>IMF</b>	International Monetary Fund
<b>IOM</b>	International Organization for Migration
<b>ISID</b>	Inclusive and Sustainable Industrial Development
<b>ISO</b>	International Organization for Standardization
<b>IT</b>	Information Technology
<b>LULUCF</b>	Land use, land-use change and forestry
<b>MHT</b>	Medium and High Technology
<b>NAAU</b>	National Accreditation Agency of Ukraine
<b>NDC</b>	Nationally Determined Contribution
<b>NES</b>	National Economic Strategy
<b>NGO</b>	Non-Governmental Organization
<b>NRP</b>	National Recovery Plan
<b>OECD</b>	Organisation for Economic Co-operation and Development
<b>POP</b>	Persistent organic pollutant
<b>PV</b>	Photovoltaic
<b>RDNA</b>	Rapid Damage and Needs Assessment
<b>RECPC</b>	Resource-Efficient and Cleaner Production Centre
<b>RES</b>	Renewable Energy Sources
<b>SDG</b>	Sustainable Development Goal
<b>SME</b>	Small and Medium-sized Enterprise
<b>SPP</b>	Sustainable Public Procurement
<b>TPES</b>	Total Primary Energy Supply
<b>UAH</b>	Ukrainian Hryvnia
<b>UkrISTEI</b>	Ukrainian Institute of Scientific and Technical Expertise and Information
<b>UkrNDNC</b>	Ukrainian Scientific Research and Training Centre for Standardization
<b>UkrStat</b>	State Statistics Service of Ukraine
<b>UNDP</b>	United Nations Development Programme
<b>UNECE</b>	United Nations Economic Commission for Europe
<b>UNHCR</b>	United Nations High Commissioner for Refugees
<b>UNIDO</b>	United Nations Industrial Development Organization
<b>USAID</b>	United States Agency for International Development
<b>USD</b>	United States dollar



## LIST OF FIGURES

Figure 1: Structure of the UNIDO green recovery programme for ISID in Ukraine .....	8
Figure 2: Ukraine recovery vision .....	11
Figure 3: GDP, constant 2015 USD .....	14
Figure 4: Forecast of the real GDP, % yoy .....	14
Figure 5: Risks to the National Bank's forecast .....	14
Figure 6: Reconstruction and recovery needs, as of 1 June 2022 .....	15
Figure 7: Share of enterprises, employment, turnover and value added, by size of industrial enterprises, % .....	17
Figure 8: Industrial turnover by region, UAH million .....	17
Figure 9: Volume of industrial production of mining and manufacturing, by main industrial groupings, % .....	18
Figure 10: Indices of industrial production, general and by main industrial groupings .....	18
Figure 11: Changes to the trade and production structure .....	18
Figure 12: Air emissions and GHG emissions from stationary pollution sources, by regions, thousand tons .....	20
Figure 13: SDG 9 Industry Index .....	21
Figure 14: Manufacturing employment, % of total employment .....	21
Figure 15: MHT manufacturing value added, % of value added .....	22
Figure 16: Manufacturing value added, % of GDP .....	22
Figure 17: Manufacturing value added per capita, constant 2015 USD .....	22
Figure 18: CO2 emissions from manufacturing per unit of value added, kg per constant 2015 USD .....	23
Figure 19: Manufactured exports by technology intensity, % .....	23
Figure 20: Manufactured goods in total merchandise exports, % .....	24
Figure 21: Structure of losses, by industry, % of total assets of industry .....	25
Figure 22: Business status compared to the status of 23 February 2022 in monetary terms, USD equivalent .....	25
Figure 23: Export competitiveness of manufacturing sectors .....	27
Figure 24: Share of intermediates in total imports, % .....	27
Figure 25: Share of intermediates in total exports, % .....	27
Figure 26: Challenges for business recovery and development, survey results .....	28
Figure 27: SME participation in regional/local business support programmes .....	29
Figure 28: Estimated location of IDPs .....	29
Figure 29: Difficulties faced by unemployed IDPs and non-IDPs when looking for a job .....	30
Figure 30: Number of applicants for one vacancy, persons .....	31
Figure 31: Average salary, % yoy .....	31
Figure 32: Volume of waste generated, by all economic activities per unit of GDP, kg per USD 1,000 .....	32
Figure 33: Energy productivity, GDP, USD 2015, per unit of TPES .....	35
Figure 34: Production-based CO2 productivity, USD 2015, per kilogram .....	35
Figure 35: GHG emission structure in 2019 .....	36
Figure 36: Share of RES in TPES, % Figure 37: Share of RES in electricity production, % .....	37
Figure 37: Share of RES in electricity production, % .....	37
Figure 38: Renewable electricity generation, by source, non-combustible .....	38
Figure 39: Installed electrolyser capacity and green hydrogen production, by year .....	39
Figure 40: Agricultural exports in 2021, USD billion .....	40
Figure 41: Agricultural damages and losses .....	41
Figure 42: Main difficulties expected in the production and sale of crop products, % .....	41
Figure 43: Main difficulties expected in the production and sale of livestock products, % .....	41
Figure 44: Damage to grain storage, % .....	42
Figure 45: Availability of grain storage for upcoming harvest, % .....	42
Figure 46: Dynamics of the aggregate damage assessment, USD billion .....	42



Figure 47: Damage, by type of property, USD billion .....43  
Figure 48: Damage, by transport asset category, USD million, % .....43  
Figure 49: Geographical structure of trade in goods, % .....45  
Figure 50: Needs in support of companies for export .....45  
Figure 51: Issued eco-labelling certificates, by sector .....48

## LIST OF TABLES

Table 1: NRP areas with high potential for UNIDO’s contribution .....12  
Table 2: Forecasted macroeconomic indicators .....15

# 1 INTRODUCTION

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## 1. INTRODUCTION

In July 2022, the United Nations Industrial Development Organization (UNIDO) received a request from the Government of Ukraine to provide support for the reconstruction of the country’s industry and infrastructure, which are significantly affected by the ongoing war. In response, UNIDO commenced conceptualizing and discussing with the Government the green recovery programme for inclusive and sustainable industrial development (ISID) in Ukraine to potentially cover the period from 2024 to 2028 (Figure 1).

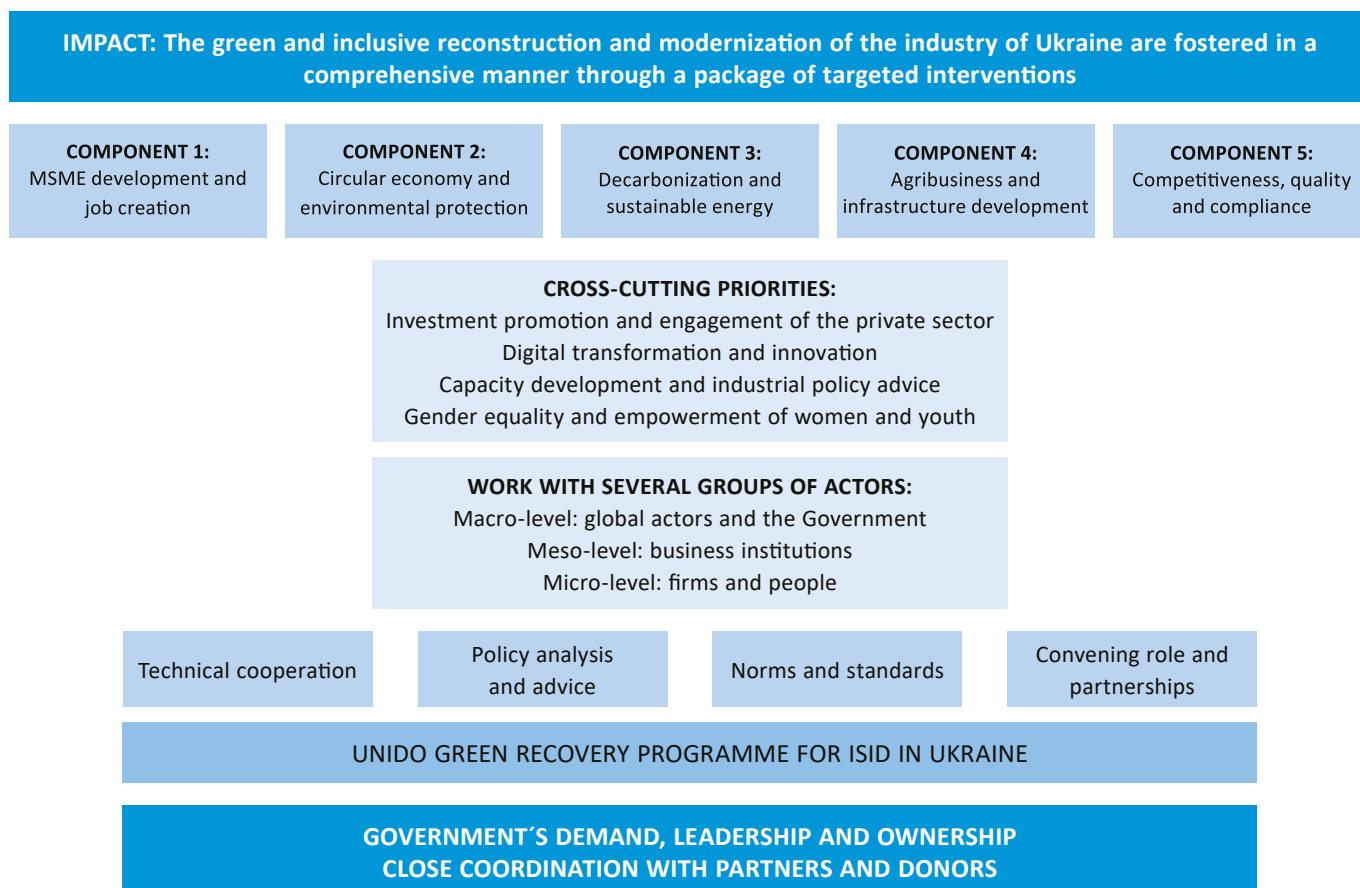


Figure 1: Structure of the UNIDO green recovery programme for ISID in Ukraine

The programme will set out a strategic vision for coherent, evidence-based, cross-sectoral and multi-stakeholder action in support of the country’s recovery efforts and long-term industrial development. Combining industrial policymaking, technical cooperation, capacity-building, peer learning, normative support and knowledge transfer, this work will be synergetic with the strategic frameworks of the Government of Ukraine and the United Nations, including the Transitional Framework (TF) for Ukraine 2022-2023, to which UNIDO is an implementing agency.

This rapid industrial diagnostic study was developed within the framework of the preparatory phase of the UNIDO green recovery programme. It aims to provide an initial baseline analysis of the situation with industry in Ukraine, inform further in-depth thematic diagnostics, as well as enable national stakeholders, including the Government, intermediary institutions, business sector and civil society, to tailor their recovery activities. One of the next steps will be to build on this study through comprehensive industrial diagnostics, leading to well-informed policymaking and capacity-building. At the same time, the rapid industrial diagnostic study could become a reference point for multi-stakeholder dialogue on Ukraine’s green recovery and ISID and, consequently, for the preparation of concrete technical cooperation activities within the framework of the UNIDO green recovery programme.



## **2** **NATIONAL DEVELOPMENT VISION**



## 2. NATIONAL DEVELOPMENT VISION

Ukraine does not have a formalized industrial strategy or policy. Its recent draft was developed in 2017 by the former Ministry of Economic Development and Trade of Ukraine (currently, the Ministry of Economy of Ukraine) and was structured around the following three pillars: promoting inclusive and sustainable industrial development, strengthening the integration of global production networks and increasing the resource efficiency of industry.

In 2018, the Cabinet of Ministers of Ukraine developed a draft order “[On the approval of the strategy for the development of the industrial complex of Ukraine for the period until 2025](#)”, which includes the following areas: sustainable economic development, rising living standards and social stability, increasing the level of national security.

The [Sustainable Development Strategy for Ukraine until 2030](#) was drafted in 2017 but has not been adopted. In 2019, the Sustainable Development Goals (SDGs) of the Agenda 2030 and their achievement were officially incorporated into the national development agenda by the [Decree of the President of Ukraine “On the Sustainable Development Goals of Ukraine for the period until 2030”](#) taking into account the national report “Sustainable Development Goals: Ukraine”. In 2020, the Cabinet of Ministers of Ukraine stipulated the need to achieve the SDGs in the process of formulating and implementing the national policy of Ukraine.

The strategic document that outlines the prospects for economic and industrial development is the [National Economic Strategy \(NES\) until 2030](#) adopted in 2021. The expected results of the NES include the establishment of a favourable environment for business development and investment, achievement of competitiveness in the international market, development of innovations and modernization of economic sectors, development of human potential, as well as ensuring equal rights and opportunities for women and men in all spheres of society. The NES will be reviewed in 2024 and 2027, evaluating the results of its implementation.

The [Strategy of Environmental Safety and Adaptation to Climate Change until 2030](#) was adopted in October 2021. Its strategic goals include the reduction of industrial pollution, creation of an effective chemical safety system, ensuring the rational use of natural resources, as well as the creation of the legal and economic framework for the introduction of waste management systems.

Ensuring the integration of environmental considerations in the country’s socioeconomic development is one of the strategic priorities of the national environmental policy. The [National Action Plan for Environmental Protection until 2025](#) was approved by the Cabinet of Ministers of Ukraine in 2021.

As a response to the challenges associated with climate change, Ukraine updated its nationally determined contribution (NDC) to the Paris Agreement in 2021, targeting the reduction in greenhouse gas (GHG) emissions of 65% by 2030 compared to the levels of 1990 and reaching climate neutrality by 2060. Its action plan for the next ten years includes the modernization and upgrading of the energy infrastructure and industrial enterprises, development of renewable energy sources (RES), introduction of energy efficiency in more economic sectors, promotion of resource-efficient agricultural practices and the introduction of more efficient waste management.

The ongoing war has challenged the relevance of national strategic documents through the major disruption in economic activity and damage to the infrastructure, environment and livelihoods of the population. As a response, an outline of the National Recovery Plan (NRP) was developed and presented at the Ukraine Recovery Conference 2022 in Lugano (Figure 2).

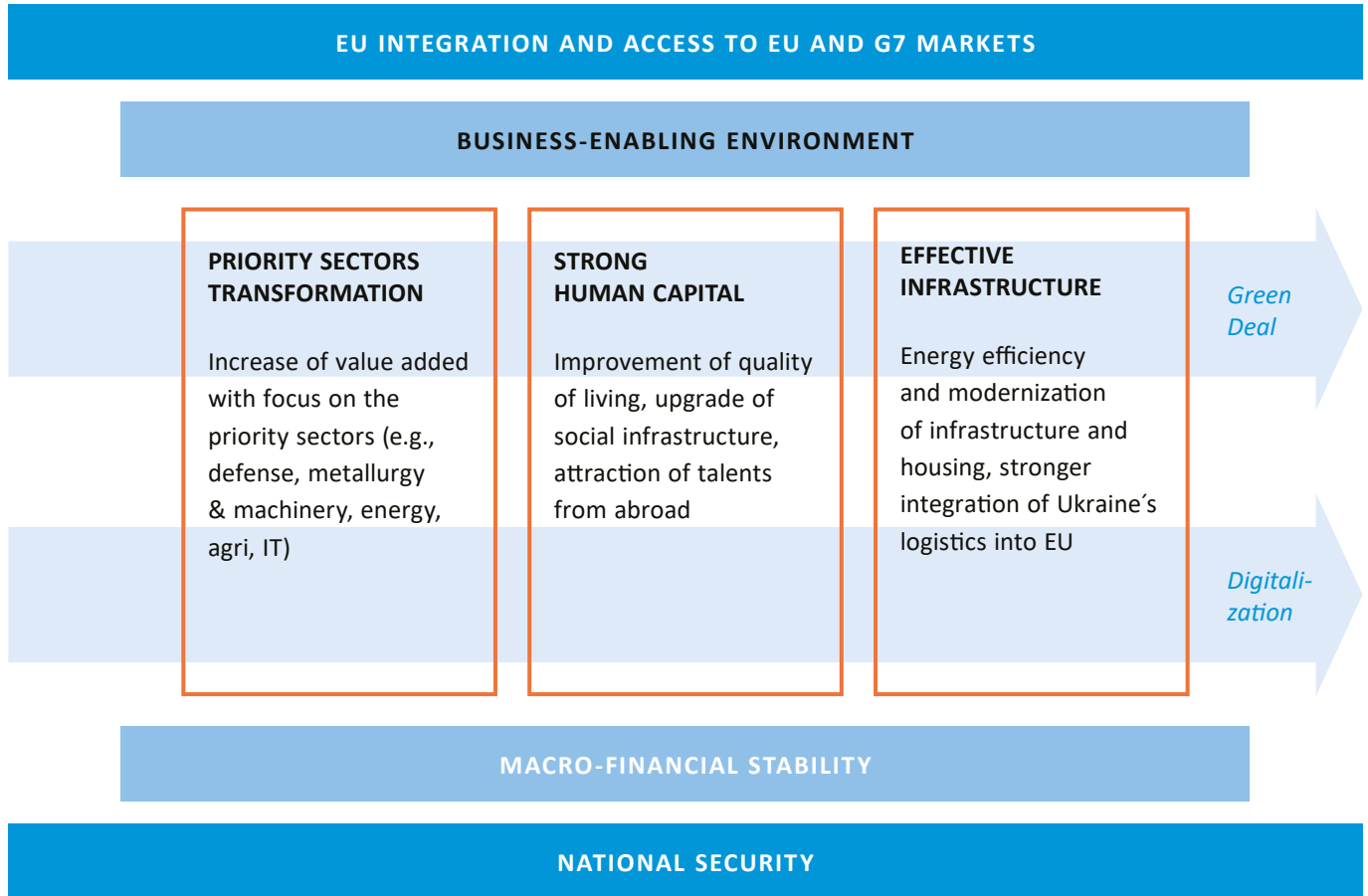


Figure 2: Ukraine recovery vision

The draft NRP contains 15 national programmes and a number of proposed projects. These projects are divided into strategic imperatives, enablers and transformation engines. UNIDO can support the implementation of these categories. Some areas with high potential for UNIDO's contribution are presented in Table 1. Among the key performance indicators (KPIs) of individual projects are GHG emissions, unemployment and value added, which are the focus of UNIDO's work. In addition, the NRP prioritizes the eco-modernization of industry (with an estimated budget of USD 10 billion) and the development of such sectors as agriculture, including processing, machine building, metallurgy, furniture and information technology (IT).

Type	National programme	Projects	Relevant KPIs
Strategic Imperative	2. Strive for EU integration	2.4.6. Ensuring access to product sales markets, in particular, access to the G7 and EU markets	Share of the EU countries in the goods and services export
	3. Rebuild a clean and safe environment	3.A.9 Restoration and development of waste management infrastructure	Reduction of GHG emissions Improvement of environmental safety
		3.A.10 Eco-modernization of industrial enterprises	Reduction of environmental pollution
	4B. Support the EU's zero-carbon energy transition	4B.3 Development of biofuels production from agri-products, residues and waste (bioethanol, biodiesel, biomethane) 4B.10 Building of RES for H2 production	Reduction of GHG emissions
Enablers	5. Boost the business environment	5.2 Review of the concentration degree in priority industries	Rank in business environment rankings
		5.9 Establishment of procurement practices for reconstruction projects in line with EIB guidelines	
		5.10 Support for incentivizing new business creation	Reduction of unemployment
		5.12 Support for re-employment with reskilling	
Transformation engines	8. Grow value-adding sectors of the economy	8.1 Development of agri-processing in alignment with EU Green Deal principles	Investment in priority sectors
		8.3 Development of high-value-added agri-productions	
		8.6 Promotion of the transition of the agri-food sector to green growth	Increased economic complexity
		8.8 Development of furniture production clusters	Growth of exports
		8.10 Development of agricultural machine building	Creation of new jobs
		8.13 Building of H2 compatible modules for metallurgy	
	9B. Strengthen the interconnectivity of Ukraine by upgrading logistics	9B.2 Long-term reconstruction and modernization of infrastructure	Growth of exports to/through the EU Capacity of export routes to the EU
	10A. Modernize regions and launch the housing upgrade programme	10A.1. Residential energy efficiency	Decrease in primary energy imports
		10A.6. Localization of windows production	
	10B. Build housing and upgrade infrastructure	10B.2. Repairs of building	Reduction of annual gas consumption
10B.3. Near-zero energy buildings (NZEB)		Decrease in unemployment	

Table 1: NRP areas with high potential for UNIDO's contribution

# 3 SOCIOECONOMIC BACKGROUND

### 3. SOCIOECONOMIC BACKGROUND

According to the World Bank classification, Ukraine is in the lower-middle-income group. In 2021, gross domestic product (GDP) was USD 101.22 billion (constant USD 2015) with 3.4% annual growth and GDP per capita at USD 2,451.9 (constant USD 2015). Estimated GDP losses in 2022 go beyond physical asset losses and reflect a major disruption of economic activities via several channels, including damage to productive assets and infrastructure, logistical problems, labour force losses, ruined supply-demand chains, uncertainty and elevated risks. The dramatic economic loss calls for an analysis of the impact of the war on the manufacturing sector, losses of small and medium-sized enterprises (SMEs) and how the war is harming manufacturing as an engine of growth and prosperity in Ukraine.

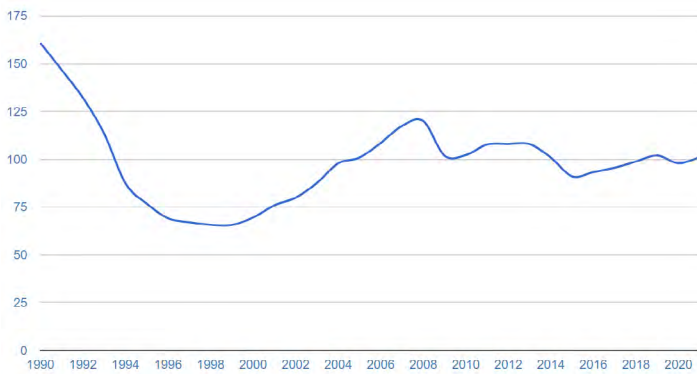


Figure 3: GDP, constant 2015 USD

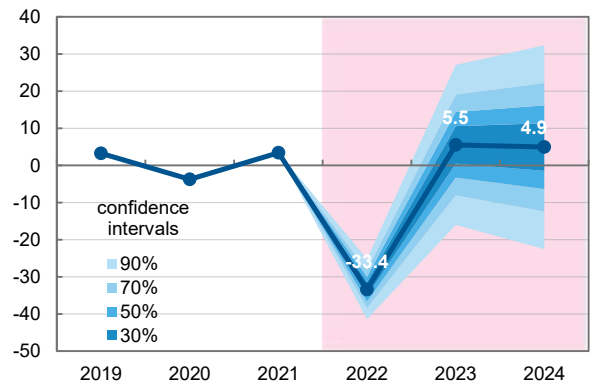


Figure 4: Forecast of the real GDP, % yoy

Ukraine’s GDP shrank by 15.1% year-over-year (yoy) in the first quarter of 2022. According to the IMF, Ukraine’s GDP is projected to drop by 35% in 2022, while the National Bank of Ukraine estimates it at 33.4% with further growth in 2023–2024 (Figure 4). At the same time, there are several major risks that could significantly affect this forecast, in particular, the escalation of the war or its prolongation (Figure 5).

		Probability that a risk will materialize		
		Low <15%	Medium 15%–25%	High 25%–50%
Degree of impact on the baseline scenario	Weak			Termination of gas transit
	Moderate	Delays in cooperation with the IMF	Cessation of the grain corridor	Increased emigration Energy risks of the coming winter
	Strong	Rapid implementation of the large-scale reconstruction plan of Ukraine “Marshall Plan”	Imprudent public finance framework (low rates on debt securities, freezing tariffs for utilities, lower amounts of international assistance, prolonged budget monetization)	Prolonged war, escalation

Figure 5: Risks to the National Bank’s forecast

Considering the impact of the war between 24 February and 1 June 2022, the damage across sectors covered in the [Rapid Damage and Needs Assessment \(RDNA\)](#) of the World Bank is estimated at approximately USD 97 billion. The most affected sectors are housing (40% of total damage), transport (31%), commerce and industry (10%). Aggregate losses total almost USD 252 billion. The total reconstruction and recovery needs are estimated at USD 349 billion as of June 2022.

Poverty based on the upper-middle-income poverty line of USD 5.5 per person per day is projected to increase tenfold and reach at least 21% in 2022. Affected regions are expected to experience even higher poverty rates.

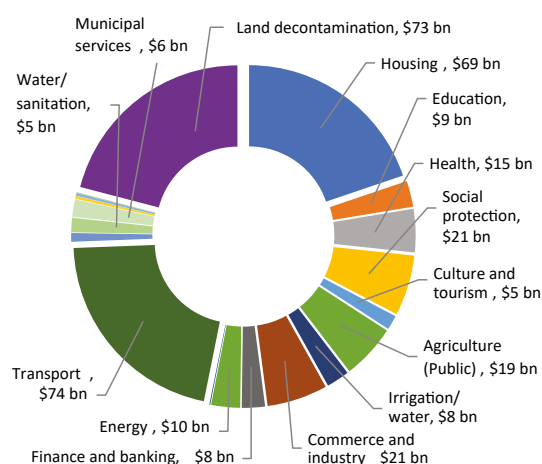


Figure 6: *Reconstruction and recovery needs, as of 1 June 2022*

Ukraine’s state budget approved by the National Parliament (Verkhovna Rada) on 3 November 2022 is a wartime budget, where all domestic resources will be directed towards military and defence spending (UAH 1 trillion/USD 25 billion or 40% of all expenditure), while budget deficit will be of unprecedented 21% of GDP (USD 31 billion). Critical social expenditure is maintained nominally stable but does not account or compensate for significant inflation and devaluation, meaning a significant decrease in real terms (30%) and the subsequent increase in poverty levels. The budget revenue is forecasted to be UAH 1.33 trillion (USD 29 billion) and budget expenditure in 2023 is planned at the level of UAH 2.58 trillion (USD 56.3 billion) or 41% of GDP. The main macroeconomic indicators are presented in Table 2. Ukraine is back to one-year budgeting from the recently introduced progressive three-year budget declaration.

	2021	2022 (estimate)	2023 (forecast)
GDP, current UAH, billion	5459.6	4727.6	6279.3
GDP, current USD, billion	199.9	129.2	137.1
<b>GDP growth rate, %</b>	<b>3.4</b>	<b>-32.0</b>	<b>3.2</b>
<b>Consumer Price Index, %</b>	<b>110.0</b>	<b>129.3</b>	<b>128.0</b>
<b>Real wages growth, %</b>	<b>10.5</b>	<b>-16.9</b>	<b>1.4</b>
Export growth, %	34.3	-29.8	7.2
Import growth, %	33.4	-9.9	1.0
UAH/USD, end of year	27.3	36.6	45.8

Table 2: *Forecasted macroeconomic indicators*

Against the current 20% inflation rate and forecasted 28% rate in 2023, nominal social expenditure remains at the level of 2022, bringing real inflation-adjusted spending down. The minimal subsistence budget (UAH 2,589/USD 56) and the minimum wage (UAH 6,700/USD 146) remain at the 2022 level, leading to a decrease in social standards in real terms.

Responding to the increased population of internally displaced persons (IDPs), compared to 2022, the Government has slightly increased budgets allocated to support low-income families, citizens in difficult situations and children.

# 4 INDUSTRIAL SECTOR



## 4. INDUSTRIAL SECTOR

### 4.1. BRIEF OVERVIEW

In 2021, Ukraine’s industry (excluding agro and construction sectors) provided jobs for nearly 2.2 million people and generated a turnover of UAH 5 trillion/USD 183 billion. Industrial manufacturing accounted for 10% of Ukraine’s GDP. The majority of Ukrainian industrial enterprises are SMEs. In 2021, enterprises with less than 250 employees represented more than 99% of all enterprises in industry, accounting for 66% of the total industrial employment and 47% of turnover. In 2020, the value added of such industrial companies accounted for 51% (Figure 7). In the industrial sector of Ukraine, large enterprises tend to generate more productivity due to greater access to capital investment.

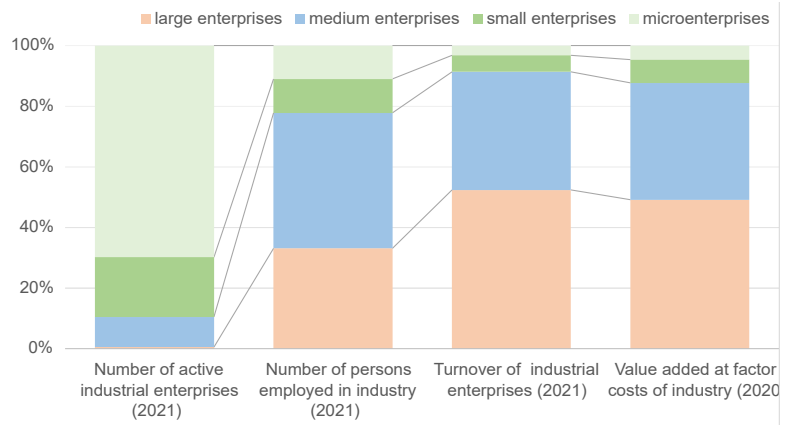


Figure 7: Share of enterprises, employment, turnover and value added, by size of industrial enterprises, %

The industry of Ukraine is concentrated in the southeast of the country. In 2020, the largest volumes of industrial turnover were in Kyiv city, Dnipropetrovsk, Donetsk, Kharkiv and Zaporizhzhia regions (oblasts) (Figure 8). These territories have historically been highly industrialized. At the same time, they are among the ones most affected by the war. The relocation of industrial companies to the western regions of Ukraine was supported by the Government. As of the end of November 2022, about 230 production enterprises have been relocated mainly to Lviv, Zakarpattia and Chernivtsi regions.

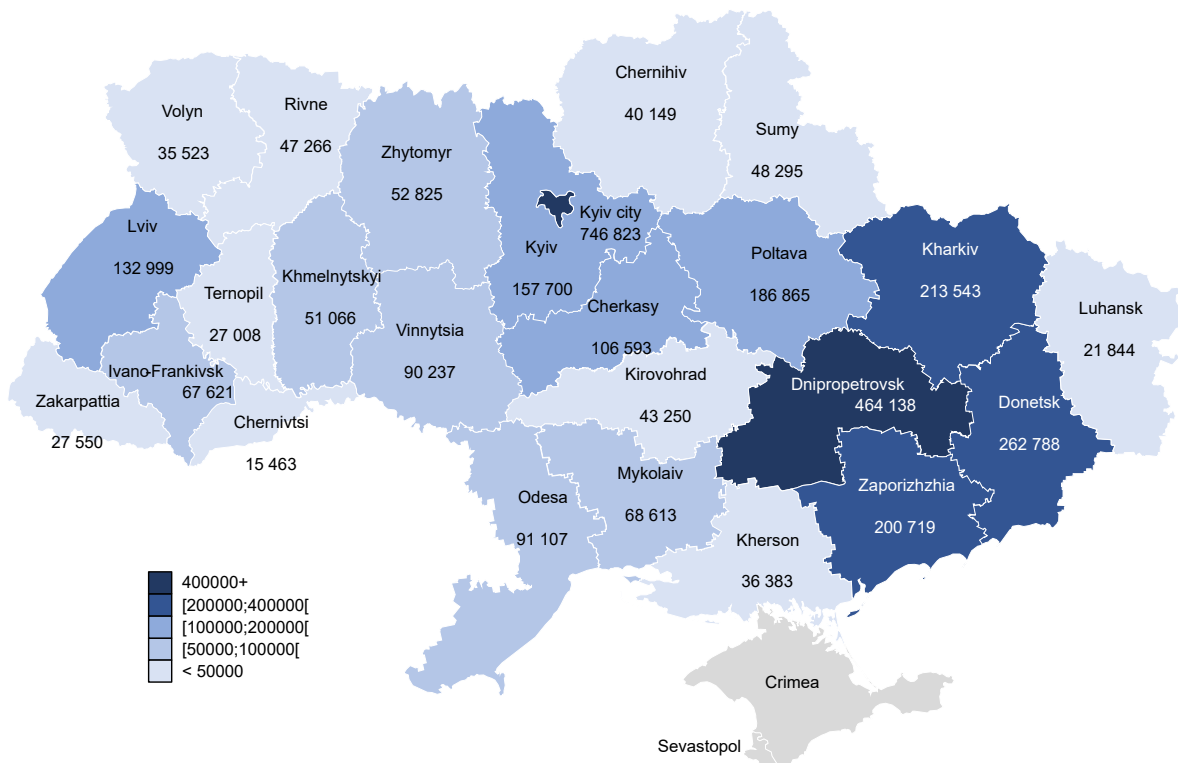


Figure 8: Industrial turnover by region, UAH million

According to the State Statistics Service of Ukraine (UkrStat), as of 2021, industrial production in the country focuses primarily on intermediate goods (52.6% or UAH 1.5 trillion) and consumer non-durable goods (26.2% or UAH 0.7 trillion) (Figure 9). 46.7% of produced intermediate goods are sold outside of the country. 57% of consumer durable goods are exported, but their value is just UAH 22 billion. This illustrates that the industrial sector’s exports have a low or medium level of technological intensity of products.

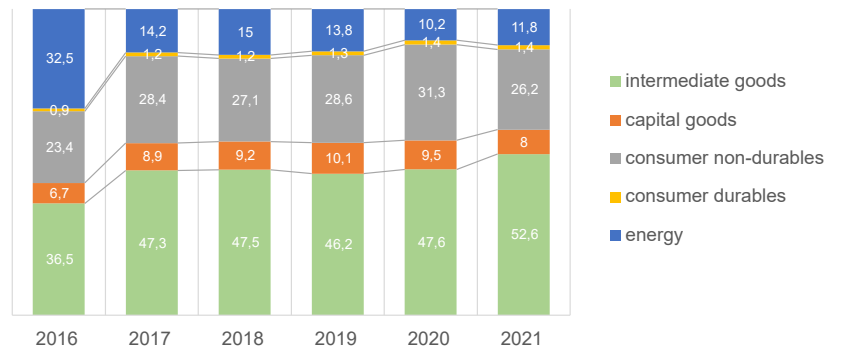


Figure 9: Volume of industrial production of mining and manufacturing, by main industrial groupings, %

The indices of industrial production (Figure 10) demonstrate a moderate increase in 2021 with an accent on consumer durable goods and intermediate goods.

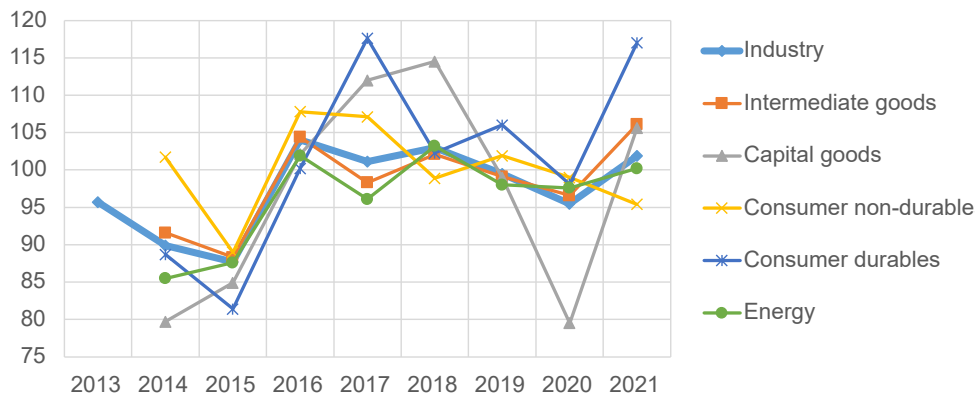


Figure 10: Indices of industrial production, general and by main industrial groupings

The change in production and trade structure in 2010-2020 (Figure 11) illustrates that Ukraine’s economy has tended to a decrease in high and medium technology products in manufacturing and exports. In the [UNIDO Industrial Competitiveness Index 2022](#), Ukraine ranks 69th (out of 154 countries).

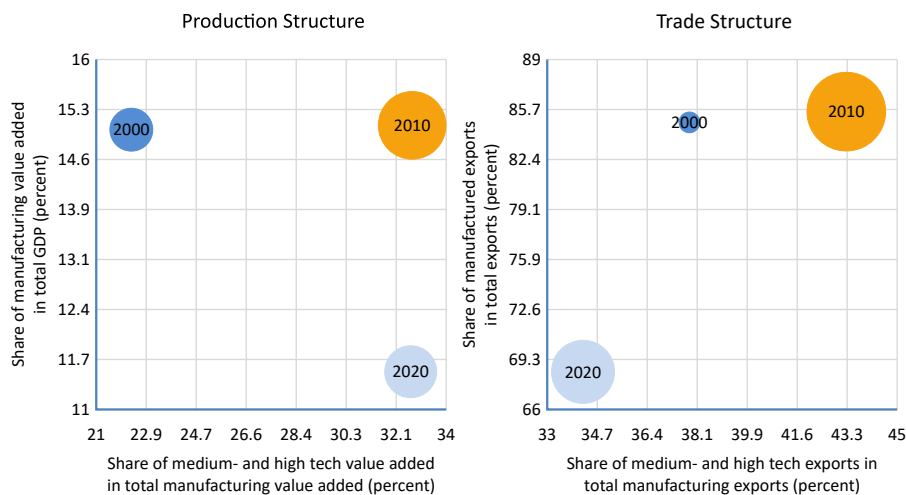


Figure 11: Changes to the trade and production structure



Considering the turnover of enterprises in 2021, the main activities of industry are the following:

- Manufacturing of food, beverages and tobacco products (18.0% or UAH 843 billion);
- Manufacturing of basic metals and fabricated metal products (14.5% or UAH 679 billion);
- Mining and quarrying (12.8% or UAH 597 billion);
- Manufacturing of rubber and plastics products, as well as other non-metallic mineral products (5.8% or UAH 270 billion);
- Machine building (5.2% or UAH 243 billion);
- Manufacturing of wood and paper products and printing (3.0% or UAH 243 billion).

In 2020, the main exported industrial products are the following, mainly from the metallurgy and food processing sectors:

- Sunflower oil (USD 5,271.3 million or 6,795.4 thousand tons);
- Iron ores and concentrates (USD 4,239.3 million or 46,292.8 thousand tons);
- Flat-rolled products of iron (USD 3,269.2 million or 7,101.0 thousand tons);
- Cast iron processing (USD 922.2 million or 3,103.9 thousand tons);
- Ferro-alloys (USD 660.0 million or 625.6 thousand tons);
- Meat and edible offal of poultry (USD 554.9 million or 431.1 thousand tons);
- Pipes made of cast iron and ferrous metals (USD 521.7 million or 473.0 thousand tons);
- Logs processed (USD 514.9 million or 2,100.2 thousand tons);
- Cigarettes containing tobacco (USD 310.8 million or 28.5 thousand tons).

The largest categories of Ukraine's exports in 2022 were grain crops (USD 5.2 billion), fats and oils (USD 3.7 billion) and ferrous metals (USD 3.7 billion). Together, they made up 43% of total exports (for the same period last year – 46%). Other top categories included electrical machinery (USD 1.9 billion) and nuclear reactors, boilers and machinery (USD 0.8 billion).

In 2020, the processing industry generated 52,311 thousand tons of waste, of which 19,807 thousand tons were utilized, 726 thousand tons were incinerated and 9,118 thousand tons were removed to specially designated areas. Main waste generators were the manufacturing of basic metals (43,650 thousand tons), food products (4,159 thousand tons) and chemicals (1,482 thousand tons). Mining and quarrying generated 391,078 thousand tons of waste mainly due to the mining of metal ores (366,901 thousand tons).

Air emissions, including GHG emissions from stationary pollution sources generated from industrial activities in Ukraine, were 2,101.1 thousand tons in 2020. Manufacturing generated 38% of emissions or 868.9 thousand tons (in particular, the manufacturing of basic metals with 33% or 729.9 thousand tons), while mining and quarrying generated 16% or 365.6 thousand tons. The most emission-intensive regions were Donetsk, Dnipropetrovsk, Zaporizhzhia and Ivano-Frankivsk.

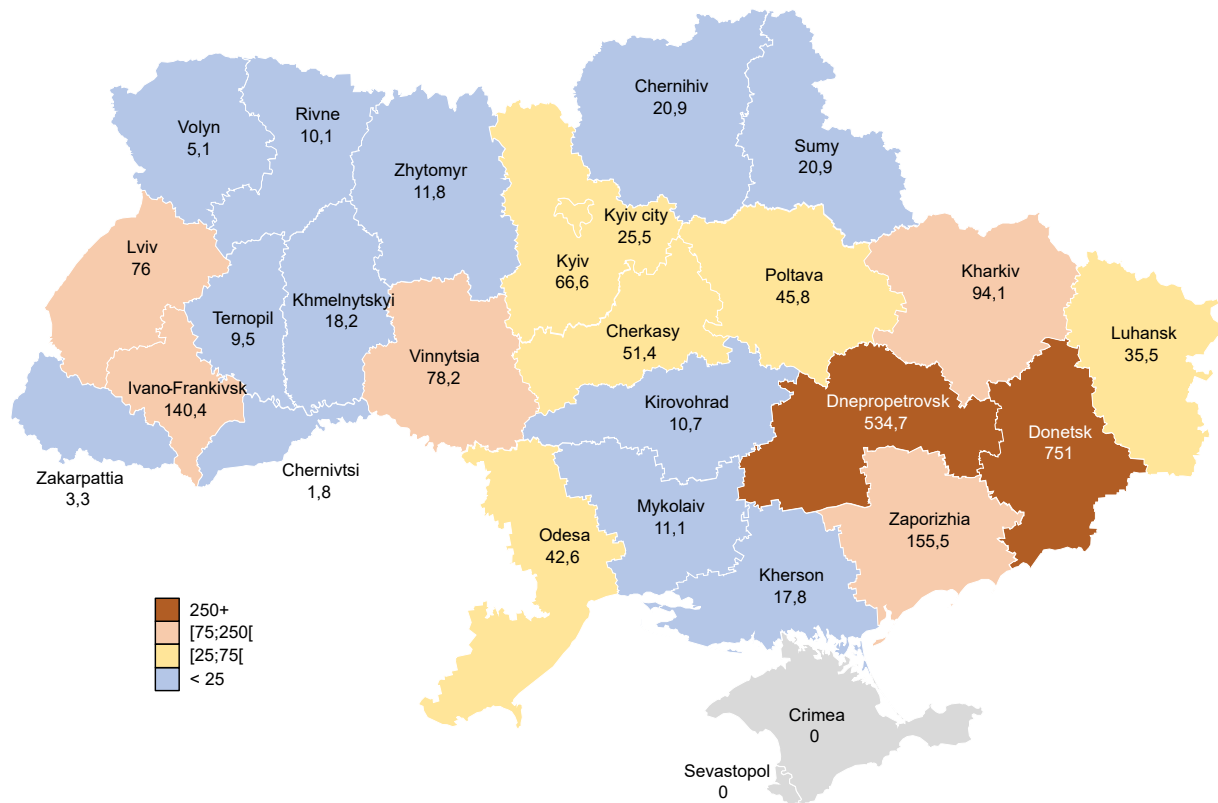


Figure 12: Air emissions and GHG emissions from stationary pollution sources, by regions, thousand tons

## 4.2. PROGRESS ON SDG 9

Despite the Government’s attention to the SDGs, the country’s progress on SDG 9 has been uneven. This could be illustrated by Ukraine’s SDG 9 Industry Index (Figure 13). This index measures manufacturing performance in more than 130 economies and can be used to identify the dimensions that have an impact on the performance of Ukraine towards achieving the targets of SDG 9. It comprises the following dimensions: manufacturing value added, manufacturing employment, technological sophistication of manufacturing production and the manufacturing sector’s environmental performance. The index tracks the performance of Ukraine over time and in relation to other economies. Since 2000, Ukraine had lost 46 positions in the index ranking and in 2019 shared the last, 132nd place with Niger, Cambodia and Angola.

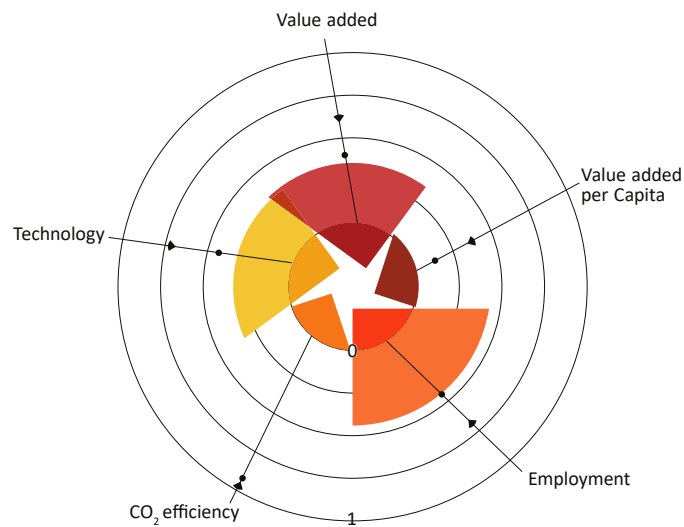


Figure 13: SDG 9 Industry Index

While some individual indicators of SDG 9, such as employment, technology and manufacturing value added, are close to the medium performance, others, including CO2 efficiency and value added per capita, are at the bottom of the ranking.

The employment indicator measures the contribution of manufacturing sectors towards a country’s employment as a whole. For Ukraine, it had negative dynamics in 2000-2016 and stagnation in 2016-2020 (Figure 14). Developed countries have the same trend but for a different reason, while middle-income industrializing countries usually have an upward trend. Therefore, in the case of Ukraine, this indicates that industrialization is slow-paced. In 2019, manufacturing employment was 12.7% and Ukraine held the 44th position in the ranking.

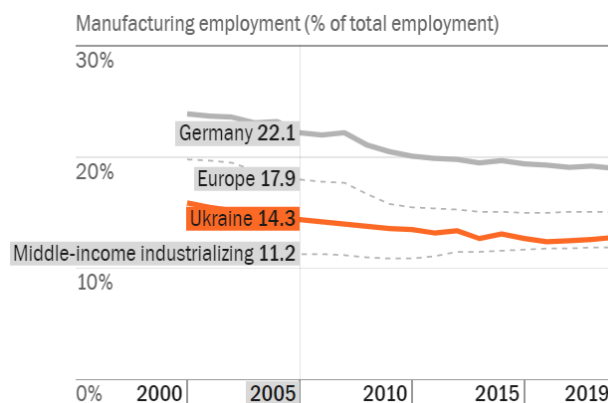


Figure 14: Manufacturing employment, % of total employment

The technology indicator measures the contribution of medium- and high-technology (MHT) industries to a country's economy. For this indicator, Ukraine has a negative trend since 2013 (Figure 15), when some parts of the country (including extensively industrial parts) were occupied. In 2019, Ukraine had 28.1% (55th position) and should reverse the negative trend.

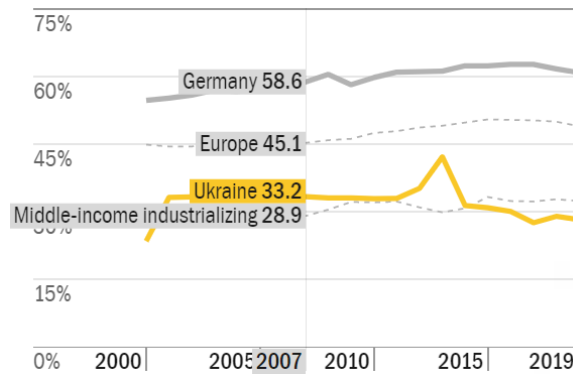


Figure 15: MHT manufacturing value added, % of value added

The value added indicator measures the contribution of manufacturing, excluding agriculture and mining, to a country's economy as a whole. Since 2004, Ukraine's performance fell behind. In 2019, Ukraine had manufacturing value added at 11.8% of GDP (Figure 16) and the 69th position in the ranking. The trend looks like the de-industrialization of the country.

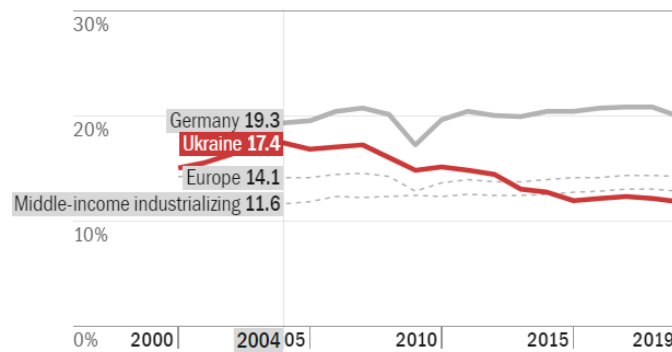


Figure 16: Manufacturing value added, % of GDP

In terms of the value added per capita indicator, the situation is even more concerning despite the insignificant progress since 2000 (Figure 17). In 2019, manufacturing value added per capita amounted to USD 273 (constant 2015), assigning Ukraine the 105th place in the ranking.

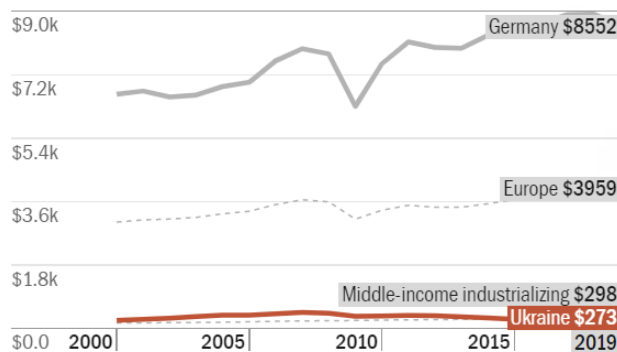


Figure 17: Manufacturing value added per capita, constant 2015 USD

The CO<sub>2</sub> efficiency indicator shows how much carbon dioxide is emitted for each unit of value added in manufacturing. For Ukraine, this indicator is controversial. Since 2000, the country has made significant progress, reducing emissions from manufacturing per unit of value added almost three-fold. However, this was due to the loss of part of the heavy industry. Yet, in 2019, it still took the last place in the ranking with an indicator of 2.79 kilograms of CO<sub>2</sub>-eq. per constant 2015 USD.

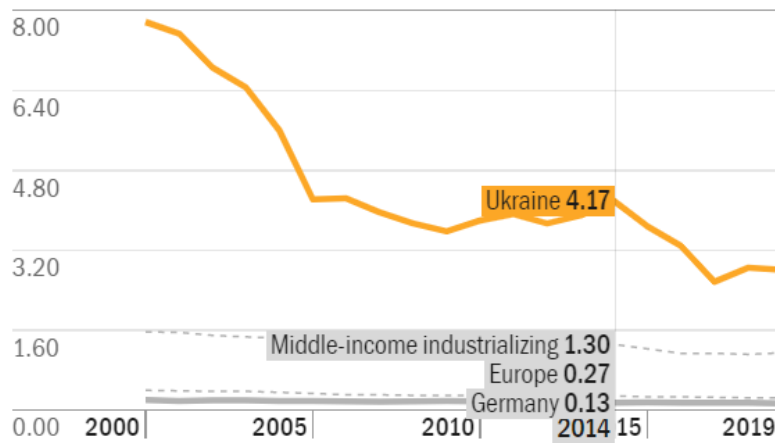


Figure 18: CO<sub>2</sub> emissions from manufacturing per unit of value added, kg per constant 2015 USD

The manufactured exports of Ukraine have a low or medium level of technological intensity with a trend to increase the share of low-tech products (Figure 19). Unfortunately, this comes at the expense of medium-tech products, potentially suggesting a loss of competitiveness.

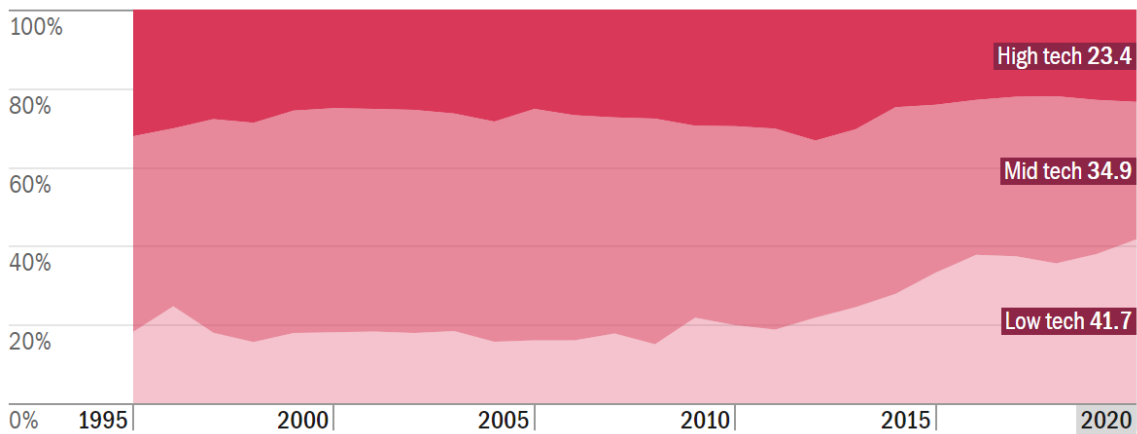


Figure 19: Manufactured exports by technology intensity, %

The same situation can be observed with respect to the share of manufactured goods in total merchandise exports (Figure 20). This implies an increasing contribution of primary unprocessed goods (e.g. minerals and crops) to merchandise exports. In 2020, the leading industries in Ukraine’s export were basic metals (29.4 %) and food and beverages (29.3%). High-level technological intensity products of machinery and appliances took third place with 6.7%. A low level of technological intensity of exports could suggest lower value-added production, as well as unskilled and potentially lower-paid jobs.

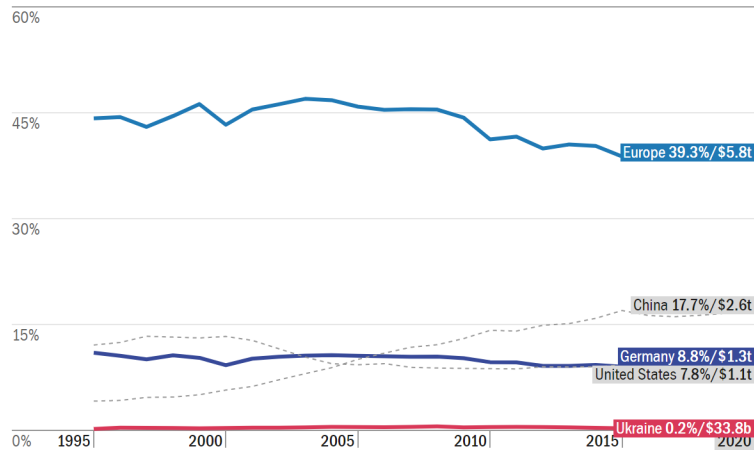


Figure 20: *Manufactured goods in total merchandise exports, %*

The SDG 9 Industry Index for 2019 and its components indicate that Ukraine has significant room for improvement in terms of the CO2 efficiency of the manufacturing sector and the added value of its products. The war has brought additional challenges to the national industrial sector.

To monitor the progress of Ukraine in the achievement of the SDGs, UkrStat in partnership with the UNDP launched the [Open SDG Platform of Ukraine](#) developed within the United Nations programme funded by the Joint SDG Fund.

A technological foresight conducted by the Ukrainian Institute of Scientific and Technical Expertise and Information (UkrISTEI) in 2021 revealed that Ukrainian industry has a sufficiently high scientific, technological and human potential to meet the national SDG 9 targets. However, this potential is not being used effectively enough to improve the technological level and move up the value chain.

In February 2021, Ukraine was included in the list of countries participating in the Global Pilot Programme for the Development of Roadmaps in Science, Technology and Innovation for the SDGs (STI4SDGs roadmaps). The development of such a STI4SDGs roadmap for Ukraine is envisaged by the Action Plan for 2021-2023 for the implementation of the [Strategy for the Development of the Innovation Sector in Ukraine until 2030](#), as well as the Operational Plan of the Ministry of Education and Science for 2023. UkrISTEI is responsible for developing the roadmap.



### 4.3. IMPACT OF THE WAR

The war has a major impact on the industry of Ukraine. It is the third sector after infrastructure and housing by the total value of damages and asset losses. As of 1 June 2022, according to the [World Bank's RDNA](#), total losses across commerce and industry amount to USD 47.5 billion with total damage to facilities estimated at USD 9.7 billion (transportation, military equipment production, energy and agriculture are not included).

As of November 2022, the [Kyiv School of Economics](#) assessed the total damage to the assets of enterprises at USD 13 billion. At least **412 enterprises** were damaged or destroyed since the beginning of the war.

Among other industries, metallurgy suffered the most (Figure 21). In particular, two enterprises were destroyed, which are the largest on the list of damaged/destroyed – Azovstal and Ilyich Iron and Steel Works – both located in Mariupol. Among regions, the Donetsk region suffered the most, accounting for almost half of the total damages to enterprises. In addition, significant losses have occurred in Kharkiv, Luhansk and Kyiv regions.

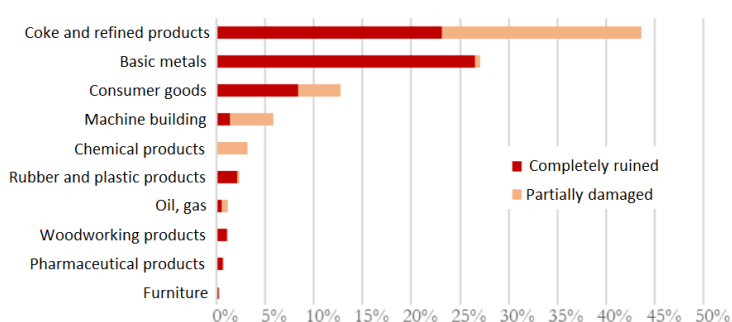


Figure 21: Structure of losses, by industry, % of total assets of industry

Total reconstruction and recovery needs for the commerce and industry sector are estimated at **USD 20.8 billion** over 10 years.

According to the survey of SMEs in Ukraine carried out by the Centre for Innovation Development, Office for Entrepreneurship and Export Development, national project Diia.Business, strategic agency Advanter Group, while 75.3% of enterprises stopped working completely in early March, there were only 9.9% of such companies in November 2022. At the same time, 32.4% of enterprises have not changed or expanded their operations in November, compared to 23 February 2022 (Figure 22). According to the survey of industrial companies carried out by the Resource-Efficient and Cleaner Production Centre (RECPC) in July 2022, 52.8% of the surveyed enterprises reduced their activities and 23.6% completely stopped activities. Manufacturing companies named problems with sales, lack of personnel (due to displacement or mobilization), loss of suppliers (especially raw materials) and issues with exports as the main challenges for their performance.

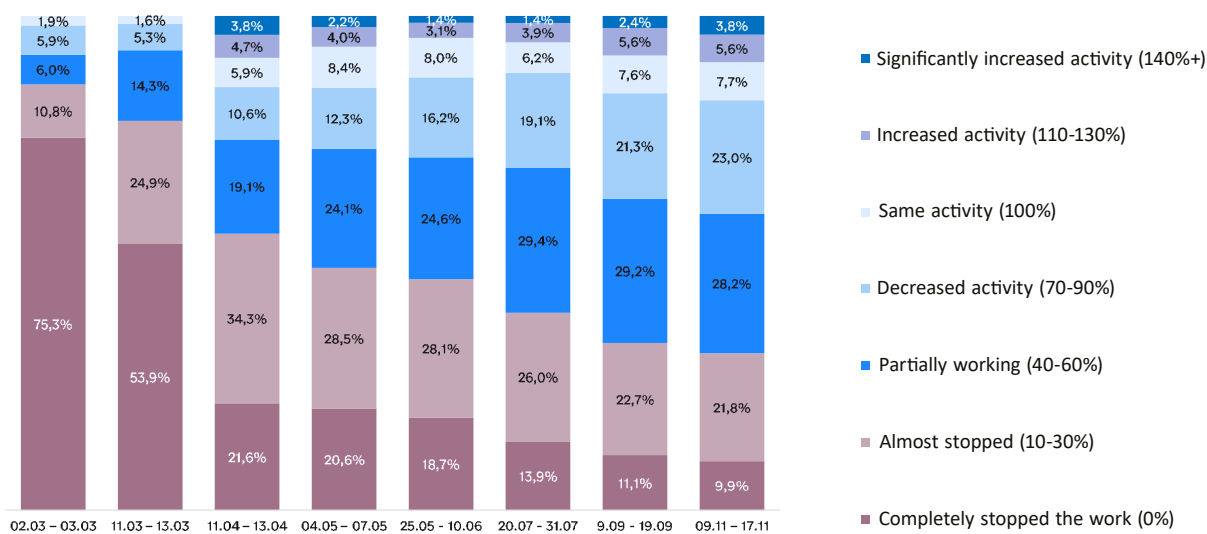


Figure 22: Business status compared to the status of 23 February 2022 in monetary terms, USD equivalent

# 5 STRATEGIC PRIORITIES

## 5. STRATEGIC PRIORITIES

### 5.1. SME DEVELOPMENT AND JOB CREATION

Among the most competitive manufacturing industries in Ukraine according to the calculated revealed comparative advantage are food and beverages, wood and basic metals (Figure 23). However, these industries tend to produce low- or medium-value-added products and their competitiveness is driven by relatively low labour costs and a favourable exchange rate.

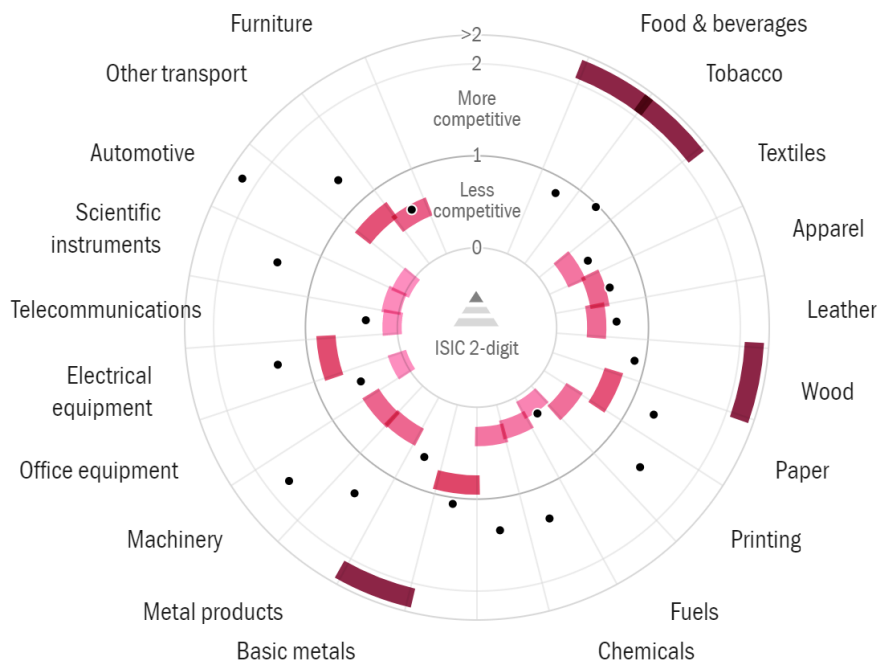


Figure 23: Export competitiveness of manufacturing sectors

The share of intermediate products in imports (Figure 24) and exports (Figure 25) indicates the underdevelopment of the national manufacturing sector. The country imports mainly final products and exports intermediate products with a major disparity.

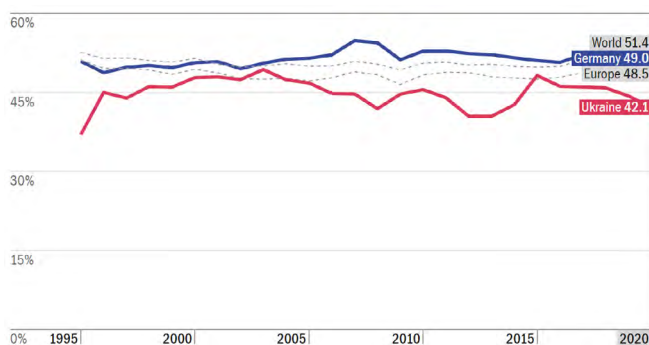


Figure 24: Share of intermediates in total imports, %

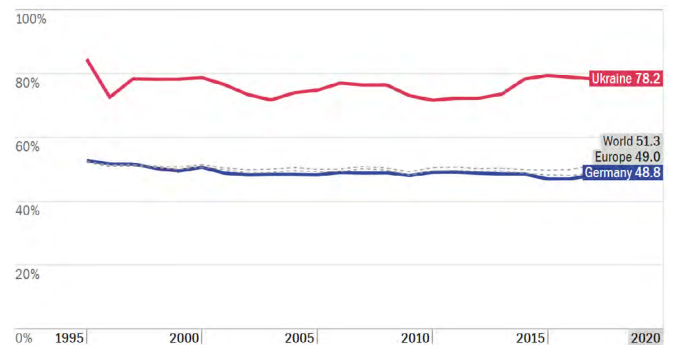


Figure 25: Share of intermediates in total exports, %

Among the challenges for the recovery and development of business, companies named the unpredictability of the situation and actions of the Government, the lack of customers in the domestic market, as well as the unavailability of credit lines and support programmes (Figure 26). Thus, in order to stabilize the socioeconomic situation during the martial law, the Government of Ukraine offered support programmes and actions in the following areas:

- Relocation of enterprises to safe areas;
- Establishment of state orders for goods and services;
- Reduction of the tax burden and regulations;
- Support to SMEs through interest-free lending for all areas of business, expanding access to knowledge and creating a conducive environment for doing business;
- Cash transfer programme for IDPs.

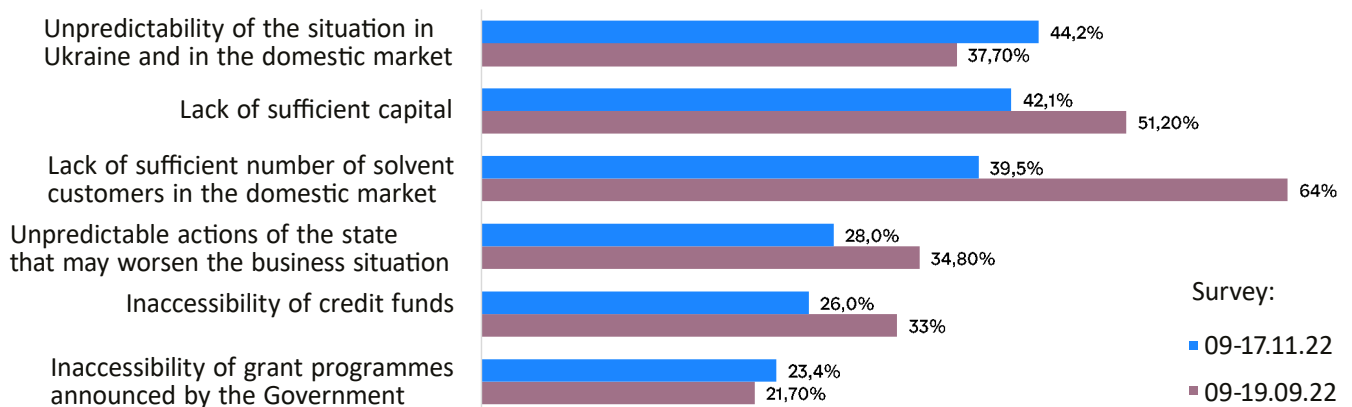


Figure 26: Challenges for business recovery and development, survey results

Partners of the Government of Ukraine also prepared a number of supporting actions. UNIDO supports relocated companies in the framework of the ongoing Global Eco-Industrial Parks Programme funded by Switzerland and the EU4Environment Action funded by the EU. The USAID Competitive Economy Programme releases grants (UAH 36 million in total) to support business continuity and recovery, including the relocation or recovery of businesses in times of war, expansion, including to foreign markets, as well as maintaining and/or improving existing business capabilities. The European Bank for Reconstruction and Development (EBRD) with funding from Switzerland and the United States has proposed a [EUR 2.4 million programme](#) on SME support in relocation.

At the same time, according to Advanter Group, nearly 58% of SMEs did not use any support programme from the Government. Less than 10% used loan programmes (similar to the [5-7-9 programme](#)) or grant programmes for IDPs, job creation or business development. According to the survey of manufacturing companies by the RECPC, almost 21% of them participated in support programmes from the state.

As for grants from international partners, they are even less popular. Only 3.6% of SMEs surveyed by Advanter Group used them. The majority (67%) of manufacturing enterprises surveyed by the RECPC were not aware of the existence of such programmes/grants and less than 10% of enterprises used these opportunities.

Local authorities have received new capacities due to the decentralization reform, which started in Ukraine in 2014. A key instrument in decentralization was the creation of self-sustaining amalgamated territorial communities. They received autonomy in respect of tax collection, self-governance and public policy. They can also build new institutions and implement local developmental projects. At the same time, despite the existence of regional/local support programmes, businesses do not benefit from them (Figure 27). The main obstacles are the low awareness and limited capacity of SMEs to prepare application packages.

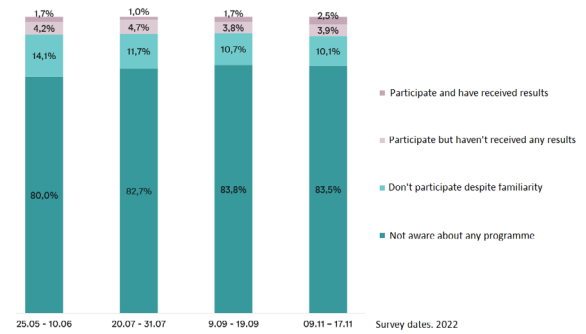


Figure 27: SME participation in regional/local business support programmes

Access to finance and support programmes is key for effective SME development. In Ukraine, there is a need in developing new programmes and mechanisms but also increasing the capacities of all actors, including central and local authorities, SMEs, business support institutions and banks. UNIDO is currently supporting SMEs in accessing finance through its Loan Guarantee Fund for industrial energy efficiency available to UkrGasBank and the Private Financing Advisory Network.

About 15% of companies surveyed by [Advanter Group](#) see the lack of qualified personnel as a challenge for their development. Above 30% of industrial enterprises surveyed by the [RECP](#) also claimed the lack of workers due to forced displacement as a negative factor having the most significant effect on their overall performance.

As of 27 October 2022, the International Organization for Migration (IOM) registered 6,540,000 IDPs within Ukraine (Figure 28). This represents a slight increase compared to 6.2 million as of the end of September. Most IDPs (53%) have been displaced for more than six months already. The share of IDPs intending to return in the long term was 71% in October 2022, and those who plan to integrate into their current location at 10%. Among those who are displaced and considering a return, most were driven by a will to reunite with families and friends (35%). Returning to their employment (24%) was also a prominent driver.

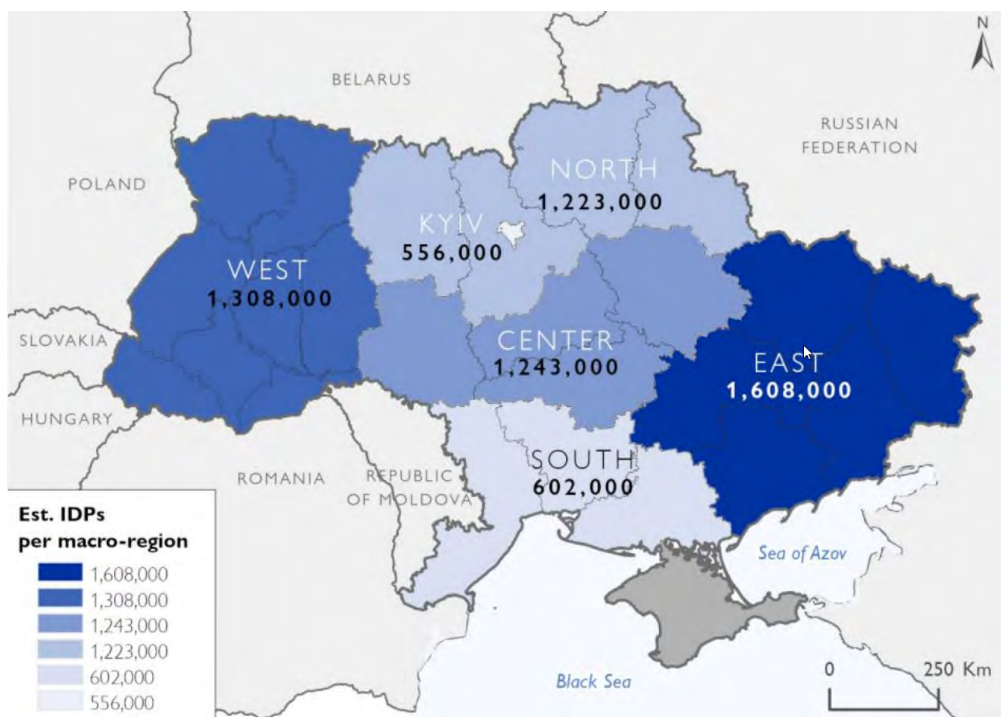


Figure 28: Estimated location of IDPs

More than half of displaced and non-displaced respondents in the 18-64 age group reported having had paid employment within the last month before February 2022 (67% and 63%, respectively). As of October 2022, only 34% of IDPs indicated being employees, while another 7% confirmed having their own businesses. The proportion of unemployed respondents was higher among IDPs than in the general population. In total, 31% of displaced respondents were unemployed with 20% actively looking for work. Among the unemployed non-displaced population (14% of all), 10% were actively looking for work. Regionally, the highest share of job seekers was found in the south region and the city of Kyiv. Difficulties faced by unemployed IDPs and non-IDPs when looking for a job are presented in Figure 29.

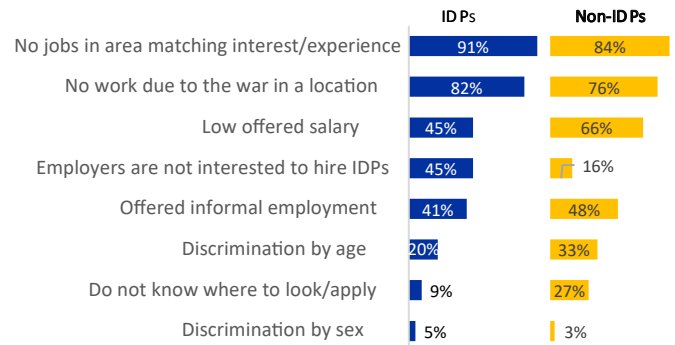


Figure 29: Difficulties faced by unemployed IDPs and non-IDPs when looking for a job

About 89% of employed non-IDPs confirmed that they were working in the same workplace they had worked in before February 2022, whereas among IDPs, only 61% reported having the same employer. 49% of the non-IDPs working in a new workplace reported that their wages were lower than they received before February 2022, compared to 75% of IDPs that had found new work.

All statistics on IDPs are collected by the Ministry of Social Policy of Ukraine in the information database. Access to this database is also granted to the State Statistics Service.

To support the rapidly growing population of IDPs, a large-scale IDP programme was launched. The programme includes the following four main types of support targeting both IDPs and host communities:

- Monthly cash transfers to IDPs to cover living expenses, including housing and utility services;
- Compensation to employers for labour costs related to the employment of IDPs;
- Reimbursement of host communities for the housing and utility costs paid by community-owned facilities used to temporarily house IDPs;
- Reimbursement of owners of private housing related to the free temporary accommodation of IDPs.

According to a 2020 survey, 10.8% of Ukrainians have a documented disability. In addition, the number of people who have significant health impairments but do not have a documented disability is 6% of the population of Ukraine. People with disabilities were among the most affected by the war. Many of them had to evacuate to find safety and receive medical care.

On 20 December 2022, 7,863,339 refugees from Ukraine were recorded. According to the protection profiling and monitoring exercise carried out by the United Nations High Commissioner for Refugees (UNHCR) (43,571 interviews conducted between May and November 2022), most refugees are women (85%), holding higher levels of education (46% with university or higher degrees and 29% with vocational training) and employed before leaving Ukraine (73%). The majority of them (63%) plan to stay in their current host country in the near future and only 14% plan to return to Ukraine. By the end of 2024, the National Bank of Ukraine assumes there will be about 5 million Ukrainians abroad, causing a proportionate decrease in the labour force and posing risks to post-war recovery.

According to the estimation of the [International Labour Organization \(ILO\)](#) of May 2022, 4.8 million jobs were lost in Ukraine and under the scenario of further military escalation, the loss of jobs will increase even more and reach 7 million. Due to the number of job seekers significantly exceeding available jobs (Figure 30) and the reduced financial resilience of businesses, nominal wages in the private sector continue to decline, which in the current conditions of high inflation translates into a significant decrease in real wages (Figure 31).

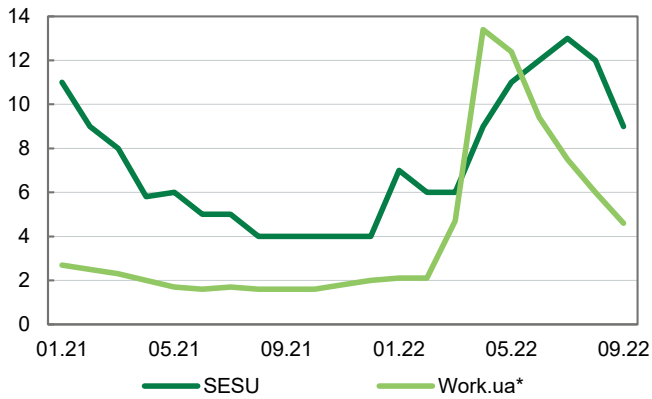


Figure 30: Number of applicants for one vacancy, persons

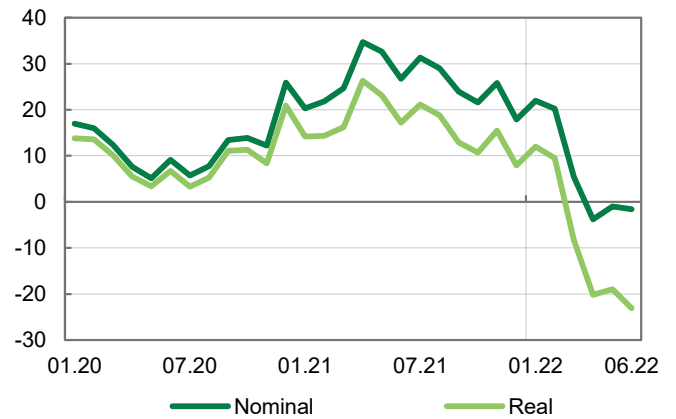


Figure 31: Average salary, % yoy

Thus, economic disruptions, combined with massive internal displacement and refugee flows have caused significant declines in employment and income. Migration losses threaten Ukraine’s economy not only by reducing the supply of labour in the near future but also by deteriorating its quality characteristics. Therefore, an important task is to preserve, restore and create new jobs, support the process of refugee return and ensure their reintegration, as well as economic employment and self-employment.



## 5.2. CIRCULAR ECONOMY AND ENVIRONMENTAL PROTECTION

The [NES until 2030](#) defines circular economy (CE), as part of the decarbonization of the economy, as one of the key pillars of economic policy. Strategic objective 3 “Strengthening the competitiveness of industrial products manufactured in Ukraine, implementation of resource- and energy-efficient technologies” includes stimulating the implementation of CE through the creation of markets for secondary raw materials, stimulating the reduction of waste generation, formation of CE policies and introduction of the extended producer responsibility system, as well as increasing resource efficiency through raising awareness on resource-efficient technologies, introduction of effective sectoral regulation, financing of resource and energy saving technologies and the implementation of sustainable public procurement (SPP). The Ministry of Economy of Ukraine started the preparation of the Action Plan for Circular Economy 2020, but this work was disrupted due to the war. This Action Plan is necessary to coordinate national efforts in making Ukraine’s economy modern, green, resource-efficient and competitive.

Ukraine does not have a mechanism to collect statistics for tracking its progress in CE like the [EU’s Circular Economy Indicators](#). There are also no statistics on green growth indicators like the number of SMEs that adopt energy management systems, apply resource efficiency and pollution reduction measures or offer green products or services. Ukraine’s progress in achieving the SDGs is monitored on the [Open SDG Platform of Ukraine](#) (under UkrStat), but most of the data was last updated in 2020. There is no legal definition of environmental goods, services and technologies. The environmental goods and services sector is an integral part of European statistical reporting in accordance with [EU Regulation No. 691/2011 on European Environmental Economic Accounts](#) and includes information on indicators such as market output and employment in the environmental goods and services sector, national environmental expenditures and energy use. The [National Programme for the Development of State Statistics](#) does not provide for the implementation of the EU Regulation No. 691/2011.

The concept of CE in Ukraine is mostly limited to waste management. However, circular business models are the basis of CE. According to the [RECPC](#), while some industrial companies use CE principles in their activities, the majority of them, including national stakeholders and the expert community, require considerable capacity-building, including the development of national knowledge and local examples.

Ukraine’s economy is dominated by resource- and energy-intensive technologies, and the progress in material efficiency is moderate. The volume of waste generated by all economic activities per unit of GDP increased from 636 kilograms in 2015 to 883 kilograms per USD 1,000 in 2020 (Figure 32). The material intensity of GDP was stable in 2015-2019, meaning that the resource productivity of the economy has not changed.

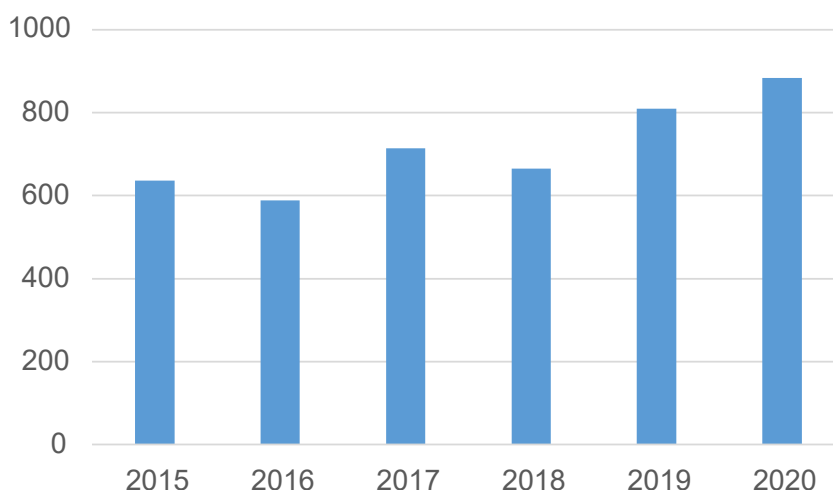


Figure 32: *Volume of waste generated, by all economic activities per unit of GDP, kg per USD 1,000*





The Association Agreement (AA) between Ukraine and the EU ratified in 2015 provides for the approximation of Ukraine's legislation to the legislation in the field of waste and resource management, in particular, Directive 2008/98/EC on waste, Directive 1999/31/EC on the landfill of waste as amended by Regulation 1882/2003 and Directive 2006/21/EC on the management of waste from extractive industries. In June 2022, Ukraine adopted the [Law "On Waste Management"](#), which defines the principles of waste generation prevention, waste volume reduction, limitation of its negative impact, as well as the promotion of reuse, recycling and recovery of waste. It will come into force in July 2023 replacing the current [Law "On Waste"](#) and will foster the implementation of the [National Waste Management Strategy until 2030](#). In December 2022, the Ministry of Environmental Protection and Natural Resources of Ukraine presented the [Roadmap for Waste Management Reform](#). The total investment for the development of proper waste management infrastructure, including the construction of waste treatment plants, is estimated at EUR 7.37 billion.

According to the regulations in the field of waste management, waste management planning should be performed at the following four levels:

- National waste management plan (to be developed and approved in 2023);
- Regional waste management plans (to be developed and approved in 2024);
- Local waste management plans (to be developed and approved in 2024-2025);
- Waste management plans of enterprises.

As of the beginning of 2023, there are no established methodologies for the development of these plans. The Ministry of Environmental Protection and Natural Resources of Ukraine will start their elaboration in 2023. UNIDO possesses unique experience in supporting industrial companies as well as municipalities (amalgamated territorial communities) in the field of waste management, carrying RECP assessments of SMEs and waste mapping exercises for municipalities within the framework of the EU-funded [EU4Environment Action](#) and can contribute to the preparation and piloting of methodologies for the development of waste management plans at the local and enterprise levels.

In 2023, Ukraine will implement extended producer responsibility schemes for packaging, batteries, as well as electric and electronic equipment, as well as plastics. The "polluter pays" principle will be implemented for extractive industries as a national law in accordance with the EU Directive 2006/21/EC.

The lack of availability of reliable data on waste generation and utilization is still a challenge for Ukraine and a significant barrier to implementing CE principles. Efforts are made to elaborate some related instruments, for example, a [start-up web aggregator](#) of open data on waste in Ukraine combined with a matchmaking service for finding partners/clients. The Ministry of Environmental Protection and Natural Resources of Ukraine has recently announced the development of a [waste management information system](#) with the functionality and capabilities to trace the lifecycle of waste based on blockchain technology. This system provides a single entry point for enterprises and simplifies obtaining permits and licenses in the field of waste management. It is planned that 80% of decisions will be made without the participation of an officer, and the system will save business funds for the administration of permitting procedures by more than UAH 2 billion per year.

The total amount of accumulated hazardous waste in Ukraine has exceeded [12 million tons](#). Among it, 42% (228,000 tons) of generated hazardous waste is utilized and 24% (128,000 tons) is in temporary storage. There are the following challenges with hazardous waste the country faces:

- The lack of confirmed data inventory of hazardous waste, including persistent organic pollutants (POPs) and mercury-containing waste;
- Sites of waste storage mostly do not meet the requirements of environmental safety and are in an unsatisfactory condition, while most of them are either filled to 90% of their capacity or are overfilled;
- The practice of hazardous waste disposal is not properly functional;
- The existing technologies and equipment for waste utilization are outdated and inefficient.



Ukraine is one of the countries that has not yet acceded to the Minamata Convention. The provisions of the Minamata Convention are aimed at protecting human health and the environment from anthropogenic emissions of mercury and its compounds. In particular, it stipulated the gradual prohibition of the production of certain devices containing mercury, as well as the mandatory cessation of its extraction. Accession to the Minamata Convention is important for Ukraine not only in the context of protecting the environment and public health from hazardous emissions of mercury and its compounds but also in the context of fulfilling the EU integration commitments. The Ministry of Environmental Protection and Natural Resources of Ukraine [announced](#) that in the near future, the draft law on Ukraine's accession to the Minamata Convention will be submitted for the consideration of the Verkhovna Rada of Ukraine. This would be the start of the long process of joining the Minamata Convention. Then, concrete steps should be undertaken to implement its provisions, including the preparation of industry.

A framework [Law "On Chemical Safety and Chemicals Management"](#) approved in December 2022 creates the basis for the introduction of similar modern European regulation in Ukraine based on the requirements of the registration, evaluation and authorization of chemicals, as well as classification, labelling and packaging of chemicals. This framework European integration document will allow Ukraine to fulfil a part of the obligations under the AA with the EU, as well as reduce the risks for its population and the environment. The implementation of the law's provisions requires the development of a large number of regulations and standards, the creation of a specially authorized body and an electronic registry, as well as support for the transition of businesses to a new chemical management system.

After the start of the war, environmental and security risks have significantly increased with the growing amount of waste. Much hazardous military and building waste is generated. The operational headquarters at the [State Environmental Inspectorate of Ukraine](#) was created to track violations in the field of environmental protection.

For nine months of the war, the Ministry of Environmental Protection and Natural Resources of Ukraine has recorded more than 2,000 occasions of environmental damage. According to the methodologies developed by the Ministry, the damage from emissions of pollutants in the air alone reaches UAH 955 billion. The damage to soils and land exceeds more than UAH 450 billion. GHG emissions directly related to the war are estimated at 31 million tons CO<sub>2</sub>-eq, while potential GHG emissions from the reconstruction of destroyed or damaged infrastructure and buildings are 79 million tons CO<sub>2</sub>-eq.

At least 412 enterprises, plants and factories, including chemical enterprises, were [damaged during the war](#). There is a significant threat to nuclear and radiation safety due to the damaged nuclear and radiation-hazardous facilities. The destruction of military equipment, explosions of ammunition, burning of petroleum products, forest fires, as well as fires in residential buildings and industrial enterprises led to the release of a large volume of harmful substances into the air, including at least 87 thousand tons from destroyed military equipment, 2.7 million tons from forest and other fires.

Ukraine's economy has been dominated by resource-intensive technologies without the reuse of waste. Waste generated from extraction, enrichment, chemical and metallurgical processing, transportation and storage of minerals can serve as a secondary raw material resource for the industrial, construction and energy sectors. Secondary raw materials from the residues of final consumption products can also have a significant resource potential, which can contribute to the energy independence and energy efficiency of Ukraine.



### 5.3. DECARBONIZATION AND SUSTAINABLE ENERGY

In order to strengthen its response to climate change and effectively contribute to the joint effort to reduce GHG emissions, Ukraine ratified the Paris Agreement and submitted its first NDC in 2015 and the updated NDC in 2021. Its targets include reducing emissions by 65% from 1990 levels by 2030 and achieving climate neutrality by 2060.

According to the [NES until 2030](#), the decarbonization of the economy (energy efficiency, development of RES) is one of the key pillars of economic policy. The NES envisages the achievement of climate neutrality by 2060.

The [Energy Strategy of Ukraine until 2035 “Security, Energy Efficiency, Competitiveness”](#) adopted in 2017 defines the target share of RES at 25% (above 25% for electricity) and emissions at 50% compared to the 1990 level. Currently, the Ministry of Energy of Ukraine is preparing a new [Energy Strategy of Ukraine until 2050](#) to create conditions for the sustainable development of the national economy by providing access to reliable, sustainable and modern energy sources. It will be based on the target indicators of economic development in accordance with the NES until 2030 as well as international commitments undertaken by Ukraine (e.g. within the framework of the AA between Ukraine and the EU and the Paris Agreement).

Ukraine committed to shaping its legal framework in line with the EU climate acquis and the Energy Community Treaty. The AA ratified in 2015 includes specific provisions for climate cooperation and protection of the ozone layer.

Ukraine introduced a carbon tax, which despite its low level of revenues, could become the basis of a future climate fund once it is enhanced and the financial architecture is defined. The system of environmental finance management in Ukraine (taxes, state aid and other available financial support tools) needs to be reformed in order to progress on the EU acquis, as well as stimulate the green modernization of enterprises and the production of ecological products, thus creating new green jobs.

Ukraine remains one of the most carbon-intensive countries in the world despite a significant industrial decline since 1990. Ukraine’s emission level per unit of GDP is much higher than that of the EU and the world average. Energy productivity and production-based CO<sub>2</sub> productivity have shown an upward trend (Figure 33, Figure 34), however, they are still relatively low. Thus, in 2019, the energy productivity of Ukraine was 5,457.76 GDP (USD 2015) per unit of total primary energy supply (TPES), while for the EU this indicator was 13,754.29 GDP (USD 2015) per unit of TPES. The same applies to production-based CO<sub>2</sub> productivity. In 2020, for Ukraine, it was 2.88 USD (2015) per kilogram and for the EU, 7.50 USD (2015) per kilogram.

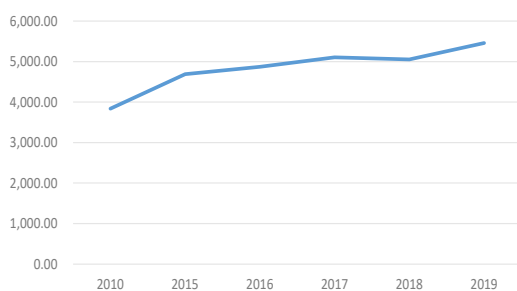


Figure 33: Energy productivity, GDP, USD 2015, per unit of TPES

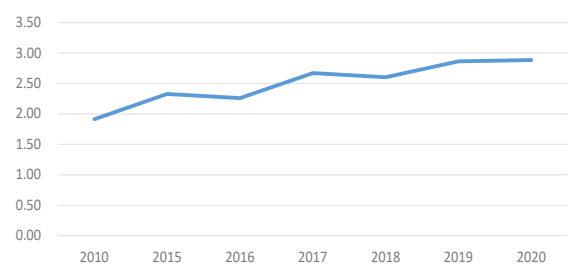


Figure 34: Production-based CO<sub>2</sub> productivity, USD 2015, per kilogram

According to Ukraine’s Greenhouse Gas Inventory 1990-2020, GHG emissions in Ukraine in 2019 amounted to 332.11 megatons CO<sub>2</sub>-eq. excluding land use, land-use change and forestry (LULUCF), which is 64.8% lower than the baseline 1990 level and 2.3% lower than in 2019. With the LULUCF sector, emissions in 2019 amounted to 332.16 megatons CO<sub>2</sub>-eq. and decreased in comparison with the baseline year by 62.4% and by 2.5% in comparison with 2018. The largest share of GHG emissions in 2019 is carbon dioxide with 68.3%. The shares of methane and nitrous oxide are 19.9% and 11.4%, respectively.

The largest GHG emissions in Ukraine occur in the energy sector (Figure 35). In 2019, the share of this sector accounted for around 66% without the LULUCF sector. Industrial processes and the agricultural sector accounted for 17% and 13%, respectively.

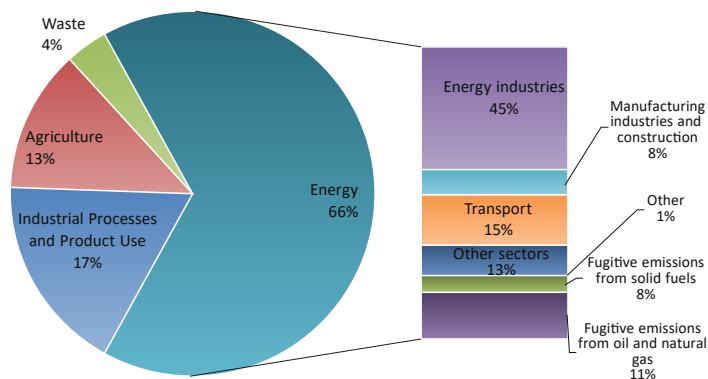


Figure 35: GHG emission structure in 2019

The eco-modernization of industry should reduce its negative impact on the environment, in particular, to decrease the volume of emissions in the air to the level of European standards. In December 2022, the Ministry of Environmental Protection and Natural Resources of Ukraine presented the first best available techniques reference documents for the following categories:

- Iron and steel production;
- Production of cement, limestone and magnesium oxide;
- Energy efficiency.

Industry is the largest final energy consumer (19.1 megatons out of 51.5 megatons in 2018). Ukraine depends on imports for around 83% of its oil consumption, 33% of its natural gas and 50% of its coal. In 2018, Ukraine imported 8.5 megatons (10.6 billion cubic meters) of natural gas, 13.8 megatons of coal and 10.4 megatons of oil products. Belarus was Ukraine's main supplier of refined products.

The war has emphasized the importance of energy security for Ukraine. Massive attacks on critical energy infrastructure facilities resulted in the introduction of consumption and capacity-limiting schedules. From 25 November to 20 December 2022, almost all electricity consumers were temporarily disconnected from the electricity supply. From 25 November to 20 December 2022, the electricity supply deficit in Ukraine remained at 20-30%. It caused blackouts and restrictions on electricity consumption for industrial consumers and households.

At the end of November 2022, the estimated damages to Ukraine's energy sector, including utilities and district heating sectors, were at least USD 9.1 billion. As of 20 December 2022, 50% of Ukraine's power capacity was either damaged or destroyed. Electricity and natural gas consumption decreased by 30-35% compared to 2021.

The Government of Ukraine is working on the reform to increase Ukraine's energy security by the following measures:

- Ensuring the security of electricity and natural gas supply to consumers;
- Integration of energy markets with European markets;
- Improving the reliability and efficiency of the unified energy system of Ukraine;
- Diversification of sources and routes of energy supply;
- Increasing the volume of domestic energy production taking into account economic feasibility;
- Development of renewable and low-carbon energy sources and alternative fuels;
- Improving energy efficiency along the chain from energy production to consumption;
- Reforming the coal industry of Ukraine.

Currently, there is a demand for energy security not only at the national level but also at the level of municipalities and enterprises.

UNIDO is supporting Ukraine’s enterprises in the area of energy and resource efficiency through advisory, training and investment facilitation services through the project on the introduction of the energy management system standard in Ukraine’s industry, the Global Eco-Industrial Park Programme and the EU4Environment Action.

Ukraine’s energy mix is relatively diversified, with no fuel representing more than 30%. In 2018, the share of coal (the country’s primary fuel) dropped to 30% followed closely by natural gas (28%) and nuclear power (24%).

Ukraine has achieved significant progress in the production of renewable energy in recent years. The share of RES in TPES more than doubled in 2009-2019 (Figure 36), as did the share of renewables in final energy consumption, which accounted for 7.44% in 2019. The development of RES was one of the Government’s priorities due to its potential to reduce natural gas dependency and enhance energy security. The generous guaranteed feed-in tariffs for electricity produced from RES were designed to promote this development. In addition, phasing out residential price subsidies for gas and heat makes heat generation from biomass more attractive. In 2017, the State Energy Efficiency Agency introduced the online investment map of Ukraine, which shows information about implemented and potential projects, as well as the resource potential of a given area.

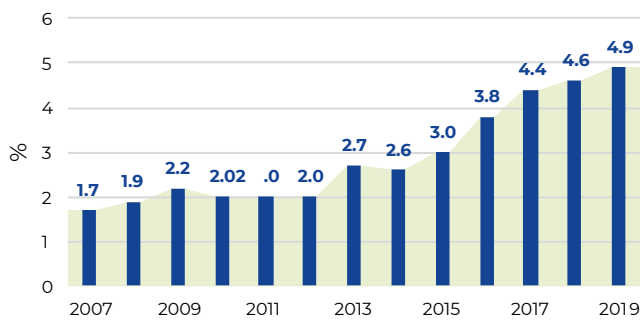


Figure 36: Share of RES in TPES, %

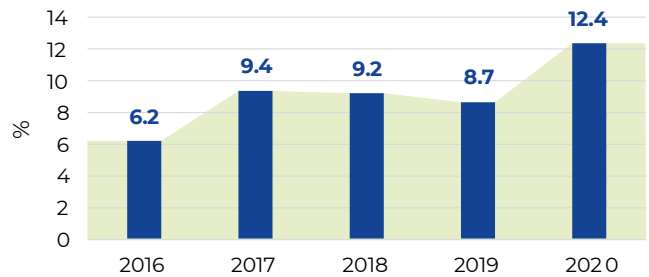


Figure 37: Share of RES in electricity production, %

The rapid expansion of RES was driven by the adoption of the feed-in tariff in 2009, which is the highest in Europe. Under the feed-in tariff policy, the energy produced from RES could be sold to a guaranteed buyer (a state-owned enterprise). The guaranteed buyer would then sell the purchased electricity at a market price (lower than the tariff). As a result, the guaranteed buyer is unable to meet payment obligations to renewable energy generators starting in 2019.

In 2021, Ukraine’s sector of RES was in turbulence. The Government of Ukraine strived to meet its obligations stipulated by the Memorandum “On Mutual Understanding in Settlement of Problem Issues in the Field of Renewable Energy in Ukraine” concluded in June 2020 and began the repayment of debts to RES producers.

Ukraine has a high technical RES potential of 874 gigawatts, including solar of 83 gigawatts, onshore wind of 438 gigawatts and offshore wind of 250 gigawatts. At the beginning of 2022, the total installed RES capacity (all grid-connected) reached 9.5 gigawatts, excluding 0.6 gigawatts of RES capacities located in occupied territories. About USD 12 billion was invested in Ukraine’s RES sector in 2009-2021. As of December 2022, 2.5 gigawatts (25%) of RES facilities are unavailable and about 6% of the total installed RES capacity has been destroyed or damaged.

The structure of renewable electricity generation in Ukraine is presented in Figure 38. It demonstrates a significant boost in electricity generation from wind and solar power plants after 2016.

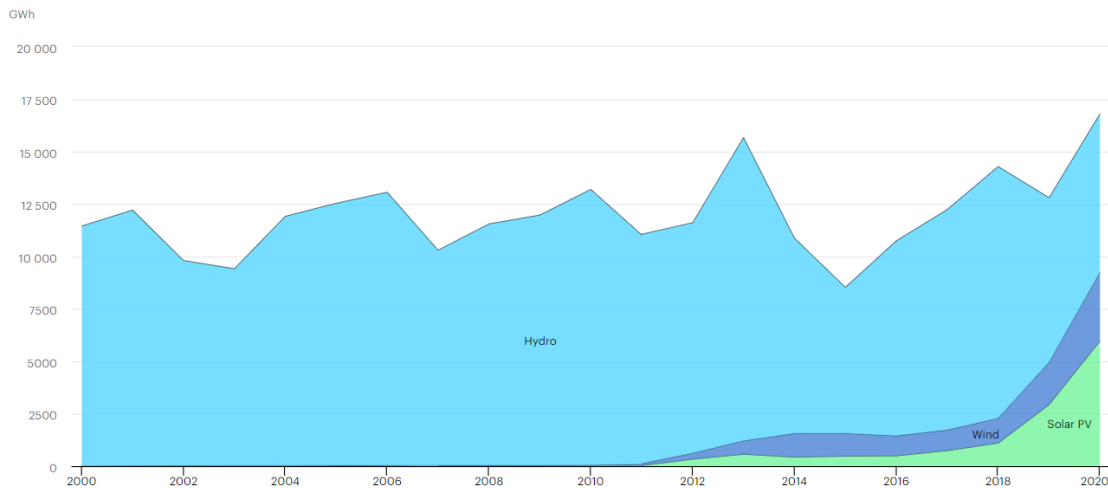


Figure 38: Renewable electricity generation, by source, non-combustible

The photovoltaic (PV) sector had the highest growth rate among other RES in Ukraine in 2019-2021. At the beginning of 2022, the total installed PV capacity, excluding 0.4 gigawatts located in occupied territories, reached 7.6 gigawatts or 80% of the total RES installed capacity in Ukraine, including 45,000 prosumer installations with a total capacity of 1.2 gigawatts. As of the end of 2022, about 13% of Ukrainian PV capacities are unavailable and about 6% of the total installed solar capacity has been destroyed or damaged, including hundreds of prosumer installations.

At the beginning of 2022, Ukraine’s total installed capacity of wind power plants (all onshore) was 1.6 gigawatts, excluding 0.2 gigawatts located in occupied territories. Almost all wind power plants in Ukraine were built in the southern regions nearby the Azov and Black seas coasts (Kherson and Zaporizhzhia regions), where natural conditions for wind power plants are the most favourable. As of 22 December 2022, approximately 80% of wind generation capacities are unavailable, while at least seven wind turbines are known to be damaged or destroyed (about 1% of the total installed wind capacity).

The development of hydrogen energy would help Ukraine advance in the energy transition and achieve climate neutrality, sustainable energy and enhanced energy security. Ukraine is one of the EU’s priority partners in the future hydrogen economy, therefore, the Ministry of Energy of Ukraine creates the necessary regulatory framework and a product certification system that meet European standards. In 2021, the Ministry of Energy of Ukraine, the National Nuclear Energy Generating Company “Energoatom”, the Gas Transmission System Operator of Ukraine and more than 25 companies joined the European Clean Hydrogen Alliance. In 2020, a working group on hydrogen was established as a part of the newly founded German-Ukrainian Energy Partnership. With support from the United Nations Economic Commission for Europe (UNECE), a draft of a hydrogen roadmap has been presented in February 2021. The Ministry of Energy of Ukraine is developing the [Strategy for the Development of Hydrogen Energy in Ukraine until 2030](#).

Ukraine has the capacity to produce hydrogen both for domestic consumption and for export. Ukraine’s potential to produce three types of hydrogen is currently being explored taking into account the carbon footprint of the entire lifecycle and competitive production costs, whereas “blue” comes from natural gas, “green” from RES and “pink” from nuclear power.

Through the installation of 8 gigawatts until 2030, as outlined by Hydrogen Europe in the 2x40 GW initiative, Ukraine could produce around 21 terawatt-hours of green hydrogen annually (Figure 39). This would cover 12% of the total hydrogen demand of the EU in 2030 projected in the [EU Hydrogen Roadmap](#).

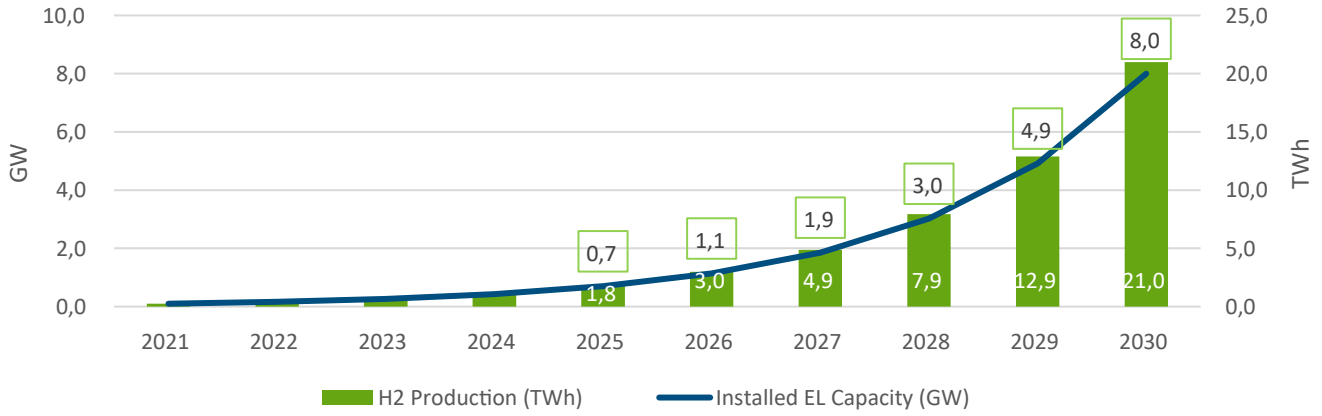


Figure 39: Installed electrolyser capacity and green hydrogen production, by year

## 5.4. AGRIBUSINESS AND INFRASTRUCTURE DEVELOPMENT

The agricultural sector is of great importance to the national economy of Ukraine. In 2021, it made up the largest share of GDP with 10.6% or UAH 580.5 billion. Exports of agricultural products accounted for above USD 27.9 billion or 41% of the exports of goods. The structure of Ukraine’s agricultural exports is presented in Figure 40.

Ukraine is among the major producers of agricultural commodities in the world. In the cereal sector, its contribution to global production is particularly significant for barley, wheat and maize and on average accounted for 4% of the global output of those crops between 2016-2017 and 2020-2021. Ukraine ranked the sixth largest wheat exporter in 2021, exporting 20 million tons of wheat and meslin, with 10% of the global market share. In the oilseed industry, Ukraine’s contribution to global production was particularly important for sunflower seed with around one-third of world production over the period. Its average shares in world rapeseed and soybean production are more limited, whereas Ukraine accounts for 2% of world production.

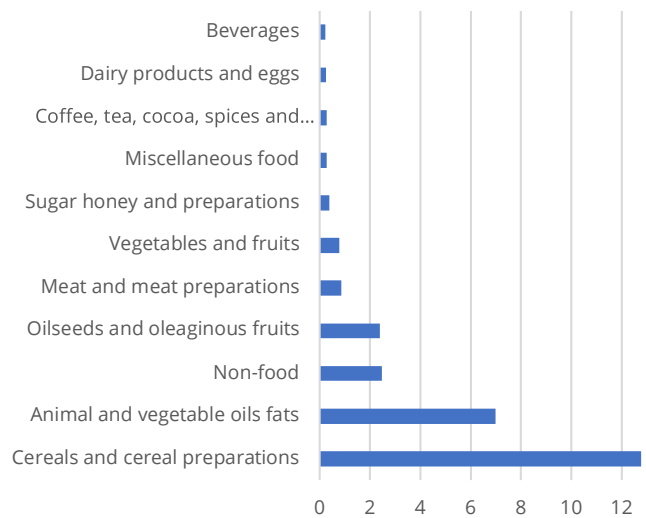


Figure 40: Agricultural exports in 2021, USD billion

As of September 2022, the damage caused to the agro-industrial complex of Ukraine is estimated at USD 6.9 billion, including the following:

- Agricultural machinery, elevators and other storage facilities;
- Livestock and beekeeping;
- Perennial crops;
- Input, harvested grain and oilseeds.

The largest source of damage is destroyed agricultural machinery and equipment. Its replacement and repair cost is estimated at USD 3 billion. The second largest category of damage is destroyed or stolen grain and oilseeds with an estimated value of USD 1.87 billion. Elevators and other storage capacities also suffered substantial damages, which limits Ukraine’s capacity to store its harvest. Their estimated repair and replacement cost is USD 1.1 billion.

The World Bank estimated agricultural sector needs at USD 18.7 billion over 10 years (with USD 10.04 billion in the first year of the post-conflict period) in order to stimulate the overall economic recovery and provide sources of income to farmers. Ukraine’s agricultural sector is an important source of livelihood for nearly 13 million people living in rural areas that are involved in small-scale agricultural production. While around two-thirds of agricultural production is made by enterprises, households produce around 32%, including almost half of the production of livestock. Around 25% of the rural population involved in agricultural production stopped or reduced their activities due to the war. This percentage is higher in the contact line regions with 38%. Over 40% of rural households in Sumska, Dnipropetrovska, Odeska, Chernihivska, and Mykolaivska regions stopped/reduced agricultural production.



Estimated total agricultural losses of rural households as of September 2022 are around USD 2.25 billion, including USD 1.4 billion in losses and USD 0.8 billion in direct damages. The structure of agricultural damages and losses is demonstrated in Figure 41.

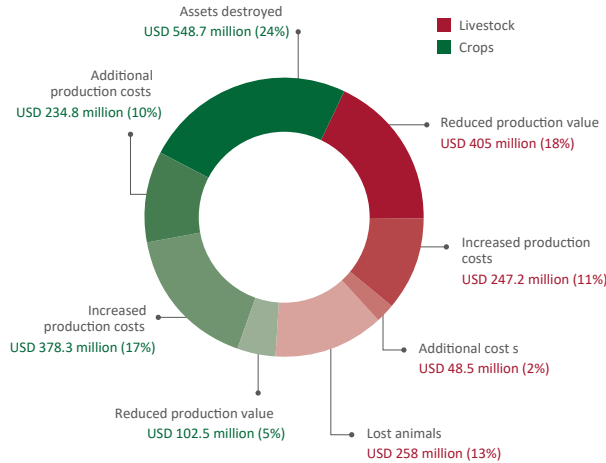


Figure 41: Agricultural damages and losses

According to the nation-wide rural household survey carried out by the Food and Agriculture Organization of the United Nations (FAO), at the national level, major challenges expected by rural households involved in the production and sale of crop products include access to fuel, electricity or power-generating equipment (24%), access to fertilizers or pesticides (23%), low benefits from the sale of products (around 20%) and access to seeds (18%) (Figure 42). In terms of the production and sale of livestock products, nationally, over 30% of rural households expected challenges in accessing animal feed, around 25% mentioned fuel and slightly over 20% mentioned low benefits from the sale of products (Figure 43).

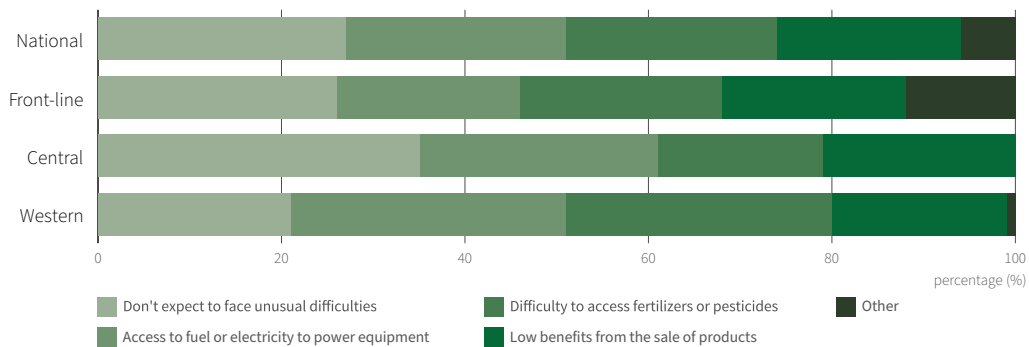


Figure 42: Main difficulties expected in the production and sale of crop products, %

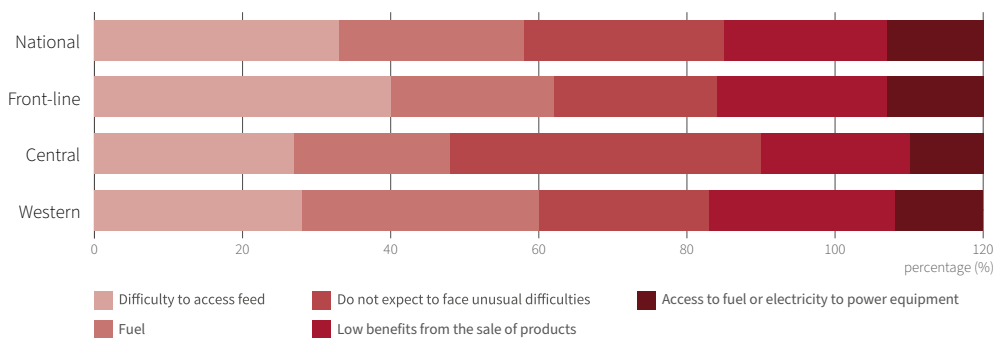


Figure 43: Main difficulties expected in the production and sale of livestock products, %

The [Ministry of Agrarian Policy and Food of Ukraine](#) has prepared and prioritized a list of needs in the agricultural sector and is coordinating international assistance efforts. These needs include the following:

- Power generators;
- Seeds;
- Storage capacity;
- Funding support of the Partial Guarantee Fund;
- Construction of new film greenhouse complexes;
- Test systems and related consumables purchase to increase export.

One of the mentioned needs is storage capacity. The sudden interruption of maritime exports and the slow pace of exports through land and river routes curtailed the available storage space for cereals harvests. As of May 2022, 14% of all grain storage facilities were either damaged or destroyed (Figure 44). The FAO estimated a deficit of storage space for the new harvest at 16.3 million tons, which could reach 20 million tons if hostilities perpetuate in the eastern regions. Around 40% of Ukrainian producers need storage support (Figure 45).

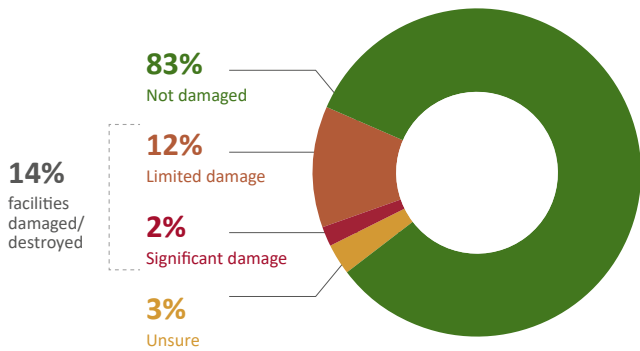


Figure 44: *Damage to grain storage, %*

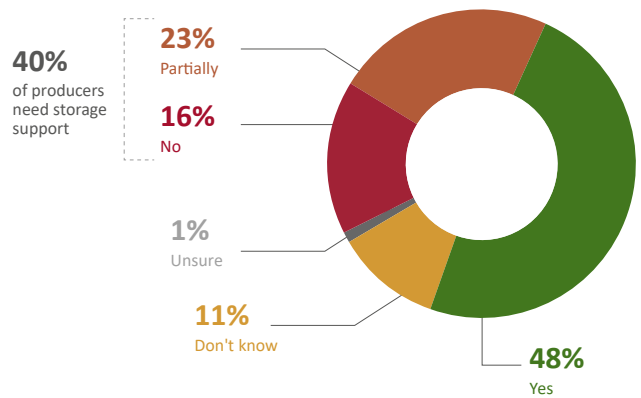


Figure 45: *Availability of grain storage for upcoming harvest, %*

In order to address this issue, the Ministry of Agrarian Policy and Food of Ukraine together with the FAO launched a support programme to provide Ukrainian producers with temporary grain storage facilities (sleeves) with a capacity of 200 thousand tons with support from the Governments of Canada and Japan.

Taking into account the structure of agricultural products and their exports, the development of deep processing of agricultural products in Ukraine can contribute to the transition of the resource-based (raw material) national economy to a more technologically advanced one and create an economic spill-over effect.

As of 1 September 2022, the total amount of direct documented damage to residential and non-residential real estate and other infrastructure was estimated at more than USD 127 billion (at replacement cost) (Figure 46). As of November 2022, it was USD 135.9 billion.

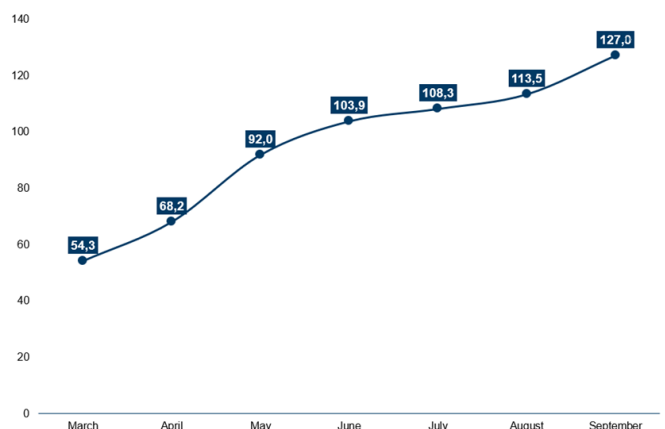


Figure 46: *Dynamics of the aggregate damage assessment, USD billion*

The largest share in the total volume of damages is to residential buildings (39.7% or USD 50.5 billion) and infrastructure (27.7% or USD 35.3 billion) (Figure 47). Another USD 6.9 billion were damages to the agricultural sector. Cumulative direct losses from the destruction and damage of the public sector (educational, social, scientific and healthcare institutions, cultural buildings, sports facilities, administrative buildings, etc.) amounted to about USD 11.6 billion.

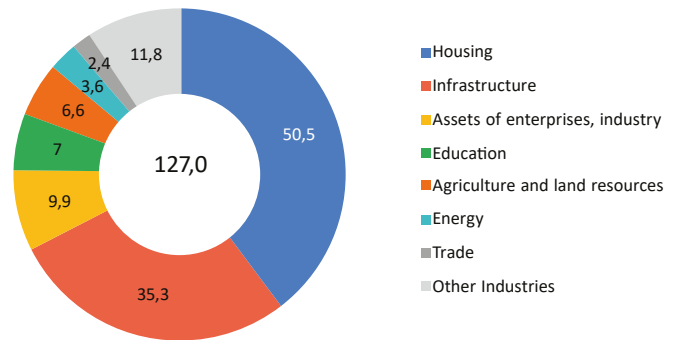


Figure 47: Damage, by type of property, USD billion

As of 1 June 2022, the war has resulted in total damage of around USD 3 billion for the energy sector, including damages in the power sector (USD 1.4 billion), district heating (USD 0.7 million), gas sector (USD 0.5 billion) and transport fuel sector (USD 0.4 billion). However, due to the specific objective of targeting the energy sector of Ukraine, this damage is constantly growing. Thus, as of November 2022, damage to the energy infrastructure increased to USD 6.8 billion. The up-to-date figure may be higher, as there is currently no detailed information on the damage caused to the country’s energy infrastructure.

Ukraine’s transport network is extensive due to the country’s scale, geographical location and population distribution. The damage of USD 29.9 billion (Figure 48), losses of USD 26.1 billion and needs of USD 73.8 billion in Ukraine’s transport sector are significant. In 2018, Ukraine adopted the National Transport Strategy until 2030 aimed at the creation of a safely functioning and efficient transport system in the country integrated into the world transport network.

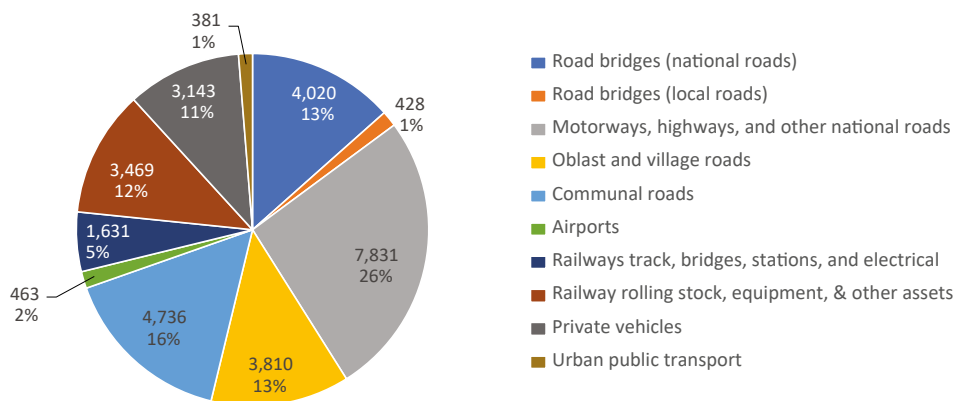


Figure 48: Damage, by transport asset category, USD million, %

Ukraine’s telecommunication and digital sectors play a key role in enabling the country’s service sector, particularly the IT industry and start-ups. Widespread access to mobile and fixed broadband was one of the key drivers of the country’s economic growth. In December 2019, the wireless communications penetration rate was 131% per capita and the fixed broadband penetration rate was 32%. For accessing state services, online courses and business support programmes, 22 million Ukrainians use the web portal Diia launched by the Ministry of Digital Transformation of Ukraine. Estimated damage in telecommunications and the digital sector has reached USD 0.7 billion. Losses of economic value added in the sector amount to USD 0.6 billion. The need for reconstruction and recovery is estimated at USD 3.3 billion over the medium term within 10 years.

The Ministry for Communities, Territories and Infrastructure Development of Ukraine is coordinating the country’s reconstruction efforts. The restoration of physical infrastructure, including transport infrastructure, energy generation, hospitals, public services and housing, could allow building back better and investing in the future based on the principles



of sustainability, overcoming a carbon footprint, reducing climate impact and improving energy and resource efficiency. New green practices have been already included in international standards. Translated into technical regulations, they are a key element for the reconstruction of essential infrastructure, facilities and services, as well as their management. The adoption of sustainability standards would also contribute to the alignment of Ukraine with key EU regulations as part of the integration effort, including the energy efficiency and energy performance of building directives.

The Ministry for Communities, Territories and Infrastructure Development in cooperation with the Ministry of Digital Transformation is currently implementing an [urban planning reform](#) to ensure maximum transparency in the construction sector. Its first step was the relevant Law adopted in December 2022.

## 5.5. COMPETITIVENESS, QUALITY AND COMPLIANCE

The EU and Ukraine have provisionally applied their [Deep and Comprehensive Free Trade Agreement \(DCFTA\)](#) since 1 January 2016 as part of the broader AA. The DCFTA opens markets for goods and services on both sides based on predictable and enforceable trade rules. There are 20 free trade agreements that Ukraine concluded with its trading partners.

As part of its efforts towards EU accession, Ukraine is gradually taking steps to achieve compliance with the EU technical regulations and systems of standardization, metrology, accreditation, conformity assessment and market surveillance and the implementation of trade rules that facilitate the movement of goods, services, capital and people. Among the key priorities of Ukraine’s development is to ensure the competitiveness of its products in global markets.

The war has accelerated the change of markets for Ukrainian products (Figure 49). The European market has become more valuable for Ukrainian companies.

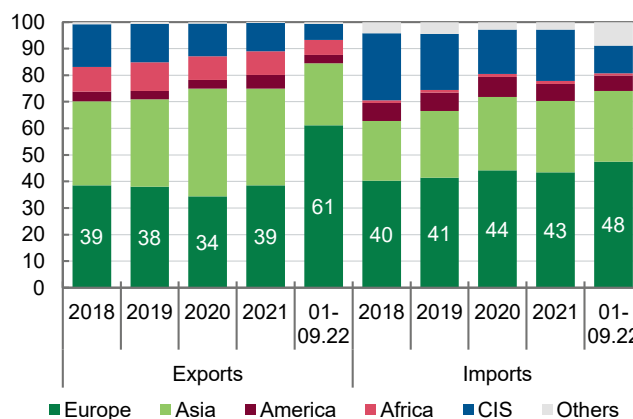


Figure 49: *Geographical structure of trade in goods, %*

At the same time, according to the national [survey](#), nearly 27% of Ukrainian companies export their products (at least partially). Another 17% are planning to export and the barriers they encounter are the lack of knowledge and experience (47.1%), limited expertise in international sales (32.9%), lack of organizational and managerial preparedness (23.5%) and non-compliance of products with the requirements of international markets (20.0%). Not-exporting companies see the main obstacles in the lack of need due to the developed national market (29.2%), lack of knowledge and experience (22.7%) and non-compliance of products with the requirements of international markets (17.0%). Therefore, the lack of knowledge and non-compliance of products is a considerable concern in both groups of companies.

The needs of enterprises in export identified during the survey are presented in Figure 50. Worth noting that 18.4% of enterprises require consultations on compliance with regulations in the new markets and 13.1% on product certification.



Figure 50: *Needs in support of companies for export*

Technical regulation is the responsibility of the Ministry of Economy of Ukraine. As of November 2022, 37 agreements in the field of technical regulation were concluded with 31 trading partner countries, 17 of which are at the intergovernmental level. At the same time, [27 technical regulations](#) were adopted as part of the AA between Ukraine and the EU.



The [National Accreditation Agency of Ukraine \(NAAU\)](#) is the state body, which main functions are the accreditation of compliance assessment bodies and monitoring of compliance of the bodies accredited by it. NAAU is an [associate member](#) of the European co-operation for accreditation and a signatory to the bilateral agreement on recognition in the fields of accreditation of testing and calibration laboratories, medical laboratories, product certification bodies, management system certification bodies, personnel certification bodies and inspection bodies. In total, as of [2022](#), in Ukraine, there are accredited 778 testing, 38 calibration and 29 medical laboratories, 118 products, processes and services certification bodies (DSTU EN ISO/IEC 17065), 12 personnel certification bodies (DSTU EN ISO/IEC 17024), 62 management systems certification bodies (DSTU EN ISO/IEC 17021-1) and a number of other bodies. At the same time, Ukrainian companies are not sufficiently active in certification. Thus, according to the [2021 survey of certifications](#) of the International Organization for Standardization (ISO), Ukrainian companies had 1,480 valid certificates on ISO 9001:2015 “Quality management systems”, 279 on ISO 22000:2018 “Food safety management systems”, 298 on ISO 14001:2015 “Environmental management systems”, 234 on ISO 45001:2018 “Occupational health and safety management systems”, 38 on ISO 50001:20011&2018 “Energy management systems”. The rest of the standards had even fewer valid certificates in Ukraine or none at all. The most active sectors are basic metals and fabricated metal products, food, beverages and tobacco, machinery and equipment, as well as electrical and optical equipment. They are also the main exporting sectors.

Negotiations are underway with the EU to conclude an Agreement on the Access of Ukrainian Goods to the EU Market, which would open the access of industrial products to the markets of Ukraine and the EU countries on the basis of mutual recognition of the results of conformity assessment works for these products. Preliminary assessments of the Ukrainian quality infrastructure and the adaptation of national legislation have been conducted since October 2020. UNIDO, through its Global Quality and Standards Programme, has contributed to the process by supporting the translation of relevant legislative acts and providing training for the Department for Technical Regulations of the Ministry of Economy of Ukraine and the NAAU.

The European Committee for Standardization (CEN) and the European Committee for Standardization in Electrical Engineering (CENELEC) are the two official bodies responsible for developing technical standards in Europe. They officially approved the application for the state standards of Ukraine at the General Assembly on 24 November 2022 for entry into force on 1 January 2023. Therefore, Ukraine established even closer links with the European Standardization System and, therefore, with the European Single Market. The status of affiliate is available to any national standardization organization of a country formally recognized as a candidate or potential candidate for EU membership. It aims at the alignment with European standards and closer relationships between their standardization system and the European one, facilitating harmonization with the European Single Market. Consequently, becoming an affiliate is an intermediary step before becoming a full member.

The national standardization body of Ukraine is the Ukrainian Scientific Research and Training Centre for Standardization (UkrNDNC). With the support and direct involvement of the Department of Technical Regulation of the Ministry of Economy of Ukraine and it collaborated with CEN and CENELEC, experts worked to update the database of European standards and examine the legal framework, which provided an opportunity for the batch adoption of European standards as Ukraine’s national standards. In December [2022](#), Ukraine adopted 20,268 European CEN and CENELEC normative documents as national normative documents with entry into force on 31 December 2023. Until 1 July 2023, technical committees of standardization of Ukraine must identify and cancel national standards, the provisions of which contradict the provisions of the European standards of CEN and CENELEC, as well as identify harmonized national standards and amendments to them that should be cancelled.

The adoption and integration of European standards into the Ukrainian economy will allow for ratifying the Agreement on Access of Ukrainian Goods to the EU Market faster, as well as opening new opportunities and prospects for Ukrainian businesses.

The UNIDO project on the introduction of the energy management system standard in Ukraine’s industry has been



working with UkrNDNC since 2016 to support the national adoption of ISO 50001 family standards and with the NAAU and certification bodies to strengthen the national conformity assessment framework and capacities for ISO 50001.

Ukraine has a well-established system of public procurement. In 2021-2022, the electronic procurement system [Prozorro](#) had 8.43 million lots with an expected value of USD 74.1 billion, 36.5 thousand procuring entities and 312.7 thousand bidders. In accordance with the recommendations of the World Bank, state enterprise Prozorro started adapting the electronic system to specific standards and conditions approved by the World Bank, including the compliance mechanism. Using Prozorro in accordance with the requirements of the World Bank's international tender procedures will become possible in March 2023.

The [Law of Ukraine "On the Fundamental Principles \(Strategy\) of the State Environmental Policy until 2030"](#) stipulates the implementation of green procurement as one of the tasks in ensuring the sustainable development of the natural resource potential of Ukraine. The updated [Law of Ukraine "On Public Procurement"](#), which brings the legislation of Ukraine closer to the requirements of EU Directive 2014/24 and EU Directive 2014/25, provided new opportunities for the use of public procurement in accordance with Ukraine's obligations defined in Article 152 of the AA.

Currently, within the framework of the EU4Environment Action in Ukraine, the SPP policy and eco-labelling system are being promoted by developing standard SPP tender documentation criteria for different product categories and a methodology for their application, as well as building the capacity of the business sector to participate in tenders and access eco-labelling.

The electronic procurement system Prozorro is introducing modules for the application of requirements to products and services and non-price criteria for evaluating proposals of procurement participants for the inclusion of SPP. The legal framework does not limit the scope and conditions of the application of non-price criteria but their scale should not exceed 30%.

With the beginning of the war, the Government of Ukraine introduced exceptions to the Laws of Ukraine "On Public Procurement" and "On Defence Procurement" for certain types of goods, works and services of critical importance. Electronic auctions have been cancelled until July 2023 due to electricity supply blackouts. The rest of the purchases are carried out in accordance with the legislation through the procurement platforms of the Prozorro system or, in the case of a simplified procedure, through the Prozorro Market. After the end of martial law, all categories of goods, works and services will be procured in accordance with the legal framework.

Since 2003, the [all-Ukrainian public organization "Living Planet"](#) has been the operator of the I-type eco-labelling programme (according to ISO 14024:2018). As of January 2022, the results of the programme are the following:

- 52 standards establishing environmental lifecycle assessment criteria for goods and services of different categories;
- 72 SME owners of the "Green Crane" eco-labelling certificates;
- 132 certificates confirming compliance with eco-labelling standards issued for more than 1,000 products marked with the "Green Crane" label.

Food, construction materials, detergents, paints and varnishes have been the most active industrial sectors in certification (Figure 51).

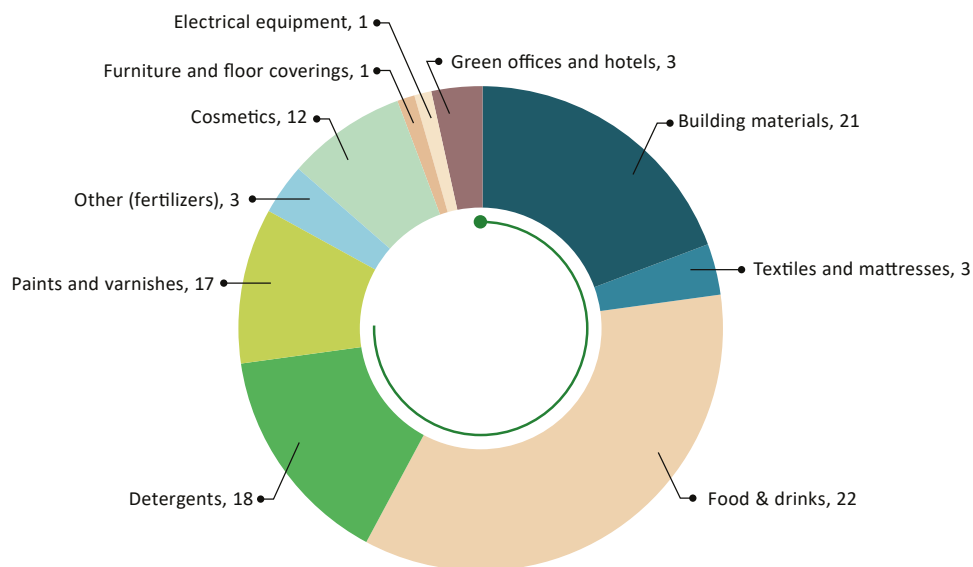


Figure 51: Issued eco-labelling certificates, by sector

As of December 2022, nearly 30% of licensees have been lost due to the location of their production facilities in occupied territories and/or their destruction as a result of the war.

Among the barriers to environmental certification and effective application of eco-labelling by manufacturers, retailers and service providers, the following should be noted:

- Lack of personnel and lack of financial resources of SMEs;
- Lack of demand for certified products among large customers;
- Phenomenon of greenwashing, which discredits eco-label licensees.

Another barrier is a lack of awareness of product manufacturers, suppliers, service providers and contractors about the basic principles, methods and best practices of eco-labelling and the correct application of environmental labels.

In the public sector, eco-labelling and standards that establish environmental criteria for products of a certain category can be applied in tender documentation in accordance with Articles 23 and 29 of the Law of Ukraine “On Public Procurement”. Despite best practices and success stories, there is limited scale-up due to the insufficient level of awareness of customers regarding the use of this tool and methods of verification.



# **6** RECOMMENDATIONS AND **OPPORTUNITIES FOR ISID**



## 6. RECOMMENDATIONS AND OPPORTUNITIES FOR ISID

ISID and the achievement of the SDGs are priorities for Ukraine. The Government has demonstrated its commitment through the adoption and achievement of voluntary NDC, changes in the strategic and legal frameworks, as well as the updates of relevant policies. Ukraine is progressing towards the SDGs. For instance, in the case of SDG 9, there are results on industrial employment and improvement in CO<sub>2</sub> efficiency in industry, although industrial CO<sub>2</sub> emissions relative to GDP are still too high.

Apart from the ongoing war, one of the main obstacles to further progress in this area in Ukraine is the lack of consistency in approaches and the absence of an effective strategic direction. Thus, strategies and action plans for sustainable development, industrial development, implementation of CE and other important components have not been finalized or approved. This leads to the absence of clear goals and targets for national institutions and other stakeholders, which, in the context of the restructuring of the Government, reduces their institutional capacity to lead the necessary transformation, for example, by applying systematic and targeted financial and non-financial incentives, as well as monitoring results and implementing corrective action.

The NRP of Ukraine launched in 2022 sets a long-term vision for the country's recovery and development. However, as it is being prepared in a short time as a response to the war, the NRP does not cover all key aspects of ISID. Moreover, such a plan should build on national strategies and not replace them. Therefore, improving the capacity of national bodies, including the Ministry of Strategic Industries, the Ministry of Economy and the Ministry of Environmental Protection and Natural Resources, in effective and result-oriented policymaking is a key task to ensure systematic and resilient progress in achieving ISID.

The ongoing war heavily impacts Ukraine, its economy and, in particular, its industrial sector. Along with the obvious challenges like the direct damage and losses of industrial production, companies and infrastructure, including energy generation and distribution facilities, it has exposed the sector's shortfalls, such as the vulnerability of supply chains, low export capabilities, limited access to finance or support initiatives, including the lack of capacity at the level of SMEs, as well as the lack of required personnel, to name a few.

Ukraine's industry produces and exports mainly low-tech intermediate products, which makes the country's economy resource-based. Deepening the processing of resources, increasing the technological level and developing modern "service as a product" models would help decouple the growth of the national economy from the use of resources. This means not only supporting start-ups and innovation hubs but also helping existing industrial companies by raising their awareness and capacity, as well as providing incentives. There is a need to re-establish links between scientific institutions and the industrial sector to promote innovation as well as to fully utilize the potential of science and technology to implement the key tasks of the green modernization of the Ukrainian economy and industry.

One of the main challenges faced by Ukrainian companies in the context of the war is the lack of customers in the domestic market, as well as their inability and unpreparedness to access foreign markets. Mainly due to the historical focus on domestic or neighbouring markets, many enterprises lack international sales experience and organizational and managerial capacity, while their products do not meet the requirements of the international market. Ukraine's AA with the EU and the signed DCFTA unlock new markets for the country's industry, however, its readiness should be strengthened. New regulations to be developed and implemented in the process of association should become a driver for national industrial companies to advance without creating an insurmountable barrier to manufacturing their products. This requires direct work with companies addressing the above-mentioned challenges, national piloting of reforms and support of SMEs in their implementation, as well as the capacity-building of business support organizations.

A reflection of the lack of customers is the lack of resources (primarily, materials) for Ukrainian manufacturing companies, which they also faced in 2022. Certainly, there was some unused national potential missed due to active hostilities,



destroyed logistics and the relocation of industrial enterprises. National databases, if they existed, might help companies restore production links more promptly. Identifying national, integrating into global and securing strategic value chains is a mandatory task for creating a resilient national economy and industry.

Economic shocks combined with massive internal displacement and refugee flows have led to a significant reduction in the employment and income of people. Migration losses impede the development of Ukraine's economy not only by reducing the supply of labour in the short term but also by deteriorating its quality characteristics. Even now, there is a significant skills mismatch between employers and job seekers, which may be caused by the relocation of businesses and the simultaneous movement of people. For Ukraine's industry, a non-expensive high-quality labour force has been a valuable impetus for competitiveness. Therefore, an important task is to preserve, restore and create new jobs, support the process of the return of refugees and ensure their reintegration and economic employment and self-employment.

Ukraine undertakes some business support efforts and has business support programmes. However, manufacturing SMEs and other stakeholders (business support organizations, financial institutions, central and local authorities) are mostly unable to benefit from these programmes. There is a need in building the capacities for designing programmes, promoting them and reporting on their results to unlock the potential of SMEs in value and job creation, exports and development. Reforming the system of environmental finance and creating new funds require proper planning, justification and coordination with the Government.

The eco-modernization of Ukraine's industry is a relevant task, which takes a significant place in the announced NRP of Ukraine. Resource- and energy-intensive technologies used by the national industry reduce its competitiveness and resilience, as well as cause a significant impact on the environment. Eco-modernization means the implementation of resource-efficient and cleaner production, best available technologies, continuous monitoring and improvement, eco-design and eco-labelling standards, prevention or minimization of non-productive outputs, industrial synergy and the promotion of eco-industrial parks as places where industrial symbiosis is supported by the Government and international partners.

Further clustering and planning for the sustainability of industrial manufacturing is an opportunity for green industrial recovery. Proper planning for industrial clustering and the set-up of industrial parks is therefore paramount before physical re-building. UNIDO has experience and tools for supporting such planning processes, particularly, in the context of special economic zones and eco-industrial parks.

Waste management is a major issue for Ukraine. Along with the great amount of construction waste generated during the war, there is a challenge with municipal and industrial waste. Currently, it is mostly disposed of in landfills while its potential for energy generation and material recovery is not exploited. A waste management reform has been launched, which includes the preparation of waste management plans from the national to the enterprise levels. These activities should be supported by an appropriate methodology, practical experience and piloting at the level of enterprises, territorial communities and regions. In addition, new regulations for the management of dangerous waste and certain hazardous substances, such as mercury, create a need for assistance to industrial companies in their management. Accounting, monitoring and reporting industrial waste generation, for example, through open data platforms is another important issue, which can bring more opportunities for waste reuse.

Focusing on waste recycling and reuse in the implementation of CE in Ukraine, it is worth mentioning that CE is not limited to this. National industry demands understanding CE business models, creating national knowledge and practical expertise in the transition to CE by applying such approaches as "service as a product", "sharing", "internet of things", etc.

The digitalization potential of Ukraine is immense. The country has made significant progress in digitalization in various areas, from public services to private sharing business models. While the technical capacity is strong, there is a demand for practical inputs (identifying dependencies, setting rules, drafting laws, conducting pilots) in the area of SME digitalization. These can be e-monitoring systems to track progress and measure the performance of manufacturing companies in the



areas of productivity, resource efficiency, environmental impact, waste recycling, open databases on waste (for reuse), excess heat, installed power generation, etc.

National statistics have broad coverage but are sometimes incomplete or complicated. While Ukraine has tried to collect and systematize data on the achievement of the SDGs, such areas as CE, green industrial development, environmental goods and services or SPP are not reflected in national statistics, making it impossible to monitor progress.

Aiming to achieve climate neutrality by 2060, Ukraine remains one of the most carbon-intensive countries in the world despite a significant industrial decline since 1990. The largest GHG emissions in Ukraine come from the energy production sector with industry as the largest consumer. Recent significant growth in renewable energy production has been offset by the war when many renewable energy facilities were damaged/destroyed or lost. The massive shelling of critical energy infrastructure facilities led to a deficit in the electricity supply. This has highlighted the need for the rapid restoration of infrastructure and new mechanisms for the promotion of RES, as well as the importance of energy security not only at the national level but also at the level of municipalities and enterprises.

Ukraine is one of the EU's priority partners in the future hydrogen economy. The country has the potential to produce hydrogen, including green hydrogen, both for domestic consumption and export. There is also the potential for the application of green hydrogen in local industries. The development of hydrogen energy will contribute to Ukraine's climate neutrality and energy security. The draft hydrogen roadmap presents some areas of interest for the country where they are planning to use green hydrogen. Green hydrogen could be used for ammonia production feeding into fertilizer production and for the reconstruction of the steel sector. All this would contribute to the country's low-carbon industrial development and recovery.

Agriculture has recently taken a central place in Ukraine's economy, playing an important role in exports, employment and inclusive economic growth in rural areas. Ukraine is one of the major producers of agricultural commodities in the world. Currently, it is facing urgent needs in access to electricity, fertilizers and seeds, as well as storage capacity. Taking into account the structure of agricultural products and exports (mainly barley, wheat, maize and sunflower seeds), the development of deep processing of agricultural products in Ukraine will facilitate the transition from the raw material national economy to a more technologically advanced one.

In the context of the war, the European market has become more important for Ukrainian companies. They need consultations on regulatory compliance to access new markets, as well as product certification and labelling, which in turn requires national capacity-building. Currently, ISO certification is not widespread enough among Ukrainian SMEs, therefore, there is a need to support companies in order to improve their production and compliance.

As part of its efforts to realize Ukraine's EU accession perspective, the country is accelerating the process of harmonizing standards and implementing trade rules that facilitate the movement of goods, services, capital and people. Ukraine has recently adopted more than 20,000 European CEN and CENELEC normative documents as national ones with entry into force in 2024. Therefore, while the technical committees of standardization will identify and update national standards, which provisions contradict the provisions of the European CEN and CENELEC standards, there is a need to prepare national manufacturing companies.

The introduction of green procurement will allow Ukraine to achieve economic goals by creating demand for innovative products, services and goods that minimize environmental impact throughout their lifecycle.

National green recovery and ISID in particular is a complex task that requires the coordinated mobilization of all national capacities as well as international support. The involvement of civil society organizations together with local administrations and communities will be of vital importance in achieving long-term recovery objectives and future resilience. These institutions have demonstrated their potential during the development of the NRP and can contribute to its implementation.



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