INVESTMENT GUIDE UKRAINE

MINISTRY OF ECONOMY OF UKRAINE

KSE Kyiv School of Economics

MINISTRY OF ECONOMY OF UKRAINE

KSE Kyiv School of Economics

May 2024, Ministry of Economy of Ukraine

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Acknowledgment

We would like to extend our heartfelt gratitude to the organizations and individuals who have played a crucial role in producing, composing, and structuring the Investment Guide.

Our deepest thanks go to our partners: KPMG, EY, Deloitte, BDO, and the Tony Blair Institute, for their invaluable contributions. Their expertise and dedication have been instrumental in creating a comprehensive and insightful guide that will serve as a vital resource for investors and stakeholders.

Our joint collaboration in providing sectoral overviews and structuring the investment theses included in the guide has been essential in ensuring the accuracy, depth, and relevance of the information presented. We greatly appreciate our partners' commitment to supporting Ukraine's economic recovery and growth through this initiative.

Thank you for your unwavering support and partnership.

We are ready to fight for every investor

These two and a half years of war have taught us that war is not an embargo on investments. Entrepreneurs in Kharkiv, Odesa, Mykolaiv, Zaporizhzhia, Dnipro, Chernihiv, Sumy, other frontline, and rear cities of Ukraine are compelling proof of this.

Such resilience of business, combined with the support of partners and steps of Government, lead to recovery growth of Ukraine economy. After a drop of GDP by 28.8% in 2022, by the end of 2023 we achieved a 5.3% GDP growth. This trend will continue in 2024, even despite the systematic shelling of the energy infrastructure by the russians.

For this trend to continue, Ukraine urgently needs to attract private investments. To this end, the state offers a range of incentives for investors. These include a developed infrastructure for war risk insurance and support for the development of industrial parks. For an investor, an industrial park solves several problems—access to land, connection to utilities, availability of industrial buildings, and reducing equipment costs.

Another tool is the support of projects with significant investments. This is an opportunity for those willing to invest over 12 million EUR. Such entrepreneurs can receive up to 30% compensation of the investment. We have allocated 3 billion UAH for these needs this year.

And lastly, but very importantly, the investment component of the Ukraine Facility program, called Ukraine Investment Framework. We expect that the implementation of the UIF will attract up to 40 billion EUR in public and private investments.

In addition, we are carrying out reforms, improving the business environment, and combating corruption. Last year, Ukraine even improved its position in the Corruption Perception Index, rising by 3 points, which is one of the best results in the world over the past year.

Of course, Ukraine has several advantages for investors: convenient geographical location near the EU, substantial mineral resources (ranked 25th globally in extraction volumes), high agricultural potential, and potential for renewable energy development.

Most importantly, we already have specific investment projects, examples of which are described in this book. Additionally, you will find information on how to start investing in Ukraine, on the support you can receive from the Government, and information about priority sectors with the greatest potential for economic growth. These priority sectors, as well as the list of mandatory reforms until 2027, are defined in the Ukraine Plan for the Ukraine Facility from the European Commission.

This is important for our economic resilience and, consequently, our resilience on the battlefield. It is also crucial for recovery. According to RDNA3, the direct damage to Ukraine from the war is $152.5 billion, the total economic, social, and other losses are nearly $499 billion, and the recovery needs amount to $486 billion. The state can only tackle this challenge together with the private sector. Every dollar, euro, yen, pound, or hryvnia of investment matters.

Therefore, we are ready to fight for every investor.

Yulia Svyrydenko
First Deputy Prime Minister and Minister of Economy of Ukraine

Introduction

Dear reader,

We are pleased to present the Investment Guide, specially prepared for the Ukrainian Recovery Conference in Berlin in June 2024. This guide offers a comprehensive list of investment project examples across the energy, infrastructure, agriculture, and IT services sectors. Compiled through a joint effort with Ukrainian businesses, advisors, and supporters, we hope it provides you with in-depth insights into Ukraine's investment landscape and offers actionable and attractive investment and financing opportunities.

We understand that before making a final investment decision, extensive analysis is required. This process can take several months to a year for thorough evaluation. Despite the existing challenges associated with the ongoing war, we believe now is the right time to explore investment opportunities in Ukraine. Robust private sector growth is essential for Ukraine's recovery.

We appreciate that investing in Ukraine during the on going war presents significant challenges and risks, but we value the commitment of Ukrainian and foreign businesses standing with us during this period.

The Ukrainian government, with the support of its international partners, has introduced a comprehensive suite of measures and incentives designed to facilitate and de-risk investments under the current circumstances. These include guarantees from G7 countries and the EU, war risk insurance, state-sponsored programs for investment support, streamlined processes for construction and infrastructure projects, tax incentives, and access to affordable financing.

These strategic measures are designed not only to mitigate inherent risks but also to provide significant opportunities for early investors to contribute to and benefit from Ukraine's reconstruction and resulting economic growth. We invite investors to take advantage of these robust support systems and become integral to Ukraine's transformative journey towards a resilient and prosperous future.

Why Invest in Ukraine?

Investing in Ukraine is crucial for supporting the recovery and rebuilding efforts, which in turn contributes to global stability and prosperity.

Ukraine offers a unique strategic investment opportunity with its significant consumer market and strategic geographical location in Europe. Despite the unprecedented challenges from the full-scale invasion, Ukraine has shown remarkable economic resilience. The country has made strides in market access and regulatory alignment with the EU, laying the groundwork for substantial economic growth through ongoing reforms.

Ukraine is undertaking reforms to enhance its business environment and integrate with European standards. The GoU is implementing reforms focusing on improving the country's business climate including legal reforms, anti corruption, business environment and privatisation. Key reforms of the business environment include customs reform, tax reform, business deregulation, relaunch of the Bureau of Economic Security, simplified procedure for connecting real estate to utility networks, alignment of public procurement with EU standards and general harmonisation of rules and regulations with the EU acquis, energy markets liberalization.

Economic Rationales for Investing in Ukraine Now:

- **International Financial Aid:** Significant international financial aid is being mobilized to support private investments, including co-financing mechanisms with International Financial Institutions (IFIs) and Development Finance Institutions (DFIs), war insurance solutions, the Ukraine Facility, and the Ukrainian Development Fund.
- **Favourable Global Trends:** Global trends remain strong and favorable, such as decarbonization, EU nearshoring, and the ramp-up in the defense sector.
- **Strong Government Support:** Ukrainian State offers investment support programs, streamlined procedures for construction and infrastructure projects, and tax incentives for significant investments.
- **Extensive Reconstruction Scope:** The war has created substantial reconstruction needs across various sectors, including infrastructure, housing, energy, and agriculture. By investing now, investors can participate in the early rebuilding efforts, gaining long-term returns
- **High Growth Potential:** Post-war Ukraine is expected to experience significant economic growth driven by reconstruction efforts, international support, and structural reforms. Investing now positions investors to benefit from this growth trajectory.
- **Prime Entry Opportunity:** Investing in Ukraine before the war ends positions investors as early movers, allowing them to capitalize on opportunities and establish a foothold in the market ahead of competition. Early entrants can secure prime projects and partnerships with compelling financing.
- **EU Accession Prospects:** Ukraine's progress toward EU accession presents a core anchor for further reforms and modernization. Early investment allows businesses to benefit from aligning standards and regulations, facilitating smooth integration into the European market.

Ukraine's Competitive Advantages:

- **Proximity to Europe, Middle East, and Africa:** Ukraine provides access to nearly 2 billion consumers.
- **Skilled Human Capital:** Highly educated work force, particularly in STEM fields, provides a unique human capital base for businesses. Despite the challenges of the war, Ukraine continues offering a skilled and cost effective labour force that competes with many developing markets.
- **Agrifood Powerhouse:** Known as the «breadbasket of Europe,» Ukraine continues to be a major global exporter of wheat, corn and sunflower oil, contributing significantly to global food security. Despite Russian attempts to block the Black Sea transportation corridors, Ukraine is exporting the same volumes of agri products in monetary terms in 2024 as it did before the war. Ukraine has significantly increased its capabilities in food processing despite the ongoing war.
- **Green Energy Prospects:** Due to Ukraine's energy transition plans and the unfortunate blatant destruction of its thermal power production by Russia, Ukraine is facing significant energy shortages. The country is rapidly expanding its green energy production with investments in renewables (solar, wind, biogas), and laying the foundation for the development of green hydrogen production.
- **Availability of Scarce Critical Materials:** Ukraine boasts 117 different types of mineral resources (out of the 120 most common ones) and 8,800 industrial deposits, including titanium, lithium, manganese and iron ores, zirconium, and graphite. The development of these deposits will be vital for certain industries on a global scale.
- **Opportunity to Become a Manufacturing Hub:** Ukraine offers cost effective skilled labour force and a highly developed raw material base (agrifood, forestry, critical raw materials). The proximity to the EU markets enables Ukrainian industry to integrate into global value chains.

Investment Opportunities in Ukraine

The convergence of strong international support, EU accession prospects, and global economic trends create an optimal environment for investments in Ukraine. Reconstruction needs, supported by substantial financial backing, offer significant opportunities for investors.

In the guide, we focus on the government's priority sectors as reflected in the Ukraine Facility (UF) and on the development of the processing industry to address bottlenecks in export logistics and increase added value. The guide does not cover investment opportunities in the defense industry and some other economic sectors.

The Ministry of Economy received a few hundreds of projects requiring more than USD 155 billion in investments. The information was gathered by Kyiv School of Economics, with the support of the Ministry of Economy of Ukraine and other relevant ministries. Over the last year, we held a number of sector specific working groups with over 600 stakeholders, including businesses, associations, NGOs, and government bodies. Majority of the projects have an execution timeframe over the next few years.

The Investment Guide presents 95 projects across nine key sectors, requiring approximately USD 25 billion of funding:

1. **Agrifood**: From complex fertilizers to fruit, vegetable, poultry, and meat products.
   - Ukraine's agrifood sector, crucial to global food security, accounted for 62% of total exports in 2023. Despite the invasion's impact, the government is implementing reforms to ensure food safety, security, and improved investment facilitation.

2. **Transportation and Logistics:** Construction of new terminals, development of export logistics, restoration of roads, bridges, tunnels, and improvements in sea, river and rail transportation.
   - Ukraine's central location in Eastern Europe makes it important for the trade and travel. Significant investment is needed to repair and modernize infrastructure.

3. **Energy:** Advancing renewable energy goals, increasing efficiency in traditional generation, investing in energy storage and transportation.
   - Ukraine's energy sector is a cornerstone of its economic growth with substantial potential for renewable energy development. Magnified by war-induced damages, the sector remains pivotal to Ukraine's modernization.

4. **Hydrogen:** At-scale production of carbon-neutral hydrogen.
   - Ukraine's abundant renewable energy resources position it as a key hydrogen supplier to Central Europe, supported by competitive production and transportation costs.

5. **Green Steel:** Manufacturing of green steel and production of HBI/DRI for green metallurgy.
   - Ukraine's ferrous metallurgy sector is significant in the global context, though the war has posed significant challenges. Investments in green steel initiatives can drive economic recovery and sustainability.

6. **Critical Raw Materials:** Lithium, titanium, uranium, graphite, cobalt, nickel, tantalum, and other rare-earth elements.
   - Ukraine holds substantial potential for CRM extraction, essential for green energy transition and technological innovation.

7. **Housing, Reconstruction, and Building Materials:** Construction of building materials factories, reconstruction of damaged housing, social and affordable housing, water and sanitation facilities.
   - Significant damage to the housing sector necessitates investment in reconstruction, with a focus on sustainability and modernization.

8. **Pharmaceutical and Medical Sectors:** Production of vaccines, modernization, and construction of medical facilities.
   - Ukraine's pharmaceutical sector has seen growth, supported by increasing public healthcare spending and significant sectoral transformation.

9. **Information and Communication Technology & Digital:** Infrastructure projects, human capital developments, and technology investments.
   - The ICT sector is a major contributor to Ukraine's economy, with exponential growth in IT service exports and technological proficiency.

Possible Next Steps and How the Government of Ukraine Can Support Investors:

1. Validate and Strengthen Business Cases

The Ukrainian government has launched several working groups focused on key sectors to provide fact-based analysis of potential investment projects. These working groups help investors validate and pressure-test their business cases.

2. Project Preparation Assistance

The Ukrainian government is ready to supply necessary data and collaborate with experts to assist in conducting pre-feasibility studies, preparing for investment decisions, and attracting financing.

3. Engage with Potential Investment Partners:

The Ukrainian government is working on establishing recovery and development initiatives with IFIs (International Financial Institutions) and insurers to facilitate access to finance and mitigate war-related and other investment risks.

4. Explore Investment Incentives Offered by Ukraine:

Ukraine offers incentives for large-scale investments, such as tax and import duty relief, subsidies, and streamlined access to infrastructure and utilities. The government can provide detailed information on available incentives and assist investors in navigating the application process to maximize the benefits.

We trust that the Investment Guide will effectively serve as a roadmap for navigating these opportunities, providing detailed insights into projects and sectors ripe for investment. Your partnership can contribute to Ukraine's recovery and long-term prosperity, driving forward an era of sustainable growth and innovation.

Volodymyr Kuzyo
Deputy Minister of Economy of Ukraine

Table 1: Investment projects portfolio					
№	Sector	Number of Projects in Guide	Project Finance in Guide, USD bln	Projects Categories	Projects Finance, Total, USD bln
1	Energy	15	9.5	Wind generation; Oil and gas; Biofuel and biomethane; Nuclear power; Peaking power including cogeneration; Solar generation; Hydrogen; Grids and interconnectors; Hydroenergy; Storages; Central heating	79.8
2	Transport and Logistics	20	5.3	Construction and restoration of roads, bridges and tunnels; Development of railway infrastructure, electrification; Renewal of passenger and freight rolling stock; Air transport; Public transport; Sea and river transport; Export logistics	19.4
3	Agrifood	15	0.4	Irrigation systems; Storages; Fruits & Vegetables production; Seeds; Plant protection products; Complex fertilisers; Nitrogen fertilisers; Dairy products; Meat products; Eggs & Chicken; Logistics; Oil & Fat; Vegetable proteins; Corn starch & Gluten; Machinery & equipment	5.6
4	Green Steel	3	3.0	Green steel products; DR-pellets, DRI, HBI; Mining and processing; Ferroalloys, Limestone; Recycling of waste ore processing	11.7
5	Critical Materials	10	2.7	Lithium; Titanium; Uranium; Tantal, Rare-earth elements; Graphite; Cobalt, Nickel, Beryllium, Aurum, Polymetal	4.8
6	Housing, reconstruction and building materials	14	5.4	Destroyed and Damaged Housing Compensation, Social and Affordable Housing Fund, Regional Water and Sanitation Improvement Project, Float glass factories	9.8
7	Pharmaceutical and Medical sectors	7	0.5	Creation of an enterprise for the production of vaccines and pharmaceutical, new medical facilities are private and PPP	1.2
8	ICT and digital sector	11	0.2	Infrastructure projects in information technologies, Human capital development, Products and services, Investment and export	0.2
9	Other	-	-	Mechanical engineering, Social security, Retail, Tourism, Financial services	3.3
	Total	**95**	**27.1**		**136.0**

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Abbreviations and Acronyms

ASO	App Store Optimization
BOF	Basic Oxygen Furnace
CAGR	Compound Annual Growth Rate
CAPEX	Capital Expenditure
CBAM	Carbon Border Adjustment Mechanism
CHP	Combined heat and power
CI/CD	Continuous Integration and Continuous Delivery/Deployment
CRC	Cold Rolled Coil
CRM	Critical Raw Materials
DFC	Development Finance Corporation
DFI	Development Finance Institution
DRI	Direct Reduced Iron
EAF	Electric Arc Furnace
EBRD	European Bank for Reconstruction and Development
ECA	Export Credit Agency
EFF	Extended Fund Facility
ER	Exchange Rate
ESG	Environmental, Social and Governance
ESP	Endless Strip Production
ESU2050	National Energy Strategy Until 2050
EU	European Union
EV	Electric Vehicle
FDI	Foreign Direct Investment
FID	Final Investment Decision
FX	Foreign Exchange
G7	The Group of Seven
GoU	Government of Ukraine
GDP	Gross Domestic Product
GTSOU	Gas Transmission System Operator of Ukraine
HBI	Hot Briquetted Iron
HPP	Hydropower plant
HRC	Hot Rolled Coil
IDP	Internally Displaced Persons
IFI	International Financial Institution
IMF	International Monetary Fund
ICT	Information and Communications Technology
LCE	Lithium Carbonate Equivalent
LCOE	Levelized Cost of Electricity

LLC	Limited Liability Company
MAPF	Ministry of Agrarian Policy and Food of Ukraine
MGP	Medical Guarantee Programme
MENA	Middle East and North Africa
MIGA	Multilateral Investment Guarantee Agency
MOU	Memorandum of Understanding
NBU	National Bank of Ukraine
NHSU	National Health Service of Ukraine
NPL	Non-Performing Loan
NPP	Nuclear Power Plant
OEM	Original Equipment Manufacturer
OHF	Open Hearth Furnace
p.p.	Percentage Point
PIT	Personal Income Tax
PPA	Power Purchase Agreement
PPC	Pay-Per-Click
PPP	Purchasing Power Parity
PSA	Production Sharing Agreement
PV	Photovoltaic
R&D	Research and Development
RDNA	Rapid Damage and Needs Assessment
RELINC	Restoration of Critical Logistics Infrastructure and Network Connectivity
RES	Renewable Energy Sources
SDR	Special Drawing Rights
SME	Small and Medium-Sized Enterprises
SOE	State-Owned Enterprise
SpG	Spherical Graphite
STEM	Science, Technology, Engineering and Mathematics
TEN-T	Trans-European Transport Network
TEU	Twenty-foot Equivalent Unit
TPP	Thermal Power Plant
UNCTAD	United Nations Conference on Trade and Development
UNHCR	United Nations High Commissioner for Refugees
UGS	Ukrainian Geological Survey
US DOE	United States Department of Energy
USGS	United States Geological Survey
UZ	Ukrainian Railways (Ukrzaliznycia)
VAT	Value-Added Tax

CHAPTER 1

General information about Ukraine

GENERAL INFORMATION ABOUT UKRAINE

Ukraine, the largest country in Europe by area, is rich in natural resources including fertile black soil, minerals, forests, and water resources. It boasts a highly skilled workforce and comprehensive transportation and energy infrastructure, including railways, roads, ports, airports, electrical grids, and gas pipelines. Its strategic location, with access to deep-water Black Sea ports, facilitates global maritime trade, while its road and rail links ensure connectivity with European countries.

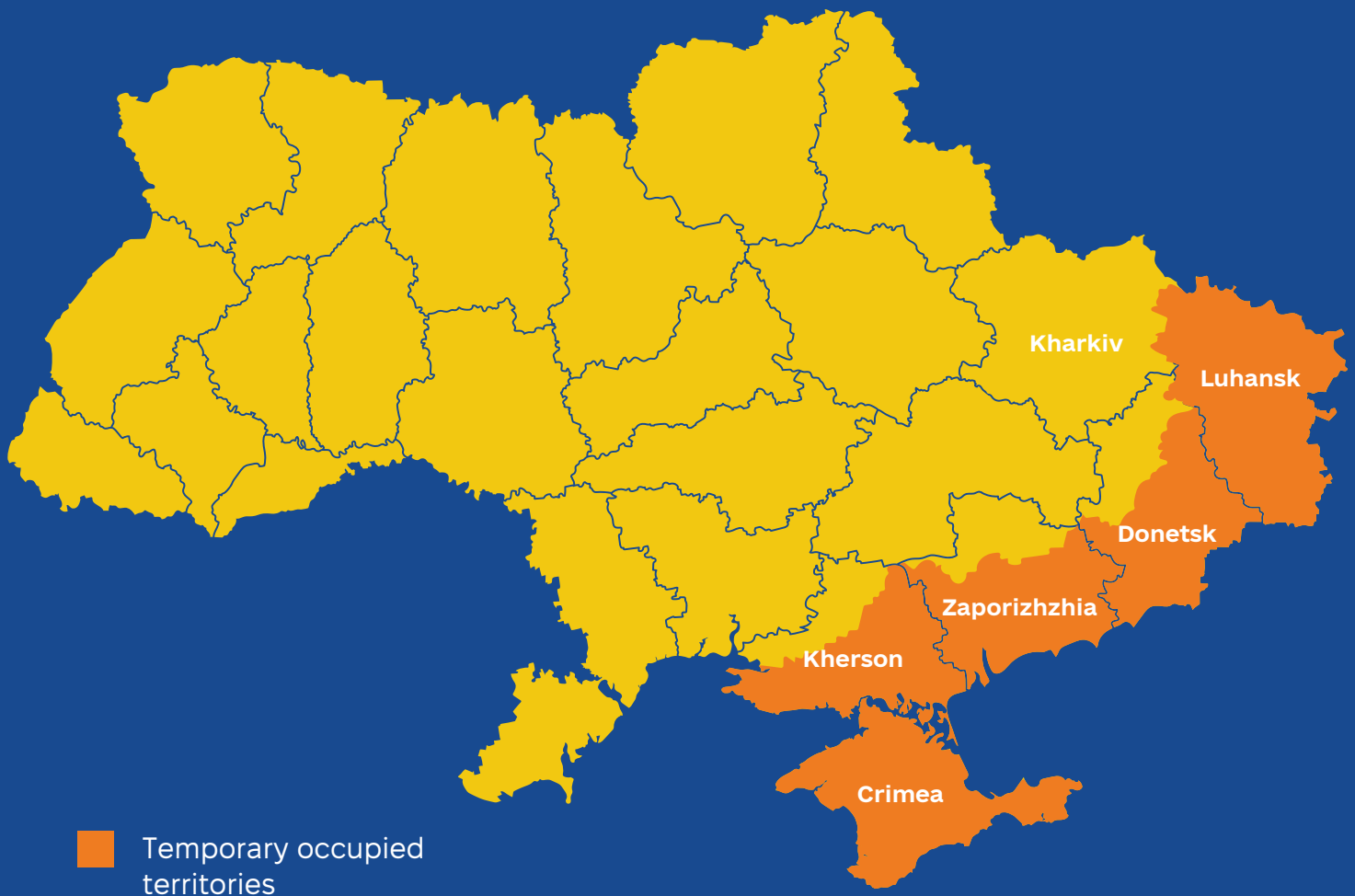
Ukraine's geographical position also makes it an important for trade and travel between Europe and Middle East

603.7 thous km²

comparable in size to France, Ukraine has the potential to become a Eurasian hub

Ongoing integration with the EU and deepening cooperation with G7 countries open new opportunities for economic development, technology adoption, and a green industrial transition. These factors, along with financial support programs like the EU's Ukraine Facility, position Ukraine for sustainable economic growth and rapid recovery post-conflict.

Ukraine controls and defends its territory, and has not lost any significantterritory since 2022



Temporary occupied territories

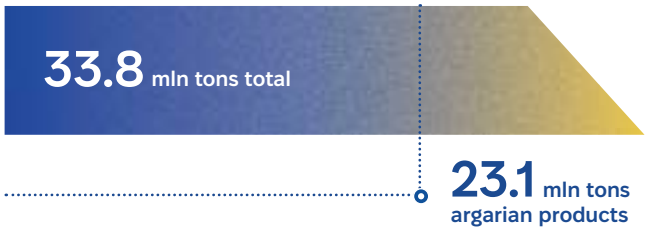
LOGISTICS

Including Ukrainian logistic routes into the Trans-European Transport Network (TEN-T) in 2022 marked a significant development of the country's transport infrastructure. Ukraine's competitive advantage lies in its ability to deliver goods timely and efficiently.

TRANSPORTATION FROM UKRAINE BY ROAD TO MOST MAJOR DESTINATIONS IN EUROPE

Maritime trade is integral to ensuring the efficiency of Ukraine's exports: before the war, 60% of foreign trade shipments were conducted through deep-water seaports. Although the maritime blockade by Russia significantly risked undermining Ukraine's export capabilities, grain shipments are now nearing pre-war levels. This recovery is thanks to assistance from European countries in building new logistic routes, support from partner countries in ensuring the operation of the maritime grain corridor, and the successes of the Armed Forces of Ukraine in mitigating the blockade's impact. The efforts allowed Ukraine to increase export revenues and cope with problems related to the disruption of transport routes in the Black Sea region.

Were exported during the 7 months of operation of the Ukrainian corridor (September 2023 - March 2024)



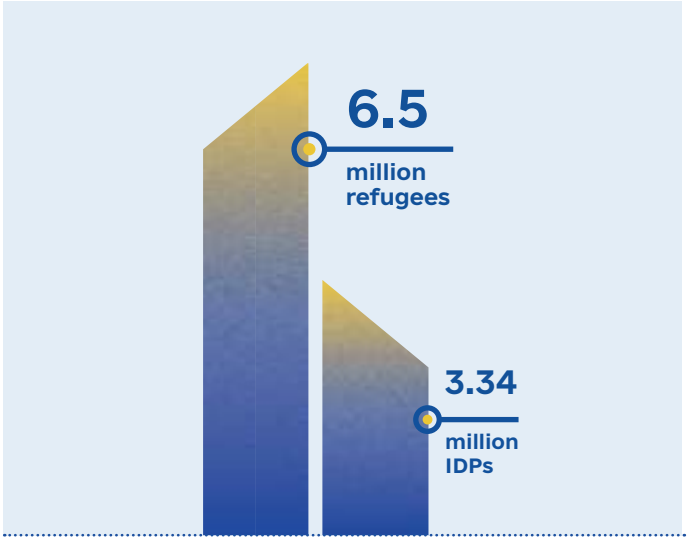
This surpasses the export volume achieved during the entire year of operation of the Black Sea Grain Initiative, which was almost 32.9 million tons. Overall, by the beginning of 2024, the Ukrainian corridor had enabled Ukraine to achieve nearly pre-war monthly levels of maritime transportation for export goods. Therefore, despite Ukraine not having its own Navy, this resurgence of trademarks a large defeat of Russia's attempted naval blockade and showcases the resilience of Ukraine's maritime trade.

HUMAN RESOURCES AND LABOUR MARKET

Ukraine is one of the most labour-abundant countries in Europe. In 2021, its population reached 41.6 million people, placing it seventh among European countries. According to the International Labour Organization, Ukraine's workforce in 2021 amounted to 17.4 million people. This large labour pool underscores Ukraine's potential for economic productivity and growth, providing a solid foundation for the prosperity of various industries and sectors.

However, Russia's unprovoked aggression has led to significant displacement, both abroad and within Ukraine. As of April 19, 2024, the UNHCR estimated that nearly 6.5 million Ukrainians had become refugees, with 5.9 million residing in Europe. Additionally, as of March 2024, Ukraine had registered 3.34 million internally displaced persons (IDPs).

Despite these challenges, Ukraine has managed to maintain a highly skilled and educated workforce. In 2023, Ukraine ranked 15th in the Global Skills Index, thanks to its expertise in fields such as computer science, applied mathematics, software engineering, big data, and machine learning. According to the Global Innovation Index 2023, Ukraine ranked 55th globally and was among the top three most innovative economies with below-average incomes. The country received high ratings for its development in education, information and communication technologies, and the intellectual level of human capital.



Although many highly skilled workers were forced to temporarily emigrate, the Ukrainian diaspora within the European Union remains a vital support for the Ukrainian economy. For instance, remittances in 2021 totaled USD 14 billion, 2.1 times the level of foreign direct investment. Since 2022, remittance levels have remained resilient, with increased contributions from Ukrainians who settled in the US. Many refugees expect to return post-war; as of July 2023, 70% of refugees in neighbouring countries planned to return. Additionally, a third of refugees and more than half of IDPs have already been able to return to their homes.

MINERAL RESOURCES

Ukraine ranks 25th in the world in terms of mineral extraction volumes. Thanks to its unique raw material base of iron and manganese ores, Ukraine is one of the countries with the most developed ferrous metallurgy.

Ukraine boasts:

117
different types of mineral resources
(out of the 120 most common ones)

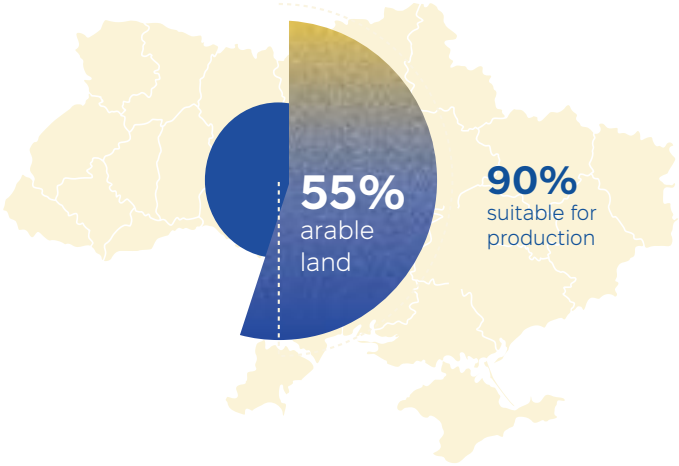
8,800
industrial deposits

Ukraine is among the top 10 countries in terms of global output:

- 5th in titanium production (5.7% of world production)
- 6th in iron ore production (3.3% of world production)
- 7th in manganese production (3.2% of world production)
- 10th in zirconium production (2.0% of world production)
- graphite and uranium production (1.0% of world production)

AGRICULTURE

Ukraine is one of the leading global producers and exporters of agricultural products, playing an important role in supplying oilseeds and grains to the world market. Often regarded as the "Breadbasket of Europe," over 55% of Ukraine's territory consists of arable land, with approximately 90% of agricultural lands suitable for production. During the 2021/2022 marketing year, Ukraine held a leading position in the world in sunflower production (30.6% of world production), and ranked second in sunflower oil production (30.6%), and sunflower meal production (27.5%). Ukraine's agriculture sector suffered significantly after Russia's full-scale aggression. In 2022, the grain harvest decreased by 40% (only 53.8 million tons were harvested), and vegetables decreased by 25% (29 million tons). By the end of December 2023, the total grain harvest amounted to 57.9 million tons.



ENERGY

At the beginning of 2022, Ukraine's energy sector was one of the most advanced in Europe, with 56 GW of electricity generation capacity, making it one of the largest. It was also among the top three natural gas producers (~20 billion m³) and had Europe's largest underground gas storage (31 billion m³) with a 38,000 km natural gas transmission system. Nuclear energy provided over half of Ukraine's electricity (55.5% in 2021 and 58.1% in 2022), followed by thermal power generation, which accounted for ~39% of installed capacity and 23.8% of electricity production in 2021.

By 2021, Ukraine had installed more than 8 GW of onshore wind and solar capacity. In 2023, wind and solar accounted for about 10% of electricity generation. Considering sizable hydroelectric power plants, the share of clean energy produced reached 20.3% (more than in the pre-war period).

Renewables development

From 390/GW to 874/GW
Ukraine's renewable energy potential

Up to 10/bln m³ of biomethane
Ukraine can produce annually, primarily from agricultural residues

CHAPTER 2

Economic Development of Ukraine in 2022-2023

ECONOMIC DEVELOPMENT OF UKRAINE IN 2022-2023

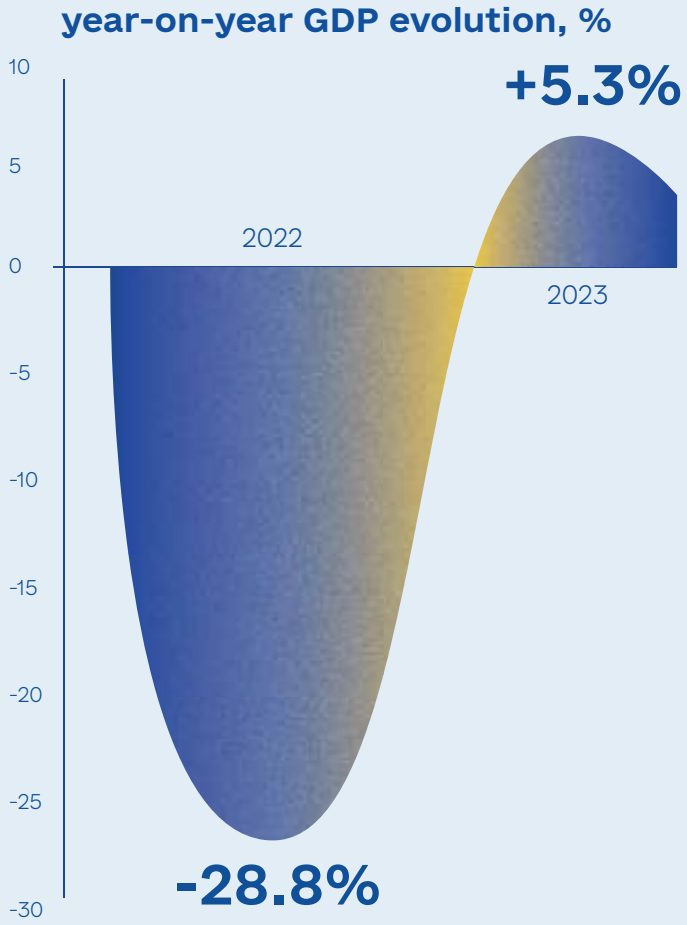
UKRAINE'S ECONOMY IN 2022-2023

Ukraine's economy withstood the war and transitioned to growth in 2023:

Due to Russia's unprovoked aggression, Ukraine's GDP contracted by 28.8% in 2022, the largest in its history. However, the economy showed remarkable resilience, achieving a 5.3% GDP growth in 2023. This recovery was driven by balanced policies, including suspending burdensome regulations, relocating businesses to safe areas, and investing in energy equipment.

The 2022 decline was mainly due to the destruction of production capacities and infrastructure, occupation by Russian forces, and significant logistical disruptions. The resilience of Ukraine's economy is evident in GDP growth over the 2023. This growth was supported by stabilising the energy supply, favourable weather, and restored electricity imports. Stable inflation and devaluation expectations led to a 7.2% increase in household consumption. Significant investments in defence, infrastructure restoration, and entrepreneurial ventures boosted gross fixed capital formation by 52.9%.

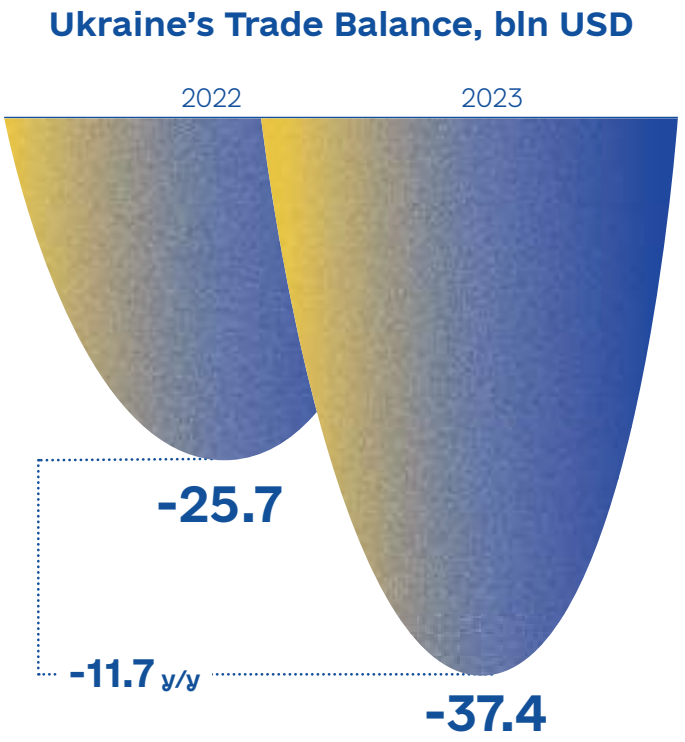
However, the 8.5% increase in imports of goods and services, driven by rising consumer and investment demand, along with the 5.4% decrease in exports, negatively impacted GDP.



Trade Balance

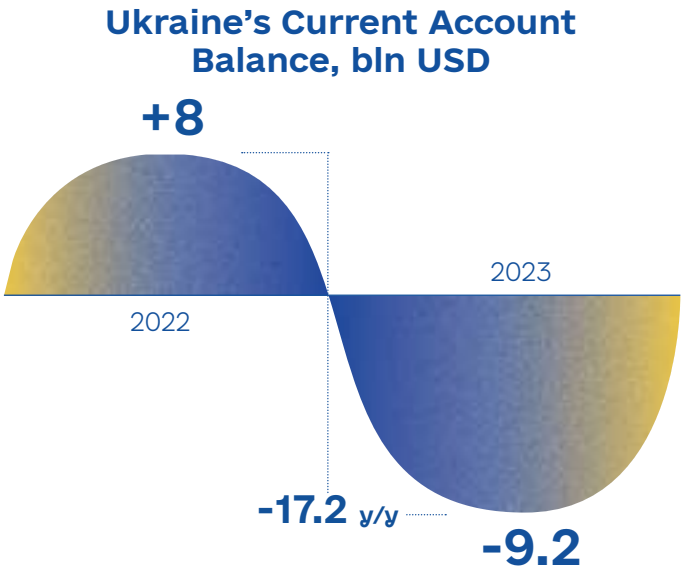
Amid significant obstacles to exports and rising import needs for defence, military, enterprise activities, and energy security, Ukraine's negative trade balance significantly increased in 2022. The trade deficit in goods and services nearly tenfold compared to 2021, reaching USD 25.7 billion. The goods trade deficit grew by 2.2 times to USD 14.7 billion, while Ukraine ceased being a net exporter of services, resulting in a service trade deficit of almost USD 11.1 billion due to a sharp increase in imports.

In 2023, the negative trade balance deepened further due to Russian aggression, reaching a record USD 37.4 billion, a 45% increase from 2022. The goods trade deficit doubled to USD 28.8 billion, driven by logistics issues limiting exports and increased import needs for defence. The goods trade deficit accounted for over three-quarters of the total trade deficit. Additionally, the services trade deficit remained significant at USD 8.6 billion, although it decreased by USD 2.5 billion from 2022, mainly due to reduced travel service imports as Ukrainian refugees' residency statuses changed abroad.



Current Account Balance:

In 2022, the negative balance of trade in goods and services was offset by a significant decrease in income from investments and only a slight decrease in the volume of private remittances to Ukraine, as well as by the receipt of grants and humanitarian aid provided to Ukraine by international partners. As a result, the current account balance in 2022 was positive, amounting to nearly USD 8 billion. However, in 2023, the deficit in foreign trade in goods and services was only partially offset by the inflow of funds from abroad. Against the backdrop of continued gradual reduction in the volume of private remittances and increased payments for investment income, the volumes of grants and humanitarian aid from international partners also decreased. This led to an increase in the deficit of the current account to USD 9.2 billion.



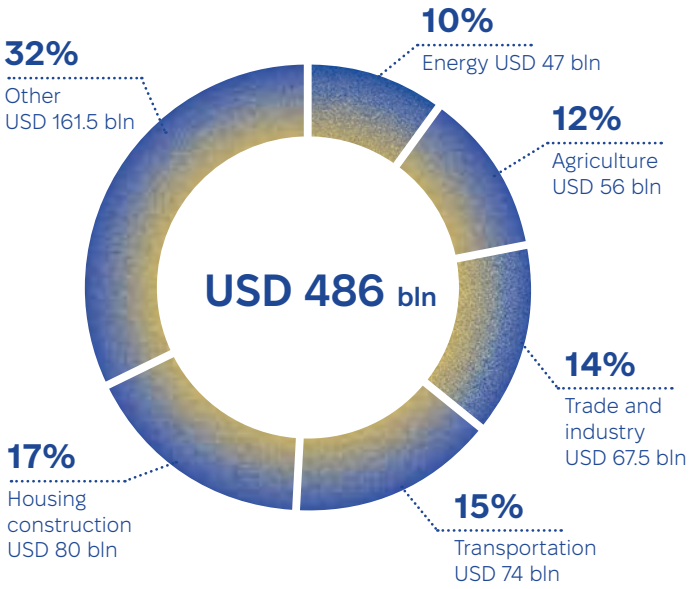
Foreign Direct Investment (FDI)

The aggression of Russia led to a halt in the inflow of foreign investments into Ukraine. However, by 2023, foreign investors began to resume their activities in Ukraine, with nearly USD 4.3 billion of FDI injected into the Ukrainian economy. A significant portion of these investments came from foreign investors who were already operating in the Ukrainian market. For example, Laude Group of Companies, a Polish logistics operator, announced in August that it had transferred €100 million to Ukraine[1]. In April, Bayer announced that it intended to invest €60 million in a corn seed production plant[2]. At the same time, there is also a gradual resurgence in attracting new foreign investors, who invested nearly USD 0.7 billion.

Assessment of Damages from Russian Aggression

Ukraine has suffered immense damages and losses as a result of Russia's full-scale aggression. As of the beginning of 2024, according to World Bank estimates, the damage inflicted on buildings and infrastructure is estimated at USD 152.5 billion. The most affected sectors include housing and utilities, transportation, trade and industry, energy, and agriculture. The greatest destruction is concentrated in the Donetsk, Kharkiv, Luhansk, Zaporizhzhia, Kherson, and Kyiv regions. The overall economic losses, taking into account disruptions in economic flows and production, as well as additional costs associated with the war (such as debris removal), are estimated at over USD 499 billion.

Reconstruction and recovery needs create a huge market for Ukraine`s Recovery, which is estimated at over USD 486 billion. Of them, about USD 278 billion are reconstruction needs, the other USD 208 billion are recovery (production/service restoration) needs. The largest needs are in housing (over USD 80 billion, or 17% of the total), transportation infrastructure (almost USD 74 billion, or 15%), industry, construction, services and commerce (USD 67.5 billion, or 14%), agriculture (USD 56 billion, or 12%), and energy (USD 47 billion, or 10%, as of today, it is significantly higher).



[1] - https://ukraineinvest.gov.ua/en/news/16-08-2023/
[2] - bit.ly/4aRoi6Y

Table 1. Damages, losses and needs			
	Damage	Loss	Needs
SOCIAL SECTORS	**66.6**	**71.2**	**161.8**
Housing	55.9	17.4	80.3
Education and science	5.6	6.9	13.9
Health	1.4	17.8	14.2
Social protection and livelihoods	0.2	9.5	44.5
Culture and tourism	3.5	19.6	8.9
INFRASTRUCTURE SECTORS	**55.2**	**115.4**	**148.0**
Energy and extractives	10.6	54.0	47.1
Transport	33.6	40.7	73.7
Telecom and digital	2.1	2.3	4.7
Water supply and sanitation	4.0	11.6	11.1
Municipal services	4.9	6.8	11.4
PRODUCTIVE SECTORS	**26.6**	**249.4**	**136.6**
Agro	10.3	69.8	56.1
Industry and commerce	15.6	173.2	67.5
Irrigation and water resource management	0.7	0.7	10.7
Finance	0.0	5.7	2.3
CROSS-CUTTING SECTORS	**4.0**	**63.3**	**39.9**
Environment, natural resource management, and forestry	3.3	26.5	2.3
Emergency response and civil protection	0.4	0.5	2.3
Governances and public administration	0.3	1.7	0.7
Explosive hazard management	–	34.6	34.6
ALL	**152.5**	**499.3**	**486.2**

MACRO "WINS"

IMF Financing

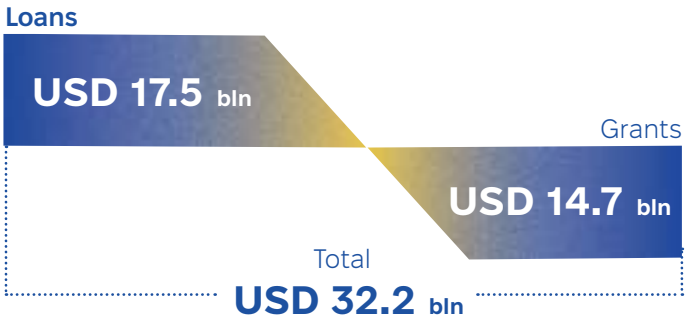
On March 31, 2023, the IMF approved a four-year Extended Fund Facility (EFF) program amounting to SDR 11.6 billion (USD 15.6 billion). The EFF program is part of a four-year financial support package totalling USD 122 billion under the baseline scenario and USD 140 billion under the deteriorated scenario

IMF Financing

Budget Deficit Support

In 2022, Ukraine received USD 32.2 billion in external budget support, of which USD 14.7 billion, or 45.8%, was granted, and the rest were loans provided on very favourable terms. This allowed the year to end with a State Budget deficit of USD 28.3 billion, as compared to USD 43.1 billion excluding grant funding.

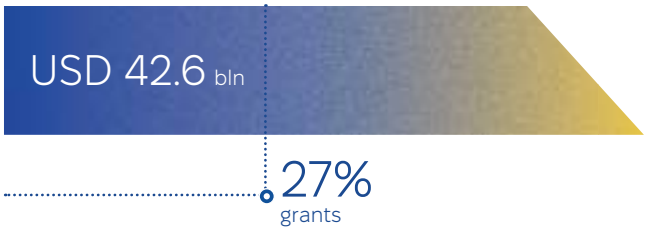
External budget support, 2022



Revenues

The dynamics of revenue execution of the state budget in 2023 significantly improved due to higher tax collections in response to the recovery of economic activity and several one-time receipts (for example, a transfer from the National Bank of Ukraine amounting to USD 2 billion). Total revenues of the State Budget reached USD 73.1 billion, which is 49.5% more than in 2022. In 2023, the state budget received USD 42.6 billion from foreign partners and IFIs, of which 27% were granted.

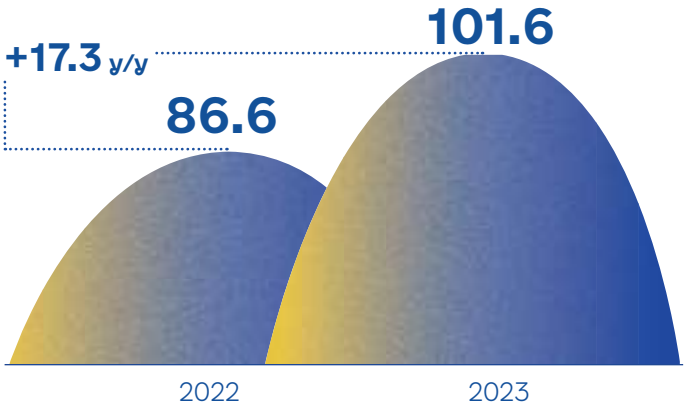
Ukraine's state budget received from foreign partners and IFIs in 2023



Debt

Ukraine's state debt in 2023 increased moderately by 17.3% in dollar terms compared to the previous year, reaching USD 101.6 billion, thanks to grant financing from foreign partners. However, this debt growth, as before, is driven by the provision of loans on very favourable terms, with long repayment terms and low or subsidised interest rates, meaning they will not overly burden Ukraine's financing needs in the coming years

Ukraine's state debt, bln USD



Inflation

In December 2023, the consumer price index dropped to 5.1%, compared to 26.6% at the end of 2022. Several factors contributed to the consecutive slowdown in inflation. Firstly, restrained demand persisted amid the ongoing war. Secondly, the relative stability of the exchange rate despite the transition from a fixed regime to a managed float helped alleviate inflationary pressure. Thirdly, the easing of price pressure on the population was achieved by maintaining stability in the majority of utility tariffs. Moreover, the decline in global energy prices further contributed to easing inflationary pressure. Simultaneously, the stabilisation of the centralised electricity supply since mid-February allowed for reduced electricity costs due to the less intensive use of autonomous generators. Among other disinflationary factors were the stabilisation of inflation and devaluation expectations, as well as record harvests of certain crops.

Inflation in Ukraine

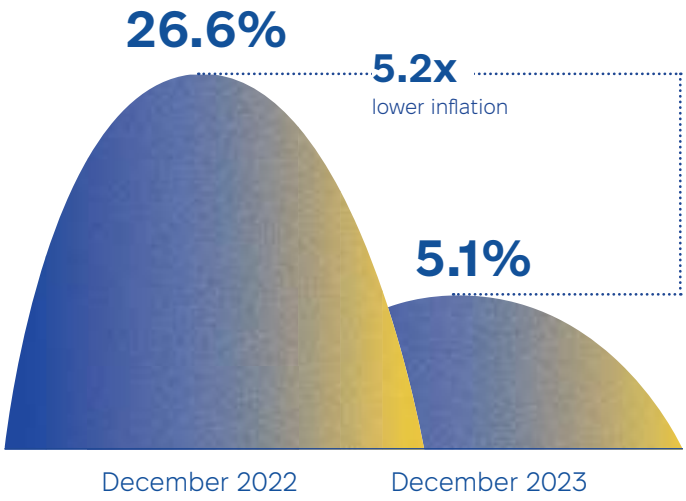


Table 2. Key macroeconomic indicators of Ukraine's development in 2020-2023				
	2020	2021	2022	2023
GROSS DOMESTIC PRODUCT				
nominal, USD billion	156.6	199.8	162.0	178.8
% to the previous year	96.2	103.4	71.2	105.3
GDP deflator, %	110.3	124.8	134.3	118.5
CONSUMER PRICE INDEX				
on average to the previous year, %.	102.7	109.4	120.2	112.9
December to December of the previous year, %.	105.0	110.0	126.6	105.1
PRODUCER PRICE INDEX				
on average to the previous year, %.	98.4	140.8	147.3	124.2
December to December of the previous year, %.	114.5	162.2	138.2	116.2
AVERAGE MONTHLY SALARY OF EMPLOYEES, GROSS				
nominal, USD	430	513.6	459.1	476.9
Labour force aged 15-70, million people	17.6	17.3	15.23	15.13
Number of people engaged in economic activity aged 15-70, million people	15.9	15.6	12.43	12.23
Unemployment rate of the population aged 15-70 according to the International Labour Organization methodology, % of the labour force of the respective age group	9.5	9.9	18.43	18.93
Current account balance, USD million	5,267	-3,882	7,972	-9,209
Balance of goods and services (according to the balance of payments methodology), USD million	-2,378	-2,671	-25,737	-37,395
Balance of goods and services, % of GDP	-1.5	-1.4	-16.3	-21.0
Exports of goods and services (according to the balance of payments methodology), USD million	60,707	81,504	57,517	51,093
Exports of goods and services, % to the previous year	95.5	134.3	70.6	88.8
Imports of goods and services (according to the balance of payments methodology), USD million	63,085	84,175	83,254	88,488
Imports of goods and services, % to the previous year	82.9	133.4	98.9	106.3
Foreign direct investment inflow, USD million	304	7,954	247	4,334

[4] According to the Ministry of Economy

CHAPTER 3

Strengthening stability

3.1. IMPLEMENTED CRISIS MEASURES

Since the beginning of the full-scale war, the GoU and the NBU have proactively implemented a series of anti-crisis measures aimed at stabilising and supporting the country's economy.

At the beginning of the full-scale war, the NBU fixed the hryvnia exchange rate and introduced several significant currency restrictions. These decisions helped to prevent panic and ensure the stable operation of the financial system, as well as to help businesses and households adapt to the conditions of a full-scale war. Many of the restrictions introduced are being progressively lifted/amended while others are still in force.

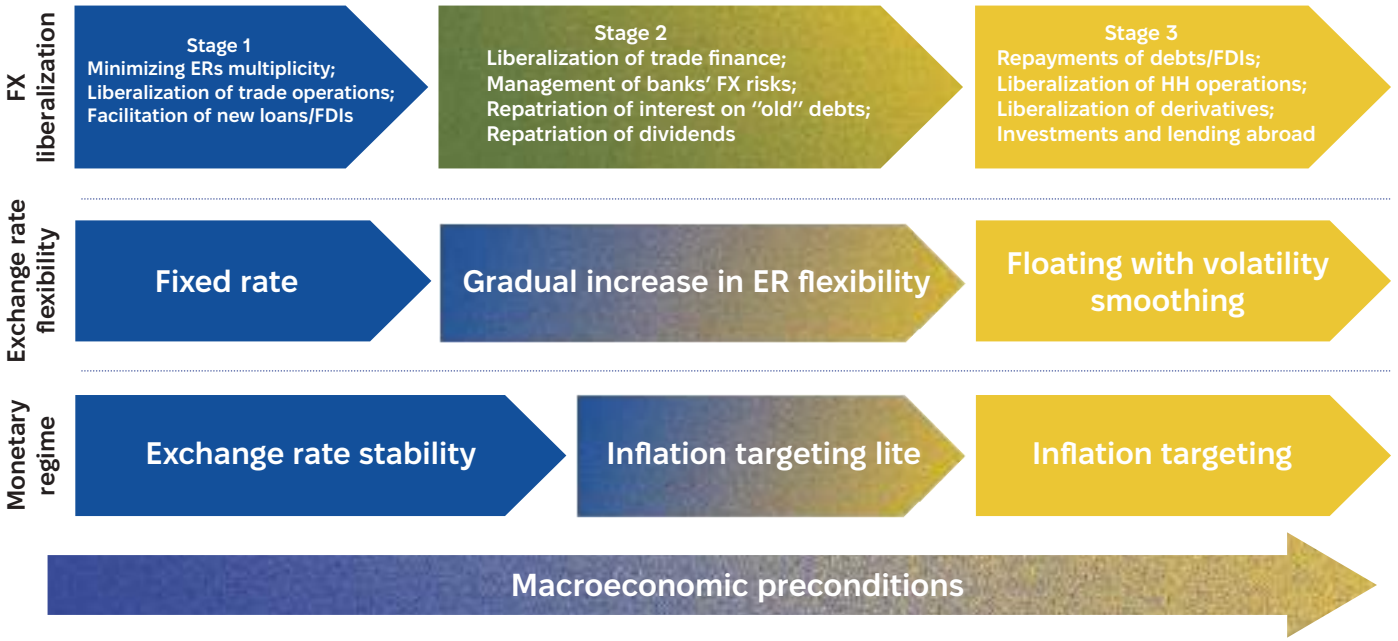
Table 1. Main restrictions for business in Ukraine

Type	Original restriction	Status	Changes
Monetary	Fixed official exchange rate for February 24, 2022	Mitigated	Managed exchange rate flexibility established
FX	Suspension of the foreign exchange market of Ukraine	Mitigated	Most FX market operations resumed
	Prohibition of foreign currency purchase	Mitigated	The ban on foreign currency purchases subject to a limit has been lifted
	Prohibition of transfering of FX funds to accounts of foreign units	Mitigated	Resident transfers to the accounts of their separate subdivisions in foreign countries are allowed
	Restriction of repayments of debts abroad	Mitigated	Service of "old" loans and repatriation of investments guaranteed by foreign ECAs and development banks
	Restriction of payments for imports, only critical imports are allowed	Mitigated	Restrictions include only imports of certain services
Financial	Settlement deadlines for export and import transactions are 90 calendar days (instead of 365 calendar days)	Mitigated	Most FX market operations resumed
	Limitation of cash withdrawals by clients to UAH 100 thousand per day and the foreign currency equivalent (excluding salary and social payments)	Will be liberalised	-
	Prohibition to carry out any currency transactions involving a legal entity or individual located in the Russian Federation or the Republic of Belarus	Unchanged	-

These actions were necessary to ensure the reliable and stable functioning of the country's financial system. The NBU is gradually implementing the Strategy for easing FX restrictions, moving to greater exchange rate flexibility, and returning to inflation targeting, provided that the appropriate preconditions are in place (Fig. YY).

In addition, the NBU is considering granting permission to transfer dividends received by foreigners in Ukraine abroad. The pace of changes directly depends on inflation and inflation expectations, accumulated international reserves, and interest rates.

Figure 1: The Strategy for easing restrictions by areas



These measures to ease the current FX restrictions include the implementation of Ukraine's benchmarks under the IMF EFF program in two phases. The immediate priorities are to minimise the multiplicity of exchange rates, increase opportunities for business trade, and facilitate new investments. Significant achievements have already been made in the latter two areas, including the ability of businesses to import any commodity from abroad and partially repay «new» debts to foreign creditors (Table 4).

Table 2. Measures and progress in easing FX restrictions

STAGE 1 Minimising multiplicity of ERs; Liberalising trading operations; Stimulating new loans/FDIs	STAGE 2 Trade financing; banks' FX risks; Repatriation of interest on "old" debts and investments
Sale of cash FX by financial institutions	Deadlines for mandatory settlement in FX
Sale of non-cash FX by banks to individuals	Transfers on "old" customs declarations
FX transfers for imports of works and services	Reimbursement of advance payments from before the invasion
Operations with corporate cards	Purchase by banks into FX position for the formed reserves
Service of "new" external corporate debt	Change of currency of loan agreements
Repatriation of "new" dividends	Repatriation of dividends
Service of "old" loans and repatriation of investments guaranteed by foreign ECAs and development banks	Repatriation of interest on "old" external debt
Payments for "new" leasing, factoring and leases	Payments for "old" leasing, factoring and leases

started completed

3.2. UKRAINE PLAN & REFORM PROGRAME

Ukraine has secured significant financial support to bolster its economy during the war and recovery until 2027. The key support packages include:

1. Extended Fund Facility from the International Monetary Fund (IMF EFF) in the amount of USD 15.6 billion of direct budget support approved on 31 March 2023;

2. Ukraine Facility from the European Commission (UF) in the amount of EUR 50 billion approved on 1 February 2024. UF financial support includes:

EUR 38.27 billion of direct support to the state budget;

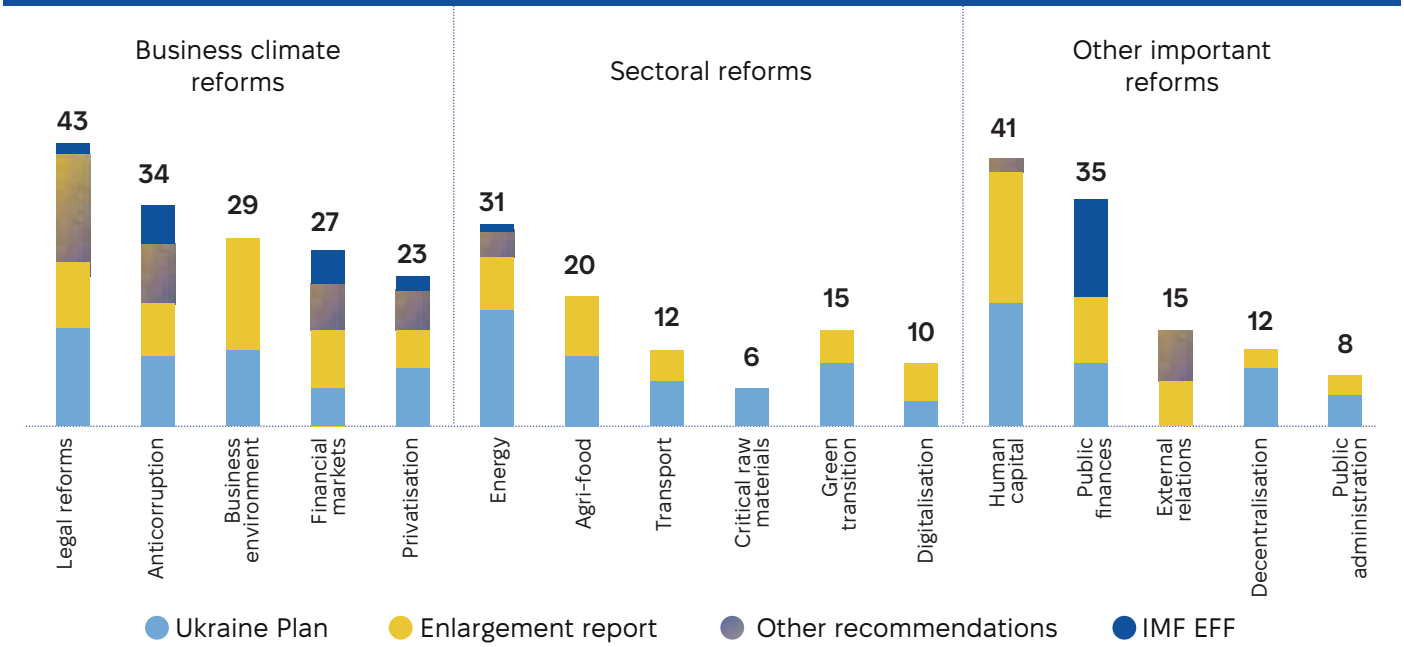
EUR 6.97 billion of Investment funds (Special investment instrument to stimulate investment in priority sectors);

EUR 4.76 billion of Technical support.

In addition to financial aid, Ukraine is undertaking reforms to enhance its business environment and integrate with European standards. These reforms are essential for receiving full financial support from the IMF and the EU. Thus, along with easing currency restrictions, the GoU is implementing reforms across 16 key areas, focusing on improving the country's business environment. (Figure 2).

All Ukrainian reforms have been meticulously compiled and categorized into the Reforms Matrix[1] - an analytical tool designed for strategic decision-making and efficient management of the reform implementation process.

Figure 2: Number of planned reforms in the Ukrainian Plan and other programs 2024-2027



Out of 156 total reforms, 60% are expected to be implemented by 2024.

Key reforms of the business environment include business deregulation, relaunch of the Bureau of Economic Security, simplified procedure for connecting real estate to utility networks, alignment of public procurement with EU standards and general harmonisation of rules and regulations with the EU acquis. In 2024, 60% of all reforms are expected to be implemented. Most important reforms for business by area are shown in the Table 3.

[1] https://reformmatrix.mof.gov.ua/en/index/

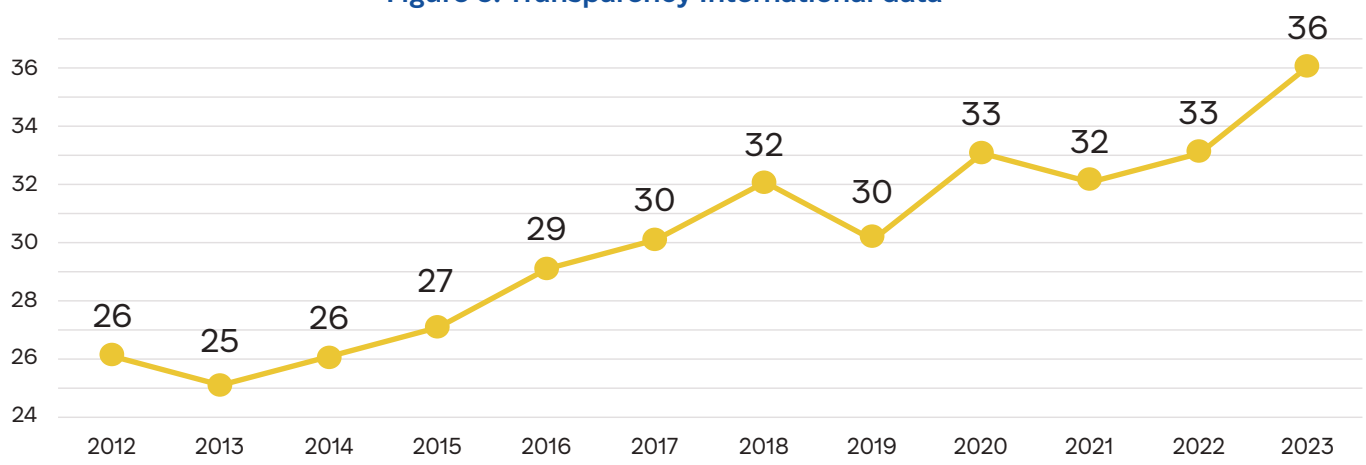
Table 3. Most important reforms for business by area in accordance with Ukraine Plan		
Type	**Area**	**Main reforms**
Business climate reforms	Legal reforms	Ensuring the integrity of judges and implementing a system for preventing insolvency of legal entities
	Anti-corruption	Strengthening institutional capacity and approving an anti-corruption strategy
	Financial markets	Strategy for the settlement of NPLs from the NBU and strengthening the securities market
	Privatisation	Implementation of corporate governance of state-owned enterprises and privatisation of non-strategic ones
	Business environment	Deregulation and simplification of business activities, bringing public procurement in line with EU standards
Sectoral reforms	Energy sector	Reduced procedures for investing in RES and ensuring the independence of the regulator
	Agriculture sector	Establishment of a Farm Sustainability Data Network system unified with the EU
	Transport & Logistics	Construction of Border Infrastructure with the EU Member States and ensuring competition in the rail transportation market
	Critical materials	Publication of a portfolio of investment projects for the extraction of critical raw materials
	IT and digitalisation	Strengthening cyber defence capabilities of critical information infrastructure facilities
	Green transition	Adoption of the state climate policy and resumption of emissions monitoring

SIDEBAR: Ukraine's commitment to business environment reform and the fight against corruption

Before the war, Ukraine made significant progress in terms of fostering a reliable and efficient business environment. As indicated by the Doing Business rankings, the country improved processes for obtaining building permits, connecting to electricity, protecting minority investors, and facilitating cross-border trade.

A critical focus was the fight against corruption, pivotal for Ukraine's EU accession efforts. Over the past decade, Ukraine's Corruption Perception Index improved by 10 points, a reflection of key anti-corruption measures such as opening public registers, implementing an electronic asset declaration system, and introducing the Prozorro platform to boost public procurement transparency.

Figure 3: Transparency International data



3.3. PRIVATISATION PROSPECTS IN UKRAINE

Ukraine has overseen a significant portfolio of state-owned assets. According to the Ministry of Economy, from 3,293 state owned enterprises listed as of 2022, only 1,058 remains economically active in 2024. These SoEs ary primarily focuses in strategic sectors like energy, infrastructure, and defence. More than half of the banking sector's assets, including NPLs, are under state ownership, alongside 370 recreation facilities, despite the challenges posed by ongoing war.

Apart from government-level SOEs, there's also a sizable portfolio of municipally owned enterprises (MOEs), estimated at around 15,000. Municipal ownership is typically for healthcare, administration, utilities, and transport, what are significant recipients of state aid. However, information on these enterprises remains fragmented due to a lack of mapping.

In 2022-2023, Ukrainian legislation underwent significant changes, broadening the scope of assets managed by the State Property Fund of Ukraine (SPFU) to include sales to private investors. **Alongside the existing framework for small privatisation asset sales through electronic auctions, new measures were introduced, including:**

- Sale of assets through electronic auctions for large-scale privatisation (assets with a starting price above UAH 250 million).
- Management through the sale of assets seized for state revenue due to sanctions by the Law of Ukraine «On Sanctions.»
- Formation of a land bank from agricultural lands previously under the permanent use right of state companies and institutions.

Ukraine's strategic objectives in managing state assets and privatisation from 2024-2027 include optimising the SOE portfolio and preparing them for privatisation, along with improving corporate governance and performance. The Ministry of Economy and SPFU will prioritise implementing these directions, defining the government's vision on SOEs through an overarching ownership policy. This policy will guide decisions on privatisation, liquidation, or retention of SOEs in state ownership, transforming the sector through corporatization and restructuring, while adhering to OECD Guidelines.

Improving governance practices, consolidating SOE management, and optimising the SOE portfolio in line with the ownership policy are key reforms planned. The relaunch of large-scale privatisations is set to occur once conditions are favourable, aiming for transparency and attracting strategic foreign investors.

For 2024-2025, the SPFU plans to initiate the sale of large-scale privatisation assets, with 19 assets already listed as of April 2024. Additionally, small privatisation assets will be actively listed for sale, with 1,344 objects listed by the end of May 2024. The State Budget of Ukraine for 2024 anticipates revenues of 4 billion UAH from the privatisation of state-owned assets.

The SPFU actively manages a diverse portfolio of assets, including those levied under the Law of Ukraine «On Sanctions.» As of May 2024 the list of the assets in the sanctions register included 735 items (according to the decision of the High Anti-Corruption Court of Ukraine). These assets, initially levied as sanctions, represent significant investment opportunities, prepared for sale by Ukraine's privatisation legislation. The State Property Fund has already announced its first auctions for the sale of sanctioned assets and is preparing additional sanctioned assets for sale.

The first actions expected for large-scale investment opportunities include:

- Hotel «Ukraine,» Kyiv, with four stars, located in the city centre on Maidan Nezalezhnosti, offering various amenities.
- JSC «United Mining and Chemical Company» (UMCC), one of the world's largest producers of titanium raw materials, managing Vilnohirsk Mining and Metallurgical Plant and Irshansk Mining and Processing Plant.
- A majority share of Lybid Investment Union LLC, which owns Ocean Plaza shopping mall in Kyiv, one of the largest shopping and entertainment complexes in the city.

Additional opportunities for the private sector are expected in the field of state-owned land, facilitating business opportunities through transparent leasing of agricultural land via online auctions on Prozorro.Sale. With the state owning approximately 700,000 hectares, potential annual lease income could reach up to 7 billion UAH. The first auctions under the «Land Bank» project are expected to commence in 2024, with preparatory actions currently underway by the State Property Fund and authorised entities.

CHAPTER 4

Sectoral overview

4.1. AGRIFOOD SECTOR

4.1.1. Current situation and the sector role

ROLE OF THE AGRIFOOD SECTOR IN THE ECONOMY OF UKRAINE AND GLOBAL FOOD SECURITY

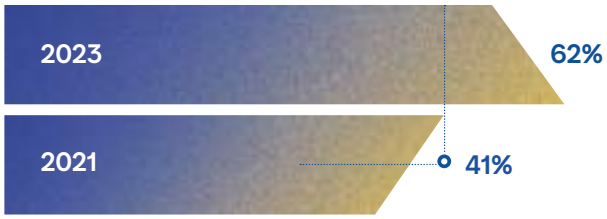
Ukraine is one of the guarantors of food security in the world, contributing to the global food market with the capacity to feed about 400 million people.[1] Before Russia's invasion, Ukraine supplied 50% of the grain stock of the UN World Food Program, the largest humanitarian organisation in the world.

The agrifood sector plays a key role in Ukraine's economy.

In 2021, agriculture represented

10.9 % of Ukraine's GDP[2]	**2.7** million people employed	**~ 17%** the total labour force[3]

As of 2022, the share of the agro-industrial complex in Ukraine decreased to 8.2%. In 2023, the projected number of people employed in agricultural sector decreased by 22%[4] and amounted to 2.1 million workers. The agrifood sector has shown much resilience, remaining a powerful component of the country's exports. **In 2023, the share of agri-food products in the total exports of Ukraine increased to 62% compared to 41% in 2021.**



After the full-scale invasion, more agricultural export products, particularly wheat and corn, were directed to or through Europe.

Figure 1: Share of Ukrainian wheat exports (%) by region 2021-2023

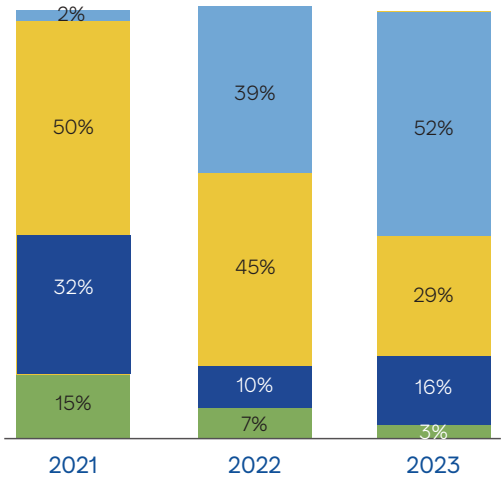
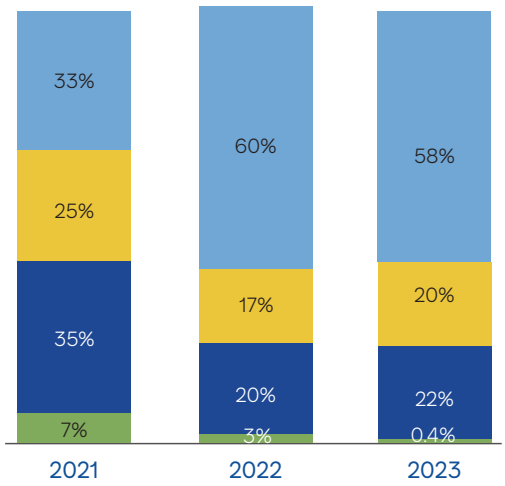


Figure 2: Share of Ukrainian corn (maize) export (%) by region of 2021-2023



Europe include transit operations | MENA | Asia | Other

[1] https://minagro.gov.ua
[2] https://data.worldbank.org
[3] https://www.ukrstat.gov.ua
[4] Report by the Center for Economic Recovery and EasyBusiness, December 2022

NATURAL ENDOWMENTS AND AGRICULTURAL LAND MARKET

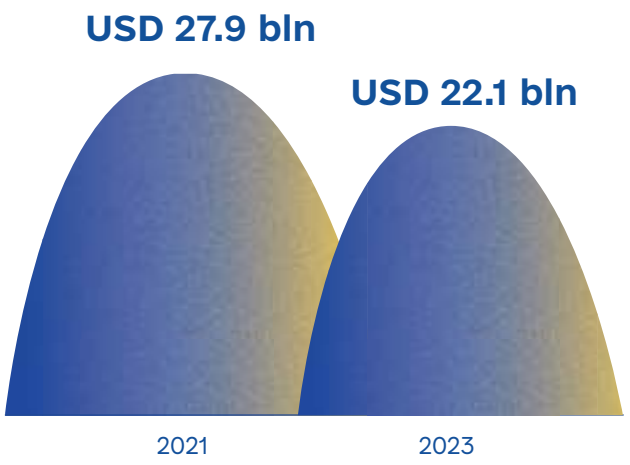
In 2020, Ukraine's agricultural land comprised 41.3 million hectares, 68.5% of Ukraine's total land area. 32.7 million hectares of agricultural lands were arable lands. The share of black soils – 15.6–17.4 million ha (8% of global reserves). **Currently, Ukraine controls an estimated 26.5 million hectares of arable land[5].** The land fund of Ukraine is characterised by an extremely high level of development. **In 2022, the rate of ploughed land in Ukraine reached an average of 54%, and in some regions – 70% or more, while the average rate in the EU countries is 30–35%.**

The sale of most of the private farmland in Ukraine was under a moratorium for over 20 years, which was abolished only on July 1, 2021. The newly formed farmland sales market, initially available only for individuals, was shut again after the Russian invasion till May 2022 due to the shutdown of the registries for security reasons. After the second opening in less than a year, the farmland market started its recovery. **In the first year after the opening of the post-invasion land market, a total of 109,500 hectares of deals were concluded. This figure rose to 212.8 thousand hectares in the second year after the full-scale invasion.** Overall, since the land market opened on July 1, 2021, 1.3% of Ukraine's farmland has been transacted. This volume represents roughly half of the transaction volumes seen in more developed markets.

The farmland prices are rising as well; in April 2024, the prices were 18.8% higher than in April 2023, increasing the capitalization of the farmland market by USD 6.9 billion. Partially, this bump in prices occurred due to the opening of the farmland market for legal entities, which received a right to buy farmland after January 1, 2024. This new phase of the land market reform also allows legal entities to receive loans using land as collateral, implying that an increase in farmland market capitalization over the last year created an additional USD 3.4 billion of collateral, which is vital to Ukrainian agribusiness that suffered USD 80 billion in damages and losses, which lead to the decrease in the credibility of the sector.

EXPORTS

Based on the 2023 performance, **Ukraine exported agricultural products in the amount of USD 22.1 billion, which is 21% less than the record performance of 2021 in the amount of USD 27.9 billion.**



Ukraine remains a key supplier of grain and sunflower oil in the world markets. Ukraine's contribution is

- **43%** of the world exports of sunflower oil,
- **19%** of rapeseed,
- **13%** of corn,
- **7%** of the world exports of wheat[6].

Despite its size, Ukrainian agriculture relies on exporting competitive but low-added-value grains and oilseeds. With regard to the more profitable prepared foods (excluding oilseed cake), **Ukraine is a net importer, and these products represent only 6% of Ukraine's trade with the EU[7].**

PROCESSED PRODUCTS, LIVESTOCK SECTOR, AND CREATING ADDED VALUE

Almost 80% of Ukraine's exports are raw commodities or partially processed products. Whereas in Poland, the share of added value in the structure of the agro-industrial complex activities amounted to about 75%[8]. According to preliminary estimates, the processing of 50% of agricultural raw materials, primarily wheat and corn, will give Ukraine an additional USD 30 billion in export revenues every year.

Ukraine has significant resources for biofuel production which are currently underexploited, but could potentially support European energy and climate goals as well as contribute to the development of the domestic market.

The raw materials for production can be renewable agricultural and forestry products that are not used for food or feed purposes, processing by-products, such as sugar beet pulp, corn silage, sorghum, etc., and livestock waste. Biofuels can replace gas and save 30% to 60% of the budget as an alternative to fossil fuels. Increasing biofuel share can ensure energy supply for social and critical infrastructure in times of war and Russian missile attacks[9].

Ukraine's livestock sector has experienced a transformation in the last two decades, marked by a steep increase in poultry production, but it is still relatively small. The livestock sector in Ukraine is important for ensuring the country's food security, however, the market is characterised by a steady tendency to reduce the number of almost all types of livestock. Exports of live animals and animal products in 2023 remained almost unchanged compared to the pre-war period (USD 1.36 billion in 2023, compared to USD 1.35 billion in 2021)[10]. Livestock production was profitable throughout 2023 thanks to lower feed prices.

[5] https://minagro.gov.ua
[6] https://apps.fas.usda.gov
[7] https://www.europarl.europa.eu
[8] https://data.worldbank.org
[9] https://www.kmu.gov
[10] https://customs.gov.ua

As a result of the full-scale war, Ukraine faced a number of challenges, but the effective interaction of business, the state, and international donors formed the foundation for further resistance to challenges.

Logistics

Prior to the Russian invasion, 98% of Ukraine's grain exports were transported through the Black Sea[11]. The disruption of the grain agreement and the blockade of shipping in the Black Sea affected the structure of logistics routes. The role of land transport has increased significantly.

To date, almost 90% of all agricultural exports goes through the ports of Great Odesa and the Danube river ports Izmail and Reni. Ukraine has introduced a more effective logistics route without the participation of the Russian Federation, continuing to be a guarantor of food security.

The expansion of UNITY's affordable marine insurance program has helped cut insurance rates in half in the commercial market. For agricultural products, the rate under UNITY is currently at 0.75%[12].

Over the year, monthly exports increased by 31% to 7.2 million tonnes of agricultural products in December 2023 compared to 5.5 million tonnes in January[13].

Since the start of the full-scale invasion, there has been a rapid shift to river shipping, and yet the potential for river transport development remains largely untapped. Logistics and grain exports have changed in the context of limited use of landlocked Dnipro River. The role of the Danube Cluster ports has increased significantly, maintaining consistently high exports. **The GoU plans to further increase the capacity of the Danube ports and expand the export capacity of the Danube cluster from 33 million tonnes in 2023 to 35-40 million tonnes in 2024[14].** The Great Odesa Ports handled 33.8 million tonnes of cargo between September 2023 and March 2024. Further volume increase is expected.

Territorial Threats (Mined Territories)

According to the Minister for Internal Affairs, about 25% of Ukrainian lands have been contaminated with landmines and unexploded ordnance. Ukraine is interested in increasing the number and expanding the existing programs for demining the lands of small farmers and supporting agricultural producers initiated by international institutions (WFP, FAO, FSD)[15]. Ukrainians are actively working on the development of drones and unmanned aerial vehicles for non-technical surveys of territories. **In less than a year, Ukraine increased its demining capabilities several times and returned to use, after an inspection, 19,000 km2 of lands in 2023-2024[16].**

The price of a non-technical examination can fluctuate around USD 6 per hectare, a technical examination - USD 3,050 per hectare, and clearing - as much as USD 29,400 per hectare[17].

Territorial Threats (Consequences of Destruction of the Kakhovka HPP)

In the pre-war period, almost 19 million hectares out of 31.7 million hectares of Ukrainian lands suffered from a severe shortage of moisture supply. The destroyed Kakhovka HPP aggravated the problem of water supply. Over 300,000 hectares will now depend on uncertain rain-fed irrigation, resulting in productivity losses of up to 70%. Reclamation and irrigation systems for land restoration are becoming more relevant, which has attracted the interest of international donors and investors. In July 2023, Japan International Cooperation Agency proposed several main directions for the restoration and modernization of the irrigation system in Ukraine.

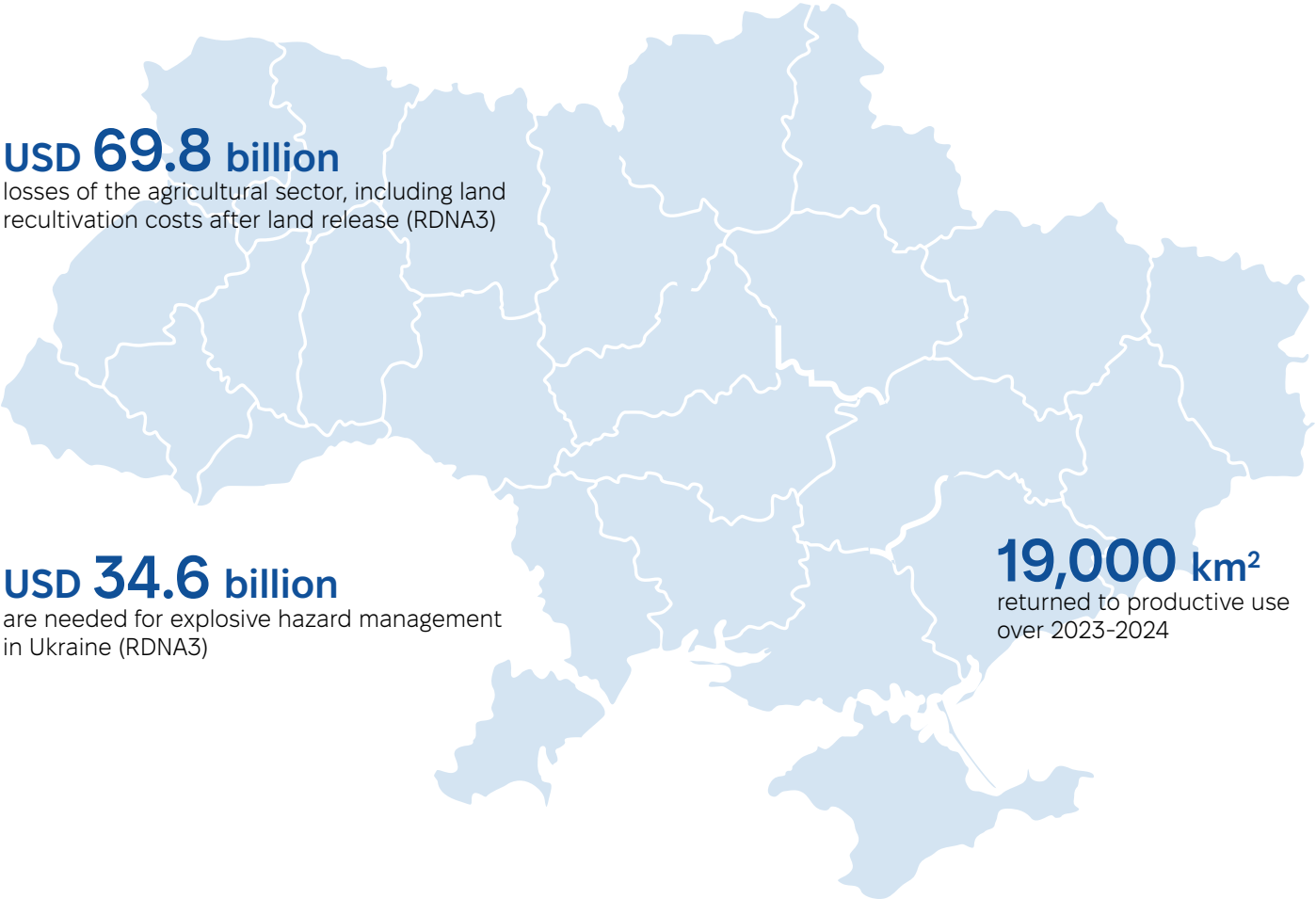
The cost of 1 hectare of drip (mainly soil) irrigation system construction will be USD 3,000-3,500. The potential for expanding the irrigated area is 1.5–1.8 million hectares of land. Modernization will require USD 3 billion of investment and will allow additional irrigation on a total area of about 1,180,000 hectares. In addition, there are 350,000 hectares of drainage systems of various types, at a total cost of USD 694 million, which should be modernised to increase their functionality.

Liquidity Issue

The state continues to promote the development of entities throughout Ukraine by offering them the "affordable 5-7-9%" lending program, budget subsidies and subventions, grant programs and guaranteeing deposits.

Other support programs include a budgetary subsidy per hectare for farmers who cultivate up to 120 hectares of agricultural land and a separate subsidy for farmers from the de-occupied territories or territories. In addition, special budgetary subsidies for cattle and grant programs for gardens and greenhouses are available. A partial deposit guarantee fund has been launched to provide guarantees for farmers to buy equipment, land, etc. if they lack collateral. A 25% state compensation for the purchase of domestic agricultural machinery was also initiated. The activated financing by international donor organisations and investors creates a favourable environment for the growth of creditor loyalty[18].

[11] https://www.trade.gov
[12] https://www.me.gov.ua, https://bit.ly/4e8ciAv
[13] https://apps.fas.usda.gov
[14] https://mtu.gov.ua
[15] https://www.me.gov.ua
[16] https://www.me.gov.ua
[17] https://kse.ua
[18] https://www.consilium.europa.eu



OVERVIEW OF KEY PLAYERS IN THE SECTOR AND SUCCESSFUL CASES OF RECENT YEARS

Ukraine's agricultural sector is characterised by a competitive market environment. Market players vary in size: large domestic companies and subsidiaries of international groups operate alongside small local farmers. SMEs are responsible for over 83% of product sales, while the share of large enterprises is lower at 16%[19].

Table 1: The 10 largest agricultural producers and exporters in Ukraine by revenue

Company name	Origination	Revenue 2023 (USD million)
Kernel	Ukraine	3,455
MHP	Ukraine	3,021
Ukrlandfarming	Ukraine	658-921
ADM Ukraine	Global	663
Agroprosperis	Global	526-790
Eridon	Ukraine	542
Astarta	Ukraine	463
Nibulon	Ukraine	400
Viterra	Global	361
Bunge	Global	361

Sourse: Compiled on public data

[19] https://www.ukrstat.gov.ua

CASE 1. Plant protection products – Ukravit Institute (commissioned in 2020)

Ukravit Group has invested USD 7 million to open a research centre Ukravit Institute in Cherkasy.

The Ukravit Institute develops original Ukrainian crop protection products that meet international certification. Each year, 2 or 3 of the most efficient combinations and developments are brought to the Ukrainian and global market. As part of the Horizon Europe 2021-2027 project, Ukravit is developing the latest optical nanocomposite sensors for the analysis of micro and macro elements in maize.

CASE 2. «Green energy» development – Kernel (commissioned in 2021)

Under a loan from the EBRD and the Clean Technology Fund, Kernel built a bioenergy plant in Poltava with an electrical capacity of 10 MW and a thermal capacity of 42 MW. The cogeneration plant runs on sunflower husk and produces heat and electricity for the plant.

CASE 3. Logistics of the Danube cluster – Nibulon (commissioned in 2023)

In 2022, Nibulon began to develop the Danube as an alternative export route, investing USD 15.5 million to build grain transhipment facilities from rail and road to river transport.

In 2023, the company doubled the share of its own fleet's shipments on the Danube, and in the first quarter of 2024, Nibulon regained its leadership in Ukrainian grain exports. The share of cargo delivered by Nibulon's own fleet was 27%, compared to 10% in 2023.

CASE 4. Deep processing of millet – Zolotonoskyi Bacon (commissioned in 2023)

A millet processing plant built by Zolotonoskyi Bacon LLC of Time Investment Group has been commissioned in the Cherkasy region. The cost of construction was USD 2.5 million. The capacity of the plant is 4 tonnes of millet per hour. The output per tonne of millet is 700 kg of millet.

The plant will focus on both the domestic market and millet exports to the EU, where gluten-free products are in high demand.

CASE 5. Processing development in Starokonstantinovskiy OEP – Kernel (commissioned in 2024)

Starokostiantynivskyi OEP is already operating at 50% capacity and is continuing to accelerate. Total investment exceeded USD 200 million.

OEP has two processing lines, 75-80% of which are already used for sunflower processing. The remaining 15-20% will be used to process rapeseed and soya beans. The plant has the processing capacity of up to one million tonnes of product annually and 120,000 tonnes of sunflower seed storage.

4.1.2. Overview and outlook of key reforms

Ukraine has clear commitments to continue reforms in the agricultural sector for integration into EU markets, enhancing investment attractiveness, and developing the industry's potential, as outlined in the Ukraine Facility[20]

Reform 1. Aligning the institutional framework, agriculture and rural development to the EU policy (Q1 2027)

Potential impact: The agricultural and rural development strategy focuses on capacity building and requires significant investment to harmonise policies with the European Union, strengthen institutions, support small producers, protect the environment and enhance financial management.

Clearly defined strategic priorities will contribute to the effective implementation of support measures aimed at the development of agri-food supply chains, diversification of manufacture, improvement of quality and safety standards, etc. The reform will encourage evidence-based policy making.

Reform 2. Ensure functioning of the land market (Q1 2025)

Potential impact: Ensuring full digital access to services will help reduce administrative discretion, improve service accessibility for the population and businesses, while also aiding tax collection and local government planning. This initiative will also contribute to greater transparency in the land market.

The introduction of market turnover of agricultural land leaves open the question of access to the agricultural land market for foreigners and companies with foreign beneficiaries. The reform should encourage the implementation of cautious but decisive steps to ensure a balance between regulation and the flow of foreign investment.

Reform 3. Improve institutional and administrative capacities to manage the investment programs (Q3 2025)

Potential impact: Implementation of an EU-style investment public support programme would improve governance standards, increase transparency and efficiency of channelling public support to the agricultural sector. It would also enable Ukraine to gain experience of EU procedures, strengthen capabilities at the national and local levels and prepare for eventual implementation of EU pre-accession programmes in agriculture and rural development.

Successful project implementation and effective management require thorough support, including engineering support, ensuring personnel safety and other aspects that affect the implementation of investment projects. The project launch is not limited to project planning, but requires additional investment to ensure the necessary elements for its implementation.

Reform 4. Improvement of the official public electronic farm register (Q1 2026)

Potential impact: Completing registration of all agricultural producers, with a particular focus on encouraging registration of the smallest producers, would improve access to support programmes for those in need, lead to higher tax revenues and encourage sector formalisation. It would also improve the functioning of the system of public support for agriculture through eliminating administrative obstacles and costs for agricultural producers when receiving state aid.

Reform 5. Long-term development of the irrigation system to increase climate resilience of the sector (Q1 2025)

Potential impact: The development of an irrigation system will enhance the productivity of agricultural lands and help ensure production stability in the face of extreme climatic conditions. Such a project can help mitigate the risks associated with droughts and improve food security in the country.

Reform 6. Demine lands and water areas (Q2 2024)

Potential impact: Adopting the reform will allow to coordinate and determine the general goals and priorities of policies in the field of humanitarian demining and mine action, areas of responsibility, role and tasks of government authorities, non-government and private demining operators, as well as priority areas of attracting support from international partners. The reform will contribute to attracting and maximising the efficiency of the use of resources.

[20] https://www.ukrainefacility.me.gov.ua

The list of reforms is not exhaustive. The Ukrainian government is also working to strengthen export logistics by opening new international checkpoints, speeding up cargo inspection procedures and expanding border capacity. Ukraine is actively allocating funds to restore critical logistics infrastructure (including rail and road networks) through the Restoration of Critical Logistics Infrastructure and Network Connectivity project[21].

Among the policies aimed at developing human capital, the government plans to create a safe and inclusive educational environment for access to quality education and to transform vocational education, including updating higher education standards and strengthening university autonomy, which will contribute to increased selectivity and flexibility of educational disciplines[22].

The state continues to support agricultural enterprises, in particular, in April 2024, the compensation of the cost of domestic machinery was renewed up to 25%. The state maintains the funding of subsidy programmes, low-cost loans and guarantee programmes.

4.1.3. Tendencies and trends

1 **Climate Change and Resource Sustainability:** Changes in climate conditions impact crop yields and the types of crops that can be grown in various regions. Adapting to these conditions through the implementation of sustainable practices and technologies will be critical.

2 **Digitalization and Automation:** Integrating advanced technologies such as precision farming, automated water management systems, and drones for spraying and monitoring can significantly increase efficiency and productivity.

3 **Bioeconomy and Circular Economy:** Focusing on the production of bioproducts and utilising organic waste as resources can help create added value and reduce environmental impact.

4 **Global Food Demand Increase:** Rising populations and increasing incomes in developing countries lead to higher food demand, which can be an opportunity for exports, especially given Ukraine's fertile chernozem soils.

5 **Changes in Global Trade and Policy:** Trade agreements, customs regulations, and political stability will influence Ukraine's export opportunities. Events like Brexit, changes in US policy, and other geopolitical shifts can alter trade flows.

6 **Enhanced Quality and Safety Standards:** Global markets require greater transparency and high safety standards for food products. This will necessitate the implementation of advanced standards and certification by Ukrainian producers.

7 **Expansion of Markets for Organic Produce:** The growing global trend towards healthy eating and organic products opens new opportunities for the Ukrainian market, considering the large areas that can be dedicated to organic farming.

4.1.4. Prospects and potential for the sector

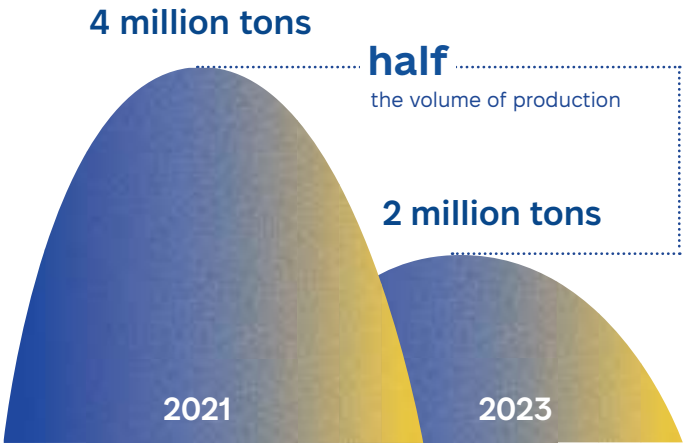
The agricultural sector has a significant potential to stimulate economic growth in Ukraine, but the key factors are further integration into the EU, access to higher levels of the value chain and modernization. Sectors that are investment-attractive for further development are presented below.

SEEDS – SUBSTITUTING IMPORTS

In the first half of 2022, Ukraine imported ten times more seeds than it sold abroad. One of the goals of the agribusiness development strategy is seed imports substitution. **Currently, Ukraine lags behind the world players in the amount of investments in R&D, on the other hand, favourable climatic conditions, not fully loaded manufacturing capacities, and an interest from international players in further localization of production indicate to a significant potential of the seed industry.** MAPF, in terms of the strategy for the development of the agricultural industry, forecasts investments in the seed market at the level of USD 840 million and construction of 12 seed production plants.

[21] https://www.kmu.gov.ua
[22] https://www.me.gov.ua

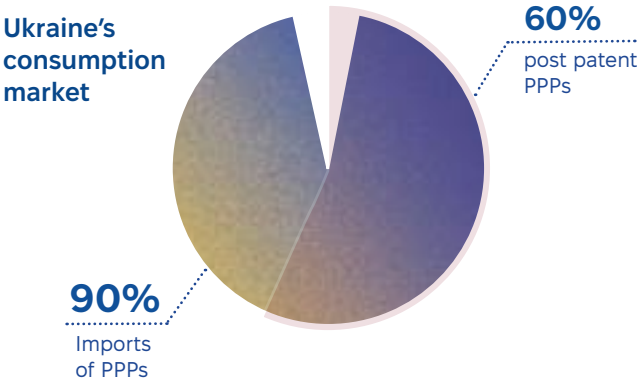
FERTILISERS – SUBSTITUTING IMPORTS AND INTRODUCING GREEN TECHNOLOGIES



In 2023, the production of nitrogen fertilizers in Ukraine was reduced by 2 times - to 2 million tons. Own capacities are limited in supplying significant volumes to the market. At the beginning of the full-scale invasion, many new players appeared, but, as of today, there is a noticeable reduction in production and plant shutdowns due to a significant dependence on the prices and supply of natural gas and raw materials. The direction of green (low carbon) fertilisers is less dependent on gas, but requires significant investments, which limits the market access of Ukrainian producers. For import substitution, it is advisable to involve international companies-leaders of the industry to launch "green" factories and localise production, which will also contribute to the improvement of the currency balance.

PLANT PROTECTION PRODUCTS (PPPS) – LOCALISING THE PRODUCTION BY INTERNATIONAL PLAYERS

Imports of PPPs make up about 90% of Ukraine's consumption. Currently, 60% of the market is taken by post-patent PPPs, with further growth expected.



The active development of the potential of local production of PPPs is possible under the conditions of reloading the available capacities of domestic manufacturers and their partnership with international companies to build trust among consumers. The role of bio- and organic PPPs is also growing rapidly, due to the desire of the EU countries to reduce the consumption of pesticides by 50% by 2030. The loyalty of agricultural holdings to well-known international brands makes it difficult for originators to enter the market. The scientific capacity of patent PPPs requires significant R&D expenses.

Simplified business conditions, affordable financing and tax holidays will make it easier for Ukrainian originators to enter the market.

AGRICULTURAL EQUIPMENT – LOCALISING THE MANUFACTURE OF HEAVY SELF-PROPELLED MACHINERY, DEVELOPING ATTACHMENT EQUIPMENT AND ACCESSORIES AND INNOVATIVE TECHNOLOGIES

In 2022, the capacity of the Ukrainian market for agricultural machinery decreased by 21% to USD 2.6 billion. Compared to Poland[23], Ukraine has three times less application of machinery, and, therefore, domestic demand has not reached saturation[24]. **The current state of the market is characterised by high import dependence and a high share of the secondary market (70% by the number of the machinery).** Investing in the existing domestic production of motor equipment has a low perspective due to outdated technologies and low consumer confidence. **In the motor equipment sector, it is expedient to concentrate on cooperation with global brands and locating their production facilities in Ukraine.** Ukrainian manufacturers are already moderately represented in the field of attachment equipment and accessories, which have a prospect of replacing a large share of imports, provided that adequate cost is ensured and investment and state support programs are attracted. **A high potential is granted to the direction of innovative equipment (drones, sensors), which are becoming relevant in the field of demining and precision farming.**

[23] https://stat.gov.pl
[24] https://www.ukrstat.gov.ua
[25] https://www.kmu.gov.ua

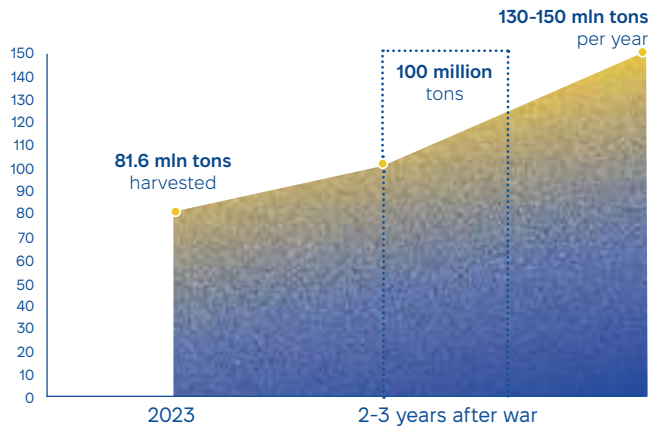
IRRIGATION – INCREASING IRRIGATION CAPACITIES

Operational wear and tear of irrigation systems in Ukraine has reached a critical limit and is more than 80%, which was intensified by the invasion from the Russian Federation and the blowing up of the Kakhovka HPP dam.

Restoration and development of irrigated agriculture is one of the priority tasks of the country. **In its irrigation and drainage development strategy until 2030, the GoU projects the further expansion of irrigation areas and water regulation, as well as the reform of the state water resources management system**[25]**.** The increased potential of inter-farm and intra-farm irrigation systems requires attracting significant investments in infrastructure, scientific research and development. International donors and investors are actively involved in the development of irrigation systems (USAID within the framework of the "Agro" Program and Japan International Cooperation Agency within the framework of the project of "Urgent Support of the Agricultural Sector").

DEVELOPMENT OF FOOD PROCESSING INDUSTRY

The record volumes of the harvest in 2021 amounted to more than 110 million tons. **In 2023, Ukraine harvested 81.6 million tons. Within two or three years after the end of the war, it will be possible to bring the harvest to the level of 100 million tons or more. The harvest potential of Ukraine is estimated at 130-150 million tons per year.**



However, the question arises of the feasibility of further increasing the sown areas to increase the harvests. As of 2022, the rate of ploughed land in Ukraine reached an average of 54%, and, in some regions, 70% or more. The processing sector is becoming more relevant to expand the value-added chain, which is currently poorly developed in Ukraine.

The development of the processing sector after the war will start with oil-bearing crops, such as sunflower, soya, and rapeseed, to be followed by corn and then by other agricultural crops. Within next years, Ukraine may receive an extra USD 20 billion a year from this sector.

This resource will be sufficient for reinvesting it in the processing sector, a move which will help enter a new stage of processing and the production of goods with higher profit margins.

LIVESTOCK SECTOR – DEVELOPING INFRASTRUCTURE TO INCREASE EXPORTS

The livestock sector in Ukraine has significant export potential. The actual state of the industry does not correspond to the potential opportunities. The products of pig breeding, livestock, and aquaculture are mainly consumed in the domestic market. In the area of milk and dairy products, private production prevails. Dependence on the imports of genetic resources is increasing, and the existing selection system is not effective enough in terms of the main parameters compared to foreign players. **Domestic manufacturers are considering export potential to the countries of the Middle East, Europe, and Asia due to the saturation of the domestic market of Ukraine and limited purchasing power, which reduces the level of marginality. Export efficiency will be achieved under the condition of cost optimization and adaptation of the production infrastructure.** The development of the existing market requires the improvement of sanitary control and construction of centralised slaughterhouses. Building full-cycle factories and localization of premix production will provide an opportunity for better cost control. To prepare products for further exports, it is needed to expand the space of cold warehouses and modern refrigerated logistics centers.

The most urgent investments include restoration of damaged assets, agricultural recovery support by addressing liquidity issues, particularly for small farmers, focus on higher value-added products and export orientation, investment in climate change resilience and integrated food and energy systems[26]**.**

Attracting investment in the country's agricultural sector will help increase the sector's productive capacity, introduce innovation, strengthen the country's food security and address a significant number of social problems in rural areas.

[26] https://www.ukrainefacility.me.gov.ua

AGRIFOOD SECTOR

Highlighted investment projects

AGRICULTURAL INDUSTRY

MHP PJSC

RAPESEED & SOYBEAN PROCESSING PLAN

VINNYTSA REGION, LADYZHYN

- **Brief Description: grain processing and export of value-added products.**
- The plant's construction will allow processing ~208,000 tons of oilseeds (rapeseed & soybean) per season.
- **Target Market:** we export our agricultural production over then 30 countries in Asia, Africa, MENA and Europe and demand for processed products is growing
- **Products/Services:** main products are soybean & rapeseed oils, by-products are soybean & rapeseed meal and soybean shell.
- **Technologies and Innovations:** extraction plant with 650-ton extractor. In steam production (for technology) we will use soybean shell and grain waste
- **Project Status:** Development of project and estimate documentation (current stage - pre-project decisions and determination of necessary equipment). We have land for construction with communications

Projects Highlights[1] ($ mln)

Type of financing - [equity / project finance]
Financing structure: CAPEX - 100% / OPEX - 0%

Expected Financial Indicators:

- NPV - (9.1, 10 years)
- IRR - 22.6%
- DPP (months) - 76
- Project launch period - 1.6
- Revenue - [full capacity] (98.2, 2026 year)
- EBITDA - [full cap.] (11.7, 2026 year)

BUSINESS MODEL

Vertically integrated agroindustrial holding: we have own of rapeseed and soybeans & we are purchasing grain from our partners - micro, small, and medium (MSMEs) agricultural enterprises. We have great potential to export from Ukraine processing product to end-consumers.

Our export (fact, AVG per year):

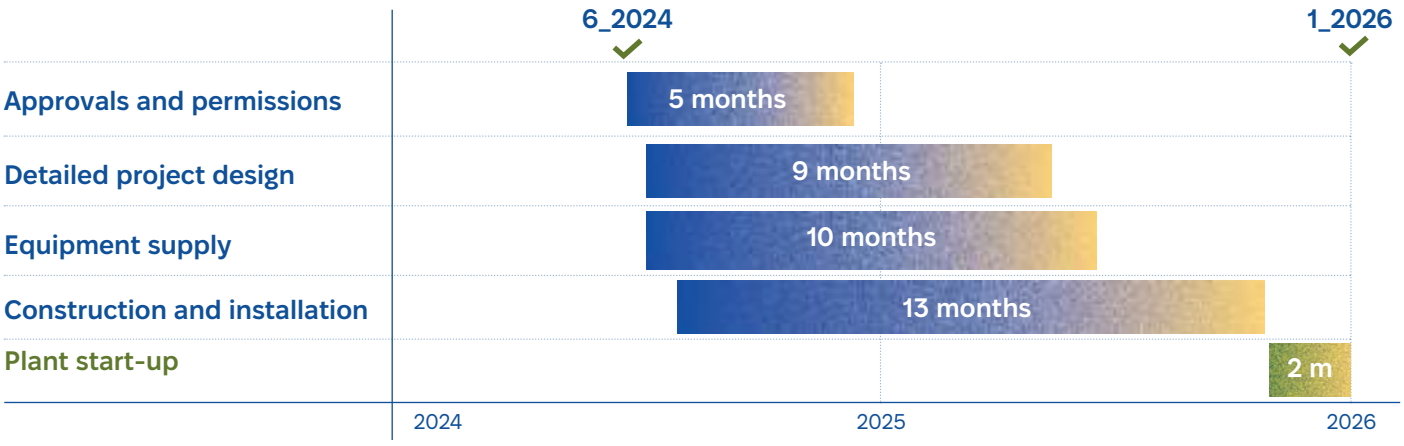
Rapeseed
82 k tons

Soybean
77 k tons

Key partners

MSMEs agricultural enterprises - suppliers of raw materials
International traders and consumers - buyers of processing products

Key Points Of Project Implementation



[1] - The project information and financial indicators are provided by company-initiator of the project.

AGRICULTURAL INDUSTRY

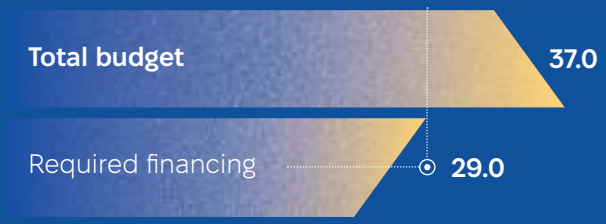
MHP PJSC

DAIRY CATTLE BREEDING

CHERKASSY, VINNYTSIA, KHMELNITSKY REGION (11 LOCATIONS)

- **Brief Description: food safety.**
- Reconstruction of existing 11 farms & new technologies will allow to produce additional milk yield +43% (+ 28,000 tons of crude milk (for selling) per year
- **Target Market:** Ukraine dairy plants
- **Products/Services:** crude milk
- **Technologies and Innovations:** animal welfare. After launching this project - electricity cogeneration from biogas plants on farms
- **Unique Selling Proposition:** # 2 Ukraine crude milk producer
- **Project Status:** Pre-reconstruction, Stage 1 (purchase of mats, manure separation and storage systems, etc.).

Projects Highlights[1] ($ mln)



Type of financing - [equity / project finance]
Financing structure: CAPEX - 100% / OPEX - 0%

Expected Financial Indicators:

- NPV - (8.9, 10 years)
- IRR - 20.3%
- DPP (months) - 85
- Project launch period - 1.6
- Revenue - [full capacity] ((37.1, 2027 year)
- EBITDA - [full cap.] (10.9, 2027 year)

BUSINESS MODEL

Vertically integrated: from field to milk (grain → feed → cattle → crude milk → $)

We have own 23 dairy farms in 3 regions and we plan to enlarge them to 11.

Volume of crude milk for sale (AVG per year):

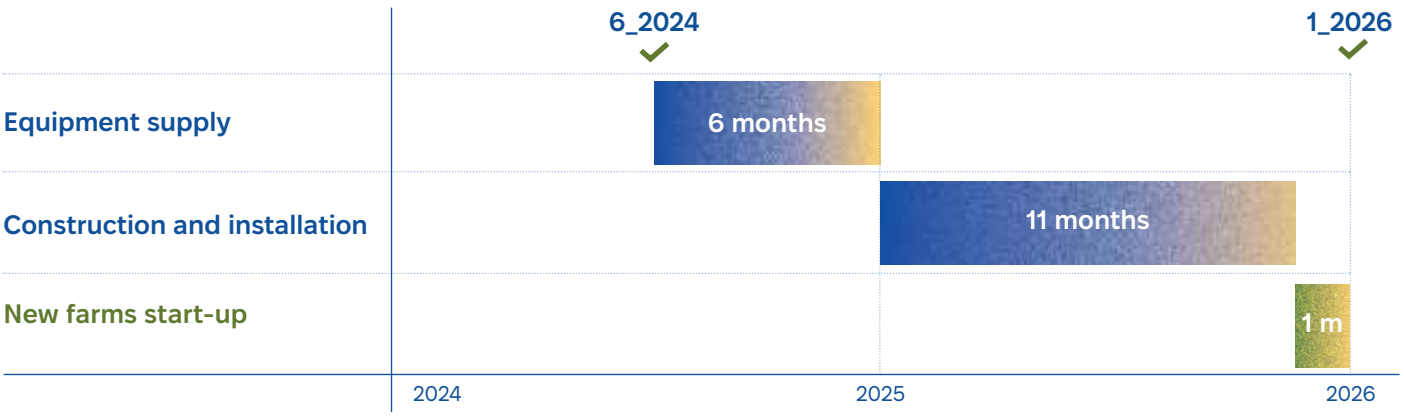
As is: **64 k tons**

To be: **92 k tons**

Key partners

Ukraine dairy plants - buyers of our crude milk

Key Points Of Project Implementation



[1] - The project information and financial indicators are provided by company-initiator of the project.

AGRICULTURAL INDUSTRY/ENERGY

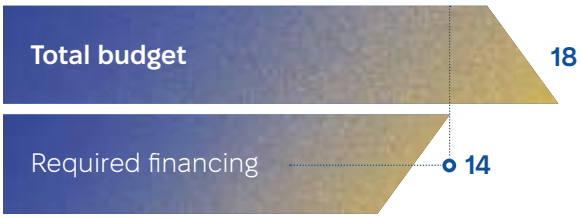
MHP PJSC

SUNFLOWER HUSK COGENERATION 10 MWH

VINNYTSA REGION, LADYZHYN

- **Brief Description: energy safety.** The construction of cogeneration complex will allow to generate ~75,000 MWh of electricity per year from alternative energy sources.
- **Target Market:** TUkraine energy system by using "day-ahead" market, the intraday market and the balancing market
- **Products/Services:** electricity
- **Technologies and Innovations:** Tsunflower husk → 10 WMh steam turbine generator - electricity
- **Unique Selling Proposition:** we have own sunflower husk for cogeneration from our oil press plant which we export nowadays
- **Project Status:** Development of project and estimate documentation (current stage - pre-project decisions and determination of necessary equipment). We have land for construction with communications

Projects Highlights[1] ($ mln)



Type of financing - [equity / project finance]
Financing structure: CAPEX - 100% / OPEX - 0%

Expected Financial Indicators:

- NPV - (1.6, 10 years)
- IRR - 16.3%
- DPP (months) - 95
- Project launch period - 1.6
- Revenue - [full capacity] (9.4, 2026 year)
- EBITDA - [full cap.] (4.7, 2026 year)

BUSINESS MODEL

We have own sunflower husk from our oil press plant, which will be use in cogeneration process instead of actual sales.

Our export (fact, AVG per year):

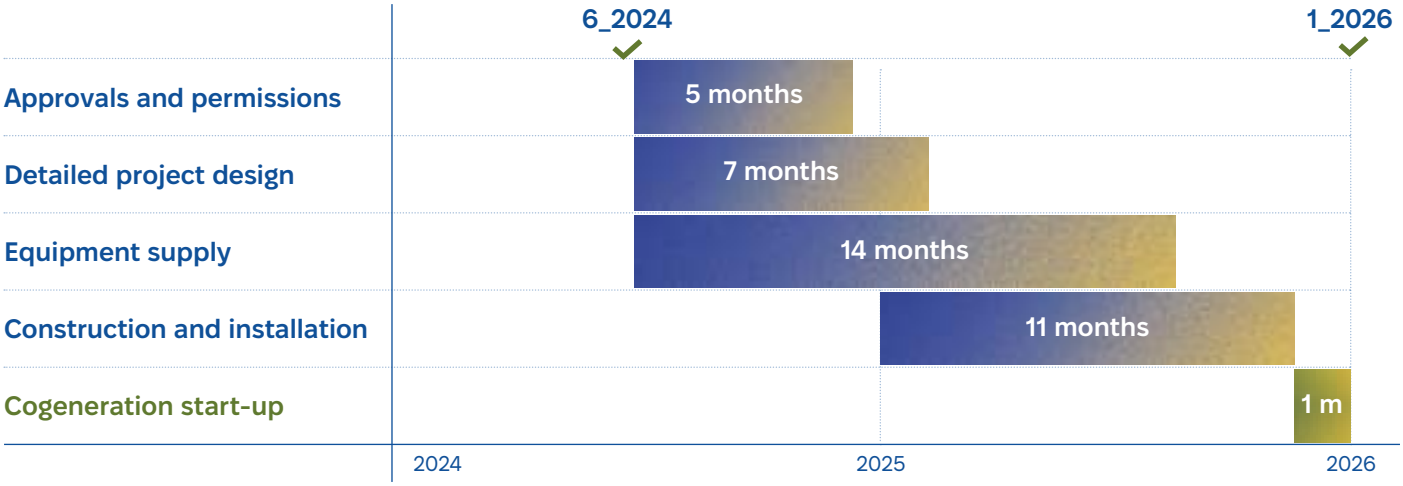
As is: sunflower husk
92 k tons

To be: electricity
75 MWh tons

Key partners

Licensed traders - electricity buyers

Key Points Of Project Implementation



[1] - The project information and financial indicators are provided by company-initiator of the project.

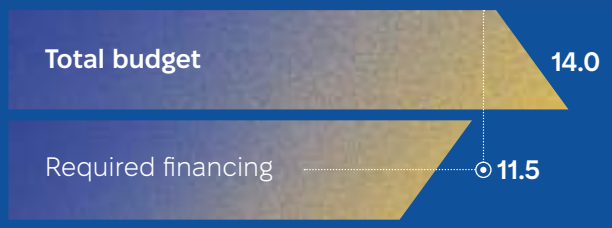
FOOD PRODUCTION / AGRIFOOD

BIP-OPOS GROUP OF COMPANIES | NOVO FISH

NOVOVOLYNSK, UKRAINE

- **Brief Description:** high-end technology fish-processing plant focused on salmon-processing and packaging to sell own brand assortment and private label product solutions for big retail players and international distributors in top-world salmon consuming markets.
- **Target Market:** international HORECA operators, EU retail chains, international distributors – MENA region, Japan, US market, Germany. Basic sales – Ukrainian retailers.
- **Products/Services: B2B products:** fillets and slices. Bi-products for fish-processing plants and cans. Both private label products for big retailers and own brand assortment: packaged fillets, sliced/ steak, smoked and fresh.
- **Technologies and Innovations:** newest cutting edge equipment with lasers by a world leader – Baader Gmbh.
- **Unique Selling Proposition:** Fresh and smoked Norwegian salmon in convenient B2B and B2C packaging made on high-end German Baader equipment 20 minutes away from EU markets.

Projects Highlights[1] ($ mln)



Type of financing - equity and/or long-term debt
Financing structure: CAPEX – 80% / OPEX – 20%

Expected Financial Indicators:

- NPV – 3.84, 10 years
- DPP (months) – 62
- Revenue – 58.4 / year
- IRR – 18%
- Project launch period – 2 years
- EBITDA – $ 4.2 / year

- **Project Status:**

- 2 hectares land plot within Industrial Park is reserved;
- Electricity, water and sewage infrastructure has been prepared;
- Factory planning– preliminary phase, need equipment approval;
- Preliminary agreement with state banks on partial financing;

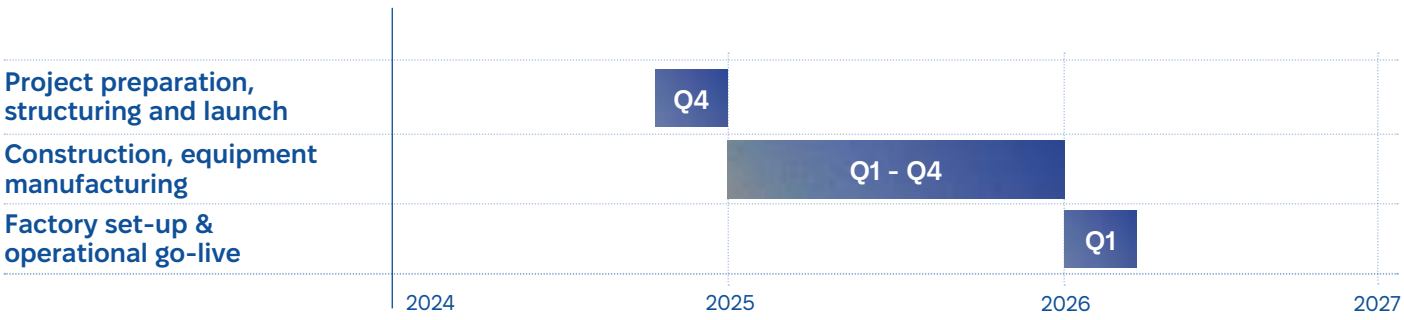
BUSINESS MODEL

- Own brand - packaged fillets and sliced fresh and smoked salmon for HORECA and retail customers
- Private label sliced salmon and fillets – for European retailers and distributors
- Salmon bi-products – sold to fish and cans manufacturers

Key partners

Baader, state bank Ukreximbank, state bank Ukrgazbank, Export Credit Agency of Ukraine, Volyn regional administration, Norwegian suppliers, Fish Importers Association of Ukraine

Key Points Of Project Implementation



[1] The project information and financial indicators are provided by company-initiator of the project.

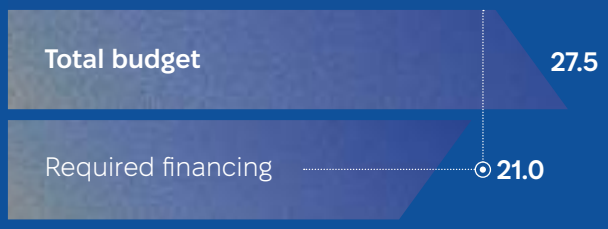
LOGISTICS / 3PL

BIP-OPOS GROUP OF COMPANIES | NOVO COLD TERMINAL

NOVOVOLYNSK, UKRAINE

- **Brief Description:** Cold terminal of A class (-18C) for storage and service of frozen food categories (fish, meat, berries, poultry, ice-cream, etc.). 3PL logistics professional services and pallet-places automated storage with modern WMS IT systems. "Green terminal" – 0 CO2 emissions.
- **Target Market:** international FMCG players, retail chains, distributors and local medium-size and large importers/exporters within described product categories.
- **Products/Services:** pallet-places storage for rent, 3PL and logistics services - palletizing, packing/unpacking, sorting, labeling, delivering to other DCs.
- **Technologies and Innovations:** green electricity used (solar panels) to be self-sufficient and fully green. Electrical charge stations available for Euro-trucks. 0 CO2 emissions.
- **Unique Selling Proposition:** First fully green A-class cold storage with professional 3PL services for top FMCG players, retailers as well as food products exporters and importers 20 minutes away from Poland.

Projects Highlights[1] ($ mln)



Type of financing - debt, equity (mix)
Financing structure: CAPEX – 95% / OPEX – 5%

Expected Financial Indicators:

- NPV – 3.55, 14 years
- DPP (months) – 78
- Revenue – 8.2 / year
- IRR – 15%
- Project launch period – 2 years
- EBITDA – 5.1 / year

- **Project Status:**
- Permissions on the land and ecology regulations received;
- Electricity and sewage infrastructure has been prepared;
- Project planning and design in the last phase of realization;
- Preliminary agreement with state banks on partly financing;

BUSINESS MODEL

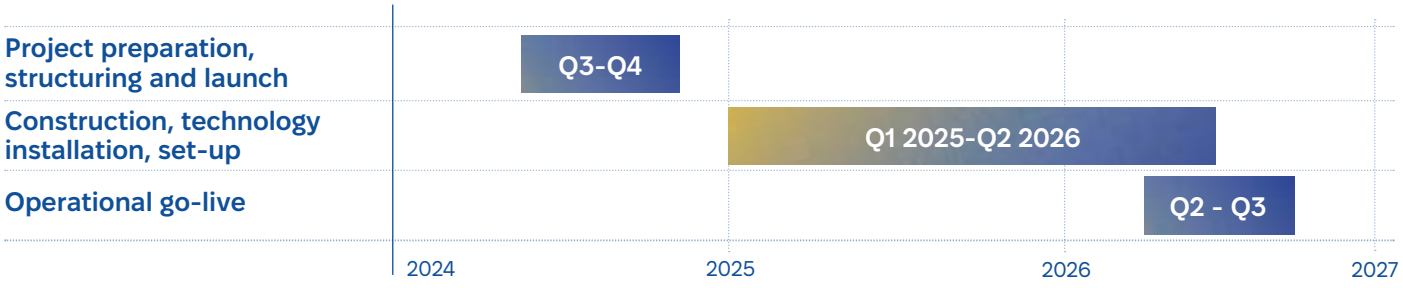
There are 2 profit streams in this project:

- Rent of pallet-places – there will be 43 000 pallets in the cold terminal for short-term (20%) and long-term (80%) rent;
- Logistics services for customers: packing, sorting, palletizing, lifting, cross-docking, labeling and other 3PL options for business needs of the Customers.

Key partners

State bank Ukreximbank, state bank Ukrgazbank, Export Credit Agency of Ukraine, Volyn regional administration, Novovolynsk city council, intl FMCG food producer, Fish Importers Association of Ukraine

Key Points Of Project Implementation



[1] The project information and financial indicators are provided by company-initiator of the project.

ECONOMY SECTOR

PE «AGRARNA KOMPANIYA 2004»

DAIRY FARM FOR 2300 COWS

KHMELNITSKY REGION, UKRAINE

- **Brief Description:** Construction of a dairy farm for 1200 onstruction of a dairy farm for 1200 Projects Highlights' ($ mln) (if applicable) heads and reconstruction of existing buildings for keeping Jersey cattle. To launch the project, it is planned to import 1100 heads of Jersey cattle from Denmark.
- **Target Market:** Increase in gross milk production across the company from 60 to 100 tons per day to meet the growing demand for raw milk in Ukraine amid declining prices for grain and protein feed.
- **Products/Services:** Whole milk, cattle meat, organic fertilizer from cattle manure (through composting)
- **Technologies and Innovations:** Tetherless housing, 2X24 milking parlor with built-in milk cooling (new dairy farm for 1200 heads)
- **Unique Selling Proposition:** Extra milk with a fat content of 3.7% and protein of 3.3%
- **Project Status:** Current status - design based on existing Farms.

Projects Highlights[1] ($ mln)

Type of financing - debt / equity
Financing structure: CAPEX - 73% / OPEX - 27%

Expected Financial Indicators:

- NPV - (5 years) - 3.6
- DPP (years) - 3.9
- Revenue - [full cap.] (8.2, 3 year)
- IRR - 22.4%
- Project launch period - 1 years
- EBITDA - [full cap.] (4.6, 3 year)

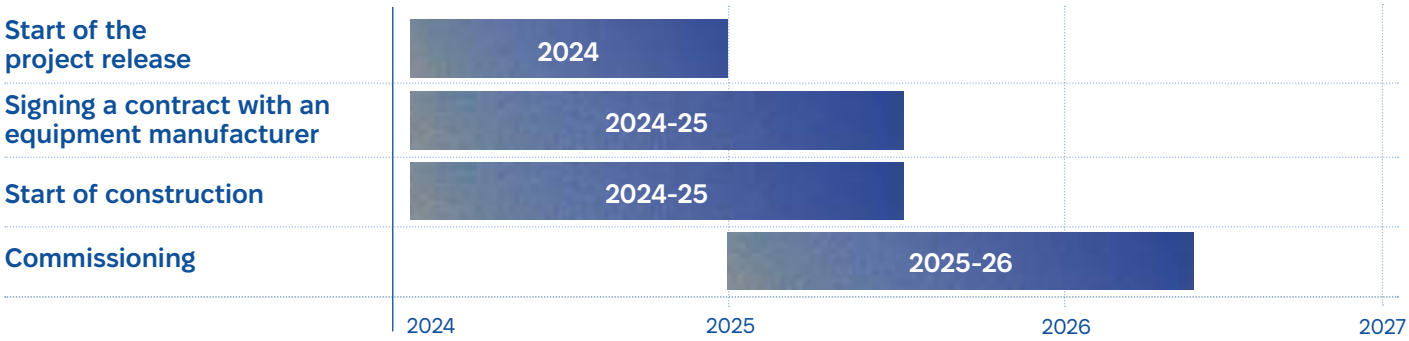
BUSINESS MODEL

- The project aims to create 2 cowsheds for 600 cows and a milking parlor. The increase in whole milk production capacity will help to better meet the demand for dairy products in Ukraine and reduce pressure on dairy prices. It will also help to be as efficient as possible within the vertically integrated ecosystem: growing grain crops to provide feed for the dairy herd in order to produce whole milk.

Key partners

Vitagro Group of companies as a key investor. DeLaval as an equipment supplier. Dubnomoloko as the main consumer of the products

Key Points Of Project Implementation



[1] The project information and financial indicators are provided by company-initiator of the project.

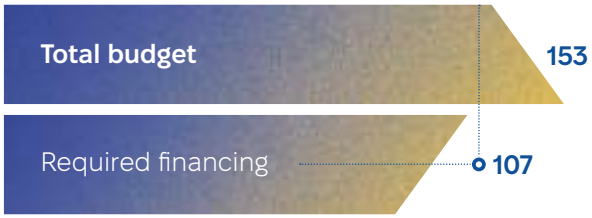
VITAGRO GROUP OF COMPANIES

PLANT FOR THE PRODUCTION OF SOY PROTEIN CONCENTRATE (SPC)

KHMELNITSKY REGION, UKRAINE

- **Brief Description:** The project involves building a plant with a processing capacity of -450,000 tons of soybean to produce soy protein concentrate with soybean oil and molasses as by-product.
- **Target Market:** The main consumers are producers of animal feed for fish. farms, pig and poultry farms that use high-quality ingredients, as well as Livestock farms themselves in the EU market.
- **Products/Services:** The main processed products will be crude soybean oil, meal, soy protein concentrate and molasses. The husk as a waste product will be used for a solid fuel boiler house for steam generation.
- **Technologies and Innovations:** It is planned to use innovative (Technologies from European and Ukrainian equipment manufacturers, including tor waste utilization, which will ensure high quality of the final product and be as environmentally friendly as possible
- **Unique Selling Proposition:** The strategic location of the plant will provide access to raw materials and markets The company has its own reliable raw material base, ensuing a stable supply of nigh-quality soybeans for processing. The products will meet international quality standards, which opens up export opportunities.

Projects Highlights[1] ($ mln)



Type of financing - debt / equity / project finance / grants
Financing structure: CAPEX - 50% / OPEX - 50%

Expected Financial Indicators:

- NPV - 23 (10 years)
- IRR - 13.71%
- DPP (years) - 7.25
- Project launch period - 2 years
- Revenue - [full cap.] (390, 2 years)
- EBITDA - [full cap.] (34, 2 years)

- **Project Status:**
- The project is at the stage of pre-feasibility study. We are In dialogue with equipment manufacturers and engineering companies to start preparing engineering documentation

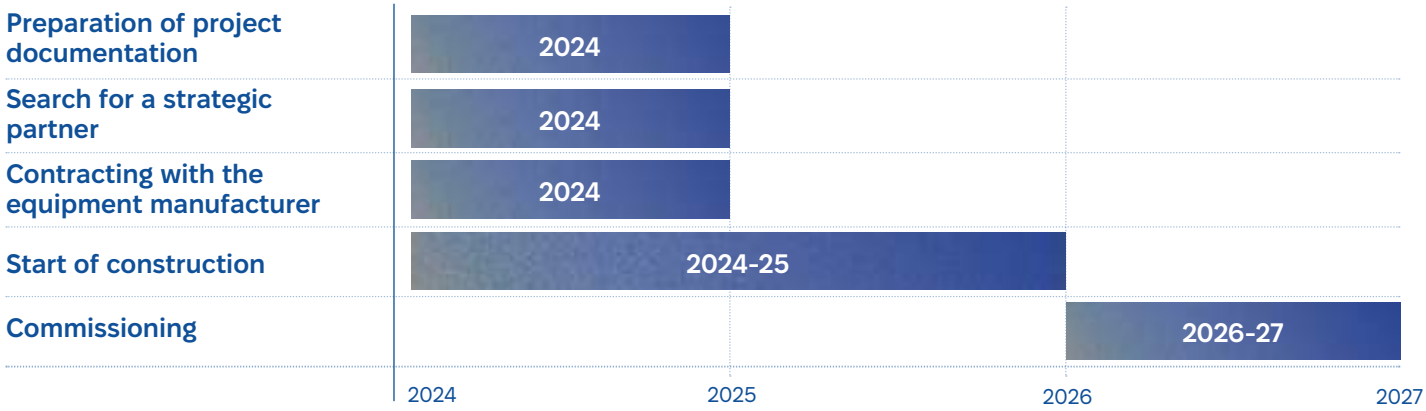
BUSINESS MODEL

- The project is aimed at building a vertically integrated soybean growing and processing ecosystem and is fully export-oriented.
- The high quality of the final product will allow the company to be a player in the premium feed ingredients market in Europe, create added value for its products and ensure stable sales of raw materials for small and medium-sized farmers in the region.

Key partners

Vitagro Group of companies as a key investorю Suppliers of equipment (Alfa Laval, Desmet Engineering, Chemsta, MyAnde, TEFF, ZIKO). Farmers. Looking for strategic partners for entering EU markets

Key Points Of Project Implementation



[1] The project information and financial indicators are provided by company-initiator of the project.

AGRICULTURAL

UKRAINIAN HEMP TECHNOLOGIES

INDUSTRIAL HEMP PROCESSING PLANT

RIVNE REGION

- **Brief Description:** Construction of a plant for processing technical hemp that will include preparation of high quality hemp seeds and hemp straw decortication line for fiber and shives production
- **Target Market:** EU countries. Potential customers: manufactures of healthy food, manufactures of ecological building materials, ecological packaging, automotive industries
- **Products/Services:** Hemp seeds, hemp fiber, hemp shives. Services for farmers in fields of growing technical hemp
- **Technologies and Innovations:** Ukrainian technologies and equipment will be used in the project
- **Unique Selling Proposition:**
  - It will be the first industrial hemp processing cluster in the West part of Ukraine
  - Creation a business model for scaling
  - Creation of a resource base for further, deeper processing of hemp and producing value added products

Projects Highlights[1] ($ mln)

Type of financing - debt
Financing structure: CAPEX - 71% / OPEX - 21%

Expected Financial Indicators:

- NPV - (10 years) - 0.4
- DPP (months) - 55
- Revenue - [full cap.] (1.34, 2026 year)
- IRR - 23.9%
- Project launch period - 10 years
- EBITDA - (0.3, 2026 year)

- **Project Status:**
- Licensed hemp producer since 2022
- Certified producer of sowing hemp seeds
- Feasibility study of the first hemp processing plant and preparation for implementation in 2025

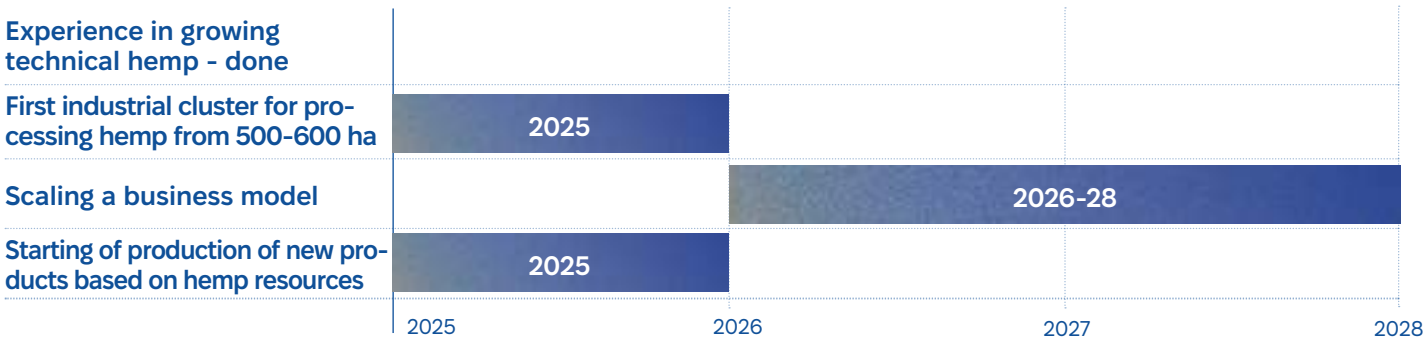
BUSINESS MODEL

- Building a vertically integrated, diversified company with a list of hemp-based products. The business model includes creation an industrial cluster for hemp processing. Then their scaling.
- At the next stage - creation a number of value-added products, both independently and in partnership with other companies.

Key partners

Vitagro group as a key investor. Suppliers of equipment (Ukrainian companies). Farmers. Looking for strategic partners for entering EU markets

Key Points Of Project Implementation



[1] The project information and financial indicators are provided by company-initiator of the project.

AGRICULTURE

INTERRESOURCES LTD

KROPYVNYTSKYI

PRODUCTION OF KRAFT PAPER MADE FROM TECHNICAL HEMP

- **Brief Description:** The project creates agricultural cluster of technical hemp, with subsequent processing into white kraft paper. As subproduct, pellets will be produced and used to obtain technological heat and for sale. This approach not only ensures efficient resource utilization but also contributes to waste reduction.
- **Target Market:** Paper - World wide, B2B, companies who use rolled paper as material in their production. Pellets – Ukraine and EU – alternative energy. Seeds – EU – production of hemp oil
- **Products/Services:** Project producers 7k tons of hemp seeds, 20k tons of white kraft paper and 33k tons of pellets.
- **Technologies and Innovations:** Renewable source of paper cellulose, green industrial and household energy.
- **Unique Selling Proposition:** Deep high-value added agricultural product processing, own unique resource base, efficient resource utilization, green accessible local energy.

Projects Highlights[1] ($ mln)

Type of financing - mix of dept and equity
Financing structure: CAPEX – 76% / OPEX – 24%

Expected Financial Indicators:

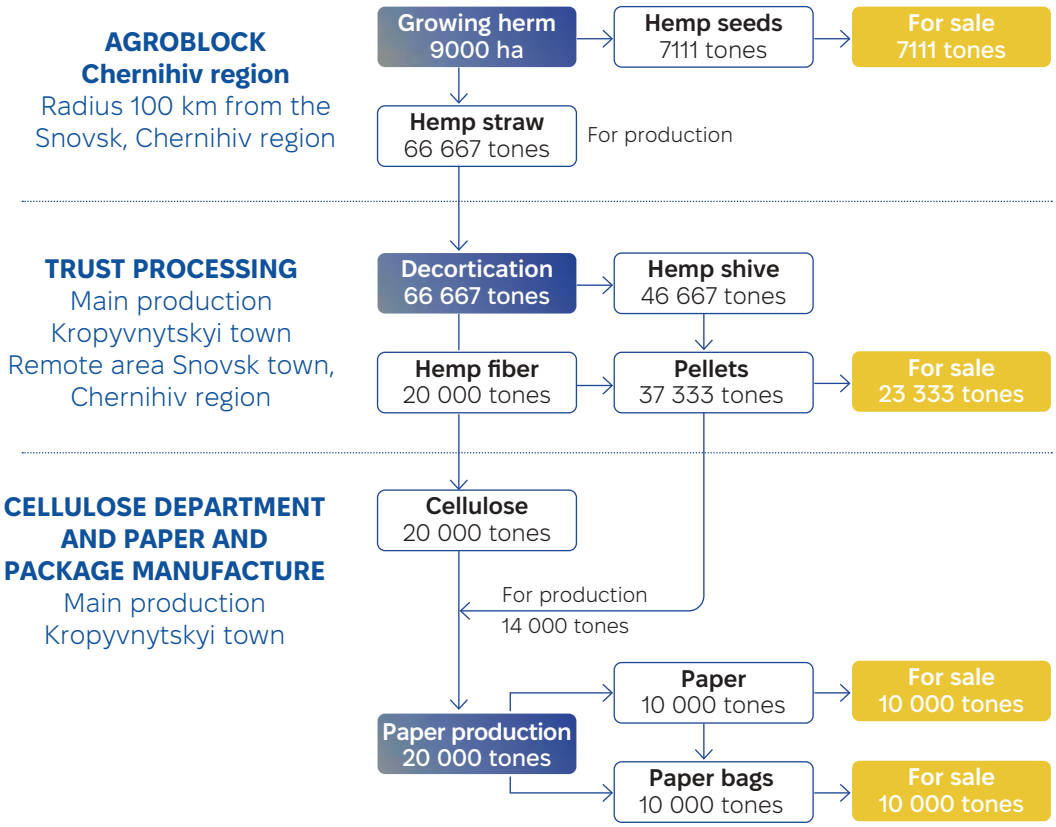
- NPV – (28, 4 years)
- DPP (months) – 66
- Revenue – 50.8, 4 year)
- IRR – 21%
- Project launch period – 3 years
- EBITDA – 17.5, 4 year)

Project Status:

- green field, running agricultural business 5k hectares, land plots for development in ownership

BUSINESS MODEL

- Agriculture: hemp seed planting material production – inhouse. Hemp growth – outsourced to partner agricultural companies, forming two clusters.
- Each cluster will have own decortication and pelleting lines.
- Production: hemp fiber is processed into cellulose and then to paper on main production cite.



AGRICULTURE

TAK-MOLOKO LCC

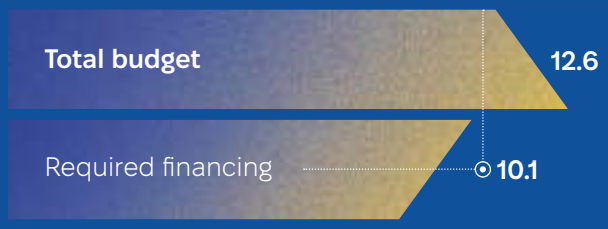
CONSTRUCTION OF A DAIRY COMPLEX

VINNYTSIA REGION

(+TAK AGRO LCC, GROUP OF COMPANIES TAK)

- **Brief Description:** Construction of a dairy complex "TAK-MOLOKO" LLC with a capacity of 1,500 dairy cows in the Vinnytsia region
- **Target Market:** Internal consumers: milk processing enterprises, dairy farms, crop enterprises. External consumers: dairy farms.
- **Products/Services:** milk production; breeding of heifers; growing and harvesting of forage.
- **Technologies and Innovations:** launching a biogas plant to utilize cattle manure and increase the farm's energy independence and energy efficiency, maximizing the transition to organic fertilizers for growing rough and concentrated feed, biologization and restoration of cultivated land.
- **Unique Selling Proposition:** The company's team has many years of experience and the ability to develop a highly efficient dairy complex with guaranteed results. By expanding the existing dairy business, additional jobs will be created both in the farm and in related industries (1:10 ratio), and social stability in rural areas will be maintained

Projects Highlights[1] ($ mln)



Type of financing - Debt financing (IFOs, commercial banks)
Financing structure: CAPEX – 65% / OPEX – 35%

Expected Financial Indicators:

- NPV – (1.9, 5 years)
- DPP (months) – 60
- Revenue – [full capacity] (12, first year after full capacity)
- IRR – 28%
- Project launch period – 1.5
- EBITDA – [full cap.] (4.7, first year after full capacity)

Project Status:

- An existing dairy farm with 430 cows, an existing team of experts, and a developed project concept. Ready for implementation.

BUSINESS MODEL

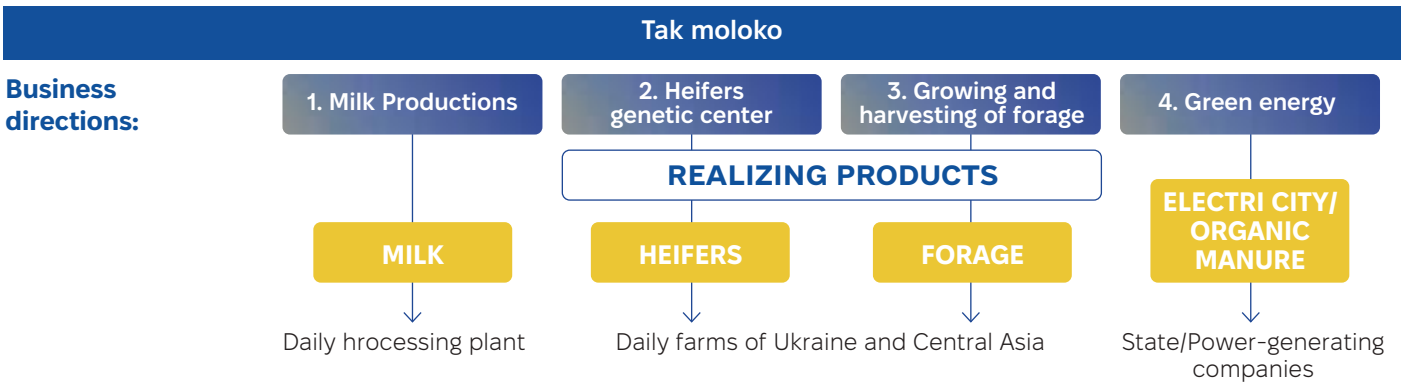
«TAK-MOLOKO» LLC - dairy farm located in the Vinnytsia region, Pogrebyshchensky district, Borshchagivka village. Today, the farm keeps 850 cows, of which 430 are milked. The goal is to create modern highly automated dairy complex with a capacity of 1,500 dairy cows with business directions: milk production; heifers genetic center; growing and harvesting of forage. The company's team (47 employees) has many years of experience and the ability to develop a highly efficient large-scale dairy complex. It will ensure an increase in the supply of price-competitive raw milk, «green» energy, and the expansion of the domestic heifer sales market. Thanks to the expansion of the existing dairy business, additional jobs will be created both in the economy and in related industries (ratio 1:10), European salary levels will be ensured for the employees of the complex, social stability will be supported in rural areas, and conditions will be created for the return of forcibly displaced persons.

KEY POINTS OF PROJECT IMPLEMENTATION:

- Approval of the project, obtaining financing.
- Approval of contractors for construction. Purchase of machinery, animals, equipment
- Construction of a farm and necessary premises
- Beginning of the implementation of the business project at full capacity

Key partners

TAK AGRO LCC (proprietary company) Global Agro Finance LCC (management of dairy farm)
Advisory Centre of the Association of Milk Producers (technology)



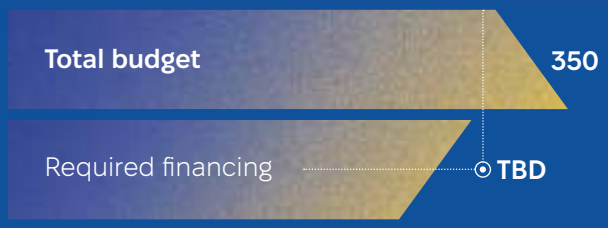
AGRICULTURE

ARIA COMMODITIES | GREEN LACTIC

UKRAINE, IVANO-FRANKIVSK REGION, CITY OF BURSHTYN

- **Brief Description:** construction project for a corn processing plant to produce lactic acid using industrial biotechnology method .
- **Target Market:** **lactic acid market** that will grow at **7.8-9.5%** annually. **Main consumers:** companies in the food, cosmetic and pharmaceutical industries, bioplastic manufacturers
- **Products/Services:** Deep Corn Processing, **lactic acid and by-products** (corn gluten, oil, animal feed, corn phosphatide concentrate, and gypsum)
- **Technologies and Innovations:** production using industrial biotechnology method, production automation, purification facilities and renewable energy resources
- **Unique Selling Proposition:**
  - Guaranteed satisfaction of domestic demand
  - Prospects for export
  - Renewable Energy as a Project's Integrity
- **Project Status:**
  - Pre-Development. Negotiations and project presentation to potential investors
  - Production of the finished product is set to commence in 2027

Projects Highlights[1] ($ mln)



Type of financing - internal resources (10-20%) and investment financing (80-90%) - TBD
Financing structure: CAPEX / OPEX (to be calculated)

Expected Financial Indicators:

- NPV – 800
- DPP (months) – 60 (5 years)
- Revenue – [full capacity] (to be calculated)
- IRR – 24.3%
- Project launch period – 3 years 3 month
- EBITDA – [full capacity] (to be calculated)

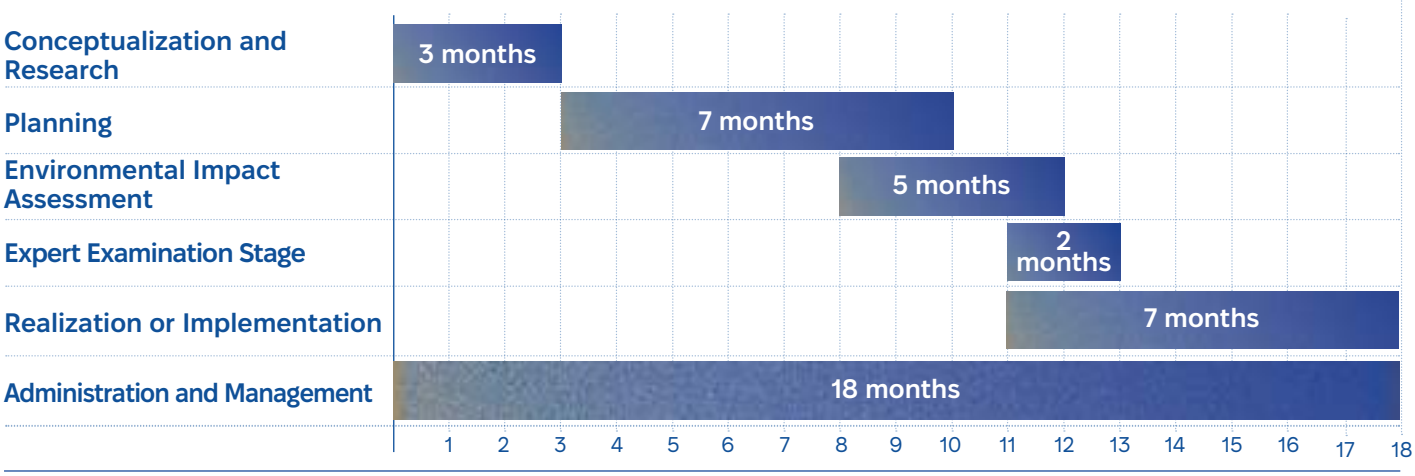
BUSINESS MODEL

- Plant's capacity is **750 tons** of raw material (corn grain) **per day**
- **Income** generated from **exporting lactic acid** and **sales of by-products**
- **Advantages of the location** include **access to water sources** and **excellent logistics**
- Average distance from spot to **Romanian, Hungarian, Slovak** and **Polish** border is about **120-180 km**
- Raw material will be purchased from farms in the western region **(~3.5 mln tons** is grown within a **70 km radius of the plant)**
- Construction will provide over **4 000 new jobs opportunities**

Key partners

ADEPT GROUP (co-investor and technological partner) **CEMSAN, ALFALAVAL,OCYCHINA, SULZER** (equipment and engineering) **SIRIUS CONSULTANCY** (technological consultations, networking)
Local administration, the technological park of the city of Burshtyn, and local farms.

Key Points Of Project Implementation: Implementation Schedule for the Pre-feasibility Stage



[1] The project information and financial indicators are provided by company-initiator of the project.

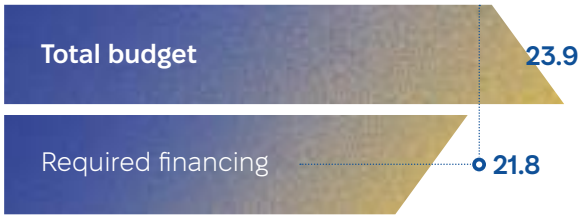
FRUIT WOODLANDS LTD

UKRAINE, VOLYN REGION, LUTSK DISTRICT, VILLAGE OF OMELNE

PROCESSING COMPLEX FOR BLUEBERRIES

- **Brief Description:** Project aims to develop a 90-hectare blueberry plantation and a processing complex for cooling, sorting, and storing blueberries using advanced Dutch technology for efficient production and high-quality output.
- **Target Market:** The EU market, particularly the UK, which experiences internal shortages during the harvest period in Ukraine (according to research by the International Blueberry Organization (IBO)).
- **Products/Services:** Blueberries cultivated on-site -1540 MT year. Sorting and selling blueberries from other producers-1580 MT year.
- **Technologies and Innovations:** The project incorporates advanced Dutch technologies, ensuring protection against various risks including frost, rain, wind, bird damage, power outages etc.
- **Unique Selling Proposition:** According to IBO research, during the blueberry harvest period in Ukraine (June-September), there is a shortage of quality berries on the market, especially on the UK market. Implementation of the project makes it possible to grow blueberries and

Projects Highlights[1] ($ mln)



Type of financing - grant, project finance, debt, equity
Financing structure: CAPEX – 78% / OPEX – 22%

Expected Financial Indicators:

- NPV – 1.7, 10 years
- DPP (months) – 98
- Revenue – [full cap.] (13.55, 2030 year)
- IRR – 15.98 %
- Project launch period – 2 years
- EBITDA – [full cap.] (4.25, 2030 year)

- **Project Status:**

The project is under implementation. In 2020, the first phase was completed with 17 hectares of blueberries planted, an 8,000 cubic meter water storage pool built, and a pumping station established for irrigating 50 hectares of plantations.

BUSINESS MODEL

The primary source of income for our project is from selling blueberries cultivated on-site. We also generate additional revenue by utilizing our sorting complex to process blueberries from other producers, including during the off-season in Ukraine, sourcing from international markets such as Peru, Chile, and South Africa. The field is located in Omelne Village, Volyn Region, Ukraine. It is 156 km from the Polish border, 777 km from the port of Gdansk, 806 km from the port of Odessa, 432 km from the cargo terminal at Warsaw airport, and 196 km from Lviv airport.

The initial planting of berry bushes, covering an area of 17 hectares, was completed in 2020. Existing activity data confirm the feasibility of expanding operations to cover the full 90-hectare site.

The project aims to provide significant employment opportunities, with the potential to attract and settle 400 workers, offering them competitive wages and the chance to return from abroad.

Key partners

Design works - «van Oostrum Woerden», «FFT Projects BV.», The Netherlands. Construction - LLENTAB AB, Sweden, refrigeration equipment - VAN KEMPEN and VAN AMERONGEN, Netherlands. Sorting machines - Elifab Solutions, Spain. Seedlings - world leader company Fall Creek®. Protection against: frost - wind machines «ORCHARD RITE», France; from rain, hail and wind - «Haygrove», England, «Valente S.r.l.», Italy; from birds «Bird Control Group», Netherlands.

Key Points Of Project Implementation

2025 year

· Purchase of seedlings;
· Start of construction of sorting complex, dormitory;

2026 year

· Planting of seedlings;
· Construction of protection systems against frost, rain, wind, and birds;
· Purchase of equipment for the sorting complex and dormitory;
· Purchase of transport vehicles for blueberry transportation;
· Launch of a dormitory for staff and a sorting complex, on its own 14 hectares · Purchase blueberries from other producers

[1] The project information and financial indicators are provided by company-initiator of the project.

MA'RIJANY HOLDING LLC

ZHYTOMYR REGION, UKRAINE

MA'RIGANY HEMP COMPANY LLC MA'RIJANY AGRO LLC
MA'RIGANY ESSETS LLC "Volodarsko-Volynskiy flax plant" PSJC

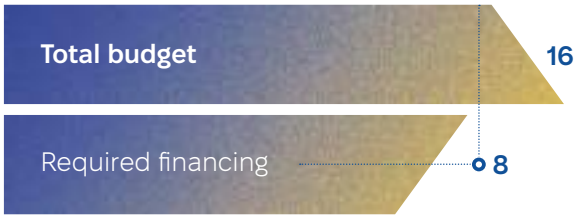
PROCESSING INDUSTRIAL HEMP INTO LONG FIBER

- **Brief Description:** MA'RIJANY project is implementing the first modern production of long textile fiber from industrial hemp in Ukraine. The goal is to create a business for the primary processing of hemp stalk with the subsequent production of long hemp fiber for the textile industry (main business), short fiber and shives (by-products of processing)
- **Target Market:** Worldwide supplier of hemp fiber. The focus for long hemp fiber is on the European textile market, primarily supplying spinning mills and fabric manufacturers. Short hemp fiber will be utilized in the local Ukrainian market by partnership companies as a raw material for nonwoven and construction materials. Hemp shives (hurd), as an eco-friendly, will be utilized in the local market by the farming, insulation, and construction industries
- **Products/Services:** primary processing of hemp stalks with the subsequent production of long hemp fiber for the textile industry (main business), short fiber and shives (by-products of processing)
- **Technologies and Innovations:** A state-of-the-art primary processing line for bast crops (industrial hemp and flax) will be installed. For efficient sorting of primary processing products, the long fiber line is equipped with an auxiliary short fiber line. Purchased 2 modern harvesters. Contracts for the supply of balers for baling hemp trusts in the field were concluded.

BUSINESS MODEL

- **Hemp cultivation:** We are engaging local farmers through contracts for hemp cultivation with a guaranteed buyout of the yield. We also manage our own farming operations to grow and harvest hemp.
- **Hemp harvesting:** We are providing harvesting services to local farmers, enhancing efficiency and reducing their operational expenses.
- **Fiber extraction:** We are utilizing mechanical decortication processes to extract hemp fibers from the straw, producing various lengths of hemp fibers and by-products such as hemp shives.
- **Product sales:** Long fibers will be supplied to spinning mills and textile manufacturers (main product for export), short fibers will be supplied to nonwoven fabric producers and automobile manufacturers (possible export), and shives will be sold to farmers for agricultural use and to construction companies.

Projects Highlights[1] ($ mln)



Type of financing - Equity, private investing
Financing structure: CAPEX – 80% / OPEX – 20%

Expected Financial Indicators:

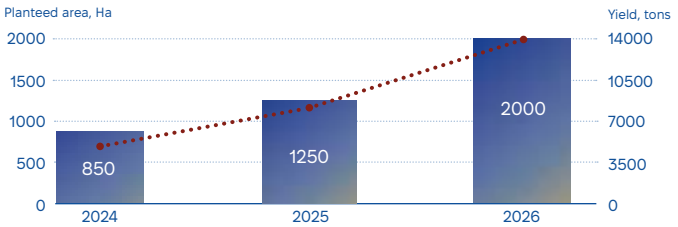
- NPV – 27.7 (10 years)
- IRR – 25.5%
- DPP (months) – 39
- Project launch period – 5
- Revenue – 14.3 (2027 years)
- EBITDA – 9.1 (2027 years)

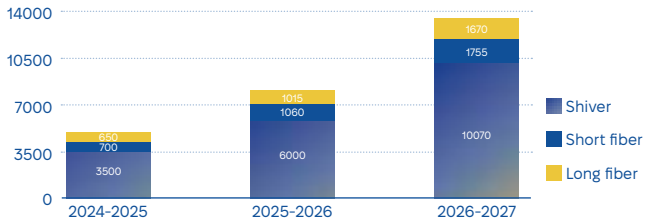
- **Project Status:**
  - Funding has been raised from private investors, covering about 50% of the project budget;
  - Official letters of intent with defined procurement volumes were received from key customers - leading European companies;
  - Obtained a license for the cultivation of industrial hemp;
  - Seeding works on an area of about 540 hectares have begun;
  - A contract for the supply of main production equipment from a leading global manufacturer has been concluded;
  - Construction and renovation works on the site are currently underway.

Key partners

- Institute of Agriculture of the Northeast, Institute of Bast Crops of the National Academy of Agrarian Sciences of Ukraine - supplier of licensed hemp seeds and agricultural oversight;
- Spinning mills in Europe - main clients for our entire textile fiber.
- Manufacturers of equipment and agricultural machinery;
- Manufacturers of building materials, nonwovens, fuel and paper producers, bus manufacturers - consumers of short hemp fiber and firewood
- State Service of Ukraine on Medicines and Drugs Control - granting licenses and quotas for the cultivation of industrial hemp

FURTHER DEVELOPMENT 2024-2027





AGRICULTURE

FLORIA-UKRAINE LLC

THE GREENHOUSE COMPLEX FOR GROWING VEGETABLES

UKRAINE. RIVNE REGION VOLODYMYRETSKY DISTRICT, VILLAGE OF ZABOLOTTA

- **Brief Description:** Construction of a greenhouse complex with an area of 6 hectares. (productive area 5.8 ha) on the basis of the existing business, which has been successfully operating since 2008. The goal is to grow vegetables (cucumbers 70% and tomatoes 30%).
- **Target Market:** The target market is Ukraine, countries of the European Union.
- **Products/Services:** Our operations include the cultivation of cucumbers and tomatoes within 2 greenhouse complexes, totaling 2.4 hectares. We are planning to expand cultivation into a new greenhouse facility.
- **Technologies and Innovations:** Modern efficient equipment is used. A competitive advantage is gained through a special tariff for thermal energy at the enterprise.
- **Unique Selling Proposition:** Practical experience in growing crops. Unsaturated sales markets for implementation. Energy advantages in the cost structure due to special heat tariffs. Modern technological equipment.

Projects Highlights[1] ($ mln)

Type of financing - grant, project finance, debt, equity
Financing structure: CAPEX – 79% / OPEX – 21%

Expected Financial Indicators:

- NPV – 15,450, 10 years
- DPP (months) – 120
- Revenue – [full capacity] (15.05, 2035 year)
- IRR – 33%
- Project launch period – 2 years
- EBITDA – [full cap.] (4.235, 2035 year)

- **Project Status:**
The project is prepared for the start of construction works, with all relevant permission documents obtained. Technical conditions for connection to heat networks have been addressed, along with permission to use land and water bodies located in the sanitary protection zone. Additionally, permission to develop urban planning documentation for the greenhouse complex project has been secured

BUSINESS MODEL

The main source of income is derived from the sale of vegetables cultivated within a greenhouse complex spanning 6 hectares (productive area 5.8 hectares). Additional profit is generated from the sale of vegetables cultivated in existing greenhouse complexes. Our project is already operational, supported by modern equipment that is regularly maintained. Our company launched its first greenhouse in 2008 and maintains a positive credit history. We have successfully secured investment bank financing for the implementation of a greenhouse complex covering 1.6 hectares. The project will create employment opportunities, allowing approximately 80 workers to return from abroad and be employed and accommodated at competitive wages.

Key partners

During construction, the greenhouse complex utilized state-of-the-art equipment from firms such as «Netafim» and «Groutek Holland Den Haier». Plans are underway to incorporate Dalsem ReVoX Systems. Our company collaborates with Dalsem, a trusted partner and supplier since 1932.

Key Points Of Project Implementation

[1] The project information and financial indicators are provided by company-initiator of the project.

CULTIVATION AND PROCESSING

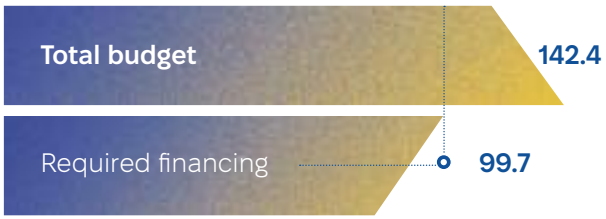
GLOBYNSKYI M'YASOKOMBINAT LLC TERRA AGRICULTURE LLC

CONSTRUCTION OF FACILITIES FOR INCUBATION, FATTENING AND PROCESSING OF BROILER CHICKENS

UKRAINE, POLTAVA REGION, KREMENCHUK DISTRICT, HLOBYNE TERRITORIAL COMMUNITY

- **Project objectives:**
  - Creation of a raw material base for the production of semi-finished products and sausages under Globino ™
  - Quality control and ensuring sustainable volumes of chicken for LLC "GLOBYNSKYI M'YASOKOMBINAT"
  - Sales of chilled chicken to the EU market and increasing competition on the Ukrainian market
- **Target Market:**
  - National networks of Ukraine (ATB, Silpo, Novus, METRO, Auchan Ukraine)
  - HORECA
  - Processing companies (LembergMit LLC, SMK group)
  - Countries of the European Union
- **Products/Services:**
  - egg incubation, rearing of broiler chickens, production of chilled chicken, semi-finished products and culinary products, provision of slaughtering services.
- **Technologies and Innovations:**
- **Equipment from leading European manufacturers:**
  - incubator equipment - HatchTech incubation technology
  - equipment for fattening buildings - Big Dutchman
  - slaughter line - Meyn Poultry Processing Solution.
- **Processing of livestock waste products at the bioenergy complex**
- **Unique Selling Proposition:**
  - the opportunity to expand into the European market;
  - availability of chicken processing facilities;
  - support for competition in the national market.

Projects Highlights[1] ($ mln)



Type of financing - debt
Financing structure: CAPEX – 83.8% / OPEX – 16.2%

Expected Financial Indicators:

- NPV – 3.65 (5 years)
- DPP (months) – 60
- Revenue – 327,129.4 (4 year)
- IRR – 35.8%
- Project launch period – 3
- EBITDA – 111.5 (4 year)

- **Project Status:**

  The project at the implementation stage. The following agreements were concluded: for land for fattening sites, for the design of the slaughterhouse, feed line and fattening buildings; environmental impact assessment permits were obtained;

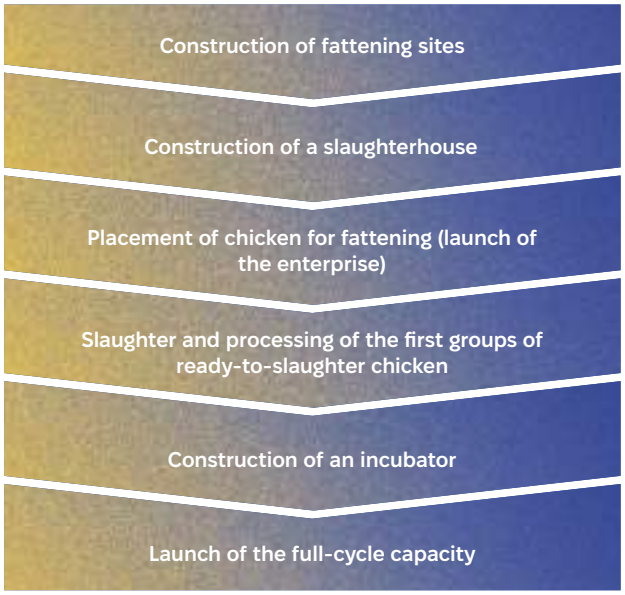
BUSINESS MODEL

«GLOBINO» is a modern group of companies that unites 5 independent enterprises under the same brand name. It's a well-known trademark in Ukraine and has long history of cooperation with retail chains. TERRA AGRICULTURE LLC will join the group and complement the production cycle as a supplier of raw materials and consumer of crop production.for agricultural use and to construction companies.

Key partners

Consumers: ATB-Market LLC, Fozzy-Food LLC, Epicenter K LLC, VOG Retail LLC, Metro Cash & Carry Ukraine LLC, Auchan Ukraine Hypermarket LLC, Omega LLC, Fora LLC, Novus Ukraine LLC. **Suppliers:** LLC «SPE «Globinsky Pig Complex», Private Joint Stock Company «MHP», Matimex, Shaller, Travaglini, ProTec, Alfa Laval, Evapco, Cryovac, Brauer, Big Dutchman, Shauer and others. **Financial institutions:** EBRD, IFC, LBBW Landesbank Baden-Wurttemberg

Key Points Of Project Implementation:



[1] The project information and financial indicators are provided by company-initiator of the project.

4.2. TRANSPORTATION AND LOGISTICS

4.2.1. Current situation and sector role

BACKGROUND

Ukraine is connected to 5 European countries - Poland, Slovakia, Hungary, Romania, Bulgaria and Moldova on the western and southern borders. It has access to the Black Sea through its deep-water ports and its Danube River ports facilitate river transport connections with European countries. Ukraine also has ports in the Sea of Azov (which are currently temporarily occupied). Ukraine's rail network (TOP-3 in Europe) is integrated with the networks of Poland, Romania, Slovakia, Hungary and Moldova.

Ukrainian transport infrastructure, largely established during the Soviet Union era, was designed to meet the goals of that time. Today, Ukraine has an extensive network of state-controlled transportation infrastructure, including roads and railways. Additionally, ports and airports are in the process of being privatised, leased, or managed through public-private partnerships (PPPs). However, years of underinvestment and a lack of strategic planning have hindered the industry's growth and compromised its capability to serve the business sector effectively.

SECTOR IMPORTANCE

The transportation sector is the economic backbone, with its various modes either complementing each other or competing to some extent in terms of ways of cargo delivery.

Prior to the full-scale Russian invasion, maritime transport was pivotal for exports in terms of volume. Additionally, an increase in recent operations of inland waterways, creates expectation that they will play a more significant role in the long term. Rail transport, which serves as the primary means of transporting export cargo to ports overland, has seen its importance surge during the war, ensuring continued export-import operations with the EU. Road transportation complements rail by providing essential connectivity to remote areas and last-mile delivery services.

Although air passenger transportation, which showed significant growth in the pre-COVID period, is crucial to ensure economic growth, boost international trade, and help in attracting foreign investment in the post-war development.

CURRENT STATE

Transport and logistics ensure the country's trade operations. Since the start of the war, Ukrainian GDP dropped by roughly 28.8% in 2022 due to significant destruction of infrastructure and disruption of logistics. The table 1 shows comparison of transport sector indicators in the pre-war period and changes caused by the full-scale Russian invasion:

Table 1: Comparison of transport sector indicators

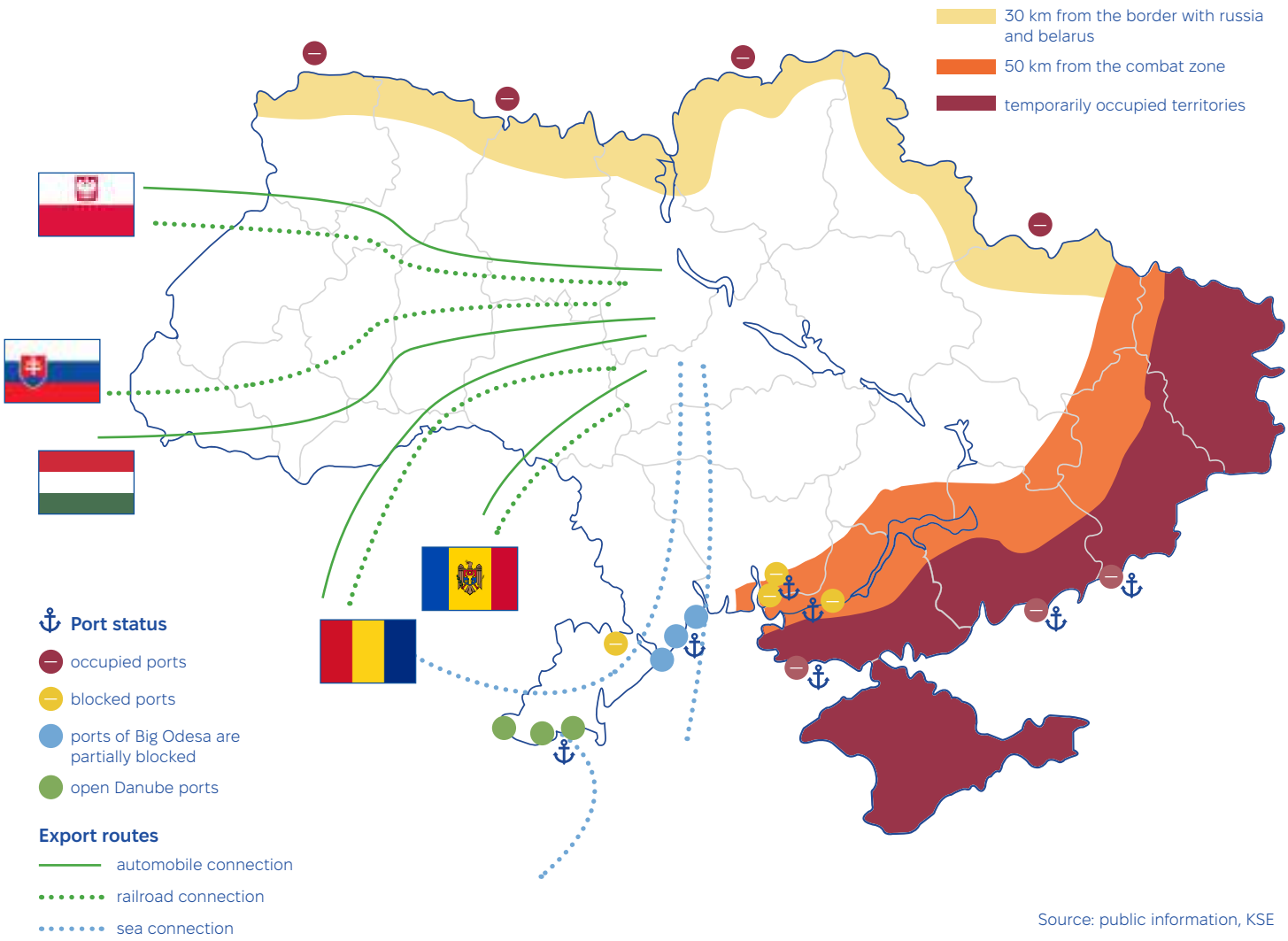
Metric	Units	2021	2022	2023
Share in GDP[1]	%	5.4	4.3	4.3
Export value[2]	USD billion	68.2	44.8	36.2
Volume of freight traffic, of which[3]:	million t	621.3	317.5	327.9
- Rail transport[4]	million t	314.3	150.6	148.4
- Seaports	million t	153.3	51.2	62
- Road transportation[5]	million t	224	175	n/a
Cargo turnover[6]	billion tkm	289.6	166.7	163.4

[1] https://www.ukrstat.gov.ua
[2] https://customs.gov.ua
[3] https://www.ukrstat.gov.ua
[4] https://www.uz.gov.ua
[5] https://www.ukrstat.gov.ua
[6] https://www.ukrstat.gov.ua

WAR IMPACT ASSESSMENT (AS OF DECEMBER 31, 2023)

During the war, established logistic chains were disrupted, and sea transportation faced initial blockades. This disruption shifted the demand for transportation services among different modes. To offset the decline in deep-sea transportation, there has been a marked increase in cargo transshipment through the Danube River ports, resulting in the construction of 23 new terminals. Additionally, there has been a rise in land-based exports, highlighting the strong interdependence between transportation modes.

Figure 1: Transport network of Ukraine: main export routes



Source: public information, KSE

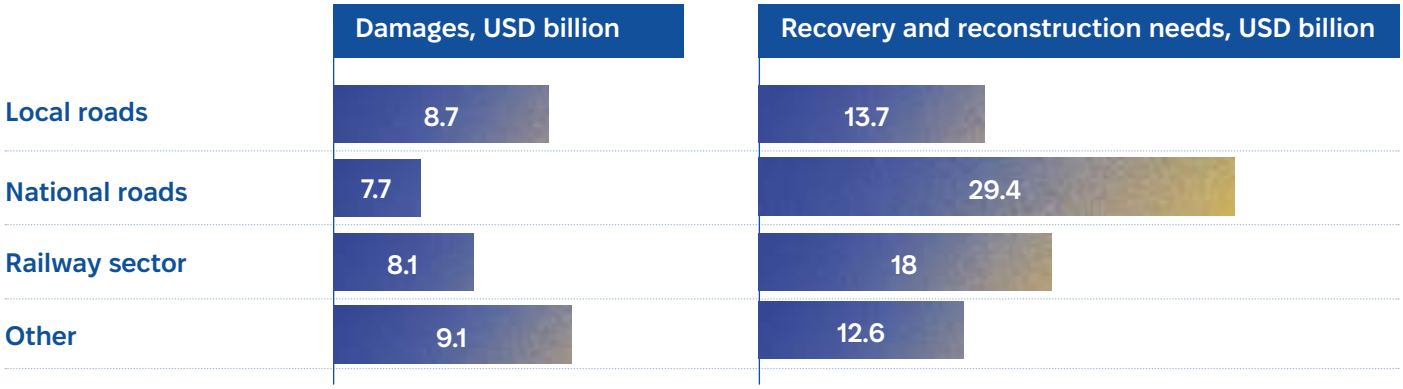
The increased reliance on land freight for exports has led to peak loads in rail and road transportation, exposing capacity bottlenecks at western border crossings. These include a limited number of exit points, rail gauge standards differing from those in the EU, and a need for intermodal transshipment terminals and warehouses.

A significant portion of civil aviation infrastructure has been damaged or destroyed, with airspaces closed to civilian traffic indefinitely. Airline operators have ceased operations and returned leased aircraft to lessors.

Ukraine is actively working to restore and develop its export and logistics capabilities, with an emphasis on integrating with the TEN-T and meeting EU transportation standards.

The transport and logistics sector's needs have been reassessed, revealing substantial potential for development and foreign direct investment (FDI), particularly in the recovery and modernization of assets damaged by military aggression. According to the RDNA 3 as of December 31, 2023, the total direct damage to infrastructure in transport was estimated at approximately USD 33.6 billion, while recovery and reconstruction needs (building back better) is USD 73.7 billion over 10 years. Apart from assets on the occupied territory, among the main damaged or destroyed assets are near 8,400 km of motorways, highways, and other national roads, bridges on the national and regional and village roads (over 140 and 150 bridges respectively), more than 50 km of railways and 83 railway bridges.

Figure 2: The assessment of direct damage and the recovery needs



- Motorways, highways, and other national roads;
- Bridges on the national road network and on the regional and village roads;
- Railway rolling stock and equipment;
- Ports and inland waterways infrastructure;
- Airports, public and private transport.

Source: RDNA 3

The war has had a considerable effect on the warehouse logistics market. The total available warehouse space has shrunk from 4 million square metres in 2020 to approximately 2.6 million square metres in 2023. The Kyiv region alone has seen a loss of over 0.45 million square metres. Warehouse operators in Eastern Ukraine have been compelled to either relocate their assets to the Western Ukraine or adopt cross-docking operations. Furthermore, some market participants have completely vacated their warehouse and storage facilities.

Land Freight – Rail Transport

- **Infrastructure:** UZ, wholly owned by the state, holds a natural monopoly over the majority of the railway transportation infrastructure, with 19,787 kilometres of railway network and 1,402 stations. The predominant railway track gauge is 1,520 mm, which is standard across former Soviet Union countries. Additionally, there are several tracks of 1,435 mm gauge (EU standard) that facilitate direct transshipment with the EU.

- **Transportation:** Rail transportation is operated by both state and private entities. The state controls passenger services, locomotives, and 51% of cargo capacities, where Ukrzaliznytsia, the state operator, provides the passenger transportation and locomotives using priority access to the infrastructure. Key private players in the market are Lemtrans, Ferrexpo, Kernel Trade, Metinvest-Shipping, and OTP Leasing.

- **Cargo:** In 2022, rail exports were the second highest in terms of volume, with 34 million tonnes (34% of total exports). In 2023, transshipped volumes decreased to 148.4 million tonnes, which is 53% lower than the 314.3 million tonnes in 2021. This significant drop is attributed to the disruption of (i) supplies to Black Sea ports and (ii) transit traffic on international corridors between Asia and Europe.

Figure 3: Volume of freight transportation by UZ, mln tons

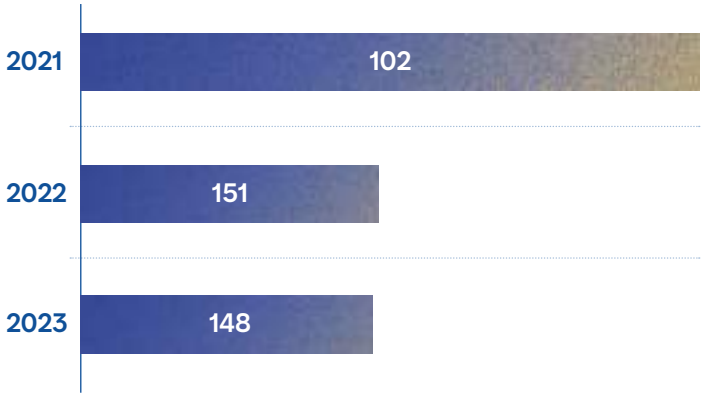
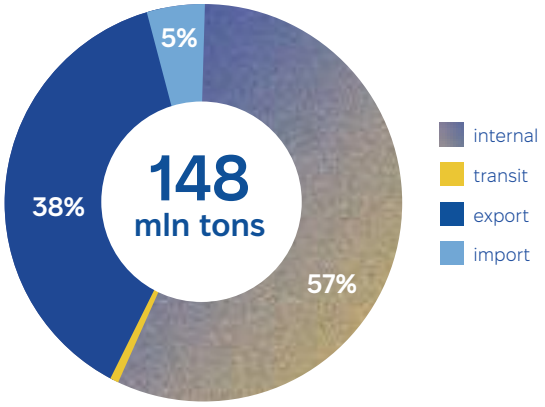


Figure 4: Structure of UZ freight transportation in 2023, %



Source:public information, KSE

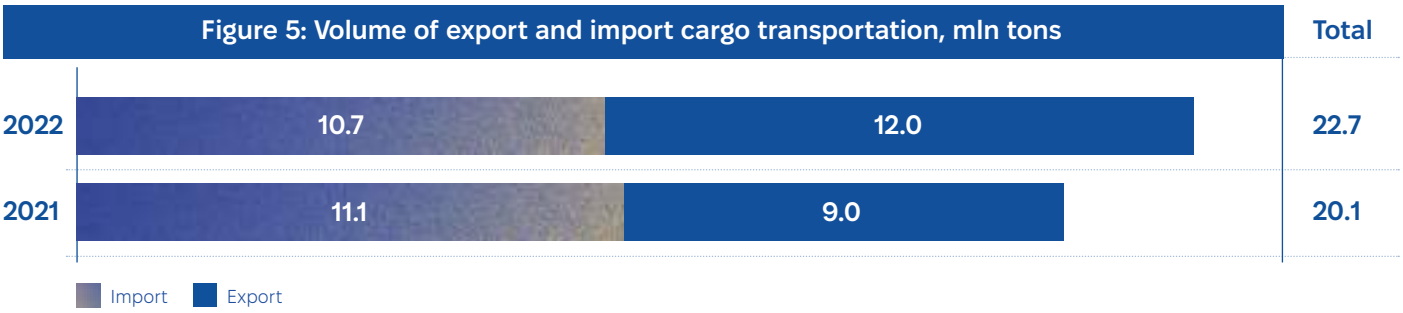
[7] https://documents.worldbank.org

Land Freight – Road Transport

- **Infrastructure:** Ukraine's road network comprises 52.0 thousand kilometres of state roads and 117.2 thousand kilometres of local roads, managed and maintained by central or local authorities. The State Agency for Restoration and Infrastructure Development of Ukraine (Recovery Agency) is the primary executive body responsible for the maintenance and development of national roads. In 2019, a new program was launched with plans to construct over 40 new public highways, overhaul more than 130 roads, and repair over 200 public roads. Prior to the war, over 14 thousand kilometres of roads had been built or refurbished. However, during the war, funds allocated for this program have been redirected to support military needs. The warehouse segment is predominantly operated by private companies. Before the conflict, the segment encompassed about 3 million square metres, with the Kyiv region representing over 54% of the total capacity. Notable warehouse projects currently underway include the M10 Lviv Industrial Park, Mostysky Dry Port Industrial Park, and Vinnytsia Industrial Park.

- **Transportation:** The road transportation services market is highly diversified and dominated by private companies. Major private players include Nova Poshta Logistics, FM Logistic, Kuehne+Nagel, Ekol Logistics, and Raben Ukraine.

- **Cargo:** In 2022, road-based exports ranked third with 12 million tonnes (12% of total exports). The volume transshipped reached 175 million tonnes, which is 21% lower than the 2021 figure.



Source: State Customs Service of Ukraine, KSE

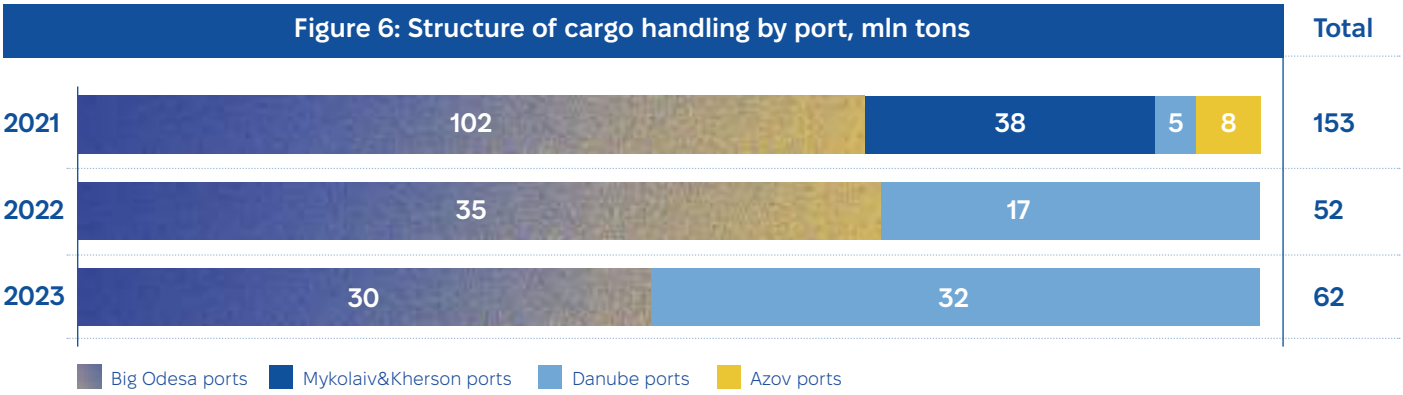
Water Freight

- **Infrastructure:** In 2021, the five largest seaports in the Odessa and Mykolaiv regions represented approximately 80% of Ukraine's total port capacity, among 18 ports. The country also has 16 river ports and terminals, which are currently underutilised due to the conflict. The river transportation infrastructure includes 2,241 kilometres of inland waterways. As of early 2024, Ukraine has lost access to 9 of its 18 seaports; 5 have been occupied since 2014 and an additional 4 since 2022. There are 9 operational seaports remaining: the Great Odessa cluster (three ports) operates under a temporary «corridor» mode with limited capacity, the Mykolaiv cluster (three ports) is blocked, and the Danube River cluster continues to transship cargoes to the EU via inland waterways. There has been a recent shift towards privatising operations at public ports, while strategic infrastructure remains state-owned and managed by the Ukrainian Sea Port Authority. The Ukrainian Sea Port Authority oversees 143 berths (totaling 40 kilometres), approach channels, water areas, protective structures, lighthouses, internal railways and roads, utilities, security, and coordinates port area development. Terminal ownership can be private, leased, or under public-private partnerships (PPP). As of 2021, berth ownership was 39% private and 61% public.

- **Transportation:** Services are provided by nearly 90 stevedoring companies, with 78% privately owned and 22% state-owned. Key private players include TIS, Transbulkterminal (Kernel), Brooklin Kyiv Port, M.V.Cargo, and Risoil terminal

- **Cargo:** In 2022, sea freight was the leading export mode with 53.8 million tonnes (54% of total exports). In 2023, the transshipped volume reached 62 million tonnes, which is 60% less than the 153.3 million tonnes in 2021.

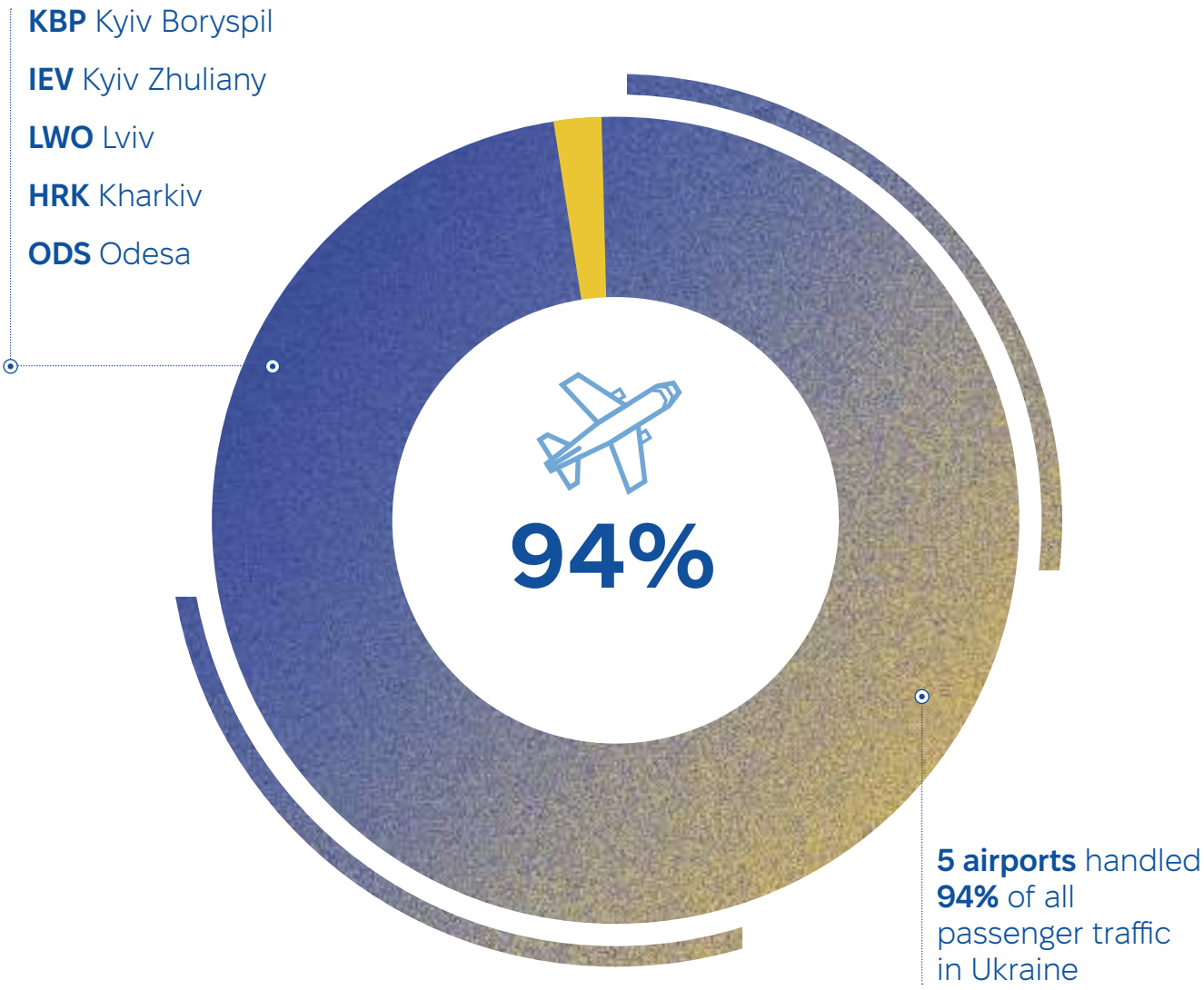
[8] https://www.ukrstat.gov.ua



Source: public information, KSE

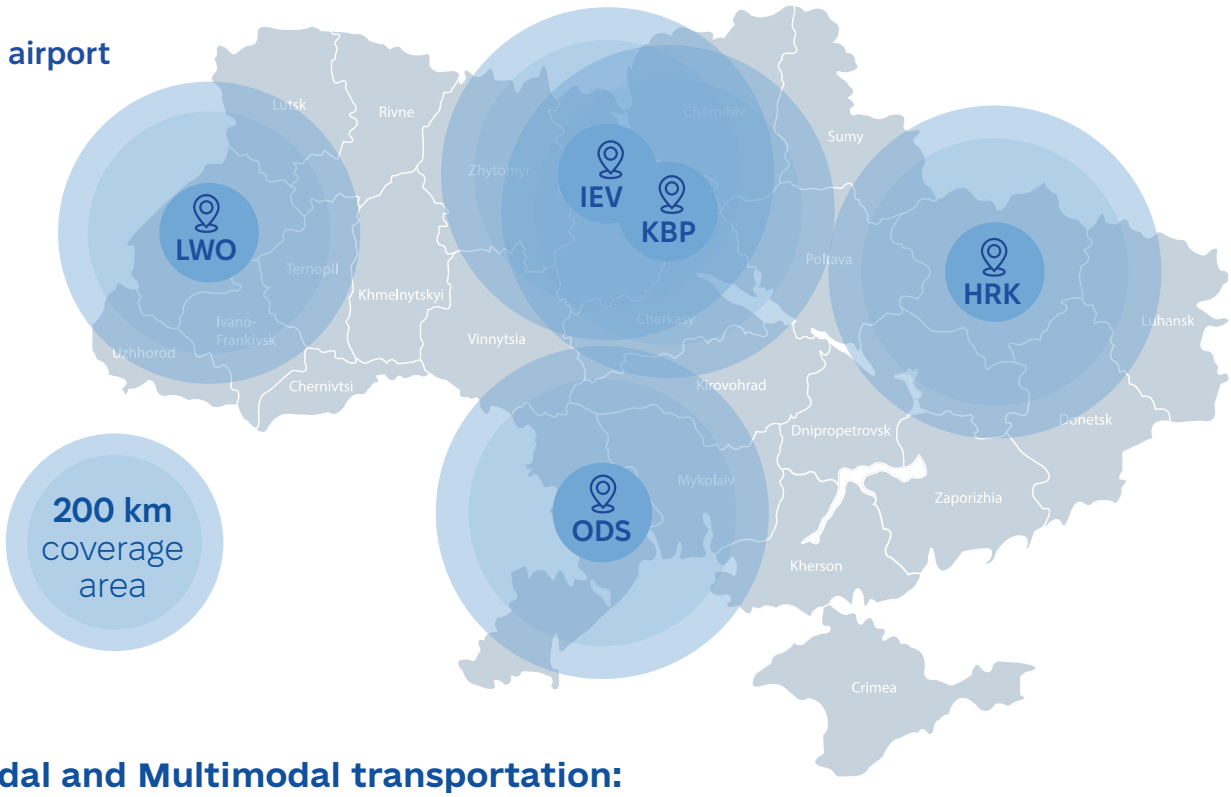
Air Freight

- **Infrastructure:** Ukraine possesses 20 airports and airfields capable of providing commercial flights. All runways are publicly owned, either by central or local authorities. Airport terminals are managed by both state and private operators, with a 74% state to 26% private ownership ratio as of 2021. The state-owned entity Ukraeroruch is responsible for air navigation services.
- **Transportation:** In 2021, approximately 94% of passenger transport and nearly all cargo transport were concentrated in two publicly controlled airports (Boryspil, Lviv) and three privately operated airports (Kyiv-Zhuliany, Odesa, Kharkiv). Air transportation services are provided by private operators. The key players in terms of flight numbers during the pre-COVID period include Ukraine International Airlines (UIA), Turkish Airlines, Wizz Air, Belavia, LOT, SkyUP, Windrose, and Ryanair. Industry is currently blocked due to hostilities.



Source: public information, KSE

Figure 7: Ukrainian airport network



Intermodal and Multimodal transportation:

- **Infrastructure:** Intermodal terminals in Ukraine are operated by both private entities and the state-owned company UZ. In November 2021, Ukraine passed the «Law on Multimodal Transportation,» establishing the legal framework for the multimodal transportation sector.

- **Transportation:** UZ offers intermodal transportation services that combine container train and combined transport train operations. Private companies function as multimodal/container hub operators and container fleet owners. Leading players in this segment include Liski (a subsidiary of UZ) and private companies such as Laude, Levada-Cargo, and TIS. These entities control 90% of the container platform fleet and managed about 70% of all shipments in 2022.

- **Cargo:** From 2018 to 2021, container traffic consistently grew by 22%, 20%, 11%, and 14% annually, culminating in a total of 279.8 thousand TEU transported in 2021. Following Russia's full-scale invasion in 2022, container traffic saw a 46% decline. However, in 2023, there was a significant rebound of 34%, reaching 201.3 thousand TEU, driven by the need to diversify grain and general cargo transshipment. Of this volume, 62% was exported, while imports and domestic transportation accounted for 19%. In 2022, the commodities transported in containers included ferrous metals (27%), grain (18%), oilseeds and cakes (14%), chemical products, foodstuffs, and vegetable oil. Of the total volume, only 32% was transported using UZ's platforms. UZ's strategic goal for 2031 is to boost container traffic to 1 million TEUs annually.

4.2.2. Overview and outlook of key reforms

Transport and logistics are key to export-oriented development. Ukraine is moving towards the implementation of the EU's Ukraine Facility program[9], under which the transport sector development will stimulate broad economic growth. Thus, it is necessary to modernise logistics systems, integrate with the EU's transport space (TEN-T network), bring the railway sector in line with EU standards, and improve port services. To achieve this, following priority goals are set:

- Restoration and development of transport infrastructure based on the long-term strategy and addressing recovery needs.

- Modernization of routes for export to the EU to develop Ukraine's export potential.

- Liberalisation in the railway transportation sector to provide a competitive rail transportation market.

- Improved shipping and port services, ensuring safety of navigation, security of ships and ports and efficiency of service provision.

This will result in the modernization of Ukraine's transportation sector and closer integration with both the European Union and the global economy.

[9] https://www.ukrainefacility.me.gov.ua

Reform 1. (Q4 2024) — **Comprehensive planning of the transport sector (including recovery).**

A potential impact of the reform: The new transport strategy shall provide a framework for an efficient, safe, sustainable transport system which will enable a swift reconstruction and post-war economic recovery and development, including war-affected territories and the country's export and logistics potential.

Reform 2. (Q4 2024) — **Development of Ukraine's export logistics potential**

A potential impact of the reform: This strategy is of utmost importance for the coordination of different investments available for the BCPs and shall ensure Ukraine, EU Member States and the Republic of Moldova enhanced transport connections in a well-coordinated manner.

Reform 3. (Q4 2027) — **Liberalisation in the railway transport sector**

A potential impact of the reform: Creation of a competitive rail market as per the essential requirements of European Union legislation will ensure improvements in the quality and effectiveness of passenger and cargo rail services and foster the integration of Ukraine's rail network and markets with the EU.

Reform 4. (Q1 2027) — **Improved shipping and port services**

A potential impact of the reform: Ensuring further development of the state safety navigation system, improved qualification level of Ukrainian seafarers, the proper level of security for vessels and ports, enhanced efficiency improvements in Ukraine's performance of its obligations under international treaties in the field of merchant shipping to ensure safety of life at sea, increasing the efficiency of service provision in seaports of Ukraine. Improved shipping and port services along with a more environmentally friendly mode of transport is expected to contribute positively to the mitigation of climate changes, to the extent possible in a context of war or post-war recovery and reconstruction.

4.2.3. Tendencies and trends

Main regional and global trends influencing the development of Ukraine's logistics sector:

1 **Ukraine integration with the European Transport Network:** Ukraine is actively working to integrate with the European transport network, while the ongoing war with Russia has led to the loss of logistical connections with post-Soviet countries. This shift necessitates a realignment of Ukraine's transportation strategies and partnerships.

2 **Disruption of West-East Logistic Routes in Ukraine:** The conflict has also disrupted traditional West-East logistic routes (Europe-Asia), prompting Ukraine to explore the potential development of North-South routes as alternatives. This redirection aims to maintain and enhance connectivity between Europe and other regions.

3 **Shift from Cost-Effective to Resilient Logistic Models:** Ukraine is moving away from purely cost-effective logistic models towards more resilient ones. This involves diversifying supply chains to mitigate risks and enhance reliability in the face of disruptions, ensuring a more secure flow of goods and services.

4 **Development of Electric and Automated Transport:** Ukraine is focusing on the development of electric and automated transport solutions, moving away from fossil fuels in the transportation sector. This transition supports sustainability goals and aligns with global environmental trends, aiming to reduce emissions and improve energy efficiency in logistics.

4.2.3. Successful private sector investments during wartime

M-10 Lviv Industrial Park

- **Warehousing facilities** in the Lviv region is planned to be developed in 6 stages. Located next to M10 international highway, 60 km from the Polish border, covers 23.5 hectares.
- **1st stage was** commissioned in February 2024.
- **Funding:** Project is actively developed by Dragon Capital. Total investments – USD 70 million, while EBRD will invest up to 35% (USD 24.5 million). In September 2023, MIGA, the World Bank's International Investment Guarantee Agency, provided a 10-year guarantee for a USD 9.2 million, that covers the risks of physical destruction due to enemy shelling and/or loss of control over it.

Mostytska dry port container terminal

- **Terminal is located** in Lviv Region near border crossing point with Poland (Shehyni — Medyka). Total area – over 36 hectares, designed for handling containers (up to 100 k TEU), grain, general and bulk cargoes. Terminal uses developed network of railway tracks of 1435 and 1520 mm and operates own locomotives fleet.
- **The terminal was** commissioned in 2022. In 2023 it handled over 72,400 TEU and 286,000 tons of other cargoes.
- **Funding:** Terminal is a partnership project of Lemtrans and Rail Trans Investment with total investments near USD 15 million.

Transshipment complex on the border with Poland - MOST Logistic Terminal

- **Project is designed** as a grain transshipment complex and container yards. The grain complex is to have a throughput capacity of more than 400 thousand tons per year and should be completed by the end of 2024. The container complex is planned to be built within the same timeframe.
- **The first phase of the project** was commissioned in 2022 (an automated unit for direct transshipment of grain between wide and narrow-gauge railcars).
- **Funding:** Complex is managed by private company Agrosem. Total investments – EUR 13.7 million, while EBRD has invested EUR 9.6 million, EUR 1.5 million – investment grant from the US, EUR 2.6 million – own funds of Agrosem.

Nibulon port terminal in Izmail

- **Since the outbreak** of the war 23 new port terminals were opened on the Danube, including Nibulon's port terminal in Izmail with a transshipment capacity of 300 thousand tons of grain cargo per month.
- **Terminal was commissioned** in 2022. As of April 2024, the terminal handled almost 3.1 million tons of grain.
- **Funding:** USD 15.5 million (equity funding).

Two-sided Risoil pier in the port of Chornomorsk

- **A 342-metre-long** double-sided pier able to handle different types of cargo simultaneously on both sides and capable of handling vessels with a draft of up to 15 metres.
- **Pier had been under** construction since 2021, and was successfully launched by Risoil Group in 2023.
- **Funding:** Total investments – UAH 1.5 billion (publicly announced USD 40 million), that included cost of unique technological equipment for oil and grain transshipment.

4.2.5. Prospects and potential for the sector

Considering principles for build back better, sustainability and resilience and strategic planning future investment plans can be divided into 3 blocks:

Recovery of damaged infrastructure	Development of new routes to EU	Resolving pre-war existed needs
Land freight:	Land freight:	Land freight:
• Rail tracks, turnouts and supporting stations • Railway rolling stock • Roads, bridges and bridge crossings	• Upgrade of main roads (priority - TEN-T network) • Construction and modernisation of road border crossing points • Construction of 1,435 rail to the EU border	• Renewal and modernization of the railway stations (esp. near seaports) • Electrification of railway infrastructure • Reconstruction and modernization of roads and bridges (Kyiv Ring Road, Lviv Ring Road, etc)
Water freight:	Intermodal and Multimodal transportation:	Water freight:
• Sea and river berths, warehouses, terminals' assets and water fleet	• Construction of new logistics centres and multimodal hubs (agri. storages and terminals)	• Sea ports concessions (Chornomorsk, Izmail, Pivdennyi, etc.)
		Air freight:
		• Local airports concessions and airfield infrastructure modernization • Boryspil airport reconstruction and development

TRANSPORTATION AND LOGISTICS

Highlighted investment projects

TRANSPORT/LOGISTICS

FERREXPO

MODERNIZATION OF EXISTING LOCOMOTIVES TO AVOID THEIR SHUTDOWN

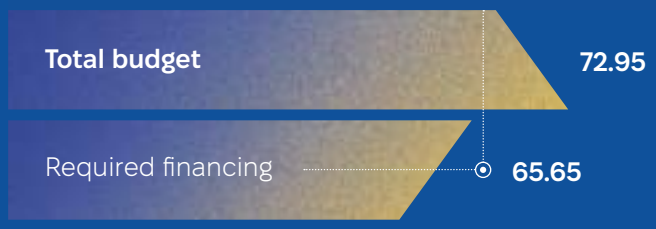
ROLLING STOCK

- **Brief Description:** Modernization of the existing locomotive fleet with the use of new, modern technologies. It is planned to modernize 36 units.
- **Target Market:** Railcar/railroad transportation.
- **Products/Services:** There is no possibility of replacing Russian-made spare parts, thus an overall replacement with European-made components is required.
- **Unique Selling Proposition:** The project will enable freight transportation, that is crucial in terms of company's integrated business model. The project will help to improve production efficiency and bring it in line with the European standards.

Project Status:

- Concept. A tender is being held for the selection of a contractor for the modernization of the first pilot diesel locomotive of the ChME-3 series.

Projects Highlights[1] ($, mln)



Type of financing - debt, project finance
Financing structure: CAPEX – 100%

Expected Financial Indicators:

- NPV[2]– $55m (20 years)
- DPP (years) – 7.6
- EBITDA – $27m (2031 year)
- IRR – 32%
- Project launch period – 6 years

BUSINESS MODEL

- Ferrexpo is weighing the modernization of the existing locomotive fleet at 6 units/year (3 locos of ChME-3 series & 3 locos of OPE-1AM series), 36 units in total. Planning to replace the diesel-generator set and main electrical components, enabling to avoid using russia-made spare parts. This will reduce fuel and power consumption (up to 45kUSD per unit/year) as well as maintenance costs (up to 500kUSD per unit/year).

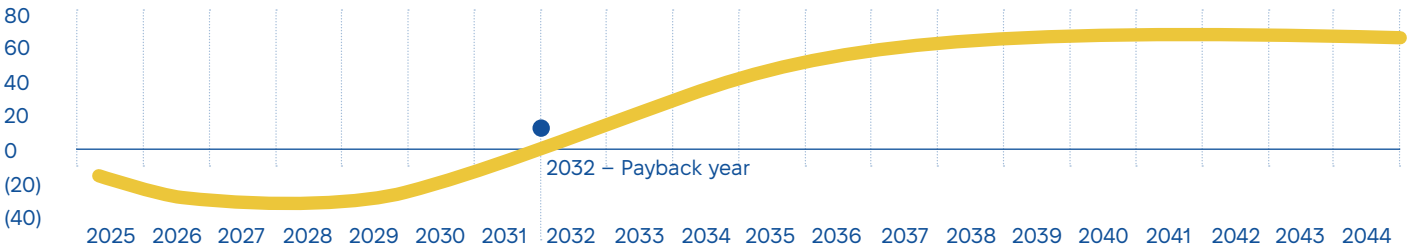
Key partners

Ferrexpo is currently exploring possible options with global producers. The key partner has not yet been determined. The study is underway. Various technologies of power-sourcing are (diesel, gas, hydrogen, electricity).

Estimated modernization schedule:

	2025	2026	2027	2028	2029	2030	Total
ChME-3	3	3	3	3	3	3	18
OPE-1AM	3	3	3	3	3	3	18

Project DCF



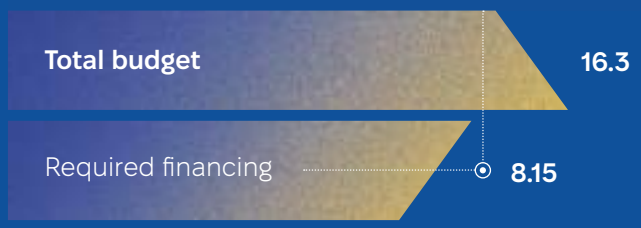
TRANSPORT/LOGISTICS

LLC "LEVADA CARGO" CONTAINER TERMINAL FASTIV

FASTIV (KYIV REGION)

- **Brief Description:** Creation of the terminal for 55,000 TEUs as the initial point of origin for the export container flow from the central region of Ukraine and for the import container flow from China, in compliance with the European Green Deal, ensuring efficient, safe and environmentally friendly transportation.
- **Target Market:** Container market operator, intermodal and multimodal transportation.
- **Products/Services:**
  - Container terminal for 55,000 TEUs on the territory of 12,5 ha next to the Fastiv-II railway station.
  - container yard (1000 TEU of simultaneous storage);
  - covered warehouse of 4800 m2;
  - railway infrastructure with a length of 1.8 km of 1520 gauge;
  - cargo fronts with an effective length of 450 meters.
- **Unique Selling Proposition:** huge region's potential for cargo containerization; attractive geographical location with developed both railway and automobile infrastructure both with strong cargo base.

Projects Highlights[1] ($, mln)



Type of financing - 1.63 debt, 3.26 equity, 3.26 project finance etc
Financing structure: CAPEX – 80% / OPEX – 20%

Expected Financial Indicators:

- NPV – 20.2 (20 years)
- DPP (years) – 8.10
- Revenue – 6.2 (2028 year)*
- IRR – 22.2%
- Project launch period – 2 years
- EBITDA – 3.8 (2028 year)*

Project Status:

- Ready for implementation

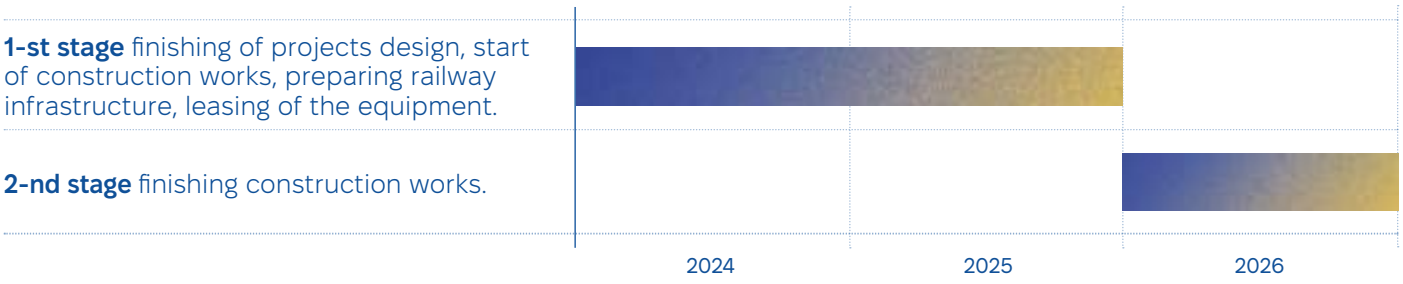
BUSINESS MODEL

- Container terminal as a key terminal of Kyiv and Zhitomir regions, hub for import from China and a consolidation point for export from Kharkov, Dnepr, Zaporozhe. This region has strong potential for cargo containerization, which allows to organize 5-7 railway trains per week and reach maximum terminal's capacity of 55 000 TEU by 2028.

Key partners

Consumers: Maersk, CMA, MSC, ZIM etc.Suppliers: Ferrari, Kalmar, Award, JCB, Kobzarenko factory.
Financing: OTP bank, Raiffeisen bank, Vostok bank.

Key Points Of Project Implementation



[1] The project information and financial indicators are provided by company-initiator of the project.
* 2028 – 3-rd year after project launch in 2026

TRANSPORT/LOGISTICS

LLC "LEMTRANS"

PURCHASE OF 2000 NEW GONDOLA CARS

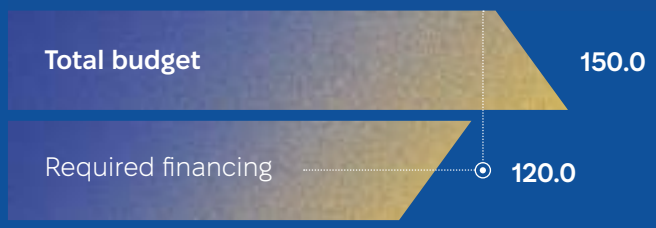
ROLLING STOCK

- **Brief Description:** The project aimed at purchasing 2,000 Ukrainian-made railcars to meet the rapid growth in demand for transportation.
- **Target Market:** Railcar/railroad transportation market of Ukraine
- **Products/Services:** Organization of railway transportation of goods in own gondola cars for the need of key Ukrainian industrial and energy companies.
- **Unique Selling Proposition:** The project will help to increase cargo flows for Ukrainian industries, cargo flows between Ukraine and other countries of the world, enabling heavy industry production, and ensure the transportation of construction materials to rebuild the country's infrastructure after the war.

Project Status:

- Ready for implementation

Projects Highlights[1] ($, mln)



Type of financing - 20% equity, 40% debt, 40% grant funding
Financing structure: CAPEX – 100%

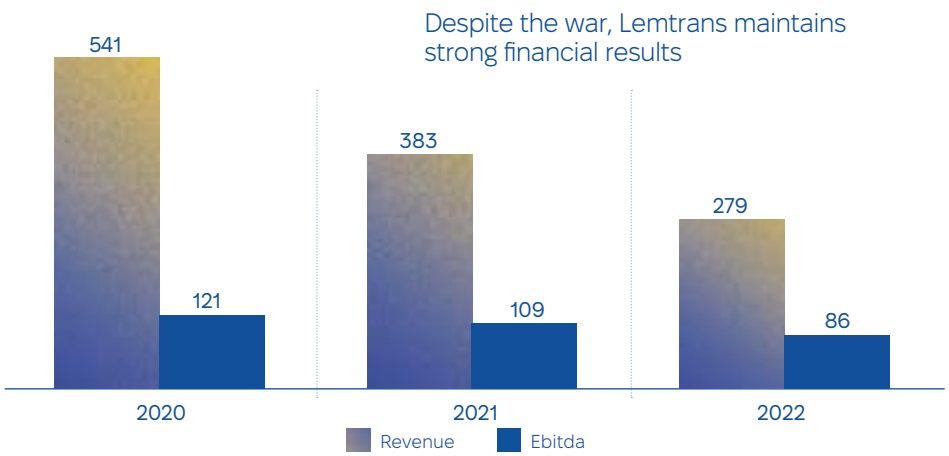
Expected Financial Indicators:

- NPV – 7.8 (22 years)
- DPP (months) – 95
- Revenue (net) – 18.0 (2 year)
- IRR – 30.7%
- Project launch period – 1 year
- EBITDA – 17.8 (2 year)

Key partners

Lemtrans – the largest private rail operator in Ukraine since 1999
Core service – organization of rail transportations in gondola cars
Wagon fleet owned – more than 9,000 gondola cars1
Transportation volume – 17 mln tons or 246,000 wagons (2023)
Market share in gondola cars transportations – 20%
Wagon repair facilities – Depot in Kamianske, Facility in Pavlograd
Major clients – DTEK, Metinvest, Technobud
Key goods shipped – coal, construction materials, iron ore

Lemtrans key financial indicators: ($ min)



[1] The project information and financial indicators are provided by company-initiator of the project. The data is preliminary and may be adjusted based on changes in project parameters and other factors.

TRANSPORT/LOGISTICS

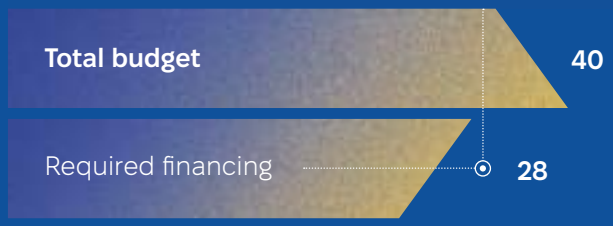
ZAMMLER UKRAINE LLC

KYIV REGION

CONSTRUCTION A WAREHOUSE COMPLEX

- **Brief Description:** Construction of an A-Class warehouse complex in 3 stages. The total area is about 60,0 k sq m.
- **Target Market:** The Project could increase ZAMMLER's share of the 3PL services market in Ukraine from 11.3% to 13.5%.
- **Products/Services:** Facility is assigned to provide logistic services: warehousing, a full range of operations for cargo handling within the warehouse, stickering, co-packing, fulfillment, cross – docking.
- **Unique Selling Proposition for Investor:**
  - Quick launch of the project - transfer of existing business from rented premises to own (existing customers will occupy 80% of the new warehouse);
  - Business expansion - increasing the existing warehouse space due to the construction of the third stage will provide an opportunity to additionally attract new customers.

Projects Highlights[1] ($, mln)



Type of financing - debt, equity, project finance etc

Expected Financial Indicators[2]**:**

- NPV – 7.2 (20 years)
- DPP (years) – 12.6
- Revenue – 11.6 (average per year for 20 years)
- IRR – 15.5%
- Project launch period – 1.6 - 2 years
- EBITDA – 5.7 (average per year for 20 years)

Project Status:

- The preliminary feasibility study has been completed. Land plot is available, project documentation is under development, equipment for the second and third stages of construction is available.

BUSINESS MODEL

- The facility is designed to serve existing B2B customers and attract new ones in order to provide logistics services with special fulfillment and cross-docking areas.

Key partners

AVON, Mondelez, Huawei; Delonghi; EGMONT Ukraine; Siemens; Samsung, Adidas; Philip Morris International; British American Tobacco; B/S/H; Lifecell; Schneider electric; Glo; UsupSo; OTIS, LG Electronics; Makita; Hilti; Mars; Karcher; JUSK; etc

Key Points Of Project Implementation

The estimated construction area includes:

warehouse (floor space) –
59,3 k sq.m

offices – 1,8 k sq.m,
mezzanine space –
9,0 k sq.m

The total useful area of the object:
70,2 k sq.m

The facility will be located on ZAMMLER's own land plot of 10.25 ha with access to the M-01 Kyiv-Chernihiv highway - distance from the center of Kyiv to the location of the complex is
28.6 km

Total construction period -
18 - 24 months

[1] The project information and financial indicators are provided by company-initiator of the project.
[2] All indicators are subject to change after the development of the final budget for the project and the conditions for the participation of partners. Project calculations are based on pre-war indicators. After the stabilization of the situation, all indicators will be updated

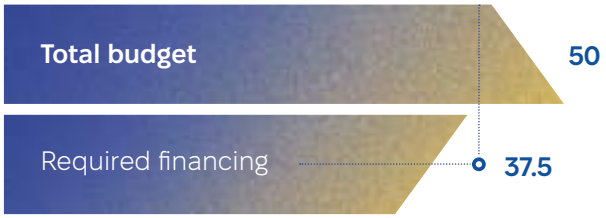
EURO LOGISTICS AND EUROCAR

TRANSKARPATHIAN REGION

(GROUP OF COMPANIES ATOLL HOLDING)

- **Brief Description:** Multimodal transshipment terminal developing as a part of logistics hub in Transcarpathian region in close proximity to the EU borders.
- **Target Market:** Industrial manufacturers and exporters, importers and distributers, retailers, e-commerce platforms etc. for providing them logistics services. Logistics companies for strategic partnership.
- **Products/Services:** transshipment, cross-docking, warehouse services, expedition and multimodal logistics services.
- **Project Status:**
  - First stage – launch in May 2022 at a logistics site of over 5 ha.
- **Unique Selling Proposition:**
  - Location in Transcarpathian region, close vicinity to the Ukrainian border with Hungary and Slovakia;
  - Multimodal and transshipment services with the advantages of private railway terminal, three EU-type railway tracks and one Europe/CIS-type railway track, customs-licensed warehouse, crane for container transshipment etc.;

Projects Highlights[1] ($, mln)



Type of financing - equity, private investments
Financing structure: CAPEX – 25% equity / 75% required investments

Project realization period – 5-8 years

- Project implementation with advantage of the Eurocar plant capacities (car manufacturer with 20+ years of experience in producing Volkswagen Group cars in Ukraine) and in close proximity to the Solomonovo Industrial Park at a territory of 66,2 ha, that gives great opportunity for expansion and scale-up.

BUSINESS MODEL

- WAREHOUSING – TRANSSHIPMENT TERMINAL – 3PL – SCALE-UP

Services and revenue streams (current and planned):

- Warehousing services (storing and handling, cross-docking, order consolidating).
- Transshipment and storage (containers and oversized cargos).
- Integrated logistic solutions "door to door" (including formation and consolidation of full-loaded trains, loaded in both directions UA ⇄ EU).
- Value-Added services (packaging, labeling, special treatment of oversized cargos, quality control).
- Technology solutions (technology systems and equipment for efficient cargo handling and tracking).

Key partners

Porsche Ukraine, GOL, Group SEB, Eurocar Service, Express Group, Ukrzaliznytsia and others (subject to NDA), potential – manufacturers and exporters interested in long lasting partnership.

Key Points Of Project Implementation

[1] The project information and financial indicators are provided by company-initiator of the project.

TRANSPORT/LOGISTICS

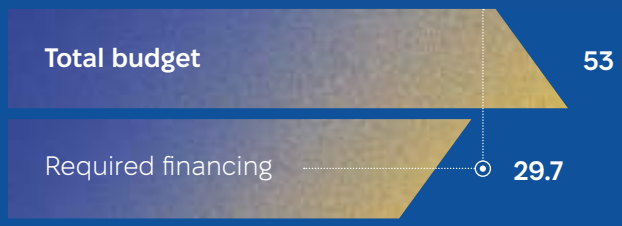
NSV GROUP LLC

INTERMODAL TERMINAL "HORONDA PLATFORM"

ZAKARPATTIA REGION

- **Brief Description:** construction of a intermodal logistic center on the area of 13 hectares with 4 unloading/ reloading tracks, that will have 1,5 mln t/year (including 13 000 TEU) transshipment capacity in close proximity to the EU borders.
- **Target Market:** intermodal logistics, delivering cargoes to the end user in EU countries. Also connection with European ports for further shipment to other countries
- **Products/Services:** transshipment of grain, vegetable oils, containers, semi-trailers, and general cargo
- **Unique Selling Proposition:** diversification of traffic flows through 3 border countries, providing full logistics services from the Ukrainian terminal to the end user in EU.
- The next stage will be the development of an industrial park with a total area of 35 hectares, the presence of which will mutually enhance the efficiency of the terminal

Projects Highlights[1] ($, mln)



Type of financing - debt and project finance
Financing structure: CAPEX – 100%

Expected Financial Indicators:

- NPV – 17.9 (15 years)
- DPP (years) – 13.8
- Revenue – 18 (2039 year)*
- IRR – 18.8%
- Project launch period – 1 year
- EBITDA – 12.7 (2039 year)*

Project Status:

- Ready for implementation

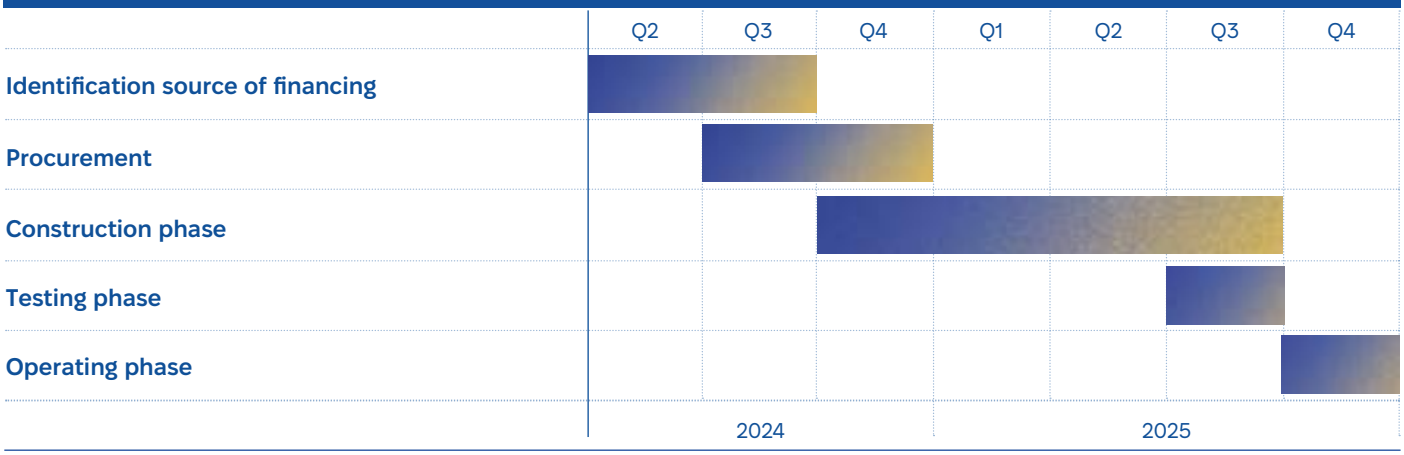
BUSINESS MODEL

- Gateway for direct import and export between Europe and Ukraine with a focus on container cargo and exports of agricultural products by rail/auto to European ports and final consumers, as well as potential import of products from Europe for Ukraine's economic recovery.
- Focus on container logistics
- Multimodal terminal with general goods warehouses and agro facilities. Possibility to use our infrastructure and legacy for European businesses while rebuilding Ukraine after the war.

Key partners

FS Group (State Italian Railways).Agricon (engineering production and construction group).
AVELLUM (a leading Ukrainian full service law firm)

Key Points Of Project Implementation



[1] The project information and financial indicators are provided by company-initiator of the project.
* 2039 – * - 15th year after project launch in 2024

TRANSPORT/LOGISTICS

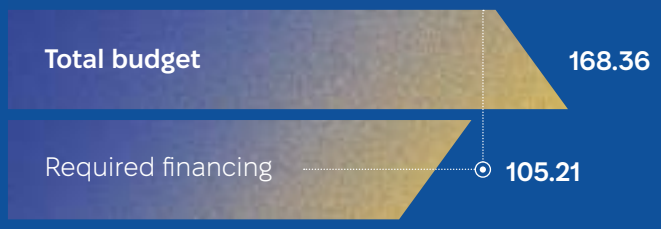
TEHAHRO LLC

ODESA REGION

CONSTRUCTION OF A FOOD AND GENERAL CARGO SEA TERMINAL AS PART OF THE INDUSTRIAL PARK

- **Brief Description:** construction of a deep-water sea terminal for food, oil and general cargo as a part of the Industrial Park, located in the Small Adzalyk estuary near Odessa.
- **Target Market:** sea freight transshipment services for food, cargo, bioethanol and vegetable oils.
- **Products/Services:** The project envisages rail and road access, warehouse services and transshipment services with a total volume of annual transshipment in the amount of 6 mln t of grain cargo, 1 mln t of liquid cargo, 500 thousand t of mineral fertilizers and general cargo Shipment to be available in ship lots of 10-80k tons
- **Unique Selling Proposition:** The project enjoys preferential tax regime being a part of Industrial park taxation. The potential throughput capacity may reach 7 mln t per year of cargo in total.

Projects Highlights[1] ($, mln)



Type of financing - debt, equity, project finance
Financing structure: CAPEX – 85% / OPEX – 15%

Expected Financial Indicators:

- NPV – 31.5 (16 years)
- DPP (years) – 10.5
- Revenue – 60.8 (2033)
- IRR – 18.1%
- Project launch period – 1 year
- EBITDA – 37.1 (2033)

Project Status:

- Ready to build

BUSINESS MODEL

- Business model and analytics are available upon request and subject to signed NDA.
- As of May 2024, over 20 million euros invested in the project.

Key partners

This is a unique project with simultaneous handling of grain, liquids (oil), general cargo and fertilizers.

The project benefits from recently voted bills by the Parliament of Ukraine, with a special tax regime (no import VAT, no corporate tax) and guaranteed State Support.

The Project Sponsor is a financially strong company with ability to co-invest, local Ukrainian team and expertise in place.

[1] The project information and financial indicators are provided by company-initiator of the project.

TRANSPORT/LOGISTICS

LLC TERWIN GROUP

KYIV, ODESA, LVIV, DNIPRO REGIONS

WINHUB FROM TERWIN

- **Brief Description:** Construction of a Class A and B warehouse complex in 4 regions with the area of 1,000,000 sq m with anchor tenants – EVA and VARUS (food and non-food retail)
- **Target Market:** warehouse & area for rent, creating an environment for SME development
- **Products/Services:** Lease of warehouses and premises for shops, hotels, hostels, petrol and repair stations.
- **Unique Selling Proposition:** energy-efficient infrastructure with integrated proposition of area for rent.
- **Basic principles:**
  - Ergonomics
  - Energy efficiency
  - Environmental friendliness

Projects Highlights[1] ($, mln)

Type of financing - debt & equity
Financing structure: CAPEX – 100%

Expected Financial Indicators:

- NPV – $61M (12 years)
- DPP (months) – 84
- Revenue – $142M (2037 year)
- IRR – 7%
- Project launch period – 5 years
- EBITDA – $92M (2037 year)

Project Status:

- 1st 2024-2025 Design & Structuring (ongoing)
- 2nd 2026-2027 Funding & Construction - ready for implementation
- 3rd 2028-2029 Funding & Construction

BUSINESS MODEL

Expected tenant occupancy plan:

- Up to 50% of general GLA will be consumed by own businesses (EVA, VARUS)* as first anchor tenant
- Large FMCG, retailers, 3PL operators, e-commerce, building companies will become potential consumer of remaining GLA
- EVA – №1 drogerie retailer in Ukraine, VARUS - №7 largest FMCG-retailer in Ukraine.
- Revenue - Y2021 $2bln, Y2022 $1.3bln, Y2023 $1.7bln

Project implementation plan		
1 STAGE 2024-2024	2 STAGE 2026-2027	3 STAGE 2028-2029
OWN INVESTMENT	OWN INVESTMENT LOAN FUNDING PUBLIC FUNDING (GRANTS)	LOAN FUNDING
214.000 sq.m. "A" and "B" class Warehouses	386.000 sq.m. "A" class Warehouses	400.000 sq.m. "A" class warehouses
KYIV – 38.000 sq.m. LVIV – 45.000 sq.m. ODESA – 26.000 sq.m. DNIPRO – 105.000 sq.m.	KYIV – 162.000 sq.m. LVIV – 100.000 sq.m. ODESA – 74.000 sq.m. DNIPRO – 50.000 sq.m.	KYIV – 200.000 sq.m. LVIV – 100.000 sq.m. ODESA – 100.000 sq.m.
$98mln	**$297mln**	**$308mln**

[1] The project information and financial indicators are provided by company-initiator of the project.

TRANSPORT/LOGISTICS

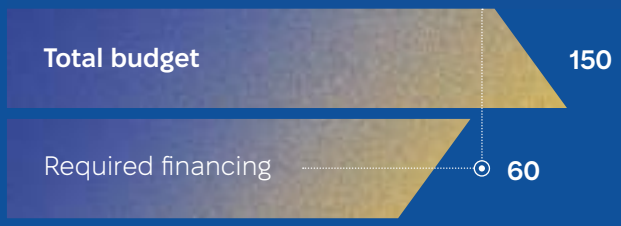
PTI

ODESA REGION

CONSTRUCTION OF GRAIN TERMINAL IN PIVDENNYI SEA PORT

- **Brief Description:** Construction of a modern, high-tech, deep-water sea terminal with capacity of up to 5 million tones annual handling of agricultural products
- **Target Market:** grain export.
- **Products/Services:** The terminal will have a throughput capacity of up to 5 million tones and its own railway station, which will provide competitive advantages
- **Technologies and Innovations:** demand for the construction of new high-tech transshipment facilities has increased due to damages to some existent port terminals.
- **Unique Selling Proposition:**
  - land plot is adjacent to the water's edge in the deepest water port in Ukraine
  - own railway station under construction
  - permits required for the construction work are received
  - income nominated in USDI

Projects Highlights[1] ($, mln)



Type of financing - equity and/or debt (project finance)

Expected Financial Indicators*:

- IRR – 17%
- Revenue – 33.6 (full capacity)
- Payback (months) – 89
- EBITDA – 18.5 (full capacity)

Project Status:

- Project is underway since January 2024

In progress:

- Installation of 1 MW from Ukrzaliznytsia and 4 MW from Oblenergo.
- Land works for railway station construction, planned to finish in December 2024.
- Ground development for main terminal, with a new technological road.

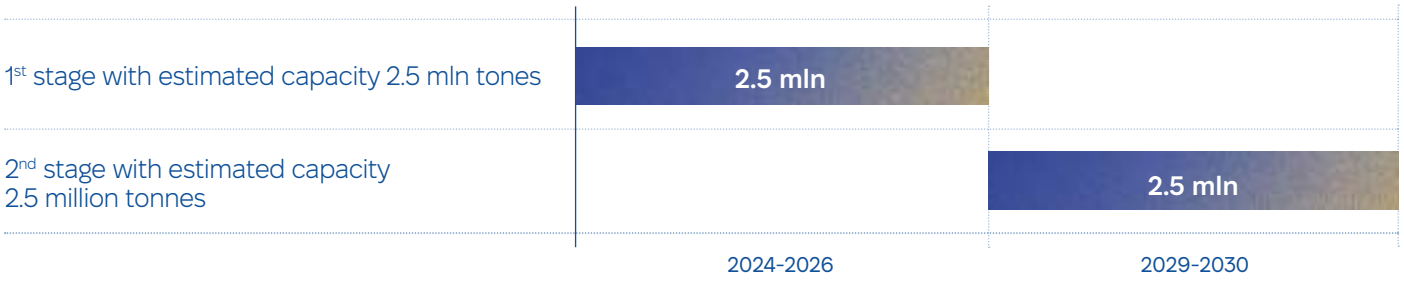
OPERATIONAL PARAMETERS

- 1st stage construction: 24 months
- Own railway station handles up to 5 trains/day (54 wagons each)
- Railcar unloading: 2000 tons/hour (6 bins, 2 wagons discharge each)
- Truck unloading: 1000 tons/hour (4 bins, 60 m3 each)
- Temporary storage: 7 silos x 860 tons = 6020 tons
- Conveyor gallery: 1600m, 1200 tons/hour (2 lines)
- Main storage: 48 silos, up to 250,000 tons
- Dolphin-type berth: 346m length, 16m depth
- 2 ship-loaders: 1500 tons/hour each

Key partners

Discussions are in progress with major agricultural enterprises to secure the terminal's operations. There's notable enthusiasm from small and medium-sized agricultural producers lacking their own transshipment facilities.

Key Points Of Project Implementation



[1]The project information and financial indicators are provided by company-initiator of the project.
*Preliminary rough estimation before applying to state support program

TRANSPORT/LOGISTICS

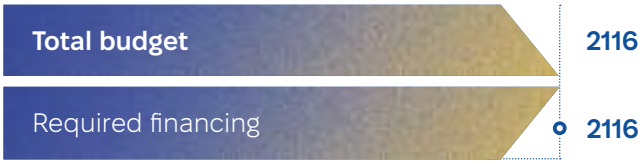
WESTERN ROUTE STATE ROADS PROJECT

PUBLIC SECTOR SPONSOR: MINISTRY FOR COMMUNITIES, TERRITORIES AND INFRASTRUCTURE DEVELOPMENT OF UKRAINE

ZHYTOMYR, RIVNE, LVIV

- **Brief Description:** Renovation of 498km of state roads M06, M10, M11 known as "the Western Route," enhancing EU-Ukraine road connectivity as part of the Solidarity Lanes Initiative
- **Impacted Populations:** Targets automobile transportation sector (particularly heavy vehicles), facilitating Ukrainian exports, military/ humanitarian aid import, and passenger transit
- **Impact:** 20-35% increased roadway capacity (up to 9.3k vehicles, including 2.7k cargo vehicles per day), improved road conditions for 50k+ daily users, 15-25% travel time reduction, increased road safety
- **Value Proposition:** Strengthens EU connectivity, in particular with Poland, leading to growth of foreign economic relations and international trade, improved export routes, better support of critical import needs. Project also expected to create new jobs, support business development, and improve road safety
- **Project Status:** Design documentation to be completed in 2024. Ready for implementation

Projects Highlights ($, mln)



Implementation Period: 2-3 years

- **Additional Details:** Includes M-06 Kyiv – Chop (including a bypass around the city of Zhytomyr) in Zhytomyr and Rivne regions, and M-10 Lviv – Krakowiec, and M-11 Lviv – Shehyni in Lviv region. Works include: preparation of design documentation, reinforcement of existing road surface, repair of critical bridge structures, improvement of traffic interchanges, creation of bus stops, replacement of culverts, construction of water drainage, installation of traffic control devices, road markings, and arranging of bicycle paths, among other works
- **Trigger Event:** Disruptions to traditional transportation routes have increased dependency and utilisation of road transportation, particularly along Western border. Average traffic flow speeds have reduced to 34-45 km/h, limiting the efficient transit

BUSINESS MODEL

Possible business models may include Build-only models for road sections with design documentation already prepared and Design-Build (DB) or Design-Bid-Build (DBB) models for the remaining road segments

LINK TO REFORMS

Contributes to Ukraine Plan reforms: National Transport Strategy through 2030 and Strategy for the Development and Construction of the Border Infrastructure with EU Member States and the Republic of Moldova through 2030. Also contributes to Sustainable Development Strategy for Ukraine through 2030

Key partners

Implemented by Agency for Restoration and thus subject to USAID ERA, which conducts comprehensive audits and post-project examinations

Key Points of Project Implementation

- **Project design documentation** (public tenders[1], development and approval)
- **Independent technical supervision** (public tenders[1])
- **Construction works** (tender documentation development, public tenders[1])
- **Construction works** (execution)

[1] - These tender processes will take place via the Prozorro platform

TRANSPORT/LOGISTICS

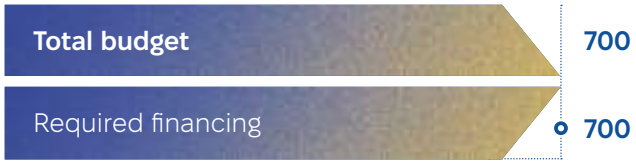
IMPROVEMENT OF ODESA PORTS ROAD ACCESS

PUBLIC SECTOR SPONSOR: MINISTRY FOR COMMUNITIES, TERRITORIES AND INFRASTRUCTURE DEVELOPMENT OF UKRAINE

ODESA REGION

- **Brief Description:** Reconstruction of two state roads (M27 Odesa-Chornomorsk and M28 Odesa-Yuzhne- M-14) to ensure sustainable and reliable road connectivity to and between three major functioning ports – Odesa, Pivdennyi, and Chornomorsk (Big Odesa ports)
- **Impacted Populations:** Seaport freight transportation providers, enhancing Ukraine's export capabilities via port infrastructure
- **Impact:** ~10% increase in freight volumes; ~20% reduction to travel time; ~40% increase in traffic projected; Daily user increase to ~130-150k users; Creation of 4,850 new jobs during construction; Improved drainage and wastewater treatment; Improved road safety and speed of emergency services
- **Value Proposition:** SWill enhance transport infrastructure and align logistical transport of Odesa region with EU standards, increasing Ukraine's export potential and facilitating future EU accession. Odesa ports have become more important as other ports have been under attack
- **Project Status:** Ready for implementation

Projects Highlights ($, mln)



Implementation Period: 1-3 years

- **Additional Details:**

M27 Odesa – Chornomorsk:

- Engineering surveys, partial design work completed
- Capital repair, reconstruction of M27 road segments and bridge over Adjalytsky estuary

M28 Odesa - Yuzhne - M-14

- Design work, capital repair and reconstruction of M28 road segments, new construction of M28 road segments and transport interchanges at various levels, new construction of the road bypassing the village of Sukhy Lyman and completion of construction of the bridge over the Sukhy estuary
- **Trigger Event:** Heavily utilization by cargo transport accessing Big Odesa ports, which have become the key route for Black sea exports via the Ukrainian Corridor

BUSINESS MODEL

Possible business models may include Build-only models for road sections with design documentation already prepared and Design-Build (DB) or Design-Bid-Build (DBB) models for the remaining road segments

LINK TO REFORMS

Contributes to Ukraine Plan reforms: National Transport Strategy through 2030 and Strategy for the Development and Construction of the Border Infrastructure with EU Member States and the Republic of Moldova through 2030. Also contributes to Sustainable Development Strategy for Ukraine through 2030

Key partners

Agency for Restoration as implementor

Key Points of Project Implementation

- **Project design documentation** (public tenders[1], development & approval)
- **Independent technical supervision** (public tenders[1])
- **Construction works** (tender documentation development, public tender processes[1])
- **Construction works** (execution)

[1] - These tender processes will take place via the Prozorro platform

TRANSPORT/LOGISTICS

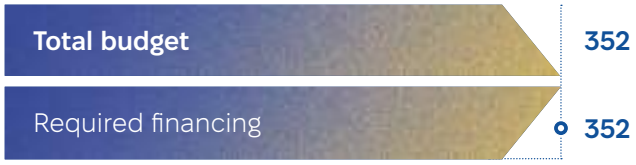
IMPROVEMENT OF WESTERN BORDER CROSSING POINTS

PUBLIC SECTOR SPONSOR: MINISTRY FOR COMMUNITIES, TERRITORIES AND INFRASTRUCTURE DEVELOPMENT OF UKRAINE

ZAKARPATTIA, VINNYTSIA, VOLYN, ODESA, CHERNIVTSI

- **Brief Description:** Improvement of 15 border crossings points (BCPs) between Ukraine and neighboring countries on Western border, allowing higher traffic volume and streamlined processing
- **Impacted Populations:** Targets automobile and pedestrian border crossings to enhance trade logistics, passenger transit (including refugees), and anti-smuggling operations at Ukraine's western borders
- **Impact:** 50% increased cargo transit capacity, improved cross-border trade facilitation, improved passenger transit capacity; reduced waiting/processing time to cross border; ~5k jobs created, more efficient transit of military and humanitarian goods into Ukraine
- **Value Proposition:** Improves cross border transportation and passenger transit efficiency, stimulating economic growth through increased exports. It will also secure import of essential goods and increase control and monitoring of goods and people crossing Ukraine's western borders
- **Project Status:** Ready for implementation

Projects Highlights ($, mln)



Implementation Period: 1-4 years

- **Additional Details: BCP improvements will include:**
  - Finishing partially complete construction works that are rendering lanes inoperable
  - Constructing new checkpoints including service areas, warehouses and access roads
  - Improving existing BCPs including installing video surveillance systems, automating BCP vehicle traffic control systems, building public toilets/canopies and establishing emergency response and civil protection systems
- **Trigger Event:** Continuous disruptions to traditional transportation routes have severely restricted Ukraine's ability to import and export goods. Greater reliance on road transportation has revealed inadequacies at BCPs, particularly for facilitating the return of Ukrainian refugees

BUSINESS MODEL

Possible business models may include build-only models for partially complete BCPs and Design-Build (DB) models for new checkpoints and assets along

LINK TO REFORMS

Will help achieve Ukraine Plan reform: Strategy for the Development and Construction of the Border Infrastructure with EU Member States and the Republic of Moldova until 2030, and enable EU accession with EU-compliant border crossings

Key partners

Will be implemented by Agency for Restoration and is thus subject to USAID ERA, which conducts comprehensive audits and post-project examinations

Key Points of Project Implementation

- **Each of the 15 components has a different implementation timeline**
- **Estimated completion periods range from 2025 to 2028**

[1] - These tender processes will take place via the Prozorro platform

TRANSPORT/LOGISTICS

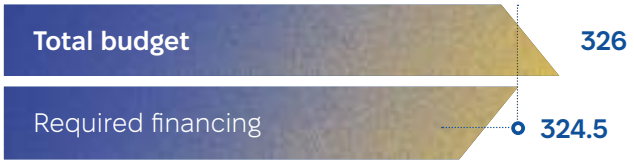
CONSTRUCTION OF NEW BRIDGE IN KREMENCHUK

PUBLIC SECTOR SPONSOR: MINISTRY FOR COMMUNITIES, TERRITORIES AND INFRASTRUCTURE DEVELOPMENT OF UKRAINE

KREMENCHUK

- **Brief Description:** Construction of new bridge across Dnipro River in Kremenchuk (Poltava oblast) with reconstruction of section of state road H-08, which links Boryspil, Dnipro, Zaporizhzhia, and Mariupol, including a bypass of city of Kremenchuk
- **Impacted Populations:** Targets automobile transport, including bike and pedestrian lanes with infrastructure for people with limited mobility
- **Impact:** Up to 60% increased traffic capacity (up to ~27k vehicles per day), up to 300 temporary construction jobs, enhanced connectivity for ~224k Kremenchuk residents, including ~7k IDPs who relocated
- **Value Proposition:** Will reduce delivery times, enhance passenger transportation, cut total transit times within Kremenchuk, ease traffic congestion, and improve the city's environmental condition. Project will establish transportation links between two banks of Dnipro river, providing enhanced connectivity between central and northern regions. Project includes infrastructure modernization to comply with EU standards and pave the way for future EU accession
- **Project Status:** Implementation stage

Projects Highlights ($, mln)



Implementation Period: 4 years

- **Additional Details:** ncludes development of documentation and feasibility (~$1.5m of funding from State Budget), construction of a bridge with four lanes of traffic and bike and pedestrian paths, including all entrances and exits to the bridge, and reconstruction of a section of State Road H-08
- **Trigger Event:** Kremenchuk sits at the intersection of M-22 Poltava, which connects the two longest international highways, and N-08, which connects Kyiv to Southeastern Ukraine. Currently, there is a single bridge connecting the banks of the Dnipro, accommodating 17k daily drivers in addition to railways. This bridge was constructed in 1949, underwent major repairs in 1988, but still requires modernization and is regularly closed for repairs. Without the bridge, Ukrainians would need to travel over 270km (northern route) or 290km (southern route)

BUSINESS MODEL

Will be implemented via the Design-Build (DB) model (contract signed and design documentation prepared)

LINK TO REFORMS

Contributes to Ukraine Plan reforms: National Transport Strategy through 2030 and Strategy for the Development and Construction of the Border Infrastructure with EU Member States and the Republic of Moldova through 2030. Also contributes to Sustainable Development Strategy for Ukraine through 2030

Key partners

Will be implemented by the Agency for Restoration and partly funded from the State Budget

Key Points of Project Implementation

Project implementation is expected to take ~48 months

All project information is provided by sponsor-initiator of the project and all monetary values are denominated in USD.

TRANSPORT/LOGISTICS

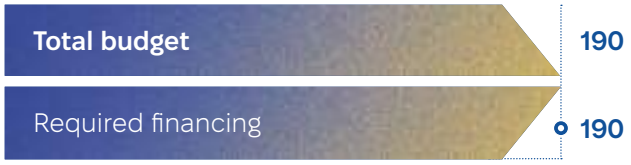
NEW UKRAINE-MOLDOVA BRIDGE CONSTRUCTION

PUBLIC SECTOR SPONSOR: MINISTRY FOR COMMUNITIES, TERRITORIES AND INFRASTRUCTURE DEVELOPMENT OF UKRAINE

VINNYTSIA REGION

- **Brief Description:** Construction of new border bridge across Dniester River to connect with Moldova. Bridge entrances, exits and connection to nearby road sections on the Ukrainian-Moldovan state border in Yampil – Koseuts. Project also includes creation of an additional international border crossing point (BCP) with Moldova
- **Impacted Populations:** Targets improving transportation for automobiles and people to support trade and economic cooperation between Ukraine and Moldova
- **Impact:** 100% increase in border crossing capacity (up to ~12k vehicles per day) to better meet projected ~200% increase in traffic between Ukraine and Moldova due to further EU integration; ~4 hour reduction in travel time between Kyiv and Chisinau from ~9 to ~5 hours; creation of up to 250-300 temporary jobs
- **Value Proposition:** Bridge will be crucial element of road network connecting Ukraine with Moldova, providing shortest route between Kyiv and Chisinau (capitals), which are both part of TEN-T network. Infrastructure modernization facilitates future EU accession

Projects Highlights ($, mln)



Implementation Period: 2 years

- **Additional Details:** Primary access route to proposed bridge is via P-08 Nemyriv–Yampil highway and a segment of T-02-02 Mohyliv-Podilskyi–Yampil–Bershad–Uman highway. Both routes have undergone comprehensive repairs in recent years
- **Trigger Event:** Passage over Dniester River requires ferry service, which as of today is not functioning. The closest border checkpoint, Mogyliv-Podilskyi-Otach is overburdened as it handles almost all border crossings between Ukraine and Moldova. Ukraine and Moldova signed an agreement in June 2023 recognizing the need to construct this additional bridge
- **Project Status:** Implementation stage. Commenced in 2021. Completed: design works, land allocation, preliminary works, construction site preparation, vegetation clearance, and land reclamation, construction of the building site, installation of utilities. Ongoing: production of support structures, reinforced concrete and steel structures

BUSINESS MODEL

Project will be implemented via the Design-Build (DB) model (contract signed and design documentation prepared).

LINK TO REFORMS

Includes modernization and improvement of transport infrastructure and road safety in accordance with requirements for EU accession. Project also contributes to Revised National Transport Strategy of Ukraine through 2030 (Ukraine Plan) and Sustainable Development Strategy for Ukraine through 2030

Key partners

Will be implemented by the Agency for Restoration

Key Points of Project Implement

- Design work, land allocation, construction site preparation, vegetation clearance, and land reclamation (completed)
- Preparatory activities and work on abutment supports (completed)
- Production of support structures, reinforced concrete and steel structures (ongoing)
- Complete construction of exits and entrances (ongoing)

All project information is provided by sponsor-initiator of the project and all monetary values are denominated in USD.

TRANSPORT/LOGISTICS

CHORNOMORSK FERRY TERMINAL (CFT) CONCESSION OPPORTUNITY

ODESA REGION

PUBLIC SECTOR SPONSOR: MINISTRY FOR COMMUNITIES, TERRITORIES AND INFRASTRUCTURE DEVELOPMENT OF UKRAINE

- **Brief Description:** Concession of Railway and Ferry Complex (CFT) for ~30 years to unlock operational potential of underutilized terminals and assets through private management and investment
- **Impacted Populations:** Potential concessionaires include operators of sea freight transshipment, transportation, ferry lines, roads and railway transshipments. Better logistics impacts all Ukrainians
- **Impact:** Optimized cargo transportation logistics; enhanced port service quality; protection of existing jobs during term of concession contract; higher environmental standards, modernized port infrastructure
- **Value Proposition:** Will increase efficiency of use and further CFT development, the only multimodal complex in Ukraine. Project also includes servicing railway, road ferry lines, and RoRo vessels1. As CFT is one of the largest terminals of this type in Black Sea region, its modernization will increase regional logistics capacity
- **Project Status:** Feasibility Study expected in June 2024

Projects Highlights ($, mln)

Total budget	TBD
Required financing	TBD

Implementation Period: 1-2 years

- **Additional Details:** Project will proceed through an open and competitive tender, with concessionaire responsible for design, construction, equipment, and cargo handling services. Transaction would include transfer of property and port infrastructure facilities and additional construction on land owned by Chornomorsk Sea Commercial Port (CSCP). EBITDA margin was 46% from 2014-2018. Concession assets provided 1.7m tons of annual cargo from 2014-2018 (38% of capacity)
- **Trigger Event:** Recent utilization has been restricted due to: russian restrictions on transshipments to Central Asia, reduction in demand for passenger vehicles, lack of investment in physical assets, deterioration, inability to attract credit due to CSCP obligation to allocate 80% of net profit to state, private competition June 2023 recognizing the need to construct this additional bridge

BUSINESS MODEL

Concession as a Form of PPP

- Full operation delegated to concessionaire or SPV: SPV responsible for design, construction, equipment, and cargo handling. Facilities transferred to SPV by CSCP2 and USPA3.
- SPV will improve asset usage efficiency and make to MoR (i) annual fixed payments, (ii) variable payments (percentage of net revenue from concession activities)

LINK TO REFORMS

Includes modernization and improvement of TEN-T transit corridors, in accordance with EU standards

Key partners

- MoR[1] – Grantor of the concession
- CSCP[2] – Holder of most assets
- USPA[3] – Holder of strategic infrastructure assets
- IFC, EBRD – Support for feasibility study preparation
- Project preparation and structuring performed by MoR in cooperation with EBRD and IFC.

Key Points of Project Implementation

- **Feasibility study** (In progress, expected in July 2024)
- **Open and competitive tender, winner selection** (2024-2025)
- **Commissioning, provision of operations** (target Q1 2026)

[1] MoR - Ministry of Restoration; [2] CSCP - Chornomorsk Sea Commercial Port; [3] USPA - Ukraine Sea Port Authority

TRANSPORT/LOGISTICS

CHORNOMORSK CONTAINER TERMINAL (CCT)

PUBLIC SECTOR SPONSOR: MINISTRY FOR COMMUNITIES, TERRITORIES AND INFRASTRUCTURE DEVELOPMENT OF UKRAINE

ODESA REGION

- **Brief Description:** Concession of two terminals (Universal Terminal and Container Terminal) for ~40 years to unlock operational potential of underutilized assets through private management and investment
- **Impacted Populations:** Potential concessionaires include operators of container transshipment and other cargo handling services. Improved logistics capacity impacts all Ukrainians
- **Impact:** Will enable increase in market share of container transshipment market. The CCT has a potential handling capacity of 750k. Target required capacity is 250k TEU per year for containers, and 3m tons per year for other cargos, while in 2008 it handled up to 540k TEUs and held a 50% market share
- **Value Proposition:** Concession is strategically positioned to reestablish competitiveness in the regional container business and to transform the CCT into a main container terminals in Ukraine. Modernized infrastructure would be compliance with EU standards, paving the way for future EU accession
- **Project Status:** Ready for implementation

Projects Highlights ($, mln)

Implementation Period: 1 year

- **Additional Details:** Will proceed through open and competitive tender, with concessionaire responsible for design, construction, equipment, and cargo handling services. Concession includes 6 berths, backyards, buildings, transport and engineering infrastructure, crane equipment, cargo equipment, staff, and other assets. Concession to span ~40 years
- **Trigger Event:** Overall decline in container volume post 2015 and cessation post invasion creates an opportunity to modernize facilities and regain regional market share

BUSINESS MODEL

- Full operation delegated to concessionaire or SPV: SPV responsible for design, construction, equipment, and cargo handling. Facilities transferred to SPV by CSCP2 and USPA3.
- SPV will improve asset usage efficiency and make to MoR (i) annual fixed payments, (ii) variable payments (percentage of net revenue from concession activities)

LINK TO REFORMS

- Contributes to 3 Ukraine Plan reforms
- Includes modernization and improvement of TEN-T transit corridors, in accordance with EU standards

Key partners

MoR[1] – Grantor of the concession
CSCP[2] – Holder of most assets
USPA[3] – Holder of strategic infrastructure assets

IFC, EBRD – support for feasibility study preparation

Key Points of Project Implementation

- Feasibility study (completed, April 2024)
- Government approval (target June 2024)
- Open and competitive tender, winner selection (target Jan 2025)
- Commissioning, provision of operations (target Q2 2025)

TEU = Twenty-foot equivalent unit
All project information is provided by sponsor-initiator of the project and all monetary values are denominated in USD.
[1] MoR - Ministry of Restoration; [2] CSCP - Chornomorsk Sea Commercial Port; [3] USPA - Ukraine Sea Port Authority

TRANSPORT/LOGISTICS

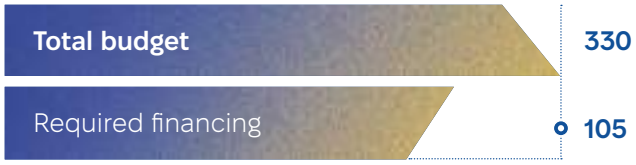
UZ LOCOMOTIVE MODERNIZATION

PUBLIC SECTOR SPONSOR: JSC «UKRAINIAN RAILWAYS»

UKRAINE

- **Brief Description:** To address needs in maintaining existing fleet while reducing maintenance and operating costs, UZ requires additional financing for modernization of 25 existing freight diesel locomotives, which includes the replacement of diesel engines with more energy efficient engines, wheel sets, and control systems
- **Impacted Populations:** Project targets railway freight transportation, enhancing goods movement and supporting Ukraine's export capacities via an upgraded rail network
- **Impact:** Expected 23% increase in average productivity of each locomotive (from 0.875 to 1.073 million tkm[1] brutto of cargo per day), 50% reduction in greenhouse gas emissions, ~35 years of extended life of locomotives
- **Value Proposition:** Promotes Ukraine's economic growth by enhancing export capacities and railway efficiency, while ensuring sustainable fleet development
- **Project Status:** Ready for implementation

Projects Highlights ($, mln)



Implementation Period: 2 year

- **Additional Details:** The total budget for diesel fleet upgrades (including acquisition and modernization) totals $330m, and includes the following components:
  - Modernization of 25 existing 2T116 model freight diesel locomotives: $105m in total, for which no commitments have been made
  - Purchase of new locomotives: $225m project budget which the US Export-Import Bank will co-finance
- **Trigger Event:** Disruptions to traditional transportation routes have increased dependency on railway transportation routes, which provide a crucial route for exports. Freight diesel locomotive fleet of UZ has an average age of 39 years and are 98.4% depreciated leading to high operational cost and frequent failures causing disruption

BUSINESS MODEL

- Possibly include financing for the procurement of equipment, components and works required for the modernization of 25 locomotives

LINK TO REFORMS

- Project includes modernization and improvement in accordance with EU norms and standards per EU accession; it also aligns with the Ukraine Plan, the National Transport Strategy through 2030, and the Sustainable Development Strategy through 2030

Key partners

Possible financing from World Bank and EBRD

Key Points of Project Implementation

- **Development of project design and modernization of pilot**
- **Material procurement (tender documentation development and public tenders through Prozorro)**
- **Construction of production and locomotive maintenance facilities of UZ through in-house contracts. New engines, control systems etc. sourced from international market**

[1] Tonne-kilometer, a unit of measurement for the transportation of one tonne over a kilometer
[2] Refers to modernization of 25 freight diesel locomotives
All project information is provided by sponsor-initiator of the project and all monetary values are denominated in USD.

TRANSPORT/LOGISTICS

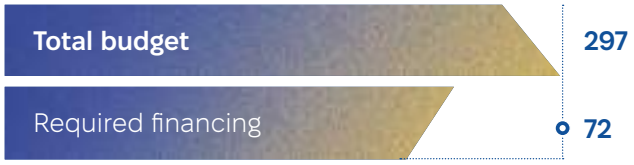
LVIV – POLAND RAIL GAUGE CONSTRUCTION

PUBLIC SECTOR SPONSOR: JSC «UKRAINIAN RAILWAYS»

LVIV REGION

- **Brief Description:** Construction of 81km of 1435-gauge rail-track from the Ukraine/Poland state border to Mostyska II section and further onto station Sknyliv (Lviv) as a part of the two EU TEN-T corridors. Includes reconstruction and replacement of tracks, construction of a passenger station and an intermodal terminal
- **Impacted Populations:** Benefits railway freight and passenger transportation, positively impacting Ukrainian business by increasing export capabilities
- **Impact:** ~2.6m tons of increased cargo capacity; capacity for ~1m-1.2m additional people to cross border; up to 565 temporary construction jobs; 111 permanent UZ jobs; additional private sector job creation from export capacity gains
- **Value Proposition:** Project will allow equal access of European railway operators to the Ukraine's railway network and promote Ukraine's economic growth and cross-border trade by enhancing export capacities and connectivity with the EU
- **Project Status:** Ready for implementation

Projects Highlights ($, mln)



Implementation Period: 4 years

- **Additional Details:** Includes reconstruction of 1520-gauge tracks and replacement of 2nd line with 1435-gauge tracks according to TEN-T requirements. Upgrade of signaling and communication systems, electrical catenary system and artificial structure. New passenger stations and intermodal terminals in Sknyliv. To date, ~$225m has been committed by USAID for design and construction of track-related projects.
- **Trigger Event:** Disruptions to traditional transportation routes, along with persistent aerial attacks on port infrastructure, have increased dependency on railway transportation routes, which provide a crucial route for refugees, goods, and humanitarian and military aid. As a result, total tons of rail transit at this route increased 98% from 2019 to 2022, for a total of ~3,557 tons of cargo

BUSINESS MODEL

- Possible business models include: Build-only models for sections with design documentation already prepared, and Design-Build (DB) or Design-Bid-Build (DBB) models for remaining segments. Once completed, UZ will oversee maintenance and operations

LINK TO REFORMS

- Contributes to Ukraine Plan reform: National Transport Strategy through 2030. Is a priority of Strategy for the EU integration of the Ukrainian and Moldovan rail systems.

Key partners

Project will be implemented by UZ in cooperation with USAID, who will define procurement processes

Key Points of Project Implementation

- **Reconstruction of existing 1,520 mm track, reorienting traffic from double to single-track; new automatic blocking and signaling**
- **Replacement of second 1,520 mm track with 1,435 mm track**
- **Construction of passenger station and intermodal terminal in Sknyliv**

All project information is provided by sponsor-initiator of the project and all monetary values are denominated in USD.

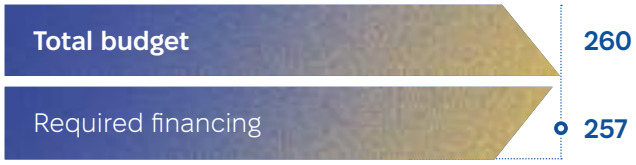
RECONSTRUCTION OF KOVEL – POLAND RAILWAY SECTION

PUBLIC SECTOR SPONSOR: JSC «UKRAINIAN RAILWAYS»

VOLYN REGION

- **Brief Description:** Reconstruction of railway structures (traction substation and tracks) of railway section running from Kovel – Yahodyn – State Border with the Republic of Poland, and electrification of this railway section in line with TEN-T regulation to increase throughput capacity and speed
- **Impacted Populations:** Benefits railway freight and passenger transportation, supporting Ukraine's export capabilities by enhancing Ukraine's railway export capacity and EU connectivity
- **Impact:** 1.5m tons of increased export capacity, 1-1.2m greater capacity for people to cross border annually, up to $2.5m in fuel cost savings due to electrification and ability to use trains weighing up to ~6k tons, ~$2.5m annual reduction in OpEx for UZ, ~250 temporary and ~120 permanent jobs across UZ
- **Value Proposition:** Reconstruction will promote Ukraine's economic growth and trade in key industries (i.e., grain and metallurgy) by enhancing export capacities and connectivity with the EU, while increasing the volume of passenger and freight transport and enhancing the safety and reliability of trains
- **Project Status:** Ready for implementation

Projects Highlights ($, mln)



Implementation Period: 4 years

- **Additional Details:** To date, the development of a feasibility study for the Project was funded by the EIB. Project also received grant for 50% of design documentation from CEF Call 2022. Total design documentation costs estimated at ~$3.4m
- **Trigger Event:** Disruptions to traditional transportation routes have increased dependency on railway transportation routes. Cross-border traffic with Poland is heavily congested. ~2.4m tons of cargo moved along this border crossing last year. Integration with EU standard gauge (1435mm) would enable more efficient transportation

BUSINESS MODEL

- Possible business models include Build-only models for sections with design documentation already prepared and Design-Build (DB) or Design-Bid-Build (DBB) models for remaining segments. Once completed, UZ will oversee maintenance and operations; works can also be executed by UZ in-house contracting

LINK TO REFORMS

- Project includes modernization and improvement in accordance with EU norms and standards per EU accession. Project also fits into Ukraine's National Transport Strategy

Key partners

Project will be implemented by UZ; feasibility study funded by EIB (NIP grant); design documentation 50% funded by CEF Call 2022. Implementation partners are TBD

Key Points of Project Implementation

- **Reconstruction of Kovel station & traction substation**
- **Construction of the Lyuboml traction substation**
- **Reconstruction of the Kovel-Yahodyn section with electrification**
- **Construction of the DPOL at Lyuboml station**

All project information is provided by sponsor-initiator of the project and all monetary values are denominated in USD.

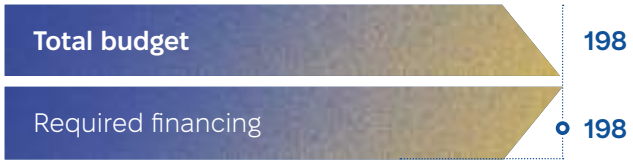
CHERNIVTSI – ROMANIA RAIL GAUGE CONSTRUCTION

PUBLIC SECTOR SPONSOR: JSC«UKRAINIAN RAILWAYS»

CHERNIVTSI REGION

- **Brief Description:** Construction and electrification of 47 km of 1435-gauge rail-track from Ukraine-Romania state border to Vadul-Siret (Romania) and further to Chernivtsi (Ukraine), as a part of the new TEN-T corridor running from Baltic Sea – Black Sea – Aegean Sea
- **Impacted Populations:** Benefits railway freight and passenger transportation, supporting Ukraine's export capabilities by enhancing Ukraine's railway export capacities and EU connectivity
- **Impact:** 1.5m addition tons of cargo capacity, capacity for 250k additional passengers, ~250 direct implementation jobs, indirect private sector job creation in long-term due to increased exports
- **Value Proposition:** Project will standardize railway gauge at strategic location and thus ensure sustainable growth of exports through Romania, serve Ukrainian national security interests, and facilitate more efficient movement of people and goods
- **Project Status:** Ready for documentation development

Projects Highlights ($, mln)



Implementation Period: 4 years

- **Additional Details:**
  Stage 1:
  - Development of documentation in 2025 (~$12m)
  - Construction of 47km of 1,435-gauge track running parallel to existing 1,520-gauge track (~$50.3m)

  Stage 2: Track electrification and TEN-T system requirement upgrades ($135.7m)
- **Trigger Event:** Disruptions to traditional transportation routes have increased dependency on railway transportation routes which are essential for refugees, goods, and humanitarian and military assistance. As a result, border crossing points in Lviv, Volyn and Chernivtsi regions are heavily congested

BUSINESS MODEL

- Possible business models include Build-only models for sections with design documentation already prepared and Design-Build (DB) or Design-Bid-Build (DBB) models for remaining segments. Once completed, UZ will oversee maintenance and operations

LINK TO REFORMS

- Contributes to Ukraine Plan reform: National Transport Strategy through 2030. Is a priority of Strategy for the EU integration of the Ukrainian and Moldovan rail systems.

Key partners

Project will be implemented by UZ

Key Points of Project Implementation

- **Project documentation: Feasibility study, general & detailed design for construction and electrification of track (2025)**
- **Construction: New 47 km of 1,435-gauge track parallel to existing 1,520 mm track (2026-2027)**
- **Electrification: Electrification to enable electric locomotives to operate on this section of railway (2027-2028)**

All project information is provided by sponsor-initiator of the project and all monetary values are denominated in USD.

4.3. ENERGY

4.3.1. Current situation and the sector role

ROLE OF THE ENERGY SECTOR IN THE ECONOMY OF UKRAINE

Before the full-scale invasion, the energy sector played a key role in Ukraine's economic growth and national security and was increasingly contributing to the country's drive to modernise its economy. The electricity sector contributed up to 8% of the Gross Domestic Product. The entire population had access to electricity.

89%
of the population

had access to treated water through pumped water systems.

UKRAINE'S POWER SYSTEM WAS AMONG THE LARGEST IN EUROPE

7th in installed generation capacity **(56 GW)**

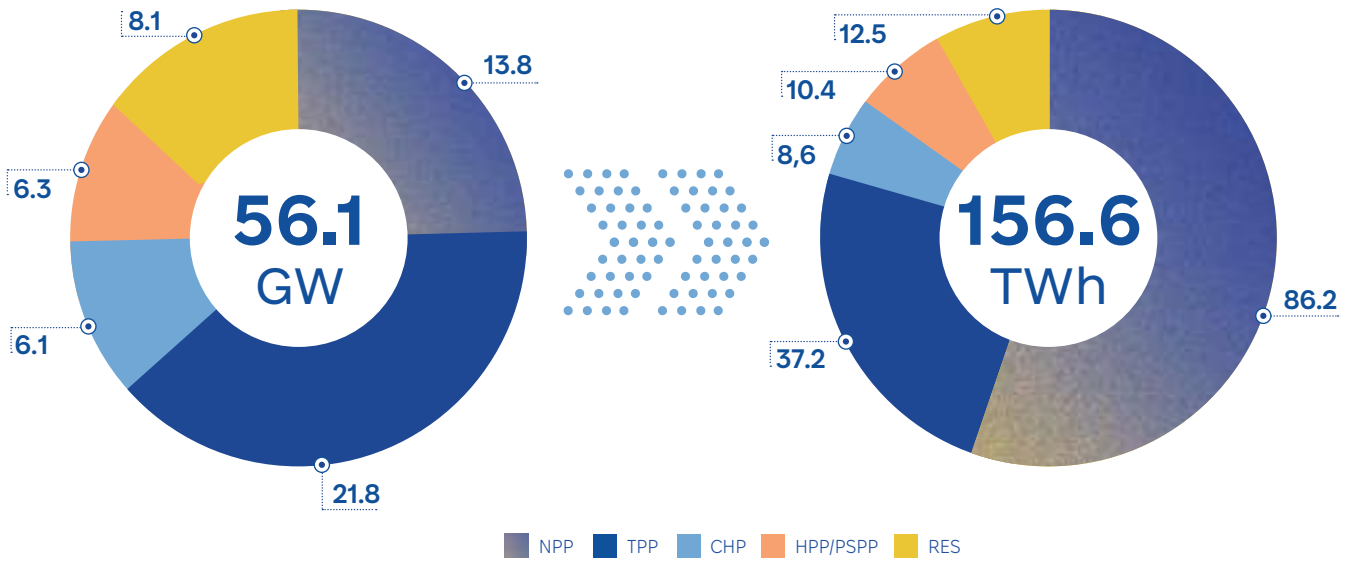
9th in electricity generation **(~156 billion kWh per year)**

Ukraine possesses a great potential for renewable energy sources (RES) development. According to the Institute of Renewable Energy of the National Academy of Sciences of Ukraine, the total potential of renewable energy sources in Ukraine reaches 874 GW, including about 250 GW of offshore wind power capacity. Meanwhile, The International Renewable Energy Agency (IRENA) estimated that Ukraine has the capacity to install more than 320 GW of wind and 70 GW of solar energy. Significant wind intensity in southern Ukraine makes wind power generation economically viable.

The country's energy mix relied heavily on nuclear generation (13.8 GW of capacity which provides 55% generation), with thermal generation utilising coal and natural gas also playing significant roles. Notably, in recent years, there has been a rapid increase in the share of generation from RES, including water, solar, wind, biomass, and biogas. Before the start of the full-scale war, Ukraine's installed renewable energy capacity included ~1.7 GW onshore wind, ~6.4 GW solar and ~6.3 GW hydroelectric power plants.

[1] https://www.ive.org.ua/wp-content/uploads/atlas.pdf

Figure 1: Installed capacity, GW, and electricity generation, TWh in 2021



The electricity sector is highly concentrated. It consists of dominant national players that generate power from coal (privately owned DTEK Energy), hydro resources (PJSC "Ukrhydroenergo"), and nuclear fuel (JSC "National Nuclear Power Generating Company "Energoatom" – Energoatom). The nationwide operator of the transmission system provides transmission and dispatching. Electricity distribution is organised among regional distributed companies that are legally separated from suppliers because of unbundling.

Onshore wind capacity in Ukraine is mostly split between a handful of large investors, including DTEK Renewables, VindKraft Ukraine, Emergy (previously NBT), Wind Parks of Ukraine, Eurocape Ukraine, Ukraine Yuzhne Energy Co. (subsidiary of a Chinese investment company CHN ENERGY Investment Group), VR Global, Eco Optima and Guris.

More than half of investment in solar capacity in Ukraine is done by medium and small companies. Major investors include DTEK Renewables, VR Global, Center Group, Scatec, CNBM, UDP Renewables, Rengy, Tokmak Solar, Eco Optima, Novosvit Energy and TIU Canada.

Ukraine also has significant reserves of natural energy resources (natural gas, oil, coal, uranium, etc.). Further development of deposits and an increase in production using the latest technologies will allow Ukraine to cover domestic consumption and ensure exports to the EU partner countries.

THE IMPACT OF THE WAR ON THE NATIONAL ENERGY SECTOR

The Ukrainian energy sector has suffered significant destruction during the full-scale invasion of russia. Only nuclear generation remains intact, producing the bulk of electricity. The capacity deficit is compensated by supplies from abroad. According to the World Bank's RDNA3 report, the damage **to the energy sector as of December 31, 2023, is estimated at**

USD 10.6 billion (this excludes ~USD 2.1 billion district heating sector)

The power sector incurred the largest share of damage totalling USD 7.5 billion, with the generation segment contributing USD 4.9 billion. The damage caused to the electricity distribution sector ~USD 430 million, the oil sector (including oil refineries, fuel depots, and fuel stations) ~USD 1.7 billion.

Total recovery and reconstruction needs as of December 31, 2023, are estimated at

USD 47.1 billion

USD 40.4 billion is necessary for power sector reconstruction, including transmission system operators, distribution system operators, and power generation facilities. Approximately USD 2.95 billion is required for the reconstruction of the gas transport system, USD 3.4 billion for the fuel oil sector reconstruction, including oil refinery facilities and distribution networks, and USD 0.3 billion for the recovery of the coal sector.

This exacerbates the need to transform the energy sector and build a modern system of generation, heat supply and energy systems. The creation of distributed generation and heat supply, the construction of new wind turbines, the construction of critical generation facilities in areas protected by air defence will allow the building of a sustainable modern energy supply system.

Recent Developments and Investments in Energy Sector

Despite the ongoing armed hostilities, Ukraine is conducting the most extensive repair campaign at energy facilities in its independence history and commissioning new generation facilities. **By the end of 2023, 100% of the repairs at TPPs and CHPs scheduled for the start of the heating season were completed, and about 3 GW of heat and power generation capacity was restored and added to the energy system**[2].

The equipment for repairs was purchased, among other things, at the expense of the Ukraine Energy Support Fund, established at the initiative of the Minister of Energy of Ukraine, German Galushchenko and European Commissioner for Energy, Kadri Simson. As of spring 2024, the Fund has managed to attract more than EUR 410 million from 13 partner countries and international organisations. Of this amount, more than EUR 393 million has been transferred to the account (the remaining amount is the announced contributions that will be transferred to the Fund's participants shortly). These funds have been used to finance the most urgent needs of Ukrainian energy companies, such as equipment, spare parts, and other technical items, as well as fuels and services needed to repair infrastructure and maintain energy and heat supply in Ukraine.

Moreover, it's critical to provide passive defence and/or fortification structures for critical energy infrastructure facilities to protect them from future russian missile and drone attacks.

Nuclear generation

Together with US-partners, the construction of new KhNPP-5 and KhNPP-6 power units using Westinghouse AP1000 technology at Khmelnytsky NPP has begun. The expected additional capacity is more than 2,000 MW. These power units are manoeuvrable, which is the optimal solution under current conditions. In addition, joint efforts of Westinghouse and Energoatom have developed a new type of nuclear fuel for VVER-440 reactors, which will allow them to compete with russia, which had a monopoly in this market before the full-scale invasion of Ukraine.

In 2023, an agreement was signed with Holtec International on the construction of up to 20 nuclear power units with SMR-160 reactors (with a total capacity of 3,200 MW) in Ukraine. In 2024, an agreement was reached to create facilities in Ukraine to produce and manufacture nuclear systems, structures, and components for small modular reactors and storage and transportation systems for used nuclear fuel.

Renewable energy sources

However, despite the ongoing war, investment in renewable energy in Ukraine has not stopped. In 2023, 182.3 MW of wind power plants, about 500 MW of solar power plants (mainly on the consumer side), and about 100 MW of gas power plants (mainly on the consumer side) were commissioned. Investments in Ukraine's energy infrastructure have been substantial, especially in renewables. For example, in 2023, Ukrainian businesses invested approximately USD 150 million in solar energy. Most of the new-generation facilities have a capacity of 1 megawatt or less. The most significant new power plant operational in 2023 was DTEK's Tyligulska wind farm, located in the Mykolaiv region, with a generation capacity of 78 MW.

At the beginning of 2022, Ukraine had approximately 45 thousand prosumers (solar power plant owners)[3]. At the beginning of 2024, according to the Solar Energy Association of Ukraine, this figure exceeded 54 thousand. It is estimated that out of the 500 MW of total SPP capacity built in 2023, most do not exceed 1 MW each, and they were commissioned primarily to replace their consumption.

Thermal generation

The Ukrainian government and private sector are making concerted efforts to restore and enhance energy infrastructure. In 2023, DTEK, Ukraine's largest private energy group, invested about USD 300 million in thermal power plant repairs and coal mining. Furthermore, the US Agency for International Development (USAID) has significantly supported Ukraine's energy sector. In 2023, USAID provided USD 475 million in emergency energy assistance to help restore and strengthen the energy infrastructure and critical electricity grid components.

[2] https://mev.gov.ua/novyna/herman-halushchenko-my-vidnovyly-i-dodaly-do-enerhosystemy-3-hvt-potuzhnosti
[3] https://www.aseu.solar/about-6

Biomethane

Currently, Ukraine has a potential for biomethane production of about 10 billion m^3 per year, provided mainly by agricultural residues. In 2023, a new biomethane plant was launched. Another one is expected to be launched this year, and 10 in the next 2 years, which will significantly increase the volume of generation from this source in the Ukrainian market.

The further recovery and development of Ukraine's energy sector are prerequisites for its becoming a driver of economic growth. The key to this will be the full integration of Ukraine's energy markets with European ones and the attraction of foreign private capital to the Ukrainian energy sector.

4.3.2. Overview and outlook of key reforms

Until February 24, 2022, Ukraine closely collaborated with international partners to improve state regulation of the energy sector and optimise the industry's environmental impact. **Despite hostilities and ongoing challenges for the energy sector, Ukraine continued to implement EU norms on the functioning of the energy market, achieving the following milestones:**

November 2022

Establishment of JSC "Ukrainian Distribution Grids," increasing the reliability and efficiency of DSO management.

February 2023

Completing the corporatisation of Energoatom as one of the stages of corporate governance reform.

April 2023

Adopting the National Energy Strategy until 2050 (ESU2050).

April 2023

Certification of Ukrtransgaz, the gas storage operator, in accordance with new EU regulations, allowing foreign traders to store more than 3 bcm of natural gas from non-residents into gas storage facilities of Ukrtransgaz in 2023.

December 2023

Full membership of the National Energy Company Ukrenergo (ISO-certified transmission system operator of Ukraine with the functions of operational and technological control of the Integrated Power System of Ukraine, the transmission of electricity via trunk power grids from generation to distribution networks) in ENTSO-E.

December 2023

The process of de-oligarchization of gas distribution networks has been completed. Seventy-seven gas distribution companies have already come under state control, guaranteeing uninterrupted gas supply in times of war (as of 2023, the length of distribution pipelines was 227 thousand kilometres).

January 2024

Presentation of the draft Hydrogen Strategy of Ukraine until 2050.

February 2024

Adoption of the Resolution «On the Introduction of Guarantees of Origin of Electricity Generated from Renewable Energy Sources».

As of the beginning of 2024, several strategies and reforms have been planned together with international partners and considering the current situation in the energy sector, including:

Reform 1: Development and approval of the Integrated National Energy and Climate Plan (Q2 2024)

Potential impact: The reform will introduce a comprehensive approach to energy and environmental policy making. This approach requires alignment of goals across government agencies and provides a level of planning that will facilitate public and private investment. Approval of the plan will ensure synchronisation of the implementation of public policies in energy and climate, coordination of governmental actions for reaching greater policy efficiency in the spheres of energy and climate, promotion of a clear step-by-step approach to achieving the goals of low-carbon development, effective preparation and implementation of policies, synchronisation of national and European policies, practical implementation of the European integration in respective spheres, provision of greater clarity and specification of national policies for investors in order to strengthen trust and inspire investments, and contribute to coordination of donor and partners cooperation in the spheres for a more efficient and practical implementation of policies.

Reform 2: Ensuring the independence of the regulator (National Energy and Utilities Regulatory Commission) (Q4 2024)

Potential impact: Ensuring the independence of the Regulator will become the basis for ensuring the effective functioning and development of markets in the energy and utilities sectors through impartial regulation of markets in order to balance the interests of consumers, business entities operating in the energy and utilities sectors, as well as ensuring energy security, European integration of the electricity and natural gas markets of Ukraine. It will promote NEURC's structured and systematic interaction with ACER (the Agency for the Cooperation of Energy Regulators).

Reform 3: Improving the efficiency of the district heating sector (Q4 2025)

Potential impact: Implementation of the reforms will help improve the sustainability of district heating, enhancing the energy security of settlements, reduce heat and water losses in district heating and improving overall efficiency (including management) to make it the most affordable and secure solution for heat and hot water supply to residents and other final customers in municipalities. As such, it will help create a favourable framework for investments in high-efficiency district heating and high efficiency cogeneration, increase the resilience of the unified energy system and decentralisation of generation facilities and ultimately support decarbonisation and reduction of greenhouse gas emissions. The reduced loss of water and reduced energy consumption resulting from improved efficiency of district heating will contribute positively to the mitigation of climate change and a more sustainable use of water resources, to the extent possible in a context of war or post-war recovery and reconstruction.

Reform 4: Electricity market reform (Q2 2026)

Potential impact: The integration of the Ukrainian electricity markets into the European ones will increase the volume of cross-border trade, improve the security of both Ukrainian and EU markets, making them less sensitive to external factors, unfair competition and possible market abuse.

Reform 5: Liberalisation of electricity and natural gas prices (Q2 2026)

Potential impact: The implementation of the reform will ensure the strengthening of competition in the wholesale and retail natural gas and electricity markets. This, in turn, will attract investment in the energy sector. The improved incentives for businesses and consumers to save energy following the liberalisation of energy prices is expected to contribute positively to the mitigation of climate change, to the extent possible in a context of war or post-war recovery and reconstruction.

Reform 6: Improvement of the regulatory framework for increasing renewable energy and ensuring stable operation of the energy system (Q3 2026)

Potential impact: The reform will ensure the creation of legal, organisational and technical conditions for the sustainable development of renewable energy on a competitive market basis, with the goal to increase the share of renewable energy in the energy balance of Ukraine in accordance with Ukraine's international obligations and national strategies and plans, while ensuring the security of energy supply to consumers. The Improved regulatory framework for increasing renewable energy and ensuring stable operation of the energy system will contribute positively to the mitigation of climate change and to other 'do no significant harm' principles, to the extent possible in a context of war or post-war recovery and reconstruction.

Reform 7: Improvement of energy efficiency in public buildings and public procurement procedures, taking into account energy efficiency requirements (Q1 2027)

Potential impact of the reform: Implementation of reform will help increase the energy sustainability of buildings and municipalities in general by reducing energy consumption in an energy-efficient way, contribute to enhancing quality of life and health by improving the internal environment and thermal comfort, expand opportunities for sustainable energy development in municipalities and reduce greenhouse gas emissions, improve the well-being of residents and the financial capacity of local governments by boosting business activity and creating new green jobs and help reduce energy poverty. The improved energy efficiency in public buildings and increased focus on energy efficiency performance in public procurement will contribute positively to the mitigation of climate change, to the extent possible in a context of war or post-war recovery and reconstruction.

4.3.3. Tendencies and trends

Despite the full-scale war, Ukraine continues to fulfil its international commitments and follow the energy sector agenda:

Phase out coal generation and achieving climate neutrality

Ukraine follows the global trend towards decarbonisation and aims to end the use of coal in the energy sector by 2035, considering all energy security issues since a significant part of Ukraine's thermal generation is using coal as a raw material. The coal-fired generation will be replaced by combined fuel CHPs and TPPs (natural gas biomethane) and biofuel CHPs (solid waste, agricultural waste, wood, etc.).

Also, in 2023, Ukraine adopted ESU2050, which defines one of the key strategic goals: achieving climate neutrality in the energy sector by 2050 and ensuring a 100% carbon-free energy mix by 2050.

European integration

Ukraine aims to develop the energy sector in synergy with the EU. Thus, in 2023, Ukraine fulfilled all the technical requirements in the Agreement on the Future Interconnection of the Power System of Ukraine and Continental Europe. The Ukrainian power grid was finally synchronised with the European, and Ukrenergo became a full member of ENTSO-E. Ukraine and Poland expanded their electricity exchange capabilities through a joint power transmission line of almost 400 km. **The capacity for electricity imports was also increased to 1,700 MW (in 2022-2024, electricity imports amounted to 1 billion kWh, and exports to the EU countries – 3 billion kWh).**

The operator of gas storage facilities Ukrtransgaz has been certified in accordance with the new EU regulations. Ukraine also joined the AggregateEU joint natural gas procurement platform in 2023.

Ukraine takes into account the EU's goals in the energy sector in its own strategic documents, particularly the Energy Strategy, as well as in other draft strategic documents, namely the Hydrogen Strategy of Ukraine until 2050 and the National Energy and Climate Plan, etc.

Integration of Ukraine's national energy sector with the European one remains an important goal for the country in 2024.

Development of renewable energy sources (RES)

For Ukraine, the development of clean energy is one of the key factors in ensuring energy independence and security, especially in the context of russia's full-scale military aggression. The share of RES in Ukraine's energy mix remains significant – in 2023, about 10% of electricity was generated by wind and solar power plants. **Considering sizable hydroelectric power plants, (more than in the pre-war period) the share of clean energy produced reached 20.3% (more than in the pre-war period).**

The Energy Strategy of Ukraine, adopted last year, envisages a course towards producing clean energy. In 2030, the share of renewable energy sources should be at least 25% in the energy mix, and by 2050, Ukraine will achieve climate neutrality.

Energy efficiency

The State Fund for Decarbonization and Energy-Efficient Transformation in Ukraine was established in 2023, thereby introducing the European "polluter pays" principle as provided for by the EU Energy and Climate Action Regulation. The fund is also planned to attract international loans and grants, with the funds received earmarked for introducing new technologies to reduce emissions, the thermal modernisation of buildings and social facilities, and other projects. **By 2030, according to the National Energy Efficiency Action Plan, final energy consumption in Ukraine is projected to be reduced by 17%.**

In 2023, a unique multi-level and multi-component IT tool, the Ukrainian National Decarbonization Platform (UANDP), was developed. The platform will serve several functions, including project collection and implementation (from technical solutions to funding), popularisation and education, and monitoring and verifying national goals.

Establishing a network of regional decarbonisation and energy efficiency offices has commenced, with the first offices opening in Dnipro and Kropyvnytskyi for cooperation with local governments.

4.3.4. Prospects and potential for the sector

Energy hub of Europe

The destruction of a significant part of Ukraine's energy infrastructure will be the impetus for rebuilding with the latest technologies. Interaction with European markets will increase as Ukraine moves closer to EU accession. The development of the Ukrainian energy sector will help European countries eliminate their dependence on russian energy products. This will improve the energy sustainability of the Ukrainian and the EU energy systems. **According to the ESU2050, exports to the EU countries are planned to increase, namely green electricity (6 GW from 2032 and 10 GW from 2050), hydrogen, ammonia, green steel, and biomethane.** Europe's largest gas storage facilities (30.95 billion m³) will also be used, and modern energy equipment will be produced for Ukraine's reconstruction and international exports.

Decentralised generation

The decentralisation approach effectively counters russia's terror against Ukraine's energy-generating capacities. **Ukraine considering the possibility of building hundreds of small power plants (from 5 MW to 30 MW) that can operate independently of each other.** This approach will ensure the stability of electricity supply in the event of a partial capacity failure. Diversification implies a large number of generating facilities and their diversity. Since wind farms and solar power plants depend on weather conditions, other facilities (gas plants, biogas heat generation, electricity storage systems, and other fuels) are being considered to balance capacity.

Hydrogen hub

Ukraine is well-positioned to become a key supplier of hydrogen to Central Europe due to the several competitive advantages. Abundant renewable energy resources combined with high land availability could enable at-scale build-out of renewable hydrogen production. Substantial existing zero-carbon energy capacity (hydro and nuclear) could serve as a transition energy source for clean hydrogen production and provide baseload power to ensure high electrolyzer utilisation. The country also has an extensive natural gas pipeline network that connects it to Central Europe, making it an attractive potential supplier of hydrogen to the region.

Even before the outbreak of the full-scale war, Ukraine was included in Hydrogen Europe's 2X40 GW Initiative, which envisages cooperation and construction of electrolysers with a total capacity of 8 GW in Ukraine by 2030 for export. Currently, the Hydrogen Strategy of Ukraine until 2050 and an operational action plan for its implementation are being developed. **The strategy defines the achievement of low-carbon hydrogen exports of 0.3 to 0.4 million tons in 2035 and 1.5 to 2.0 million tonnes in 2050, depending on the demand of importing countries.**

For more information about the Hydrogen Strategy of Ukraine until 2050, please refer to paragraph 4.4.2. "Overview of hydrogen opportunity in Ukraine".

The primary market for Ukrainian hydrogen exports is the EU market. Targeted infrastructure for hydrogen imports to the EU is planned in three priority supply corridors: the Mediterranean, the North Sea region, and Ukraine. On November 28, 2023, the European Commission adopted the first list of Projects of Common Interest (PCI) and Projects of Mutual Interest (PMI), which fully meets the objectives of the European Green Deal, including the Central European Hydrogen Corridor, which should ensure competitive transportation of renewable hydrogen from Ukraine through Slovakia and the Czech Republic to Germany and other EU countries. The project is scheduled to be implemented by 2030 with a design capacity of up to 1.5 million tonnes per year.
For more details about hydrogen production and its prospects in Ukraine, please refer to the paragraph 4.4 "Hydrogen" of this investment guide.

Localisation of power equipment manufacturing

Ukraine has a great potential for localising the manufacture of solar panels, ESUs (energy storage units), electrolysers, turbines, small modular reactors, nuclear fuel components, grids, transformers, and other energy equipment.

The production of integrated solar modules, racks, and other electronic components will help meet growing domestic demand and reduce EU countries' dependence on China. The GoU is ready to provide sites for privatisation to promote localisation.

Localisation of wind generation involves the production of all components of the tower, base, nacelle, and rotor. To facilitate localisation development, the possibility of privatising the facilities of Zaporozhtransformator and JSC Ukrainian Energy Machines is being considered.

The localisation of energy storage unit production in Ukraine is possible based on the use of explored lithium reserves at the Polokhivske, Shevchenkivske, Dobra, and Kruta Balka deposits. According to the Ukrainian Geological Survey, as of 2023, lithium and graphite reserves are sufficient to produce cathode and anode materials for lithium-ion batteries with a capacity of 1,000 GWh, which would power nearly 20 million electric vehicles.

In close cooperation with Holtec International, facilities are planned to produce and manufacture nuclear systems, structures, and components for small modular reactors and storage and transportation systems for used nuclear fuel.

ENERGY

Highlighted investment projects

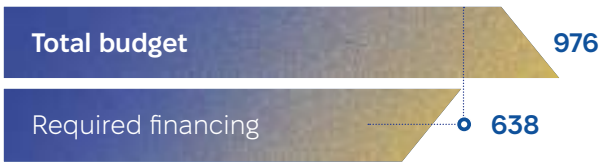
«DTEK RENEWABLES» LLC

DTEK POLTAVSKA WIND POWER PLANT

POLTAVA REGION

- **Brief Description:** Construction of a new wind power plant with a capacity of 650 MW and a projected annual electricity generation of over 2 billion kWh in the Poltava region
- **Target Market:** Upon completion of the Project's construction, the WPP will strengthen Ukraine's energy independence and partially compensate for the deficit of electricity due to lost and damaged generation capacities.
- **Products/Services:** Wind power generation of over 2 billion kWh.
- **Technologies and Innovations:** Wind power plant.
- **Unique Selling Proposition**: Increasing the share of renewable energy, strengthening energy independence, partial compensation of electricity shortages due to lost and damaged capacities.
- **Project Status:** Feasibility study/pre-feasibility study

Projects Highlights[1] ($, mln)



Type of financing – to be discussed with potential investors

Financing structure: CAPEX – 80% / Other costs – 20%

Expected Financial Indicators:

- NPV – subject to financing model
- DPP (months) – subject to financing model
- Revenue – 148 (1st full year)
- IRR – 10% (standard level for wind projects in Ukraine)
- Project launch period – 2024
- EBITDA – 123 (1st full year)

BUSINESS MODEL

DTEK Renewables is the operating company managing the renewable energy assets of DTEK Group. The company's green portfolio is 1.1 GW of solar and wind capacities, which located in the Mykolaiv, Zaporizhzhia, Dnipropetrovsk, and Kherson regions and 0.4 GW will be constructed in 2024-2025.

KEY FINANCIALS DTEK GROUP IN 2020 (MLN UAH)

Revenue	EBITDA	Total assets
116.1	32.8	180.4

Key partners

The Project will use WTGs as well as major technical equipment from world leading manufacturers

Key Points of Project Implementation:

2024 Start of project implementation → **2026** Commissioning → **650 MW of new WPP capacities**

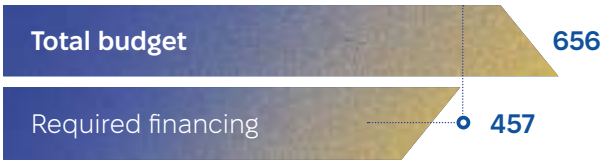
1 - The project information and financial indicators are provided by company-initiator of the project.

«DTEK RENEWABLES» LLC | PODILSKA WPP

VINNYTSIA REGION

- **Brief Description:** Project capacity – 500 MW. At the development stage. Measures are being taken to assess decisions on connection to electrical networks
- **Target Market:** Upon completion of the Project's construction, the WPP will strengthen Ukraine's energy independence and partially compensate for the deficit of electricity due to lost and damaged generation capacities.
- **Products/Services:** Wind power generation 1.5 billion kWh.
- **Technologies and Innovations:** Wind power plant.
- **Unique Selling Proposition:** Compensation for destroyed TPP capacities, helping Ukraine fulfill green transition obligations and the tasks of the Energy Strategy 2050. WPPs are at a lower risk of destruction from the terrorist attacks

Projects Highlights[1] ($, mln)



Type of financing – to be discussed with potential investors

Financing structure: CAPEX – 85% / Other costs – 15%

Expected Financial Indicators:

- NPV – subject to financing model)
- DPP (months) – subject to financing model
- Revenue – 113 (1st full year)
- IIRR – 10% (standard level for wind projects in Ukraine)
- Project launch period – 2025
- EBITDA – 94 (1st full year)

- **Project Status:** Feasibility study/pre-feasibility study

BUSINESS MODEL

DTEK Renewables is the operating company managing the renewable energy assets of DTEK Group. The company's green portfolio is 1.1 GW of solar and wind capacities, which located in the Mykolaiv, Zaporizhzhia, Dnipropetrovsk, and Kherson regions and 0.4 GW will be constructed in 2024-2025.

KEY FINANCIALS DTEK GROUP IN 2020 (MLN UAH)

Revenue	EBITDA	Total assets
116.1	32.8	180.4

Key partners

The Project will use WTGs as well as major technical equipment from world leading manufacturers

Key Points of Project Implementation:

2024 Start of project implementation → **Q2 2025** Completed development → **Q4 2026** Completed development → **500 MW of new WPP capacities**

1 - The project information and financial indicators are provided by company-initiator of the project.

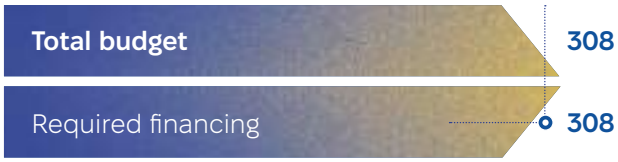
«WIND PARK WEST R» LLC

WPW «WIND PARK WEST R»

RIVNE REGION

- **Brief Description:** Construction of a wind farm with a total capacity of 200.6 MW (34 wind turbines), including a new electric substation PS 330/35 on the southern part territory of Rivne regions
- **Target Market:** strengthening Ukraine's energy sector.
- **Products/Services:** Wind power generation.
- **Technologies and Innovations:** Wind farm with a capacity of 200.6 MW (34 wind turbines), new electrical substation PS 330/35.
- **Unique Selling Proposition:** The annual projected capacity of 680 000 MWh*, the connection of 330 kV.
- **Project Status:** 50% Ready for implementation

Projects Highlights[1] ($, mln)



Type of financing – equity financing

Financing structure: CAPEX – 90%* / OPEX – 10%*

Expected Financial Indicators:

- NPV ~ 4.7*
- DPP (months) ~ 67*
- Revenue ~ 72.4* (annually)
- IRR ~ up to 17.5%
- Project launch period ~ Q2 2025
- EBITDA ~ 60.5* (annually)

BUSINESS MODEL

Includes the selection of suitable sites (completed), wind measurement campaign 24 months (completed), financing and implementation of the construction, installation and operation stages of a 200.6 MW wind power plant with 34 turbines and a new electrical substation on the southern part the Rivne regions. It includes site evaluation, investment attraction, detailed planning, construction, operation, power distribution and project management to ensure successful project execution and long-term viability.

Key partners

Energy equipment suppliers, energy companies, and financial institutions

Key Points of Project Implementation:

2025 Start of project implementation → **2027** Commissioning → **200.6 MW of new WPP capacities**

1 - The project information and financial indicators are provided by company-initiator of the project. * - approximately

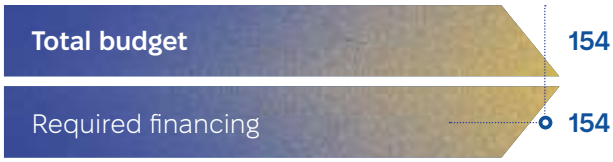
«WIND PARK WEST L» LLC

WPW «WIND PARK WEST L»

LVIV REGION

- **Brief Description:** Construction of a wind farm with a total capacity of 100.3 MW (17 wind turbines), including a new electric substation PS 110/35 on the territory of Lviv regions
- **Target Market:** strengthening Ukraine's energy sector.
- **Products/Services:** Wind power generation.
- **Technologies and Innovations:** Wind farm with a capacity of 100.3 MW (17 wind turbines), new electrical substation PS 110/35
- **Unique Selling Proposition:** The annual projected capacity of 345000 MWh*, the connection of 110 kV
- **Project Status:** 50% Ready for implementation

Projects Highlights[1] ($, mln)



Type of financing – equity financing

Financing structure: CAPEX – 90%* / OPEX – 10%*

Expected Financial Indicators:

- NPV ~ 2.4
- DPP (months) ~ 67*
- Revenue ~ 36.2* (annually)
- IRR ~ up to 17.5%
- Project launch period ~ Q2 2025
- EBITDA ~ 30.2* (annually)

BUSINESS MODEL

Includes the selection of suitable sites (completed), wind measurement campaign 24 months (completed), financing and implementation of the construction, installation and operation stages of a 200.6 MW wind power plant with 34 turbines and a new electrical substation on the southern part the Rivne regions. It includes site evaluation, investment attraction, detailed planning, construction, operation, power distribution and project management to ensure successful project execution and long-term viability.

Key partners

Energy equipment suppliers, energy companies, and financial institutions

Key Points of Project Implementation:

2025 Start of project implementation → **2027** Commissioning → **100.3 MW of new WPP capacities**

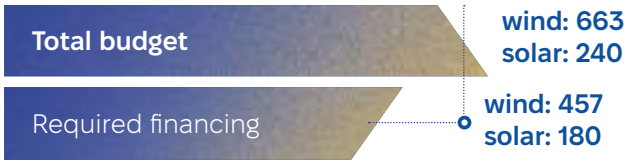
1 - The project information and financial indicators are provided by company-initiator of the project. * - approximately

GURIS | PLAKHTIYIVKA ENERGY COMPLEX

ODESA REGION

- **Brief Description:** 460 MW wind farm, 460 MW solar farm, 100 MW/200MWh energy storage facility
- **Target Market:** Strengthening Ukraine's energy sector.
- **Products/Services:** Energy generation (hybrid wind and solar) and storage.
- **Technologies and Innovations:** A combination of a wind farm, a solar farm and an energy storage facility.
- **Unique Selling Proposition:** The combination of wind, solar and battery storages allows reliable and stable supply of green electricity all across the day and the year. Potential private PPA with 500MW Hydrogen in Zakarpattia of the same investors
- **Project Status:** Ready for implementation in Q4 2024

Projects Highlights[1] ($, mln)



Type of financing – Debt financing (MFIs, commercial banks)
Financing structure: CAPEX equity 25% / debt 75%, OPEX equity 100%

Expected Financial Indicators:

- NPV – wind: 1066, solar: 705
- DPP (months) – wind: 84, solar: 72
- Revenue – wind: 130, solar: 53 (annually)
- IRR : up to 18%
- Project launch period – 2025
- EBITDA – wind: 88, solar: 50 (annually)

Highlights are given for wind and solar only as energy storage is very dependent on changes in the grid code.

BUSINESS MODEL

Güriş is a privately owned engineering and construction company founded 67 years ago, currently working in Turkey, Europe, the Middle East, Ukraine, and North Africa. Güriş, as an EPC contractor, executes diverse construction projects. Since the early 2000s, Güriş has put more emphasis on investments in renewable energy. Right now, company operates 1,132 MW of renewable projects (of which 766 MWs is wind) and develops additional projects totaling more than 500 MWs in Turkey and in neighboring countries.
N1 Capital excels in developing utility-scale green hydrogen projects, typically over 100 MW, integrating wind, solar, and battery storage. The current pipeline includes over 1 GW of green hydrogen, 800+ MW of PV, and 300+ MW of wind power.

Key partners

Energy equipment suppliers, energy companies, and financial institutions

Key Points of Project Implementation:

2024
Start of project implementation

→

2026
Commissioning

→

460 MW WPP
460 MW SPP
100 MW/200MWh energy storage system

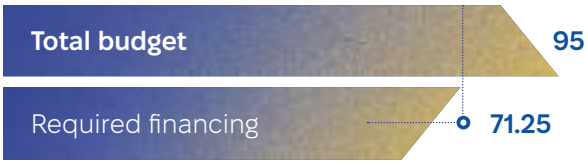
1 - The project information and financial indicators are provided by company-initiator of the project.

GURIS | OVID NORTH

ODESA REGION

- **Brief Description:** 66 MW extension of existing 32MW Ovid Wind power plant
- **Target Market:** Strengthening Ukraine's energy sector.
- **Products/Services:** Wind power generation
- **Technologies and Innovations:** Wind farms.
- **Unique Selling Proposition:** 20km away from Odesa, Ovid Wind was in 2022 one of the wind farm allowing to keep the lights of the city on. Its extension, Ovid North can be implemented very rapidly.
- **Project Status:** Ready for implementation

Projects Highlights[1] ($, mln)



Type of financing – Debt financing (MFIs, commercial banks)

Financing structure: CAPEX equity 25% / debt 75%, OPEX equity 100%

Expected Financial Indicators:

- NPV – 160
- DPP (months) – 84
- Revenue – 20.5 (annually)
- IRR – 18%
- Project launch period – 2025
- EBITDA – 14 (annually)

BUSINESS MODEL

Güriş is a privately owned engineering and construction company founded 67 years ago, currently working in Turkey, Europe, the Middle East, Ukraine, and North Africa. Güriş, as an EPC contractor, executes diverse construction projects. Since the early 2000s, Güriş has put more emphasis on investments in renewable energy. Right now, company operates 1,132 MW of renewable projects (of which 766 MWs is wind) and develops additional projects totaling more than 500 MWs in Turkey and in neighboring countries.

Key partners

Energy equipment suppliers, energy companies, DFC and other financial institutions

Key Points of Project Implementation:

2024
Start of project implementation

→

Dec 2024 / Jan 2025
Commissioning

→

66 MW
of new WPP capacities

1 - The project information and financial indicators are provided by company-initiator of the project.

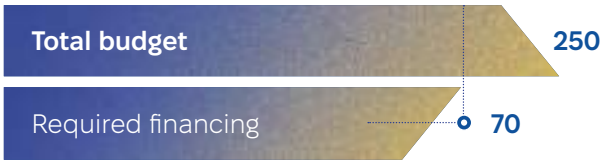
PJSC «UKRHYDROENERGO»

HYBRID POWER GENERATION SYSTEMS INSTALLATION

5 REGIONS

- **Brief Description:** installation of hybrid storage systems at five generating facilities of PJSC "Ukrhydroenergo"
- **Target Market:** Strengthening Ukraine's energy sector
- **Products/Services:** Electricity generation and storage
- **Technologies and Innovations:** installation of hybrid storage systems – 197 MW and solar systems – 35.9 MW.
- **Unique Selling Proposition:** Enhances energy system reliability, supports operations in ENTSO-E conditions, enables integration of new renewable energy capacities, and minimizes limitations on renewable sources.
- **Project Status:** Feasibility study/pre-feasibility study

Projects Highlights[1] ($, mln)



Type of financing – credit and own funds

Financing structure: CAPEX – 98.5% / OPEX – 1.5%

Expected Financial Indicators:

- NPV – 198.3
- DPP (months) – 51
- Revenue – 46.88
- IRR – 27.7%
- Project launch period – 2023
- EBITDA – TBD

BUSINESS MODEL

Ukrhydroenergo is the largest hydropower generating company in Ukraine, 100% shares of which belong to the state. The company is on the list of 15 enterprises in the public sector of the economy, the total assets comprising 70% of the total indicator in the public sector.

KEY FINANCIALS 31.12.2021 IN MLN UAH

Income	Profit	Total assets
23 437.7	11 260.8	49 325.9

Key partners

European Bank for Reconstruction and Development, Climate Investment Funds

Key Points of Project Implementation:

2024 Start of project implementation → **2027** Commissioning → **Installation of 197 MW of new hybrid energy storage systems and 35.9 solar systems at the company's 4 HPPs**

1 - The project information and financial indicators are provided by company-initiator of the project.

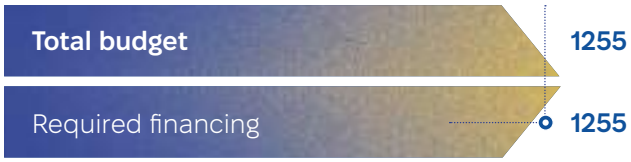
PJSC «UKRHYDROENERGO»

CONSTRUCTION OF THE THIRD PHASE OF THE DNISTER HPP

CHERNIVTSI REGION

- **Brief Description:** Construction and commissioning of new highly maneuverable generating capacities of the 972 MW HPP
- **Target Market:** Strengthening Ukraine's energy sector.
- **Products/Services:** Hydroelectric power generation
- **Technologies and Innovations:** hydro units No. 5-7, new production facilities of the Dniester HPP.
- **Unique Selling Proposition:** The project is already underway, having been developed, approved, and expertly assessed. Contracts for general contracting and the development of working documentation have been finalized

Projects Highlights[1] ($, mln)



Type of financing – credit and own funds

Financing structure: CAPEX – 100% / OPEX – 0%

Expected Financial Indicators:

- NPV – 814.18
- DPP (months) – 112
- IRR – 21.6%
- Project launch period – 2023

- **Project Status:** Implementation stage

BUSINESS MODEL

Ukrhydroenergo is the largest hydropower generating company in Ukraine, 100% shares of which belong to the state. The company is on the list of 15 enterprises in the public sector of the economy, the total assets comprising 70% of the total indicator in the public sector.

KEY FINANCIALS DTEK GROUP IN 2020 (MLN UAH)

Income	Profit	Total assets
23 437.7	11 260.8	49 325.9

Key partners

Energy equipment suppliers, energy companies, and financial institutions

Key Points of Project Implementation:

2023 Start of construction → **2028** Commissioning → **976 MW of new generating capacity**

1 - The project information and financial indicators are provided by company-initiator of the project.

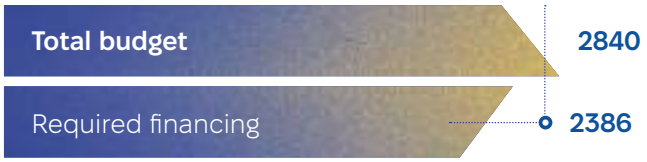
PASSIVE DEFENSE OF CRITICAL ENERGY INFRASTRUCTURE

14 REGIONS

PUBLIC SECTOR SPONSOR: MINISTRY FOR COMMUNITIES, TERRITORIES AND INFRASTRUCTURE DEVELOPMENT OF UKRAINE

- **Brief Description:** Construction of passive defense and/or fortification structures for 22 critical energy infrastructure facilities to protect facilities from future russian missile and drone attacks
- **Impacted Populations:** Sufficient and stable access to electricity is a need for all economic sectors and populations within Ukraine, particularly as russian aggression continues to target energy infrastructure
- **Impact:** Increased resiliency of energy infrastructure across 14 regions of Ukraine, ~3k temporary construction jobs, reduced disruptions to grid operations .
- **Value Proposition:** Intended to increase resiliency of critical energy infrastructure to future russian attacks and reduce risk of blackouts and other interruptions to millions of Ukrainians.
- **Project Status:** Ongoing, began in 2022

Projects Highlights[1] ($, mln)



Type of financing – 2 years

Additional Details: Includes 2 types of defense to be implemented across 22 critical infrastructure facilities across Ukraine:
- Level II: Unmanned aerial vehicle (UAV) protection (USD 2,372 mln)
- Level III: Anti-missile protection (USD 467 mln)

Trigger Event: russian attacks have damaged 40% of transmission infrastructure, damaged 20% of distribution system, and reduced generation capacity by 50%. The Project is needed to protect remaining infrastructure to deliver reliable electricity and heat for the 2024-2025 winter

BUSINESS MODEL

Design-Build (DB) business model, as well as procurement of equipment for some components

LINK TO REFORMS

A resilient energy system will enable Ukraine to withstand competitive pressures and market forces in the EU.
Aligns with UN Sustainable Development Goal 7: To ensure that people have access to affordable, reliable, sustainable, and modern energy sources

Key partners

Ministry of Restoration
Ministry of Energy
Local entities

Key Points of Project Implementation:

Began in 2022, expected to be completed in 2025
Testing has been carried out on the effectiveness of the protections
Level III & Level II are two separate passive defense systems built according to individual project designs, which are carried out at one electrical substation
Procurements subject to martial law

1 - The project information and financial indicators are provided by company-initiator of the project. * - approximately

STATE FUND FOR DECARBONIZATION AND ENERGY TRANSFORMATION

PUBLIC SECTOR SPONSOR: MINISTRY FOR COMMUNITIES, TERRITORIES AND INFRASTRUCTURE DEVELOPMENT OF UKRAINE

UKRAINE

- **Brief Description:** Support of State Fund for Decarbonization and Energy Transformation (Fund) to finance energy efficiency and decarbonization projects

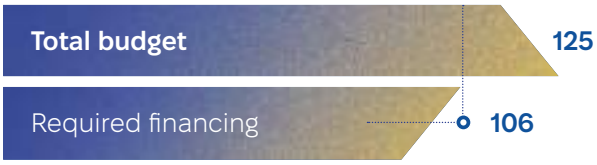
- **Impacted Populations:** Improved energy efficiency will impact all productive sectors and populations of Ukraine by reducing energy costs.

- **Impact:**
  - ~15% energy production efficiency improvement ~10%+ greenhouse gas emission reduction
  - ~20%+ replacement of fossil fuels with alternatives and renewables
  - ~20k new jobs in renewable energy
  - ~20% reduction in motor fuel consumption due to shift to EVs
  - Improved energy efficiency of buildings

- **Value Proposition:** Intended to improve energy efficiency and decarbonize Ukrainian economy, improving energy independence, reducing environmental impact and facilitating compliance with EU Energy Community standards.

- **Project Status:** Ongoing, need additional funding

Projects Highlights[1] ($, mln)



Implementation Period: Ongoing

Additional Details: CAPEX – 85% / Other costs – 15%

Expected Financial Indicators: Will provide financial support for energy efficiency and decarbonization initiatives, including compensation, reimbursement, and cost reduction through credit and leasing agreements. Financial mechanisms include partial reimbursement of interest paid on commercial bank loans and issuance of preferential loans. Selected projects will be carried out by a commission established by State Agency for Energy Efficiency and Energy Saving

Trigger Event: Law No. 3035-IX signed in April 2023 amended Budget Code to charge taxes on CO2 emissions, which supply the Fund with capital. Due to ongoing war, CO2 taxes are held fixed, increasing need for external funding to meet EU goals

BUSINESS MODEL

Fund will finance projects through two agreement models:

- Partial reimbursement of interest for commercial loans
- Preferential loans
- Underlying projects may include a wide range of models (e.g., ESCO-contracts, Design-Build, DBFM-DBFOM, etc.)

KEY FINANCIALS DTEK GROUP IN 2020 (MLN UAH)

Contributes to meeting the EU Energy Community Agreement requirements for EU accession, particularly the achievement of goals to reduce energy consumption and decarbonize the economy

Project also aligns with multiple UN Sustainable Development Goals (e.g., poverty alleviation, healthy living, sustainable energy sources, etc.)

Key partners

Ministry of Restoration
Commission established by State Agency on Energy Efficiency and Energy Saving
Commercial banks

Key Points of Project Implementation:

Funding received from CO2 emission tax and other partners (continuous)
Project selection carried out by Commission (continuous)
Projects funded (continuous)

All project information is provided by sponsor-initiator of the project and all monetary values are denominated in USD.

4.4. HYDROGEN

4.4.1. Market context and potential

INCREASING IMPORTANCE OF HYDROGEN IN GLOBAL DECARBONIZATION EFFORT

As the world continues to grapple with the effects of climate change, the need for decarbonization has become more urgent than ever. One of the key solutions to reducing carbon emissions is the use of hydrogen as a clean energy source. Hydrogen can be produced from renewable sources, making it a key component in the transition to a low-carbon economy.

One of the key advantages of hydrogen is its versatility. It can be used as a feedstock for the production of chemicals and fertilizers, as well as a fuel for heating and electricity generation. This means that hydrogen has the potential to replace fossil fuels in a wide range of industrial applications, reducing carbon emissions and helping to mitigate the effects of climate change.

Hydrogen is expected to be a crucial lever for decarbonization of hard-to-abate sectors, where reduction of carbon intensity is complicated by a combination of technological and financial challenges.

These sectors include heavy industry, shipping, aviation, and buildings, and account for ~20% of global carbon emissions (with cement and steel manufacturing alone accounting for 14%). As the demand for decarbonization grows, so too will the demand for hydrogen, making it an important part of the energy mix in the coming years.

ROLE OF HYDROGEN IN DECARBONIZATION OF EUROPEAN INDUSTRY

The European Union has set ambitious targets to reduce greenhouse gas emissions and achieve carbon neutrality by 2050. The EU has identified hydrogen and its derivatives as a key enabler for decarbonization, particularly in sectors such as industry, transportation, and heating.

Fit for 55 package, introduced by the EU as part of the European Green Deal strategy, sets out a goal to achieve

55% reduction in greenhouse gas emissions by 2030

The programme includes a range of regulations and policies aimed at decarbonizing various sectors, including transport, buildings, and industry. Hydrogen is expected to play a crucial role in achieving the program's goals.

The RePowerEU plan of the European commission proposes increasing energy efficiency, speeding up and scaling up renewable energy generation, including hydrogen.

The EU's hydrogen strategy and RePowerEU envision substantial growth of hydrogen production and use in the EU, setting a 2030 target of 10 million tonnes of domestic renewable hydrogen production and 10 million tonnes of imports from the neighbouring regions rich in renewable energy – with Ukraine being one of the strategic partners.

To encourage the adoption of hydrogen in industry, the EU has established various financial and regulatory incentives. As most of the regulatory mandates are associated with monetary penalties for non-compliance, it is expected that renewable hydrogen suppliers could secure a willingness-to-pay premium, with the amount of premium varying between countries, sectors and specific hydrogen end-uses.

SIDEBAR: European regulations and incentives promoting hydrogen production and use

The EU Emissions Trading System (EU ETS) is a key instrument that puts a price on carbon emissions. By including industrial sectors in the EU ETS, the EU incentivizes the reduction of carbon emissions and encourages industries to transition to low-carbon alternatives such as hydrogen.

Hydrogen and its derivative ammonia are covered by **CBAM (Carbon Border Adjustment Mechanism)** – a regulatory measure that aims to address carbon leakage by requiring importers of certain goods into the EU to pay a price equivalent to the ETS for the carbon emissions associated with the production of those goods. This will incentivize production and use of clean hydrogen to reduce emissions and avoid higher costs.

One of the key financing vehicles is the **Innovation Fund,** which provides financial support for large-scale demonstration projects in the field of clean energy, including hydrogen. The fund aims to accelerate the commercialization of innovative technologies and help bridge the gap between research and market deployment.

The IPCEI (Important Project of Common European Interest) programme provides incentives and financial support for strategic projects in the EU. In the context of hydrogen projects, IPCEI offers several incentives to promote the development and deployment of hydrogen in the form of investment support for e.g., green hydrogen projects, electrolyzer manufacturing factories and hydrogen infrastructure.

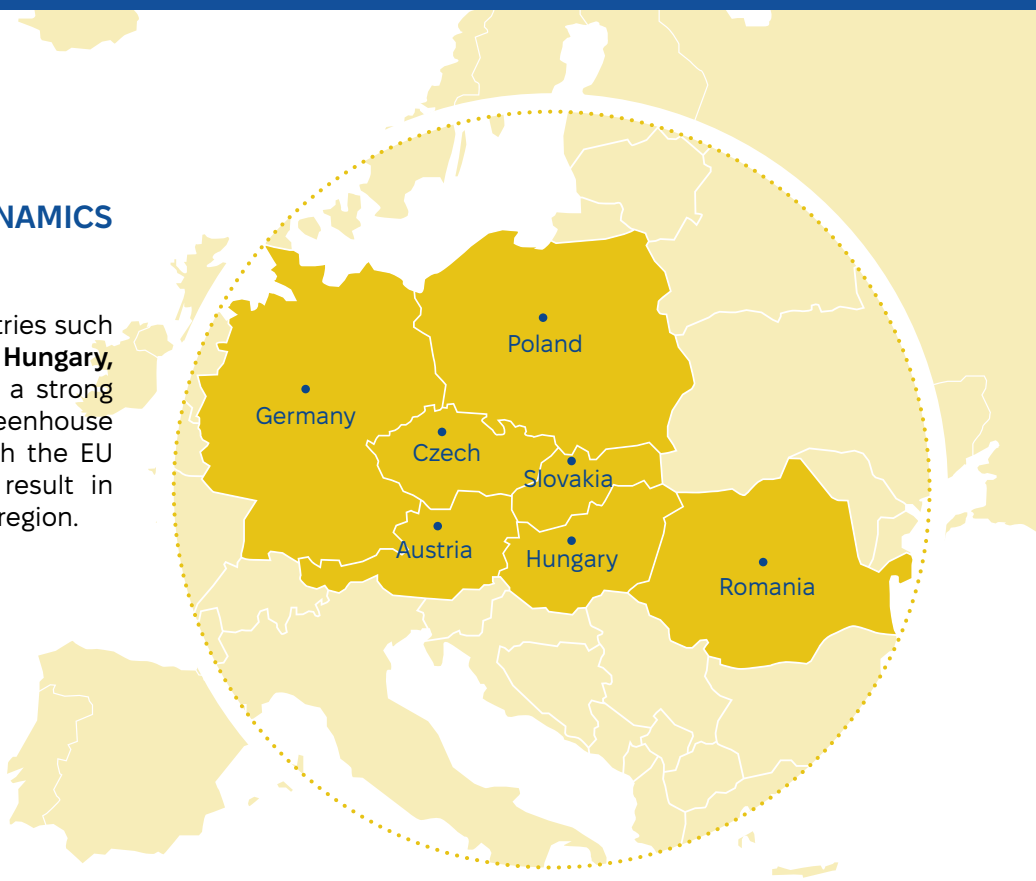
In 2022, the European Commission launched the **European Hydrogen Bank** to create investment security and business opportunities for European and global renewable hydrogen production. In April 2024, the results of the European Hydrogen Bank's first auction were announced. Seven projects across the EU will be awarded a total of €720 million under the Innovation Fund, with a plan to produce 1.58 million tonnes of renewable hydrogen over ten years, avoiding more than 10 million tonnes of CO2 emissions.

Furthermore, the EU has established the **Renewable Energy Directive (RED II / RED III),** which sets binding targets for the share of renewable energy in the EU's energy mix. This directive promotes the use of hydrogen produced from renewable energy sources in industrial processes. It provides a clear signal to industry that renewable hydrogen is a preferred option and encourages investment in renewable hydrogen production facilities.

Application of hydrogen in the transport sector is governed by sector-specific regulation: **FuelEU, FuelEU Maritime, ReFuelEU**. These regulations mandate the use of renewable fuels, driving additional demand for renewable hydrogen.

CENTRAL EUROPE MARKET DYNAMICS AND POTENTIAL

Central Europe, which includes countries such as **Austria, Czech Republic, Germany, Hungary, Poland, Romania, and Slovakia,** has a strong industrial base that contributes to greenhouse gas emissions. Efforts to comply with the EU decarbonization commitments will result in substantial hydrogen demand in the region.



EXPECTED HYDROGEN DEMAND

Assuming further acceleration of decarbonization commitments and regulatory incentives, hydrogen demand in Central Europe could reach up to

~5

million tonnes per year by 2030

heavily concentrated in chemicals, refining and transport sectors

By 2040, hydrogen demand in Central Europe is expected to almost triple, reaching up to

~14

million tonnes per year

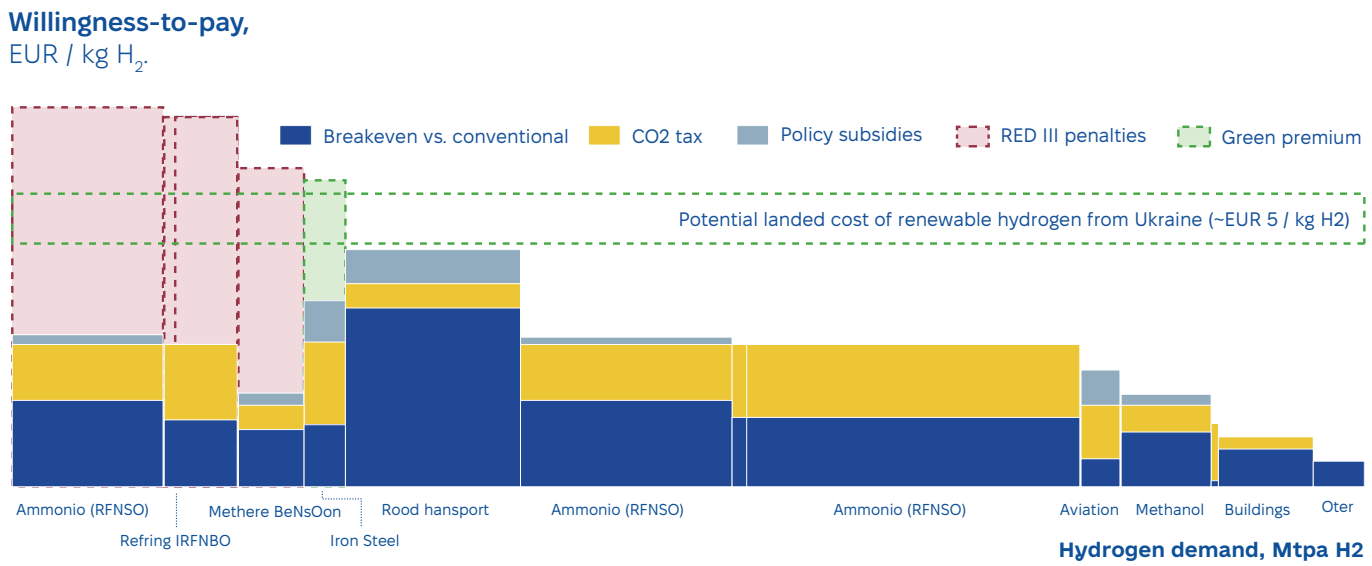
Renewable hydrogen use in most end-use applications is expected to be significantly more expensive than conventional processes. To encourage decarbonization by increasing hydrogen penetration in various sectors, regulatory incentives are critical.

Hydrogen demand and willingness-to-pay for renewable hydrogen in Europe is expected to be driven by carbon tax (ETS / CBAM) and other regulatory incentives. Drivers of renewable hydrogen demand differ across specific hydrogen end-uses. Key sectors where high willingness-to-pay for renewable hydrogen could be expected include:

- **Industry.** Hydrogen use in industry (e.g., refining, chemicals and fertilizer industry) is subject to RFNBO (Renewable fuel of non-biological origin) mandate under RED II / III regulation (Renewable Energy Directive of European Parliament), which sets targets of 42% RFNBO use in industry by 2030 and 60% by 2035. The mandate is to be implemented by imposing penalties for non-compliant volumes, which could potentially increase willingness-to-pay for the mandated volume of renewable hydrogen in these sectors by EUR 3-7 / kg H2;
- **Iron and steel.** Renewable hydrogen use in green steelmaking (to produce direct reduced iron / hot briquetted iron for use in electric arc furnaces) could be associated with additional green premium, driven by decarbonization commitments in some steel end-use sectors (e.g., automotive);
- **Transport.** Hydrogen use for fuel production for transport (maritime, aviation and road transport) is subject to quotas under FuelEU, ReFuelEU and FuelEU Maritime regulations. Specific quotas and sub-quotas differ for various sectors, potentially driving renewable hydrogen demand of 1-5% of total fuel use. The penalties associated with these mandates could potentially increase willingness-to-pay for the mandated volume of renewable hydrogen in these sectors by EUR 3-8 / kg H2;
- **Power and heat.** In power and heat sector the cost of renewable hydrogen-based solutions is significantly higher than the cost of conventional fuel use (e.g., natural gas). However, industry commitments (e.g., Germany's Hydrogen Power Plan – Kraftwerksstrategie) as well as announced plans for a capacity mechanism to be established by 2028 could drive hydrogen demand in the sector. In particular, peak power capacity could generate demand for renewable hydrogen, as fuel costs for peak power production are a relatively small part of total system cost of ownership.

In these market segments characterized by higher willingness-to-pay (driven by regulatory incentives), up to ~1-2 million tonnes per year of renewable hydrogen demand could be expected by 2030[43]

Figure 3: Expected hydrogen demand and willingness-to-pay in Central Europe by 2030
(preliminary, more detailed analysis will be part of activities of Platform for Ukraine Hydrogen Export Corridor Project Development)



[43] Estimated hydrogen demand including total hydrogen demand in Germany. More detailed analysis of expected addressable demand volume will be part of activities of Platform for Ukraine Hydrogen Export Corridor Project Development

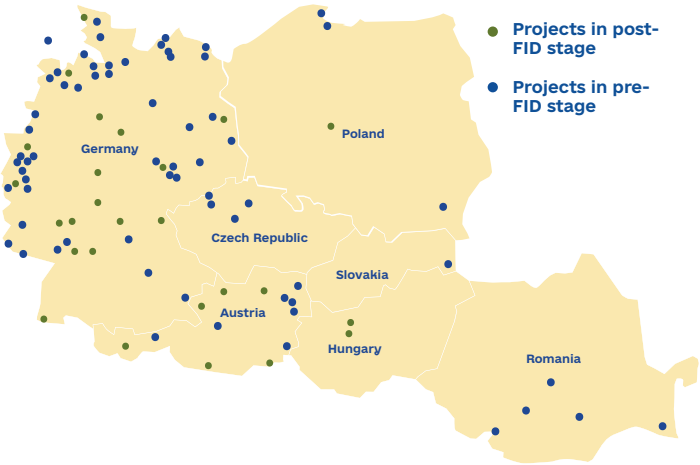
ANNOUNCED SUPPLY CAPACITIES

On the hydrogen supply side, >150 new hydrogen projects were announced in Central Europe. However, only ~40 pilot-scale projects with a total production capacity of ~50 thousand tonnes of hydrogen per year have passed FID.

Taking into account the probability of such projects reaching operation launch, projected hydrogen supply in Central Europe is not expected to be sufficient to cover demand.

Central Europe as a region is expected to become a net importer of hydrogen. However, separate countries (e.g., Romania) could become self-sufficient or even export low-carbon hydrogen to other European countries.

Figure 2: Announced hydrogen projects in Central Europe



ADDITIONAL VOLUMES REQUIRED TO CLOSE THE GAP

To close the gap, significant additional renewable energy and electrolyzer capacity is required. To meet an additional annual demand of 1 million tonnes of renewable hydrogen, significant increases in renewable energy and electrolyzer capacity are needed: ~50 TWh per year of renewable electricity, 7-10 GW of electrolyzer capacity, and 15-25 GW of renewable energy capacity.

This build-out would require **1,000 to 2,800 km²** of land

CHALLENGE FOR RENEWABLE HYDROGEN CAPACITY BUILD-OUT IN CENTRAL EUROPE

Extensive build-out in Central European countries faces multiple challenges, including high population density, land use concerns, and difficulties in finding suitable areas for onshore wind and solar power. Larger turbines may provoke stronger local opposition, and long permitting lead times and grid complexity further hinder renewable energy expansion.

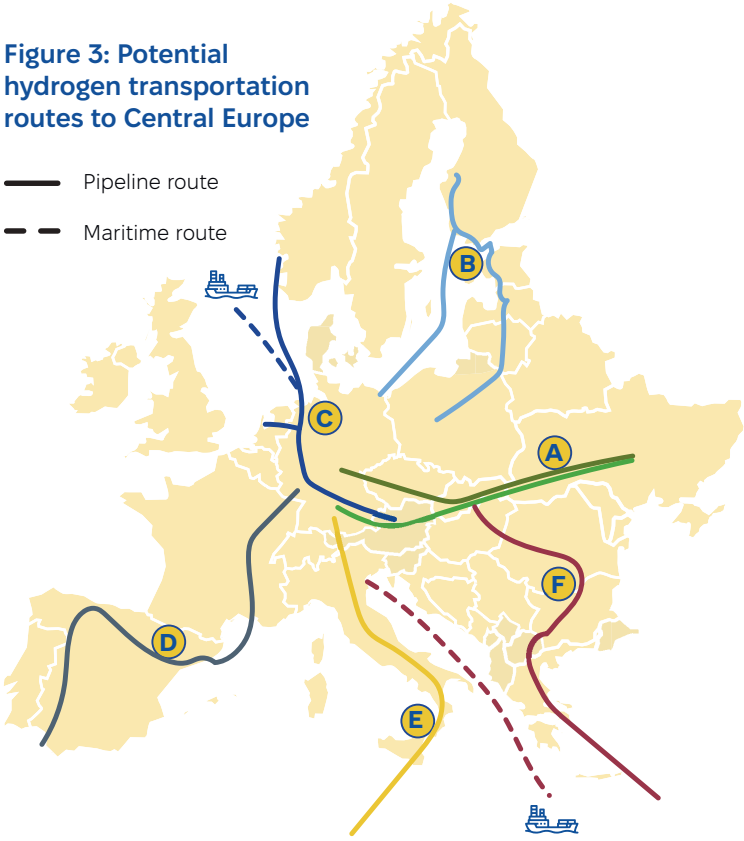
Considering the combined impact of these factors, Central Europe is expected to become a net importer of clean hydrogen.

HYDROGEN IMPORT OPPORTUNITIES

Central Europe could source a significant part of its hydrogen demand from its European neighbours, importing gaseous hydrogen by pipeline from countries with low gas prices or abundant hydro, wind, and solar power such as Norway, Portugal, Spain, Sweden, and Ukraine. The remaining hydrogen can be delivered by offshore pipeline or ship (liquified or in form of derivatives) from Middle East and North Africa, or by ship from Australia and North America.

While substantial part of hydrogen imports into Central Europe could be in the form of derivatives (ammonia, methanol, direct reduced iron), there will also be substantial demand for gaseous or liquidised hydrogen for direct use by Central European industry and power sector.

Figure 3: Potential hydrogen transportation routes to Central Europe



SIDEBAR: Overview of key potential routes for hydrogen imports into Central Europe

A. **Ukraine – Central Europe Hydrogen Corridors** are aimed at building-out infrastructure to transport renewable hydrogen from Ukraine to Central Europe.

Ukrainian gas transmission system operator is working together with transmission system operators of neighbouring countries to determine feasibility of repurposing gas pipelines for hydrogen transport.The most mature initiative on this route is Central European Hydrogen Corridor (CEHC) – an initiative of four gas transmission system operators (Gas TSO of Ukraine, eustream of Slovakia, NET4GAS of Czech Republic and OGE of Germany) to build-out hydrogen pipeline corridor to deliver ~1.5 million tonnes of hydrogen per year from Ukraine to Central Europe. The project is in pre-feasibility phase, with estimated commercial operation start by 2030. CEHC is part of the East and Southeastern corridor of European Hydrogen Backbone plan for pan-European hydrogen infrastructure build-out.

Another initiative on building-out hydrogen transportation corridor from Ukraine to Central Europe is H2EU + Store, which involves renewable energy producers, transmission system operators, gas storage operators and potential off-takers in Ukraine, Slovakia, Austria and Germany. The status of the initiative is unclear, as no updates have been made since 2021. H2EU + Store is mentioned in the European Hydrogen Backbone plan for pan-European hydrogen infrastructure build-out as a potential alternative to CEHC.

B. **Nordic-Baltic Hydrogen Corridor** connects the areas in Sweden and Finland, where low-cost hydrogen production is supported by favourable onshore and offshore wind resources, as well as high land and water availability, with demand clusters in Germany.

The Nordic-Baltic Hydrogen Corridor project was included in the PCI list as part of the "Baltic Energy Market Interconnection Plan for Hydrogen" (BEMIP Hydrogen) and was granted the status of the Project of Common Interest in the EU.

Pre-feasibility study for the project is expected to be completed by mid-2024.

Also, the Czech-German Hydrogen Interconnector (CGHI) is part of the 1st PCI / PMI list and enables hydrogen transport to demand centers in South Germany.

C. **North Sea Corridor** aims to enable hydrogen supply from high offshore wind potential areas in the North Sea to hydrogen demand areas in western parts of Germany. The corridor includes pipeline projects for transporting hydrogen from Nordic countries to Germany.

The Offshore hydrogen transport (H2T) project envisions development of a pipeline from Norway in close collaboration with the German and Norwegian government. On behalf of the German and Norwegian Governments, German Energy Agency and Gassco have conducted a feasibility study on a hydrogen value chain from Norway to Germany in 2023.

The Hydrogen Network Netherlands, which is a part of North Sea Corridor and could support transportation of hydrogen from Port of Rotterdam inland, has already taken FID. The construction of the Hydrogen Network Netherlands has started on 27th of October, 2023.

D. **Southwest Europe and North Africa Corridor** aims to transport hydrogen to demand centres in Germany and beyond, through the H2ercules project. Within this corridor, H2med is the overarching project connecting hydrogen networks in Portugal, Spain, France, and Germany. The project with the overall budget of EUR 2.50 billion aims to launch commissioning by 2030, with the target to transport ~2 million tonnes of renewable hydrogen per year.

E. **North Africa and Southern Europe** corridors are intended to deliver low-carbon hydrogen from North Africa and Southern Italy towards Central Europe. Overarching initiatives such as the SunsHyne Corridor and the SoutH2 Corridor combine multiple national projects into bigger alliances.

Major part of these routes will go through the Italian Hydrogen Backbone, consisting of approximately 2,300 kilometres of pipeline (of which 75% is to be repurposed).SoutH2 initiative is the most mature one on this route, aiming to transport up to 4 million tonnes of hydrogen per year, with planned operation start in 2030.

F. **East and Southeastern Corridor** enables the transport of hydrogen from Greece through Bulgaria, Romania, Hungary, Slovakia, Czech Republic and Austria to Central Europe. Projects already under development include the RO/HU H2 corridor and the HU/SK H2 corridor. Each of these projects is currently in the pre-feasibility phase and are all aiming to be operational in 2030. The gas TSOs of Greece, Bulgaria, Romania, Hungary, Slovakia, Czech Republic and Germany have initiated cooperation within the South-East European Hydrogen Corridor SEEHyC, which also plans to be operational in 2030.

4.4.2. Overview of hydrogen opportunity in Ukraine

UKRAINE'S POTENTIAL AS HYDROGEN SUPPLIER TO CENTRAL EUROPE

Ukraine is poised to become a key hydrogen supplier to Central Europe due to its abundant renewable energy resources and high potential to its further development, significant zero-carbon energy capacity from hydro and nuclear sources, competetive hydrogen production and transportation costs, and extensive natural gas pipeline network connected with the EU countries.

CURRENT STATE HYDROGEN IN UKRAINE

While there are no post-FID hydrogen projects in Ukraine, multiple companies have announced plans to develop hydrogen production. In summer 2020 DTEK became the first Ukrainian company to join the Hydrogen Europe association. Hydrogen Ukraine LLC announced two hydrogen valleys (H2U Hydrogen Valley Zakarpattia and H2U Hydrogen Valley Reni), which have been placed on the Mission Innovation Hydrogen Valley Platform. Eco-Optima co-founded the H2EU+Store project with Austrian gas storage operator RAG Austria, which aims to build-out a hydrogen corridor to export renewable hydrogen produced in Ukraine to consumers in Europe. Ukrainian state-owned hydropower operator Ukrhydroenergo signed a memorandum with German technology company Andritz Hydro on cooperation in the implementation of green hydrogen production projects. Other companies with announced hydrogen projects include UDP Renewables and Zakhidnadraservis.

RENEWABLE ENERGY POTENTIAL

Hydrogen production becomes feasible and economically viable due to the availability of renewable energy sources, its favourable geography and high potential for further expansion (wind power potential capacity ranges from 250 GW to 320 GW, while solar power potential could reach up to 70 GW). Even during the full-scale war, Ukraine has commissioned more than 700 MW of additional renewable energy capacity, including solar, wind and biogas power plants. For more information, please refer to paragraph 4.3. "Energy".

Ukraine's favourable onshore wind resource is concentrated in the southern part of the country (e.g., Odesa, Kherson, Mykolaiv and Zaporizhzhia regions). Existing projects in these regions reach ~40% capacity factors. Regions in the north-western part of the country (e.g., Volyn) also exhibit high theoretical wind energy potential, with several projects in development, but only few operational projects in these regions.

While Ukraine's solar energy potential is not extraordinary, with capacity factors of existing projects averaging around ~15%, solar energy generation profiles could be complementary to onshore wind profiles. This could allow to hybridize renewable energy projects, in particular, in the southern part of the country, and ensure higher electrolyzer capacity utilisation, ultimately decreasing hydrogen production costs.

Another factor in favour of renewable energy development in Ukraine is significant land availability. Ukraine has the largest land mass among European countries. Meanwhile, the country's population before the war was 5th largest in Europe, resulting in relatively low population density. Additionally, there is little "Not in My Backyard" attitude among local communities. This could allow to build out large-scale renewable energy projects for hydrogen production.

EXISTING ZERO-CARBON ENERGY CAPACITY

In the transition period, while renewable energy capacity is ramping up, at-scale production of clean hydrogen could be supported by Ukraine's extensive existing nuclear power capacity. Ukraine's nuclear power plants could receive approval for lifetime prolongation, following some investment into maintenance of blocks. This could potentially extend the weighted average remaining lifetime of Ukraine's nuclear power plants to until 2050.

Historically, Ukrainian nuclear power plants exhibited comparatively low capacity utilisation factors: **63-75%** compared to **75-90%** capacity utilisation in neighbouring countries using similar technology (Czech Republic, Hungary, Slovakia). Increase in capacity utilisation through optimization of planning and implementation of less restrictive maintenance protocols could enable substantial additional nuclear power generation in Ukraine.

IMPLICATIONS FOR HYDROGEN PRODUCTION COSTS

Estimated levelized cost of electricity production (LCOE) for new renewable energy projects in Ukraine could be in the range of

EUR 35-45 / MWh for solar PV projects[44]

EUR 30-40 / MWh for onshore wind[45] projects

For existing nuclear power capacity (assuming lifetime prolongation), LCOE could be in the range of **EUR 20-35** / MWh[46].

This could enable renewable hydrogen production cost (LCOH) of **~EUR 4-4.5** / kg H2[47], which is highly competitive in the European market

DEVELOPED GAS TRANSMISSION SYSTEM

Delivery of renewable hydrogen produced in Ukraine to Central European industrial hubs could be enabled using Ukraine's extensive gas transportation system. Ukraine's natural gas transmission system (GTS) consists of ~39 thousand kilometres of pipelines, 72 compression stations and 13 storage facilities with a total capacity of over 30 billion m³ of underground storage (with 80% of storage capacity located near borders with Central European countries). It is connected with systems of Slovakia, Poland, Romania, Moldova, and Hungary, and possesses export capacity to Europe of ~147 billion m³ per year.

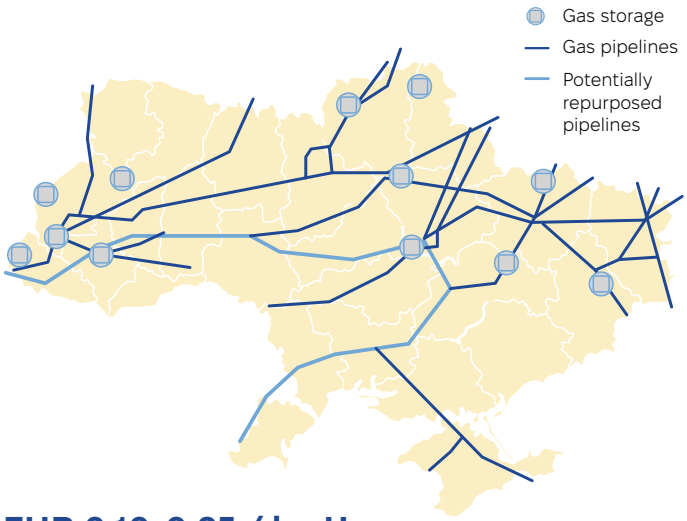
Historically, a significant part of GTS capacity was used for natural gas transit from Russia to European countries. However, following build-out of alternative gas transit routes (South Stream, North Stream I), utiliiation of GTS significantly decreased. Furthermore, following Russia's military invasion of Ukraine and resulting response from European states, including limitations on natural gas imports from Russia, transit of natural gas through Ukraine's territory decreased further (only 14.4 billion m³ in 2023). The current five-year deal with Russia's Gazprom on transit of Russian gas to Europe expires at the end of 2024; the Ukrainian side has no intentions to prolong it or sign a new deal.

This opens possibilities for repurposing some of the existing pipelines for hydrogen transport. Several large pipelines could be considered for repurposing to transport blended or pure hydrogen to Central Europe, for example:

- Urengoy–Pomary–Uzhhorod pipeline exiting Ukraine on the border with Slovakia, length of the Ukrainian section is 1,160 km and it has capacity of 29.7 billion m³ per year;
- Progress pipeline running mostly parallel to the Urengoy–Pomary–Uzhhorod pipeline, length of the Ukrainian section is 1,120 km and it has capacity of 28.5 billion m³ per year;
- Ananyiv–Tiraspol–Izmail pipeline exiting Ukraine on the border with Romania, its length is 256 km and it has capacity of 23.7 billion m³ per year.

Additionally, existing pipeline routes in Ukraine could be used to place new hydrogen pipelines, leveraging existing land use rights (right of way).

Figure 4: Ukraine's gas transmission and storage system



EUR 0.10-0.25 / kg H_2.

the range of the cost of hydrogen transportation from Ukraine to Central Europe using repurposed natural gas pipelines, according to the estimates of gas transmission system operators

This could enable highly competitive landed cost of Ukrainian renewable hydrogen in Central Europe, with the region's land-locked position presenting a significant challenge for alternative hydrogen delivery routes.

Repurposing of natural gas pipelines for pure hydrogen transport has been extensively studied in the context of planned projects. European Hydrogen Backbone, an initiative of European gas transmission system operators, assesses costs of retrofit of large-diameter onshore hydrogen pipelines for pure hydrogen transport as ~EUR 0.88 million per kilometre of pipeline, with additional cost for retrofit of compressors of ~EUR 4 million per MW.

[44] Assuming 1-axis tracking, 19-21% capacity factor, CapEx of ~USD 0.6 k / kW, OpEx of ~2% of CapEx per year, WACC of 8%
[45] Assuming Vestas 136 4000 MW turbines at 120 m hub height, 35-42% capacity factor, CapEx of ~USD 1.3 k / kW, OpEx of ~1.3% of CapEx per year, WACC of 8%
[46] Assuming 85% capacity utilisation, CapEx required to prolong block lifetime of ~USD 0.3 k / kW, variable OpEx of USD 17 / MWh electricity, decommissioning cost of USD 350-1,100 / kW, WACC of 5-10%
[47] Assuming large Alkaline electrolyzer technology, 50-61% onshore wind and 39-50% solar PV in the energy mix, 2.4-2.8 renewable energy to electrolyzer capacity oversizing, 67-74% capacity utilisation, CapEx of ~USD 1.3 k / kW, OpEx of ~3% of CapEx per year, WACC of 8%

SIDEBAR: Key projects on repurposing of natural gas pipelines for hydrogen transport

Parmelia Gas Pipeline conversion project. Australian project conducted by APA Group, aimed at converting a 43 km section of the Parmelia Gas Pipeline to carry 100% hydrogen. Testing results indicate it is technically feasible, safe and efficient to run the section of pipeline at current operating pressure using hydrogen. The project is progressing to phase three, which will consider preparing the section of pipeline for hydrogen service, and will include detailed safety studies and conversion plans, while continuing to investigate potential supply and offtake opportunities.

Snam gas pipeline network. Italian gas transmission system operator Snam announces that ~99% of their network (~33 k km) is ready for 100% hydrogen transport. Up to 70% hydrogen blended with natural gas could be transported with no or limited reductions on max operating pressure. Snam conducted field tests with hydrogen and natural gas blending mix of up to 10% hydrogen on key gas turbines.

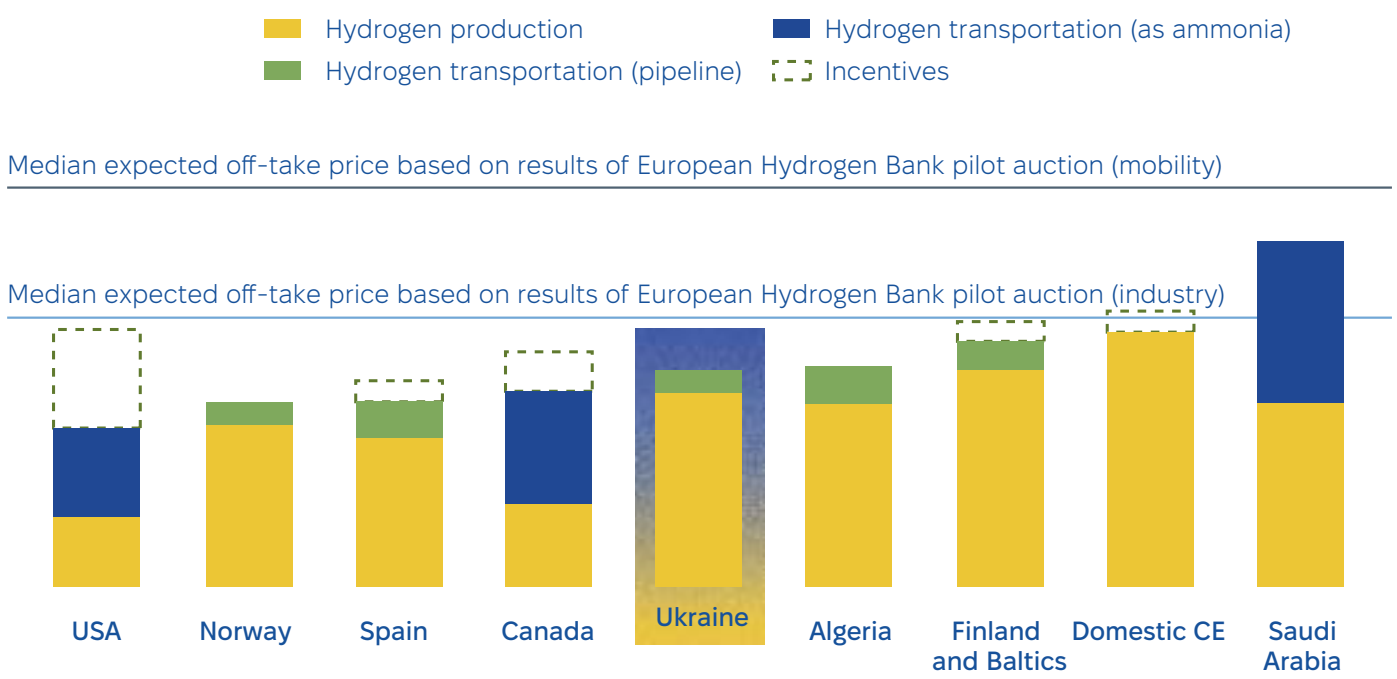
Hydrogen Network Netherlands. Dutch transmission system operator Nederlandse Gasunie has taken FID on the project to develop a national hydrogen network in the Netherlands. Over 1,000 km of pipelines are planned to be repurposed for hydrogen transport (~85% of the total pipeline network planned under project).

Emsburen-Bad Bentheim-Legden pipeline section retrofit (part of GET H2 Nucleus project). German gas grid operator Open Grid Europe (OGE) and Nowega have launched the first conversion of natural gas pipeline to transport hydrogen. The 46 km pipeline sections were detached from the natural gas network in October 2023, paving the way for hydrogen transport upgrading. First renewable hydrogen flow through the pipeline is expected in 2025.

Damao-Industrial Zone Hydrogen Pipeline Project. Chinese project by PetroChina China Petroleum and Natural Gas Pipeline Engineering Co., Ltd. to retrofit ~159 km of gas pipeline for pure hydrogen transport. The project was completed in March 2022, with potential to transport ~0.4 million tonnes of hydrogen per year.

Figure 5: Landed cost of renewable hydrogen, EUR / kg H_2

(preliminary, more detailed analysis will be part of activities of Platform for Ukraine Hydrogen Export Corridor Project Development)



STRATEGIC ROLE OF UKRAINE AS HYDROGEN SUPPLIER TO EUROPE

The European Union recognizes the potential for hydrogen production in Ukraine. EU's Hydrogen Strategy adopted on July 8th, 2020, designates Ukraine as a priority partner. European industry association Hydrogen Europe announced its 2x40 GW Green Hydrogen Initiative in 2020, which includes plans for 10 GW of hydrogen production capacity in Ukraine for export to the EU. Memorandum of understanding between EU and Ukraine on a Strategic Partnership on Biomethane, Hydrogen and other Synthetic Gases, signed at the beginning of 2023, sets out the common goal of Ukraine and EU to accelerate deployment and use of renewable energy sources and increase energy security of the region.

GTSOU is part of European Hydrogen Backbone – an initiative of infrastructure operators, which aims to enable the development of a competitive, liquid, pan-European renewable and low-carbon hydrogen market by building-out pipeline and storage system for hydrogen transport.

HYDROGEN STRATEGY OF UKRAINE

Hydrogen Strategy of Ukraine developed in consultation with European experts sets out a goal to produce

0.4-0.6 **/Mtpa hydrogen by 2035**

and

1.65-2.5 **/Mtpa hydrogen by 2050**

Targets for domestic consumption of hydrogen are 0.1-0.2 Mtpa by 2035 and 1.0-1.5 Mtpa by 2050, depending on internal demand. Meanwhile, targets for hydrogen export are 0.3-0.4 Mtpa by 2035 and 1.5-2.0 Mtpa by 2050, depending on importers' demand. Key target market stated in the Strategy – the EU.

To enable this level of hydrogen production, targets for capacity build out have been set:

- Electrolyzer capacity: no less than 3 GW by 2035 and no less than 10 GW by 2050
- Wind capacity: no less than 5 GW by 2035 and no less than 20 GW by 2050
- Solar capacity: no less than 2 GW by 2035 and no less than 5 GW by 2050

Realisation of the Strategy is planned in 3 Phases:

- Phase 1 (2024-2026): Creation of pre-requisite conditions for build-out of hydrogen economy in Ukraine, including development of necessary regulatory base
- Phase 2 (2027-2035): Establishment of hydrogen industry, including realisation of pilot projects for hydrogen production and export
- Phase 3 (2036-2050): Sustainable development of hydrogen industry, including at-scale hydrogen production and export

4.4.3. Opportunity overview

Ukraine's favourable positioning as well as the ongoing momentum in the market present an attractive opportunity for investment into renewable hydrogen production and infrastructure development in the country. Following is the description of what a potential investment project could look like.

PRODUCTION CAPACITIES SITING AND DELIVERY ROUTE

Renewable electricity and hydrogen production could be located in southern and central parts of Ukraine (e.g., Odesa, Mykolaiv, Kherson, Kirovograd, Dnipro and Zaporizhzhia regions), which combine relatively favourable renewable energy resources and access to natural gas transportation network. Multiple large-scale renewable hydrogen projects may be required to produce sufficient volumes of hydrogen export to ensure optimal pipeline utilisation. Delivery of produced hydrogen to the central export pipeline could be accomplished by repurposing regional pipelines or building new pipelines for hydrogen transport.

A part of a single line **(1,400 mm diameter)** of the Urengoy–Pomary–Uzhhorod pipeline **(~750 km)** could be repurposed for pure hydrogen transport. This pipeline further connects to Uzhgorod–Velke Kapusany pipeline **(1,400 mm diameter, 14.5 km)**, with further transport on Slovakia's territory going to either Lanzhot exit point on the border between Slovakia and Czech Republic or Baumgarten exit point on the border between Slovakia and Austria **(1,400 mm or 1,200 mm diameter, 400-450 km pipeline length for either route).**

PRODUCTION CAPACITIES AND VOLUMES

Total renewable hydrogen production volume could be **~ 1.5/mln tonns**

This would close the gap between expected hydrogen demand and local production in Central Europe and ensure sufficient utilisation (~50%) for a large-diameter pipeline. This scale of production would require 10-15 GW electrolyzer capacity and 20-40 GW onshore wind and solar capacity build-out.

PROJECT ECONOMICS

The project could deliver ~1.5 million tonnes per year of renewable hydrogen to Central Europe by 2030 at the landed cost of

~EUR 5/per kg H_2

At an expected market price of renewable hydrogen in Central Europe (set by regulation-driven willingness-to-pay), the project could achieve an IRR of 10-20%, which makes it a highly attractive investment opportunity.

4.4.4. Required unlocks to realise the opportunities

Technical feasibility assessment

A major consideration for potential investors is the technical feasibility of at-scale renewable hydrogen production in Ukraine and its delivery to Central Europe. Feasibility studies are required to evaluate project viability.

Renewable energy and hydrogen production
Renewable electricity generation and production of hydrogen through water electrolysis are proven technologies with known efficiency parameters. Technical feasibility analysis for renewable hydrogen production in Ukraine should focus on investigation of renewable energy generation potential at various locations in Ukraine (wind and solar capacity factors, potential electrolyzer capacity utilisation, etc.). Potential costs of production of renewable hydrogen need to be estimated to analyse the economic viability of the project.

Repurposing natural gas pipeline for hydrogen transport
Technical feasibility of natural gas pipeline retrofit to transport hydrogen needs to be extensively studied. While several projects on repurposing of natural gas pipelines for hydrogen transport have been successfully implemented, applicability of such cases to Ukrainian pipelines is not certain. Technical feasibility study should focus on defining key infrastructure requirements and target operating parameters for blended or pure hydrogen transport. Such parameters could include identification of required coating of pipelines (to avoid hydrogen embrittlement effect), required operating pressure and implied compression parameters, evaluation of leakage and combustion risks as well as estimation of gas losses in transport.

Hydrogen storage
Technical and economic feasibility studies are required to assess possibility of at-scale hydrogen storage on Ukrainian territory at reasonable cost (e.g., hydrogen storage in depleted natural gas fields and / or salt caverns, repurposing of underground natural gas storage to store blended or pure hydrogen, pipeline packing, etc.).

Economic feasibility and financing requirements

Economic feasibility study
Economic feasibility study is needed to assess potential demand for hydrogen in Central Europe and competitiveness of Ukrainian hydrogen in the European market. Further investigation is required to determine potential off-takers' requirements to the product (e.g., blended vs. pure hydrogen, renewable vs. zero-carbon hydrogen, documentation required to prove hydrogen origin, etc.)

Financing need

Investment requirements of the project could be separated into two main stages:

- Project preparation finance (pre-FID);
- Capital investment (post-FID).

Project preparation costs vary for different parts of the value chain. For renewable energy projects, pre-FID financing could be in the range of USD 2-4 million per GW installed capacity. For electrolyzer build-out, project preparation costs could be in the range of USD 6-10 million per GW electrolyzer capacity. Financing needed for preparation of gas pipeline conversion for hydrogen transport is yet to be determined. Feasibility study costs were estimated at USD 3-4 million. Total pre-FID financing needed for a project to deliver 1.5 million tonnes of renewable hydrogen produced in Ukraine to Central Europe could amount to USD 103-315 million.

Post-FID capital investment need for such project could be in the range of USD 32-66 billion, including:

- USD 17-44 billion for renewable energy capacity build-out;
- USD 13-19 billion for electrolyzer capacity build-out;
- USD 2-3 billion for pipeline retrofit for pure hydrogen transport (including ~USD 1 billion for pipeline retrofit on Ukrainian territory).

Potential sources of finance

The proposed project will likely require financing from both commercial and international financial institutions (IFIs). The participation of public organisations will be vital for securing capital at non-prohibitive interest rates and crowding-in private capital. IFIs will have a vital role to play in providing risk mitigation and blended finance instruments, as well as technical assistance. National development financial institutions (DFIs) and export credit agencies (ECAs) can also play an important role in providing additional capital. A syndicate of private banks will be required to provide commercial financing, led by a major international project finance specialist organisation.

A range of financial support mechanisms from public organisations can be used to reduce project risks. Grant funding is available across multiple IFIs during the ongoing war for the project preparation stage.

Various IFIs have proposed equity, debt, guarantees and insurance mechanisms available specifically for Ukraine that could be applied to the proposed project and help to de-risk investment. The EU Ukraine Facility Pillar II is set to unlock a further EUR 7 billion for the provision of guarantees to mobilise investment into reconstruction efforts, substantially increasing availability of financing, including for the renewable energy sector.

The following conditions must be met to secure post-FID financing:

- Stable geo-political situation (however, some investments could be considered even before the end of the war);
- Reputable project sponsor(s) with a strong balance sheet and proven track record, able to cover substantial equity tickets and provide completion guarantees;
- Firm commitments for long-term off-take from multiple potential customers, accounting for a substantial part of planned hydrogen production (>70%).

Potential sources of finance

To implement a large-scale hydrogen production and export project in Ukraine, coordinated effort of industrial and infrastructure companies across the entire value chain is required. Alignment between up-stream (renewable energy and hydrogen production), mid-stream (hydrogen transportation) and down-stream (potential hydrogen off-takers in Central Europe) players could help resolve the "chicken-and-egg» dilemma typical for such projects.

The cooperation between players across the renewable hydrogen value chain could take the form of a platform for project preparation and development, leading up to creation of a consortium of industrial and infrastructure companies. Cooperation agreements with increasing degree of commitment (e.g., Letters-of-Intent, Memoranda-of-Understanding, etc.) could be concluded between platform participants at each stage of project development.

The financial structure of the proposed green hydrogen project in Ukraine could take several forms depending on the prevailing conditions at the time of FID and will necessarily be a tailor-made arrangement between the parties involved. The leading project sponsor(s) or a consortium across the value chain will need to establish a local special purpose vehicle to raise equity and debt for the capital investment requirements of the project. Financing will require sequential tranches of debt and / or grace periods until revenues are generated.

Regulatory alignment and reforms

To support the build-out and operation of hydrogen production and transportation projects in Ukraine, a number of regulatory changes are required.

Renewable energy generation

Key required reforms to support renewable energy build-out in Ukraine include:

- Ensuring functioning of PPA system;
- Implementation of certificates of green origin for renewable electricity;
- Streamlining of process to obtain land rights, permits and grid connection for renewables projects.

On 24 July 2023, President of Ukraine signed Law No.3220-IX "On Amendments to Some Laws of Ukraine Regarding the Restoration and Green Transformation of the Energy System of Ukraine". This law has potential to address a substantial part of required regulatory reforms to facilitate renewable energy build-out in Ukraine. The law's effective implementation is key to enabling future renewable energy projects.

This law establishes a possibility for renewable energy producers to conclude an agreement with a counterparty on ensuring stability of the price of electricity produced from renewable energy sources (so called "Contract for Difference" or CFD). The parties may fix reference price in CFD and possible fluctuations thereof.

The law is expected to achieve substantial progress towards eliminating regulatory barriers for PPAs (Power Purchase Agreements) implementation for renewable electricity.

The law also establishes a notion of Guarantee of Origin (GoO) for electricity produced from renewable energy sources. Ownership title to GoO can be transferred separately from that of the underlying electricity. According to the law, GoO will be provided by virtue of the registry.

On 10 June 2023, Ukrainian Parliament adopted the Law of Ukraine «On Amendments to Certain Laws of Ukraine on Prevention of Abuse in Wholesale Energy Markets». The Law implements EU Regulation on Wholesale Energy Market Integrity and Transparency (REMIT), a set of European rules and practices aimed at preventing abuse in the energy market, into national legislation.

Hydrogen production, transportation and use

Dedicated regulation governing hydrogen production, transmission and distribution, and use in Ukraine is required, including alignment with the EU standards and regulations.

To enable pipeline transport of hydrogen, Ukrainian regulatory framework for gas transportation has to be adapted for hydrogen transportation. In particular, regulation on injection of hydrogen into natural gas transmission system (in pure or blended form) is needed. Process for obtaining gas grid connection should be established for hydrogen production projects. Moreover, synchronisation of regulation of transit (Slovakia, Czech Republic, Poland, Moldova) and destination (Austria, Germany, Romania) countries is needed. Operations of transmission system operators in these countries also need to be aligned.

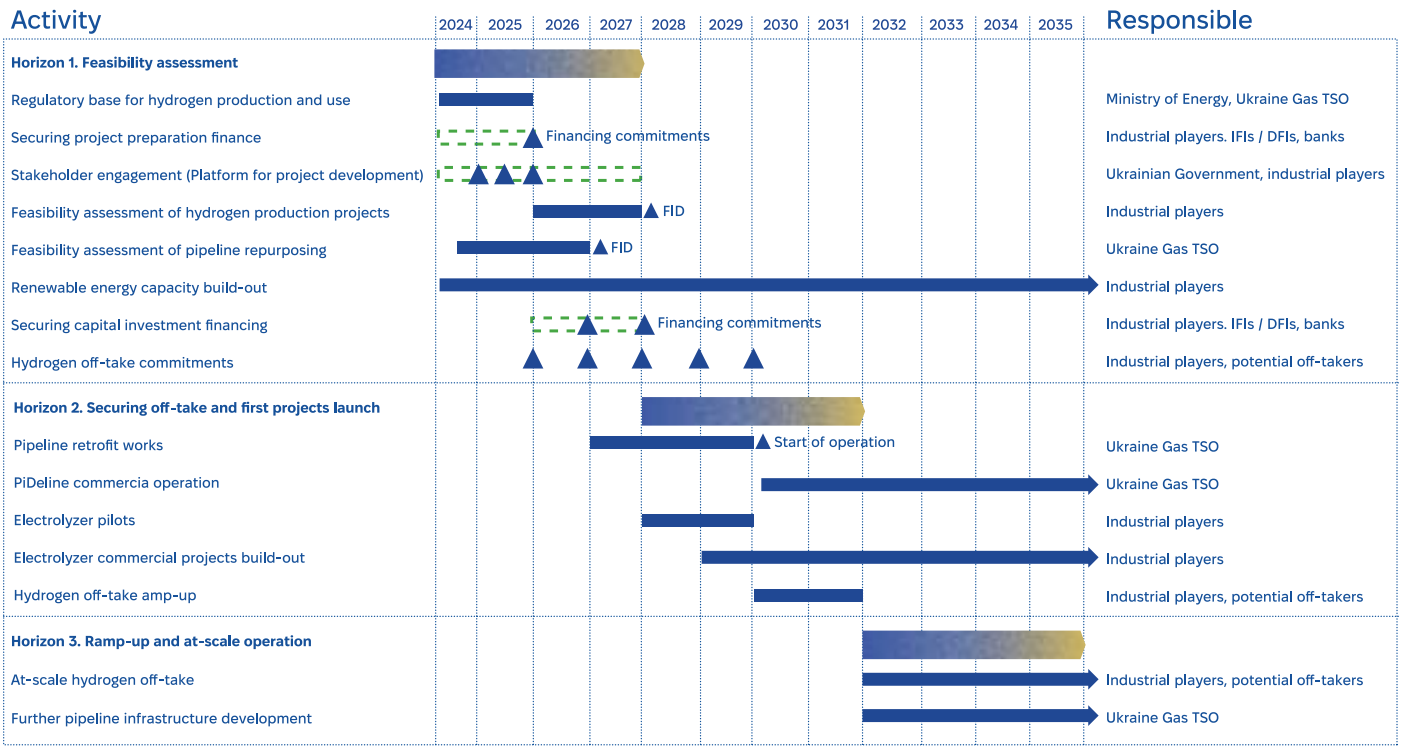
Ukrainian government is currently working on the development of new legislation under guidance of European advisors. At the end of 2019, the department responsible for the implementation of low carbon hydrogen technologies in Ukraine was established within the Ministry of Energy and Environmental Protection.

In June 2020, a working group was created within the National Security and Defense Council of Ukraine to discuss the possibility of a hydrogen economy. Furthermore, at the end of July 2020 a scientific-technical council, "Hydrogen Energy", was created within the Ministry of Energy. In 2018, the first industry association aimed at the promotion of low carbon hydrogen energy, the Ukrainian Hydrogen Council, was established in Ukraine.

ROADMAP FOR DEVELOPMENT

Build-out of renewable hydrogen production in Ukraine and export to Europe can be accomplished in stages. While gradual ramp-up of volumes is complicated due to the need to ensure sufficient gas pipeline utilisation, some strategies are available for transition period before renewable energy capacity and off-take reaches the necessary scale, including hydrogen blending with natural gas or production and export of clean hydrogen produced from nuclear power.

Preliminary high-level timeline for Ukraine Hydrogen Export Corridor project implementation



At-scale production of renewable hydrogen in Ukraine will create new jobs and economic opportunities in the country, while also reducing dependence on imported fossil fuels. At the same time, Central Europe will benefit from a reliable and sustainable source of energy, which will help to reduce greenhouse gas emissions and improve air quality. This shift towards renewable hydrogen will also help to strengthen economic ties between Ukraine and Central Europe, creating a more stable and prosperous region overall.

HYDROGEN

Highlighted investment projects

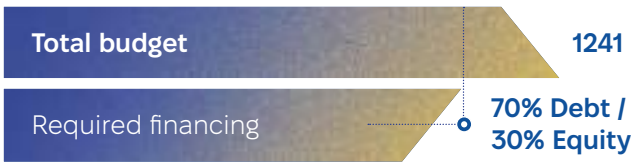
UDPR LLC

WEST UKRAINE GREEN HYDROGEN / AMMONIA VALLEY

VOLYN REGION

- **Brief Description:** providing a combination of infrastructure and resources for renewable H2 / NH3 and derivatives production in the western part of Ukraine, adjacent to existing gas pipeline networks, railways and the Western Bug River.
- **Target Market:** local market, European Union countries.
- **Products/Services:** Renewable hydrogen / ammonia production.
- **Technologies and Innovations:** Renewable hydrogen / ammonia production infrastructure.
- **Unique Selling Proposition**: Ukraine's leading investment and development company with running portfolio in photovoltaic energy (150 MW) in a partnership with E-Group, Acciona Energia and Nebras Power and vast development pipeline in wind energy (0.5 GW)
- **Project Status:** Feasibility study/pre-feasibility study.

Projects Highlights[1] ($ mln)



Type of financing – Private.

Financing structure: CAPEX – 98% / OPEX – 2%

Expected Financial Indicators:

- NPV – 875
- DPP (months) – 132
- Revenue – 238 (annually)
- IRR – 14% (up to 20%)
- Project launch period – 2026
- EBITDA – 198 (annually)

BUSINESS MODEL

Production of renewable hydrogen and ammonia for local consumption and export to European countries.

Key partners

International donors: financing, procurement of equipment and delivery to Ukraine

Key Points of Project Implementation:

Q1 2024	Q4 2024	2025
Pre-Feasibility study ready	Business Plan and Business Case ready	Fund attraction and partnership structuring

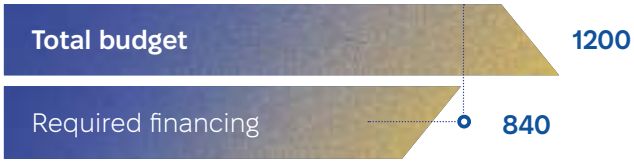
UDPR LLC

WEST UKRAINE RENEWABLE HYDROGEN VALLEY

VOLYN REGION

- **Brief Description:** Construction of a complex plant to produce ecologically clean hydrogen in Western Ukraine, which will annually produce 35,000 tonnes of hydrogen or 250,000 tonnes of "green" ammonia.
- **Target Market:** EU countries, including Germany, Poland, Slovakia and the Czech Republic.
- **Products/Services:** 35 thousand tons of hydrogen or 250 thousand tonnes of "green" ammonia.
- **Technologies and Innovations:** Complex plant to produce ecologically clean hydrogen.
- **Unique Selling Proposition**: Strong developer company track record / advantageous location on the border with the EU. Powerful solar and wind potential. Exit to the West Bug River and Baltic Sea through the Visla River.

Projects Highlights[1] ($ mln)



Type of financing – Equity financing.

Expected Financial Indicators:

- DPP (months) – 60-108
- IRR – 12-20%
- Project launch period – 2025-2026

- **Project Status:** Feasibility study / pre-feasibility study.

BUSINESS MODEL

Production of renewable hydrogen for export to Central European countries.

1 - The project information and financial indicators are provided by company-initiator of the project.

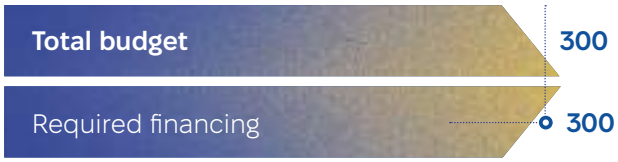
HYDROGEN UKRAINE, LLC

H_2U HYDROGEN VALLEY ZAKARPATTIA

ZAKARPATTIA REGION

- **Brief Description:** Creation of a small-scale local hydrogen value chain, with further stages including large-scale production of renewable hydrogen with a capacity from 100 MW to 1.5 GW, aiming for hydrogen supply to European consumers.
- **Target Market:** Ukrainian and Central European industry. USS Kosice steel plant is a potential off-taker.
- **Products/Services:** Renewable hydrogen production.
- **Technologies and Innovations:** Renewable hydrogen production infrastructure.
- **Unique Selling Proposition**: Hydrogen production to be built-out in proximity to electricity transmission and gas transmission infrastructure with access to water resource. This project is part of Slovak-Ukrainian hydrogen valley.

Projects Highlights[1] ($ mln)



Type of financing – Private.

Expected Financial Indicators:

- Project launch period – 2028

- **Project Status:** pre-feasibility study. The project is awaiting approval for funding, and a development schedule for the feasibility study will be established in September 2024.

BUSINESS MODEL

Production of renewable hydrogen for export to Central European countries.

Key partners

USS Kosice

Key Points of Project Implementation:

2022	2028
start of project development	project finalization

1 - The project information and financial indicators are provided by company-initiator of the project.

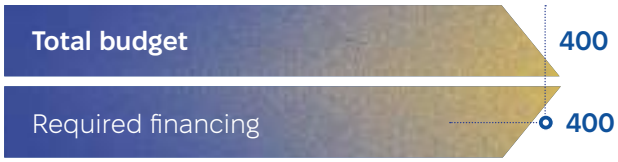
HYDROGEN UKRAINE, LLC

H_2U HYDROGEN VALLEY RENI

VOLYN REGION

- **Brief Description:** Project is dedicated to producing renewable hydrogen. Potentially three Phases are planned with 100 MW, 200 MW, and 3,000 MW installed electrolyzer capacity.
- **Target Market:** Ukrainian and Central European industry. Export plan involves hydrogen pipeline transport, or compressed gaseous hydrogen transported through barges up the Danube River.
- **Products/Services:** Renewable hydrogen production.
- **Technologies and Innovations:** Renewable hydrogen production infrastructure.
- **Unique Selling Proposition**: A land plot for the 200 MW electrolysis plant is registered and prepared following the Pre-FEED Design. Project received grant funding from the InnovateUkraine competition funded by UK International Development and hosted by the British Embassy Kyiv.

Projects Highlights[1] ($ mln)



Type of financing – Equity financing.

Expected Financial Indicators:

- Project launch period – 2027

- **Project Status:** Feasibility study. Financial indicators will be available after the completion of the feasibility study in February 2025.

BUSINESS MODEL

Production of renewable hydrogen for export to Central European countries.

Key Points of Project Implementation:

2024	2025 - 2026	2027
feasibility study and design & engineering work	permitting, delivery of equipment, construction and installation	commissioning of the facility and scaling-up of production

1 - The project information and financial indicators are provided by company-initiator of the project.

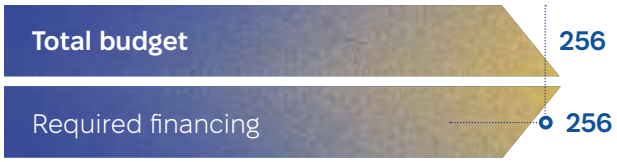
ZAKHIDNADRASERVIS, LLC

YAVORIV GREEN HYDROGEN PROJECT

LVIV REGION

- **Brief Description:** The project is aimed at construction of a 100 MW electrolysis facility in Western Ukraine that would produce ~12 ktpa of clean hydrogen. The facility would be powered by adjacent RES capacities, with possibility for grid power supply. To be transported by repurposed Uzhgorod-Dolyna gas pipeline and ~40.
- **Target Market:** Ukrainian and Central European industry. Supplied in a mix with natural gas (~5% hydrogen) to the EU through the pipeline network.
- **Products/Services:** Renewable hydrogen production.
- **Technologies and Innovations:** RRenewable hydrogen production infrastructure (electrolysis), hydrogen pipelines (repurposing existing and 40 km new pipeline).
- **Unique Selling Proposition**: Immediate proximity to the strategic Urengoy-Uzhgorod-Bratislava gas pipeline and Western border, strong logistical cost advantage. Sponsor might contribute the project land plot and its operational ~72 MW Yavoriv-1 solar plant.

Projects Highlights[1] ($ mln)



Type of financing – Private.

Expected Financial Indicators:

- IRR – 6-14%
- DPP (months) – 144
- Project launch period – 2027
- Revenue – 89 (year 4 after FID)
- EBITDA – 36 (year 4 after FID)

- **Project Status:** Feasibility study / pre-feasibility study.

BUSINESS MODEL

Production of renewable hydrogen for export to Central European countries.

Sponsor financial highlights[1].

$131 mln	$21 mln	16%
Revenues (2024)	EBITDA (2025)	EBITDA Margin (2026)

Key Points of Project Implementation:

- Land use and grid connection permits received.
- Pre-feasibility Q1 24
- Feasibility Q3 24
- Construction start Q1 25
- Launch Q3 26

1. Data is from readily available Ukrainian financial information.

4.5.GREEN STEEL

4.5.1. Current situation and the sector role

Ferrous metallurgy (including iron ore mining and processing, ironmaking, steelmaking and steel rolling) is a fundamental sector of the economy in Ukraine.

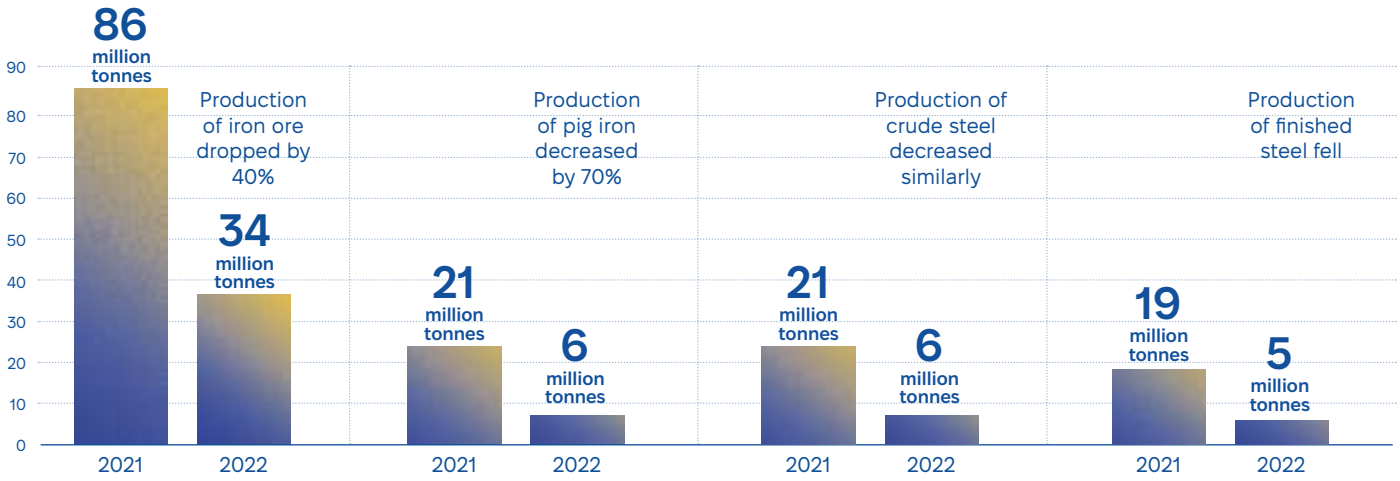
From year to year, it creates a significant economic impact. **In 2020 its aggregate share in GDP accounted for 9.5%, or EUR 12.4 billion** (including GDP generated by iron and steel companies themselves, supply chain and consumer spending of workers). The metallurgy sector and related industries employed 530 thousand people in Ukraine in 2020. Taxes paid by iron and steel companies amounted to EUR 3.1 billion in 2021.

Pre-war, one-third of Ukraine's exports was generated by the metallurgy sector: in 2021 Ukrainian iron and steel companies received EUR 20.1 billion of export revenues. Iron and steel companies are also the largest consumers in other sectors. In 2021, iron and steel companies accounted for 119.4 million tonnes of railway traffic (38% of the total volume) and 57.4 million tonnes (37.4%) of cargoes handled at Ukrainian seaports. Iron and steel companies were responsible for 18.7% of total electricity consumption and 6% of natural gas consumption in Ukraine in 2021.

The metallurgy sector also contributes to development of high-value-added industries, namely by consuming around 9% of machinery output in Ukraine. At the same time, the sector is one of the largest CO2 emitters (15% of Ukraine's greenhouse gas emissions in 2020) and polluters (SOx, NOx, hard particles), largely due to reliance on coke and coal in blast furnace ironmaking, generally outdated equipment and lack of incentives and large capital requirements for environment-related investments.

Ukraine's metallurgy sector has a significant impact not only within the country but also globally. **As of 2021, Ukraine was 5th largest exporter of iron ore, 4th largest exporter of iron ore pellets, 3rd largest exporter of pig iron and slabs.** Ukraine was also the 6th largest exporter of finished steel to the EU. Such reliance on exports is largely explained by Ukraine's relatively shallow local market for steel: steel consumption prewar was a mere 4 to 5 million tonnes per year, and it roughly halved during the war.

Figure 1: The impact of war on the metallurgy sector of Ukraine in 2022



In the first 9 months of 2023, the situation has not significantly improved, with production of pig iron, crude steel and finished steel amounting to 81-83% of 2022 values for the same period.

AVAILABILITY AND COST OF FINANCING AMID SIGNIFICANT CAPITAL REQUIREMENTS.

This has been significantly exacerbated by the war: first, increased country risks made foreign investments and access to capital markets unavailable, and financing costs prohibitively high; second, companies of the sector faced significant cash flow constraints due to lower production, low domestic consumption, inability to export and/or high logistics and other costs.

Significant and ongoing decrease in iron ore, iron and steel production is attributable to multiple factors caused by war:

- Logistics limitations resulting in significant increase in logistics costs for exporters.
- Lower prices and demand for iron and steel products due to decrease in production in Europe and globally;
- Disruptions of energy supply following mass missile and drone strikes by Russia.
- Occupation of and damages to iron and steel assets.

Approximately half of Ukraine's total ironmaking and steelmaking capacities and approximately 5% of iron ore mining capacities are located in territories occupied by Russia since February 2022;

- Additionally, the sector also faces the following significant challenges: - Availability and cost of financing amid significant capital requirements

4.5.2. Prospects and potential for the sector

Demand for green steel

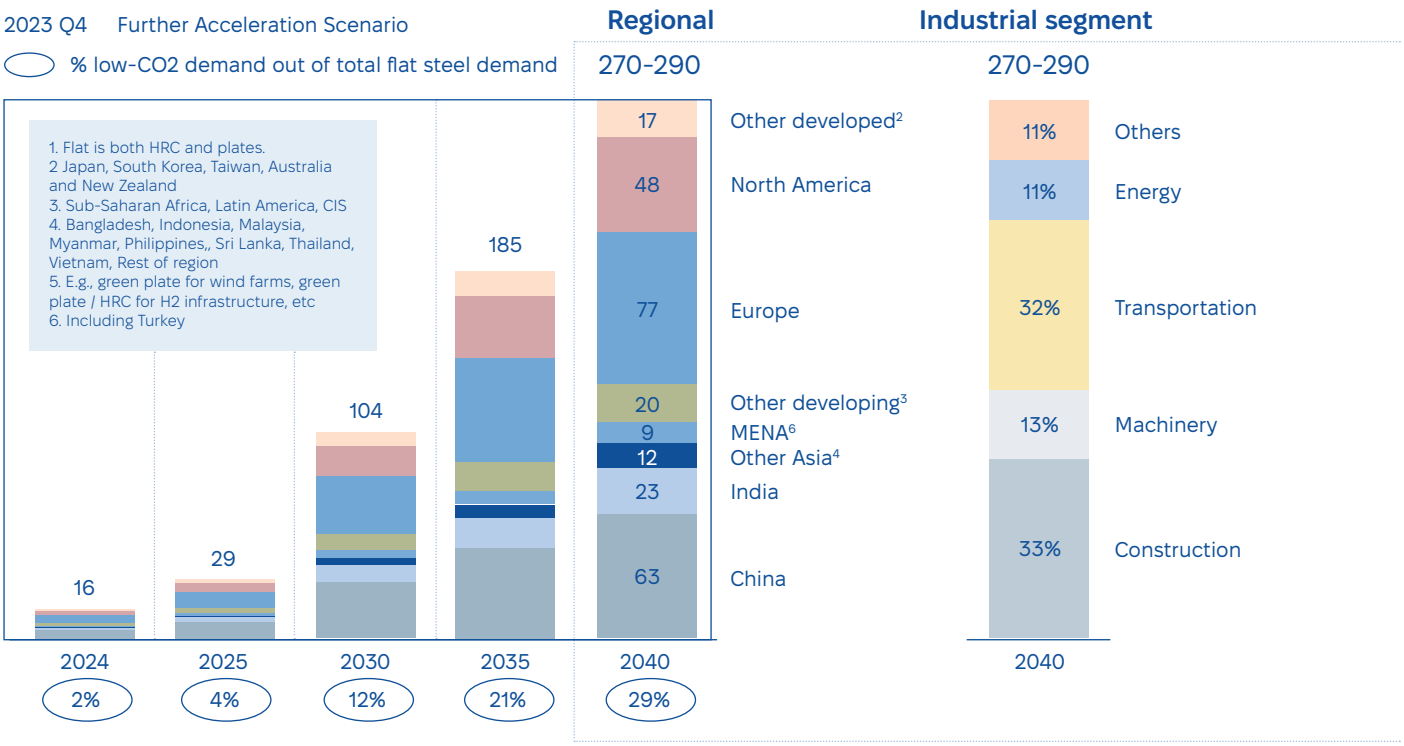
Steel production globally is responsible for 7% to 9% of the total greenhouse gas emissions, so unsurprisingly this is one of the sectors where push for decarbonization is the strongest. There are three key drivers for decarbonization of steel sector:

- Regulations. Rising CO2 emission prices, spread of emission trading schemes, and regulation like the EU's Carbon Border Adjustment Mechanism (CBAM) and the Paris Climate Agreement increase pressure to cut emissions. At the same time, green stimulus programs like the European Green Deal and government support facilitate decarbonization
- Increasing investor sustainability focus. Investors show growing consideration of CO2 emission footprint in financing decisions and cost of financing (e.g., BlackRock climate push, green bonds)
- Changing customer requirements. Steel customers have increasing awareness of environmental impact (e.g. Daimler aiming to be 100% carbon-neutral by 2039, and many other steel-consuming companies have made commitments to cut their scope 3 emissions)

The European Union is at the forefront of steel decarbonization, with EU-wide 55% emission reduction targets by 2030 and rising ETS CO2 prices in combination with melting free emission allowances (roughly halving by 2030 and zeroing by 2034) put steel players under pressure to decarbonize over the next decade.

In the first 9 months of 2023, the situation has not significantly improved, with production of pig iron, crude steel and finished steel amounting to 81-83% of 2022 values for the same period.

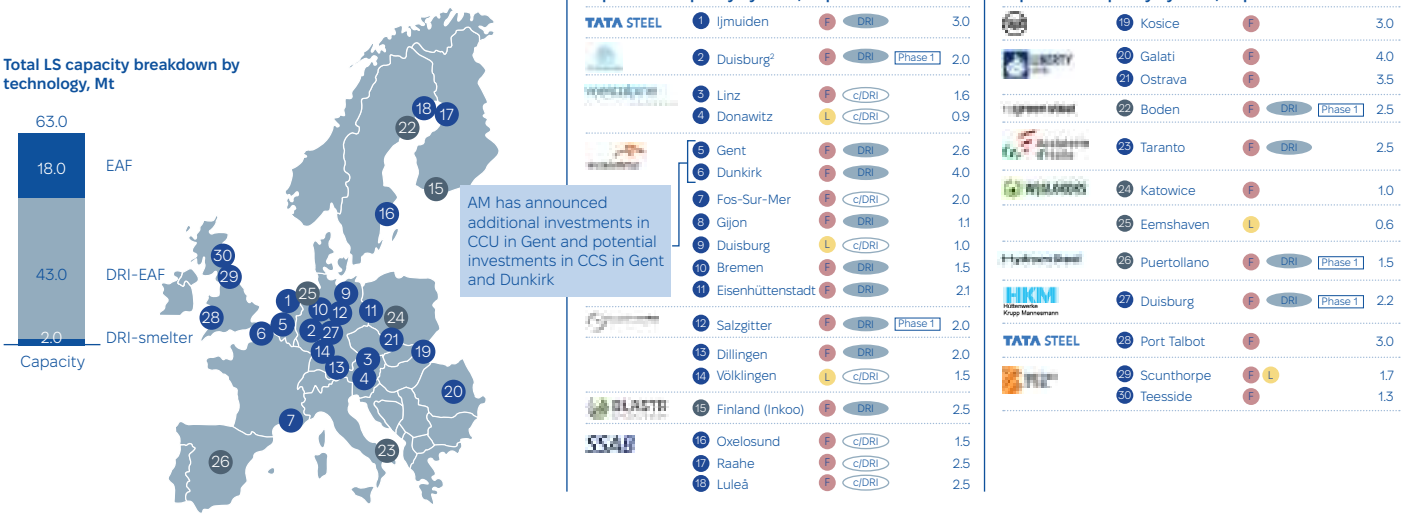
Figure 2: Global low-CO2 flat steel demand1, million tonnes



- ON THE GREEN STEEL SUPPLY SIDE, ~30 NEW PROJECTS WERE ANNOUNCED IN EUROPE, WITH TOTAL PRODUCTION CAPACITY OF >60 MILLION TONNES PER YEAR.

Figure 3: Announced green steel projects in Europe

Status as of December 2023



An extensive green capacity build-out in Europe countries would be challenging due to multiple factors, including:

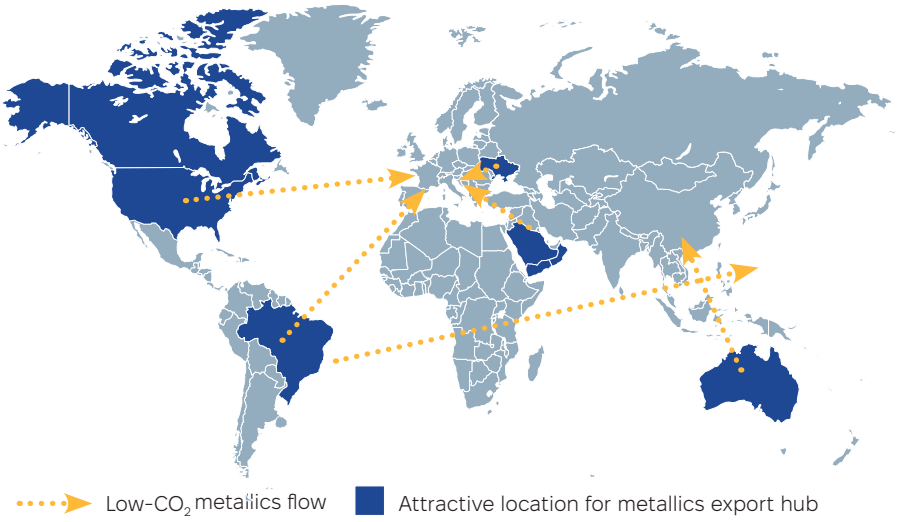
1 Lack of DR-quality[1] iron ore. As most of the projects assume a shift from hot metal production in the blast furnace to direct reduction of iron in shaft DR-module, they will require higher quality iron ore (DR-grade pellets) which is already in short supply globally and is expected to be in even higher deficit as the geological resources and mining of iron ores suitable for direct reduction is limited.

2 High cost and potential lack of supply of clean energy. The population density and growing concerns about land use have made it more challenging to find adequate areas for onshore wind and solar power. Siting issues may arise, especially as turbines get bigger, which could lead to stronger local opposition ("not in my backyard"). Long lead times for permitting and the complexity of the grid are also hindering the build-out of renewable energy and increasing its cost.

Considering the combined impact of these factors, Europe might become a net importer of green iron (likely in the form of HBI) and/or green steel. Admittedly, imports of green HBI may be more desirable for Europe (compared to green steel imports) as it will allow to keep the majority of green steel production, where European players has strong capabilities, end-customer base and sizable employment.

Europe could source a significant part of its green metallics demand from a limited number of countries with high-quality iron ore resources and cost-competitive clean energy. Such potential "green HBI hubs" include Brazil, Canada, US, Australia, Gulf states (with imported iron ore) and Ukraine.

Figure 4: Potential HBI export hubs



[1] DR-quality / DR-grade - Higher quality pellets (higher grade, lower carbon) for produced DRI / HBI

Ukraine's potential as a green HBI supplier to Europe

Ferrous metallurgy (including iron ore mining and processing, ironmaking, steelmaking, and steel rolling) is a fundamental sector of the economy in Ukraine. In 2020 its aggregate share in GDP accounted for 9.5%, or USD 13.7 billion (including GDP generated by iron and steel companies themselves, supply chain, and consumer spending of workers). Metallurgy sector and related industries employed 530 thousand people in Ukraine in 2020. Taxes paid by iron and steel companies amounted to USD 3.5 billion in 2021.

Pre-war, one-third of Ukraine's exports was generated by the metallurgy sector: in 2021 Ukrainian iron and steel companies received

USD 22.2 billion of export revenues

UKRAINIAN IRON ORE MINING AND PROCESSING IS DIVIDED BETWEEN A HANDFUL OF MAJOR PLAYERS, INCLUDING (IN ALPHABETICAL ORDER):

- **ArcelorMittal Kryvyi Rih:** ArcelorMittal subsidiary operates an iron ore mine in Europe, located near the city of Kryvyi Rih. It supplies iron ore to its steelmaking operations as well as to external customers.
- **Black Iron:** Canadian iron ore exploration and development company, advancing its 100% owned Shymanivske project located in Kryviy Rih.
- **DCH Sukha Balka:** DCH Sukha Balka is a subsidiary of the investment company DCH. The company's main mining and steel assets are located in the Dnipropetrovsk region, and it produces high-quality iron ore.
- **Ferrexpo:** one of the largest producers and exporters of iron ore pellets in Ukraine. Ferrexpo's raw material base includes 9 iron ore deposits with estimated resources of 19.7 billion tonns. The company operates several mines in the Poltava region, including the Poltava, Yeristovo, and Belanovo mines. Ferrexpo is the world's third largest exporter of iron ore pellets.
- **Metinvest:** in addition to its steel production operations, Matinvest also has significant iron ore mining assets. The company's mining division includes several iron ore mines in Ukraine, such as the Ingulets Mining and Processing Plant, Northern Mining and Processing Plant, and Central Mining and Processing Plant. The company also owns a share of Southern Mining and Processing Plant.

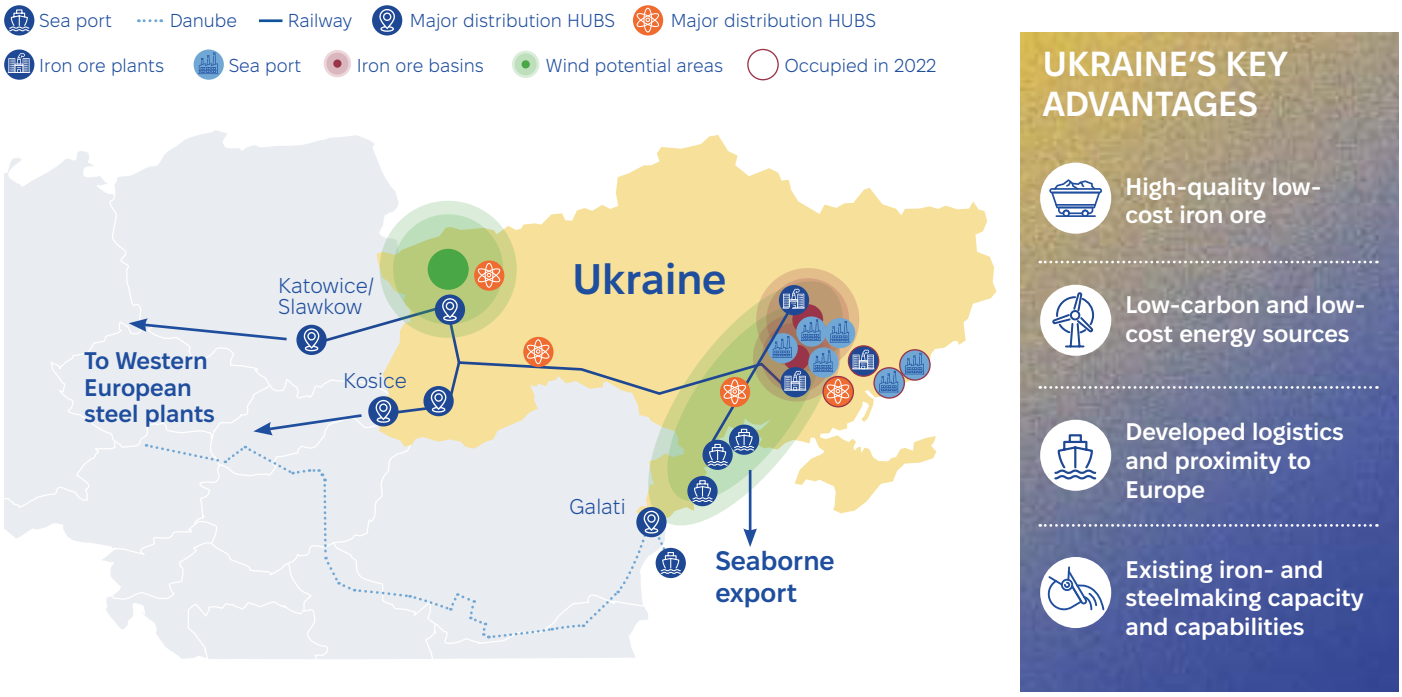
SOME OF THE PROMINENT COMPANIES IN THE UKRAINIAN IRON AND STEEL SECTOR INCLUDE (IN ALPHABETICAL ORDER):

- **ArcelorMittal Kryvyi Rih:** a subsidiary of the global steel giant ArcelorMittal, operating in Kryvyi Rih. It is one of the largest steel producers in the country and a major player in the international steel market.
- **Dnipro Metallurgical Plant (DMZ):** DMZ is one of the leading steel producers in Ukraine, specializing in long steel products such as bars, wire rods, and sections.
- **Interpipe:** Ukrainian industrial company that specializes in the production of seamless and welded pipes and railway products. Interpipe is among the world's top 10 largest exporters of seamless pipes. The company is also the world's third-largest producer of forged railway wheels.
- **Metinvest:** Metinvest is one of the largest Ukrainian vertically integrated mining and steel companies. A significant part of Metinvest's steelmaking capacity in Ukraine was damaged or occupied during the war (Azovstal Iron and Steel Works, Ilyich Iron and Steel Works).
- **The war had a significant impact on Ukraine's iron and steel capacity.** Currently, only 5 of Ukraine's 13 available blast furnaces are in operation, as well as two electric arc furnaces at Dneprospetsstal and Interpipe Steel. According to the Deputy Minister of Economy, currently, 90% of the country's iron ore assets are located in controlled territories, Ukraine also controls about 50% of steel smelting capacities. The steel sector of the country suffers not only from the destruction of enterprises in the east but also from the narrowing of logistics routes. Due to the war, Ukrainian steelmakers reduced production of pig iron and steel by 70-85%.

Capital investment in the industry has also decreased due to the war. The dynamic of capital investments in the largest metallurgical companies of the mining and metallurgical complex of Ukraine was as follows:

- **Metinvest invested USD 354 million in 2022 (-72.3% compared to 2021).** Metinvest Group has been recognized as one of the largest investors in Ukraine in 2022-2023, ranking second in the Ukrainian edition of Forbes' 20+5 largest investors in the country. The company's top investment projects in 2023 included the launch of new longwalls at Pokrovsk Coal Group enterprises, modernization and repair of chambers at Kametstal and Zaporizhstal, as well as energy projects. In 2024, the planned capital investment is about USD 319 million.
- **Ferrexpo invested USD 161 million in 2022** (-55.4% compared to 2021). In 2023, the company's capital investment amounted to USD 101 million, including sustaining and optimisation projects.
- **ArcelorMittal invested USD 112.8 million in 2022** (-63.6% compared to 2021). In 2023 the company invested USD 130 million, and announced plans to increase this amount by 20% to USD 155 million in 2024.
- **Interpipe invested USD 21 million in 2022** (-66.7% compared to 2021). Interpipe's capital investments in the first 9 months of 2023 amounted to USD 17.57 million, up 16.9% compared to 2022.

Figure 5: Ukraine is well-positioned to become a key supplier of green HBI to Europe



This position is based on many competitive advantages, including:

High-quality low-cost iron ore

High-quality low-cost iron ore. Ukraine has 5th largest magnetite ore reserves globally (~5 billion tonn), with low-cost open pit mining and cost-efficient beneficiation. Ukrainian ores have the potential to meet requirements for DR-grade quality products due to very low alumina and phosphorus content which makes them a better alternative to Brazilian and Swedish ores which are widely used by the EU steel sector.

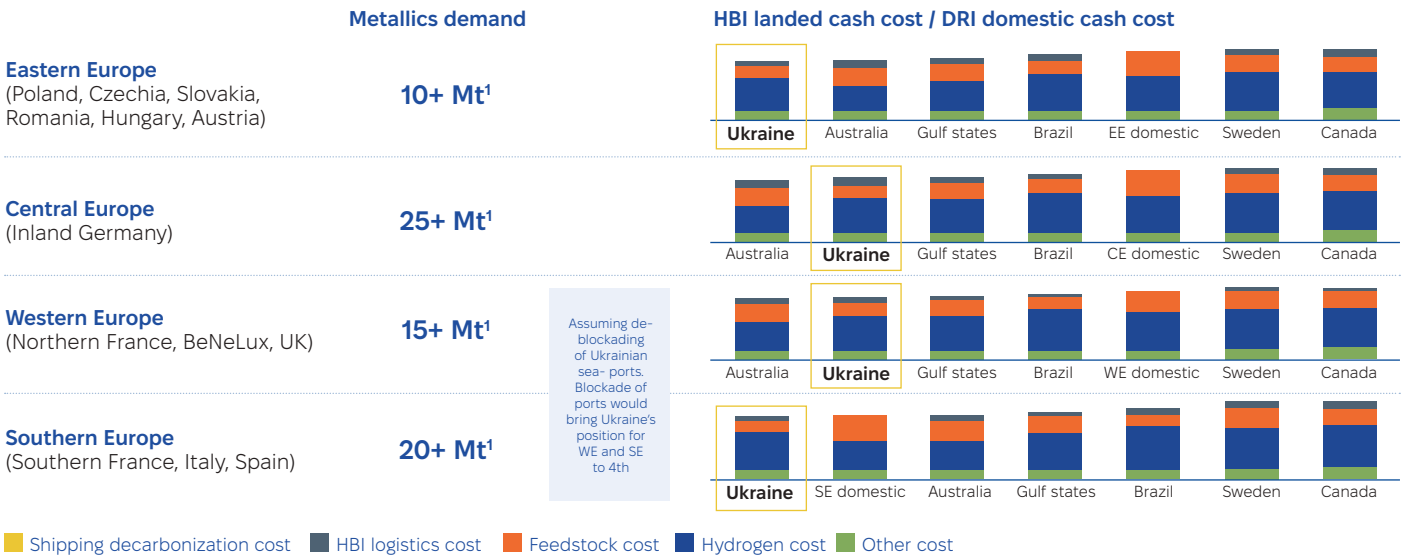
Low-carbon and low-cost energy sources

Developed logistics and proximity to Europe

Existing iron- and steelmaking capacity and capabilities

Low-carbon and low-cost energy sources. Abundant renewable energy resources (~40% onshore wind capacity factors and complementing solar profiles) combined with high land availability could enable at-scale build-out of renewable hydrogen production. Substantial existing zero-carbon energy capacity (hydro and nuclear) could serve as a transition energy source for clean hydrogen production and provide baseload power to ensure high electrolyzer utilization. The estimated levelized cost of electricity production (LCOE) for new renewable energy projects in Ukraine could be in the range of USD 40-50 / MWh for solar PV projects[2] and USD 35-40 / MWh for onshore wind projects[3]. For existing nuclear power capacity (assuming lifetime prolongation), LCOE could be in the range of USD 22-37 / MWh[4]. This could enable firm zero-carbon hydrogen production cost (LCOH) of ~USD 4 / kg H_2[5], supporting highly competitive HBI production costs against alternatives for the European market.

Figure 6: Comparison of landed cost of HBI from Ukraine and competitive locations

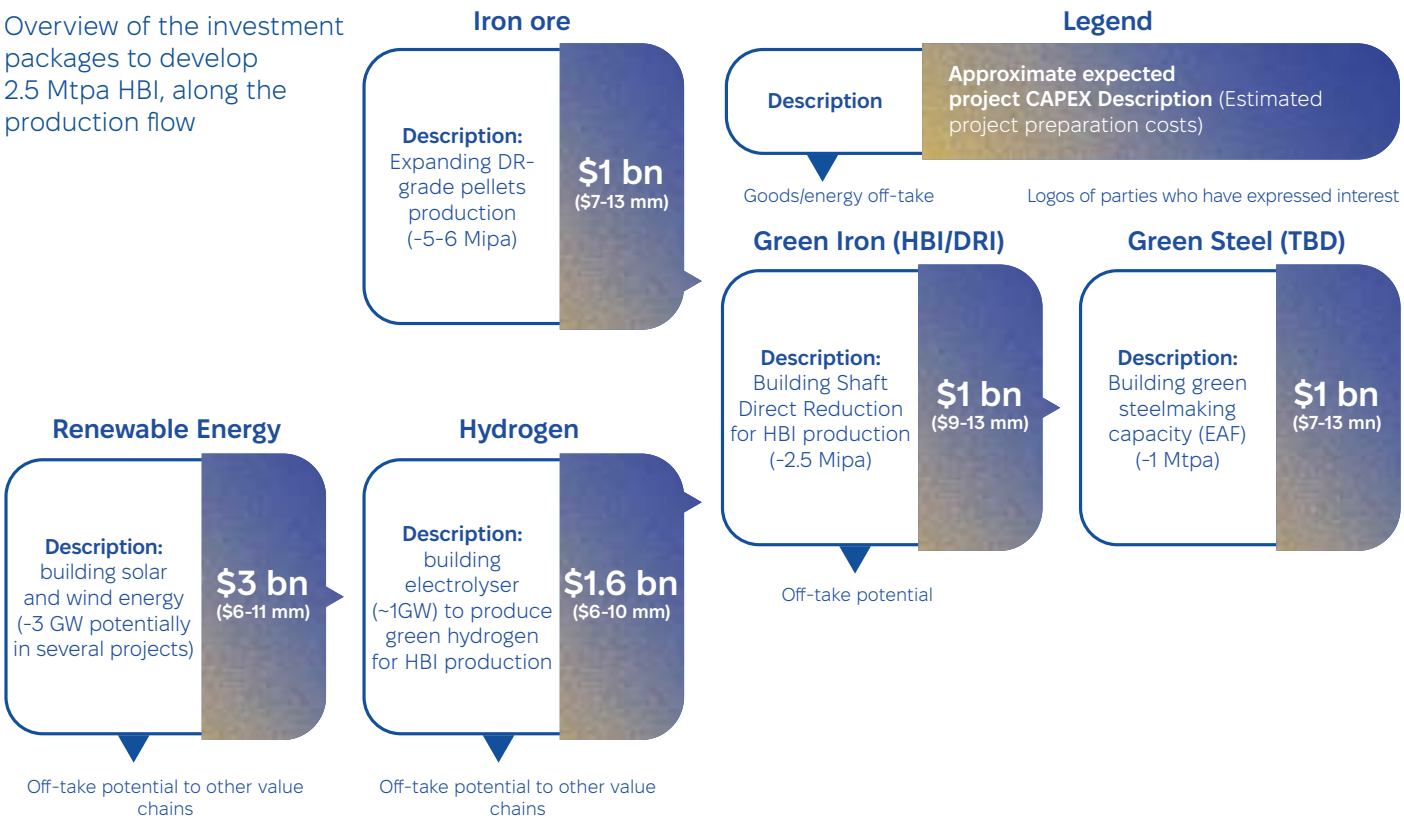


1. Expected metallics demand in 2030 based on current pig iron consumption, reduced by net scrap export. Key assumptions: hydrogen use 56 kg / + DRI /HBI, yield 1.45 t pellets to 1 † DRI/HBI, shipping decarbonization cost is +20-40% of maritime transportation costs. Including labour, electricity and O&M costs
2. Including labour, electricity and O&M costs
3. LCOH based on 1300 USD / kW Electrolyzer CapEx. hybrid onshore wind + solar PV energy, including firming costs for HBI production

OPPORTUNITY OVERVIEW

Ukraine's favourable positioning as well as the ongoing momentum in the market present an attractive opportunity for investment into build-out of the entire green iron and steel value chain in the country. Following is the illustration of how potential investment projects and the value chain could look like.

Figure 7: Illustrative green iron and steel value chain in Ukraine



[2]Assuming 1-axis tracking, 19-21% capacity factor, CapEx of ~USD 0.6 k / kW, OpEx of ~2% of CapEx per year, WACC of 8%
[3]Assuming Vestas 136 4000 turbines at 120 m hub height, 35-42% capacity factor, CapEx of ~USD 1.3 k / kW, OpEx of ~1.3% of CapEx per year, WACC of 8%
[4]Assuming 85% capacity utilisation, CapEx required to prolong block lifetime of ~USD 0.3 k / kW, variable OpEx of USD 17 / MWh electricity, decommissioning cost of USD 350-1,100 / kW, WACC of 5-10%
[5]Assuming large Alkaline electrolyzer technology, 55-63% onshore wind and 37-45% solar PV in the energy mix, 2.1-2.7 renewable energy to electrolyzer capacity oversizing, 68-76% capacity utilization, CapEx of ~USD 1.3 k / kW, OpEx of ~3% of CapEx per year, WACC of 8%

Key opportunities would include:

- **Build-out of greenfield mining capacities.** Ukraine has potential to further increase high-quality iron ore production. Additional volume (especially if combined with beneficiation and pelletizing capacities) could allow to expand production of DR-grade iron ore pellets, which are expected to become an increasingly important commodity in low-carbon iron and steel value chains, including in the EU.

- **Build-out of iron ore advanced beneficiation capacities (greenfield and / or brownfield).** As mentioned before, Ukrainian ores have very low alumina and phosphorus, while silica content remains the most challenging. To decrease silica content in Ukrainian pellets, advanced beneficiation capacities need to be built out, including magnetic separation, vertical mills and flotation technology.

- **Build-out of pelletizing capacities (greenfield and / or brownfield).** As mentioned, the share of direct reduction ironmaking is expected to increase in low carbon iron and steel value chains, DR-grade pellets are expected to become a commodity in high demand. Ukrainian ores have the potential to be beneficiated to the requirements for DR-grade feedstock. To produce DR-grade pellets from such feedstock, new pelletizing capacities are required.

- **Build-out of green ironmaking capacities (e.g., green hydrogen-based DRI / HBI production).** Ukraine is well positioned to become a key supplier of HBI to Europe due to the availability of high-quality low-cost iron ore, high potential for competitive zero-carbon energy production, logistical proximity to Europe and competitive labour resource.

- **Build out of green hydrogen production.** This is required to supply hydrogen for green direct reduction ironmaking. For one 2-2.5 million tonnes per year direct reduction plant, approximately 1-1.5 GW of electrolyzer capacity is required. Renewable energy generation capacity of 2-3 GW is required to supply electricity to such electrolyzer (potentially a mix of onshore wind and solar PV technology, with additional balancing by battery storage if economically feasible). To enable flat profile of hydrogen supply to the direct reduction plant, additional hydrogen storage build-out may be required.

- **Build-out of EAF capacities (including substituting existing OHF and BOF capacities and / or building greenfield capacities).** Electric arc furnaces using clean electricity will likely substitute other steelmaking technologies and will complement hydrogen-based DRI / HBI production to decarbonize the sector and provide "green" steel inputs for production of finished steel.

- **Build-out of finished steel production (heavy plates, HRC, CRC, coated plate, rails, heavy and medium sections).** Ukraine's finished steel production before the war was focused mostly on lower value added products, with several higher-end steel products (e.g. coated and galvanized coils) being in deficit and imported from Turkey and China. With the damage and loss of control over a number of production assets during the war and the expected demand for reconstruction, there will be a likely deficit in Ukraine of a number of steel products including heavy plates, thinner hot-rolled and cold-rolled coils, galvanized and coated coils, rails, heavy and medium sections. Therefore, there is a potential business case for building rolling mills producing these products for internal consumption and potential export to fill the market gaps due to loss of supply from Ukraine and Russia after the start of the war.

4.5.3. Required unlocks to realise the opportunities in the sector

To enable further progress and facilitate development and implementation of projects building out green iron and steel value chain in Ukraine and export to Europe, various technical, regulatory, and financial bottlenecks must be addressed.

TECHNICAL AND ECONOMIC FEASIBILITY ASSESSMENT

A major consideration for potential investors is the technical and economic feasibility of at-scale renewable energy, hydrogen, green HBI and steel production in Ukraine and its delivery to Europe. Feasibility studies are required to evaluate project viability.

FINANCING

Securing financing (including for the project preparation) is one of the key challenges, given Ukraine's risk profile due to the war.

Project preparation costs vary for different parts of the value chain. For renewable energy projects, pre-FID financing could be in the range of USD 2-4 million per GW installed capacity. For electrolyzer build-out, project preparation costs could be in the range of USD 6-10 million per GW electrolyzer capacity. For green HBI, such costs could be USD 7-10 million per typical plant.

The proposed projects will likely require financing from both private and public finance. The participation of

public organisations will be vital for securing capital at non-prohibitive interest rates and crowding-in private capital. IFIs will have a vital role to play in providing risk mitigation and blended finance instruments, as well as technical assistance. National development finance institutions (DFIs) and export credit agencies (ECAs) can also play an important role in providing additional capital. A syndicate of private banks will be required to provide commercial financing, led by a major international project finance specialist organisation.

A range of financial support mechanisms from public organisations can be used to reduce project risks. Grant funding is available across multiple IFIs during the ongoing war for the project preparation stage.

Various IFIs have proposed equity, debt, guarantees and insurance mechanisms available specifically for Ukraine that could be applied to the proposed project and help to de-risk investment. The EU Ukraine Facility Pillar 2 is set to unlock a further EUR 7 billion for the provision of guarantees to mobilise investment into reconstruction efforts, substantially increasing availability of financing, including for renewable energy sector and green iron and steel, which are designated as priority sectors under Ukraine Plan.

The following conditions must be met to secure post-FID financing:

- Stable geopolitical situation (however, some investments could be considered even before the end of the war);
- Reputable project sponsor(s) with a strong balance sheet and proven track record, able to cover substantial equity tickets and provide completion guarantees;
- Firm commitments for long-term off-take from multiple potential customers, accounting for a substantial part of planned hydrogen production (>70%).

STAKEHOLDER CO-ORDINATION

To implement a large-scale green HBI or green steel production and export project in Ukraine, coordinated effort of industrial and energy companies across the entire value chain is required. Alignment between renewable energy and hydrogen production, HBI producers and potential HBI off-takers could help resolve the "chicken-and-egg» dilemma typical for such projects. Long-term off-take will be critical to secure financing.

The cooperation between players across green iron and steel value chain could take form of a platform for project preparation and development, leading up to creation of a consortium of industrial and energy companies. Cooperation agreements with increasing degree of commitment (e.g., Letters of Intent, Memoranda of Understanding, etc.) could be concluded between platform participants at each stage of project development.

The financial structure of the proposed green iron and steel projects in Ukraine could take several forms depending on the prevailing conditions at the time of FID and will necessarily be a tailor-made arrangement between the parties involved.

REGULATORY ALIGNMENT AND REFORMS

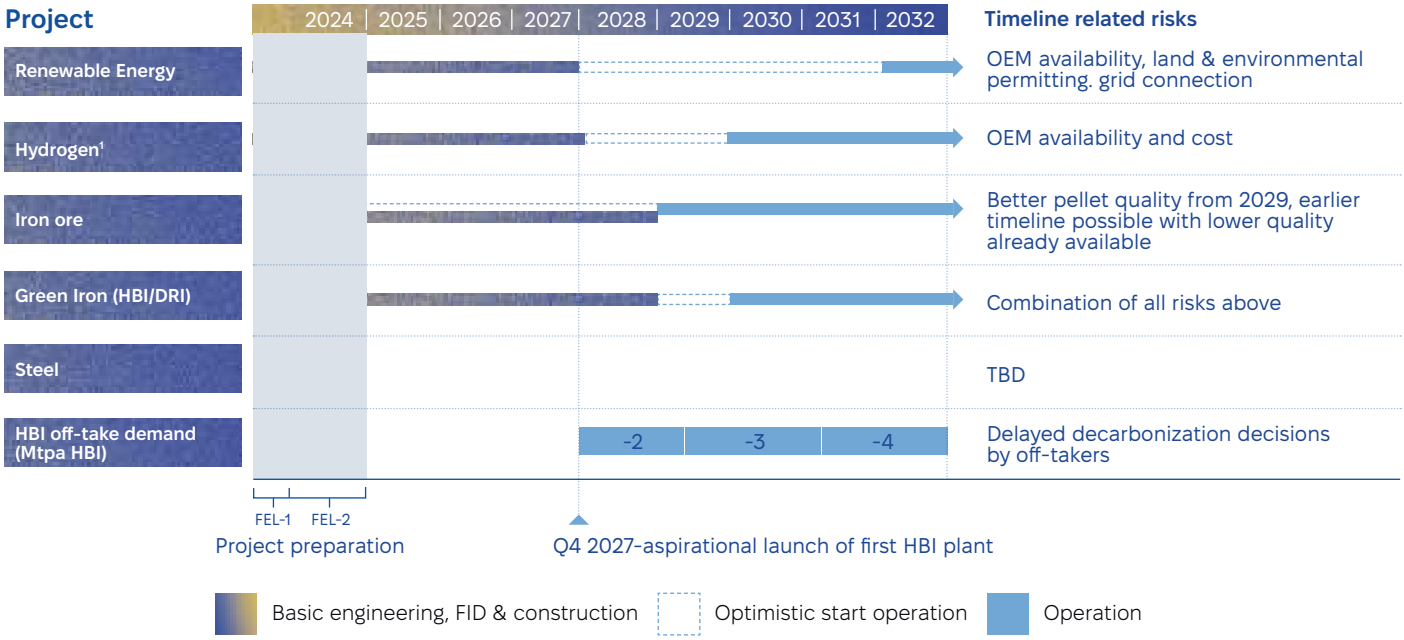
To support the build-out and operation of green iron and steel value chain in Ukraine, a number of regulatory changes are required, including:

- Stable and transparent regulations and tax regime;
- Streamlining of process to obtain land rights, permits and grid connection for renewables projects;
- Ensuring functioning of PPA system;
- Implementation of certificates of green origin for renewable electricity;
- Dedicated regulation governing hydrogen production, transmission and distribution, and use in Ukraine is required, including alignment with EU standards and regulations.

ROADMAP FOR DEVELOPMENT

Build-out of green iron and steel production in Ukraine and export to Europe can be accomplished over the several years.

Figure 8: Preliminary high-level timeline for project implementation



At-scale production of green iron and steel in Ukraine will create new jobs and economic opportunities in the country. At the same time, Europe will benefit from a reliable and cost-efficient source of green metallics to enable **European steel sector decarbonization, de-facto creating a "win-win".**

Sidebar: Potential green iron and steel projects in Ukraine

Metinvest: concentrate flotation and new pelletizer based on one of the existing iron ore mines

Project description: The Project aims to build DR-grade pellets production at one of Metinvest's existing facilities, where it will partially replace outdated pelletizing machines. The project consists of 2 parts: building advanced iron ore beneficiation (flotation) to produce 70-71% Fe DR-grade concentrate (pellet feed) and building new state-of-the-art 6 million tonnes pr year pelletizer

Participating companies: Metinvest Holding

Investment need: ~ USD 1 billion

Project status: Feasibility study

Expected date of commercial launch: 2028-2029

Greenfield 2-2.5 Mtpa HBI production

Project description: Building a Midrex Flex module to produce HBI using up to 100% renewable hydrogen to supply Ukrainian and European green steel industry

Participating companies: Ukrainian iron and steel player / international investor (similar projects have been contemplated by Ferrexpo, Metinvest and international steel players)

Investment need: ~ USD 1 billion

Project status: Pending feasibility study

Expected date of commercial launch: 2031

Interpipe: green EAF flat steel production

Project description: The project focuses on increasing production of green HRC in Ukraine by increasing production capacity to capitalize on European and Ukrainian market demand. It involves building two elements: Electric arc furnace (EAF) to produce liquid steel – powered by the grid; and 1 million tonnes per year endless strip production (ESP) line, including a coating plant, to convert liquid steel into HRC, bypassing need to store, re-heat and re-roll slabs

Participating companies: Interpipe Ukraine

Investment need: ~ USD 1 billion

Project status: Pending feasibility study

Expected date of commercial launch: 2028

GREEN STEEL

Examples of promising projects

METALLURGY

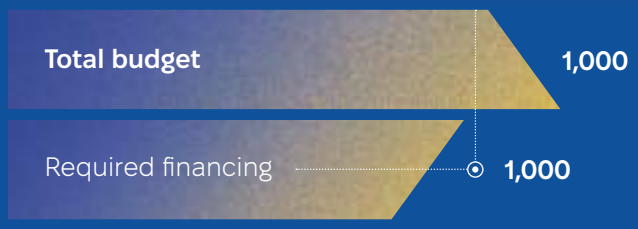
METINVEST[1], PJSC NORTHEN GOK

CONCENTRATE FLOTATION AND NEW PELLETIZER AT AN EXISTING IRON ORE MINE

DNIPROPETROVSK REGION, UKRAINE

- **Brief Description:** the Project aims to build advanced iron ore beneficiation and pelletizing capacities on existing mining capacities in Kryvyi Rih to produce DR-grade pellets.
- **Products/Services:** 67.5%-68% Fe DR-grade pellets, 70%-71% Fe iron ore concentrate.
- **Target Market:** domestic and international (Europe, Middle East) green steel industry.
- **Unique Selling Proposition:** large iron ore reserves which can be beneficiated to DR-grade quality. These pellets will have a steady increase in demand as the steel industry transitions to low carbon steel production.
- **Technologies and Innovations:** iron ore beneficiation capacities with additional flotation step; pelletizing plant, potentially using alternative fuel instead of natural gas for reducing carbon footprint.
- **Project Status:** Feasibility study, search of funding

Projects Highlights[2] ($ mln)



Type of financing - debt financing (MFIs, commercial banks), project financing

Financing structure: CAPEX – 100%

Expected Financial Indicators[2]:

- NPV – n/a[2]
- DPP (months) – n/a[2]
- Revenue – > 600 (year 5 after FID)
- IRR – n/a[2]
- EBITDA – n/a[2]
- Project launch period – 2029

BUSINESS MODEL

- Cost-competitive production of DR-grade iron ore pellets for domestic consumption (e.g., in Metinvest's own ironmaking projects) and for export (e.g., to European and Middle Eastern countries, where deficit of raw materials for green steelmaking is expected

KEY POINTS OF PROJECT IMPLEMENTATION

Vertically integrated steelmaker managing every link of the value chain. Diversified asset base:

- in geographic terms: manufacturing facilities locate in different regions of Ukraine, as well as abroad – Bulgaria, Italy, the UK and the US
- in product terms: from iron ore and coking coal to coke, pig iron and steel products

Key partners

Metso other
European partners are expected to be involved

Key Points Of Project Implementation

- Start of development of project documentation 2025
- Start of operation 2029

Key metrics (2023)

Sustainability	**C.70,000** employee headcount[1]	**US$447 MN** taxes paid globally	**US$165 MN** allocated to help Ukraine during the 2 years of full-scale war[2]
Finance	**US$7.4 BN** revenues	**US$0.9 BN** EBITDA	**12%** EBITDA margin
Sales	**12.6 MT** iron ore product[3]	**5.4 MT** semi-finished and finished steel product[4]	**4.5 MT** coking coal concentrate

[1]Metinvest has a wide list of investment projects for mining and metallurgical plants - from the production of DR-class pellets to green steel and rolled steel. Additional projects are available upon request.
[2]The project information and financial indicators are provided by company-initiator of the project upon request.
[3]As at end of 2023. [4]Including around 5.3 mt of pellets. [5]Covering 2023 figures, which are preliminary. [6]Including around 0.7 mt of pig iron.

METALLURGY

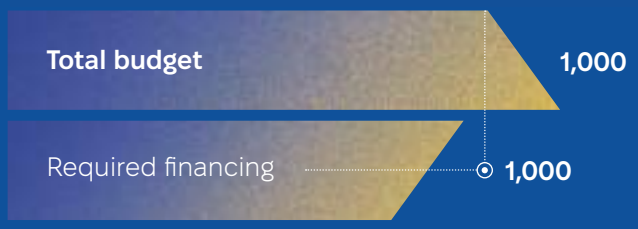
UKRAINIAN IRON AND STEEL PLAYER / INTERNATIONAL INVESTOR

GREENFIELD
2-2.5 MTPA HBI PRODUCTION

SIMILAR PROJECTS HAVE BEEN CONTEMPLATED BY FERREXPO, METINVEST AND INTERNATIONAL STEEL PLAYERS

- **Brief Description:** Building a direct iron reduction module to supply 2-2.5 Mtpa HBI to Ukrainian and European green steel industry. The project will be fed with Ukraine-produced DR-grade iron ore pellets
- **Target Market:** Domestic and international (Europe, Middle East) green steel industry.
- **Products/Services:** "Green" hot briquetted iron (up to 100% renewable hydrogen based)
- **Technologies and Innovations:** Technology provides the flexibility to operate on different ratios of natural gas (NG) and hydrogen, up to 100% H2.
- **Unique Selling Proposition:** Competitive cost of products, availability (proximity) to raw materials, Green HBI, Jobs & taxes, logistical proximity to Central Europe.
- **Project Status:** Pre-feasibility

Projects Highlights[1] ($ mln)



Type of financing - TBD[2]
Financing structure: TBD[2]

Expected Financial Indicators:

- NPV – TBD[2]
- DPP (months) – TBD[2]
- Revenue – TBD[2]
- IRR – 15-20%
- Project launch period – 2029
- EBITDA – TBD[2]

BUSINESS MODEL

- Production of hot briquetted iron using Ukrainian DR-grade iron ore and locally produced renewable hydrogen for domestic consumption (e.g., in Ukrainian steel mills) and export (e.g., to Central European countries, where exports from Ukraine have logistical advantage.

Key sources of funding structure

External project debt raise from commercial banks and IFIs/DFIs with the support of ECAs and/or guarantees from EU in the frame of Ukraine Facility.

Key Points Of Project Implementation

The prospect of introducing the CBAM payment system will lead to the need to switch to «green» metallurgy in Ukraine and obtain a competitive export product.

A preliminary analysis of sales markets predicts the prospect of stable growth in demand for direct reduction iron products from 2030+.

[1] The project information and financial indicators are provided by company-initiator of the project.

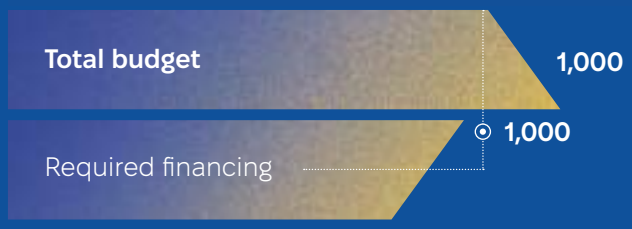
INTERPIPE UKRAINE

GREEN EAF-BASED FLAT STEEL PRODUCTION

DNIPROPETROVSK REGION, UKRAINE

- **Brief Description:** The project focuses on increase in the sponsor's steel output by 1 Mtpa through construction of an electric arc furnace and a hot rolling line at the existing steel mill site in Dnipro in Central Ukraine.
- **Target Market:** TDomestic and international (Europe, Middle East) markets.
- **Products/Services:** Low-carbon ("green") hot-rolled coil (HRC) from renewable-hydrogen based DRI / HBI and scrap.
- **Technologies and Innovations:** Electric arc furnace (EAF), initially powered by the grid with potential for localized renewable generation; endless steel production (ESP or equivalent) line connected directly to EAF.
- **Unique Selling Proposition:** Significant flat steel deficit in Ukrainian market and high expected demand for green steel in Europe creates market for the product.
- **Project Status:** Pre-feasibility study

Projects Highlights[1] ($ mln)



Type of financing - 70:30 debt:equity (initial hypothesis)
Financing structure: CAPEX - 50% / OPEX - 50%

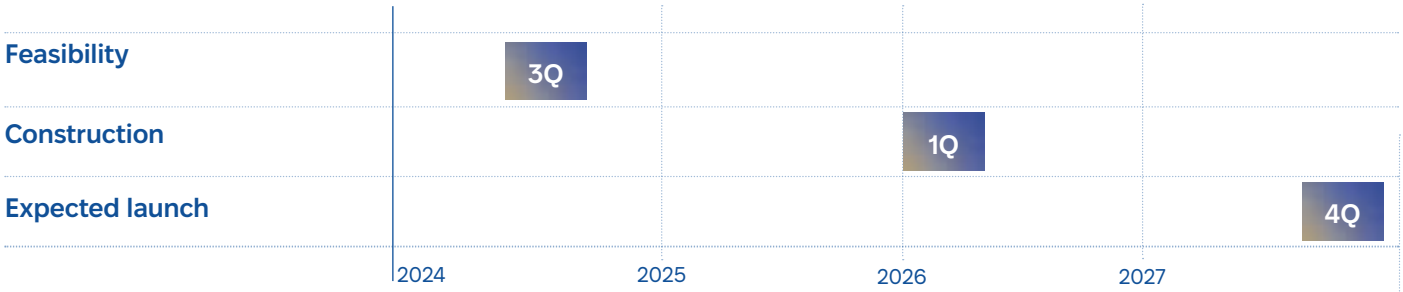
Expected Financial Indicators:

- NPV – n/a (n/a years)
- DPP (months) – ~100
- Revenue – ~1,600 (year 5 after FID)
- IRR – 15-20%
- Project launch period – 2028
- EBITDA – ~300 (year 5 after FID)

Key partners

Project has been discussed with potential partners: Primetals, Danieli

Key Points Of Project Implementation:



[1] The project information and financial indicators are provided by company-initiator of the project.

4.6. CRITICAL RAW MATERIALS (CRMS)

4.6.1. Current situation and the sector role

Ukraine possesses significant potential for CRMs extraction and utilisation, which are increasingly important in the context of the global green energy transition, innovative technology, and strategic applications (e.g., aerospace and defence), among geopolitical pushes to reduce dependence on supplies from China and Russia.

The availability of CRMs such as lithium and graphite represents an enabling factor for decarbonizing energy production and mobility ecosystems. Furthermore, CRMs are in increasing demand in the majority of key industrial ecosystems from aerospace and electronics to health and construction.

Deposits of 22 out of the EU's 34 critical minerals are found in Ukraine. Ukraine's potential in CRMs and its importance for the strengthening of both the EU's and Ukraine's economies has been recognized by signing a Memorandum of Understanding between the EU and Ukraine on a Strategic Partnership on Raw Materials in 2021. In 2021, the EU and Ukraine entered into a strategic partnership agreement concerning raw materials, with the primary goal of enhancing the diversification, resilience, and security of the supply of critical raw materials for both parties. The EU aims to more effectively incorporate Ukraine's raw materials into the EU battery value chains, while US partners consider a strategic partnership with titanium production in Ukraine.

Figure 1: List of EU's critical minerals, with presence in Ukraine

Strategic raw material	Supply risk	Economic impor-tance	Li-ion batteries	Fuel cells	Electroly-sers	Wind turbines	Traction motors	Photo-voltaics	Heat pumps	Data trans-mission networks	Data storage and servers	Smart-phones, tablets and laptops	Robotics	Drones	Space launchers and satellites	H_2-DRI with EAF/SAF	Additive manufac-turing
Magnesium Metal	4.1	7.4			●						●	●	●	●	●		●
Gallium	3.9	3.7						●		●	●	●	●	●	●		
REE	3.7-5.1	4.2-5.9		●	●	●	●		●	●	●	●	●	●	●		
Boron	3.6	3.9		●	●	●	●	●	●	●	●	●	●		●		
Cobalt	2.8	6.8	●	●	●					●		●	●		●		●
PGM	2.7	7.1		●	●					●	●	●	●		●		
Lithium	1.9	3.9	●							●		●	●	●	●		
Bismuth	1.9	5.7								●	●	●					
Germanium	1.8	3.6						●		●	●	●					
Natural Graphite	1.8	3.4	●	●	●					●		●	●	●	●	●	
Titanium metal	1.6	6.3										●	●	●	●		●
Silicon metal	1.4	4.9		●	●	●	●	●	●	●	●	●	●	●	●	●	●
Manganese	1.2	6.9	●	●	●	●			●	●	●	●	●	●	●	●	●
Tungsten	1.2	8.7			●							●		●	●		●
Aluminum	1.2	5.8	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●
Nickel	0.5	5.7	●	●	●	●		●	●	●	●	●	●	●	●	●	●
Copper	0.1	4.0	●	●	●	●	●	●	●	●	●	●	●	●	●		●

Ukraine has a developed mining ecosystem as a base for the development of further mining and processing of critical materials, which pre-war generated over 6% of Ukraine's GDP. Also, Ukraine historically had a powerful engineering and technical base, as well as labour skills for the implementation of complex mining and industrial projects to support the extraction and beneficiation of minerals. Before the war, Ukraine was among the global top 10 producing countries for a number of CRMs (incl. titanium ore, titanium sponge, TiO2, titanium ingots and slabs, zirconium, graphite, and manganese).

4.6.2. Overview and outlook of key reforms

1 Strengthening strategic planning and ensuring optimum framework for strategic investors

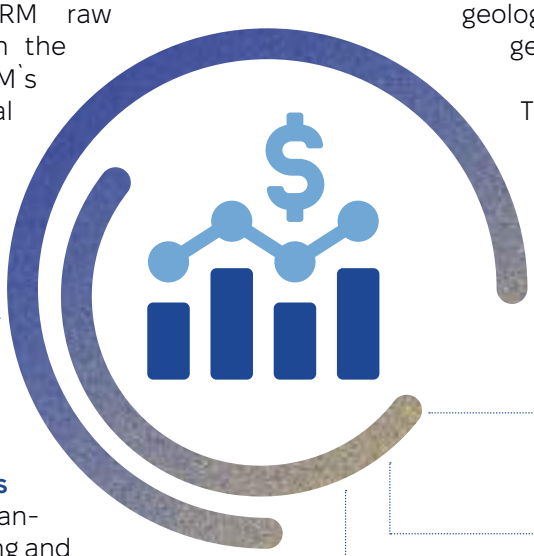
The adoption of the amendments to the State Programme of Development of Mineral Resource Base of Ukraine up to 2030 will create prerequisites for further attraction of investments in the CRM extraction and processing. In the medium to long term, this measure will unlock substantial investment, growth and employment opportunities by providing legal and financial instruments for investment promotion. Security conditions permitting, verification/re-assessment of CRM reserves of Ukraine using the international classification system as well as preparation and promotion of the list of mining investment opportunities in Ukraine through online auction bidding and Production Sharing Agreements tenders for solid minerals are both measures that could potentially have an immediate economic impact through attraction of new foreign direct investments. Verification and re-assessment of Ukrainian resources of CRMs according to the EU Critical Raw Materials Act 2030 shall stipulate forming value chains for CRM raw materials supply. The report on the reassessment of Ukrainian CRM`s reserves using the international classification system will help investors to make appropriate decisions.

2 Improving administrative procedures and transparency

Optimising the procedure and reducing the administrative burden saves time for potential investors and reduces the total investment cost. To achieve such progress three components of reform should be realised:

- **Forming a pipeline of investment projects.** Ukraine intends to attract strategic international investors by facilitating access to mining investment opportunities
- **International Production Sharing Agreements tenders launch.** To enhance transparency, a model PSA will be developed, and procedures for concluding PSAs will be streamlined and made publicly available
- **Digitising access to geodata and services by regulator.** Efforts will continue to improve and digitise the services offered by the Ukrainian Geological Survey. This includes providing free online access to geological data, establishing a National Geological Portal to consolidate geological information, and making geological reports accessible through an investor e-cabinet

These three measures will serve to improve transparency, speed and cost efficiency for new investment decisions. Both measures have the potential of immediate economic impact through the attraction of new foreign direct investments.



3 Use of Modern Extraction Technologies and Integration of Ukraine into Modern Processing Value Chains

Progressive introduction of mandatory ESG reporting for the mining and extractive sectors will ensure transparency, checks and accountability as regards ESG standards for the industry. It will consequently contribute to sustainability development of the industry and attracting investments. These initiatives, in turn, contribute to climate change mitigation and adaptation efforts, as well as the protection of the water, marine resources, and biodiversity, the transition to a circular economy, and pollution prevention.

4 Boosting Institutional Capacity

There are plans to revitalise funding for the Ukrainian Geological Survey to bolster its institutional capacity. This move aligns with Ukraine's commitment to the EU CRM Act 2030.

5 Value Addition and Employment Generation

The strategic goal of CRM investments is to maximise the value of critical materials and their application within Ukraine. This involves leveraging domestic expertise and labour to positively impact employment and value addition through CRM extraction and processing, while simultaneously ensuring a sustainable supply to the EU.

4.6.3. Tendencies of key reforms

Lithium and graphite are essential components in the production of batteries for electric vehicles and renewable energy storage systems. **With the EU's goal of transitioning to a sustainable and low-carbon economy, the demand for related products will rise significantly.**

The critical raw materials sector for EV and battery production is one of the fast-growing global sectors where Ukraine can plug into a growing global value chain. Ukraine-based production of lithium and graphite can help to diversify and de-risk Europe's growing needs.

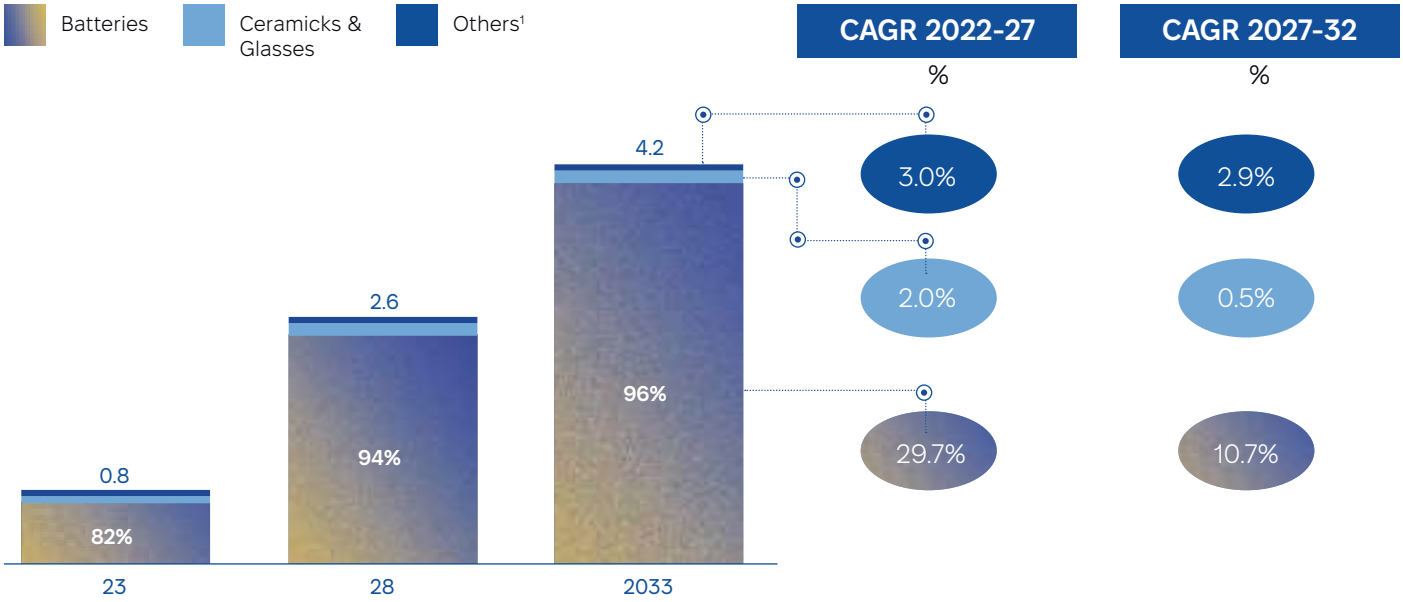
LITHIUM

Lithium stands as a pivotal component in the production of electric vehicle (EV) batteries, with its utilisation in batteries comprising 82% of lithium demand in 2023. Its usage is expected to be further supported by the adoption of lithium-based battery chemistries in mass market vehicle segments. Consequently, the mining and refining of lithium emerge as critical for the automotive industry and energy storage solutions worldwide.

LITHIUM DEMAND

The annual global growth rate of electric vehicle (EV) production, forecasted at 27% over the next ten years, is driving a rise in lithium demand by 23% p.a. over the same period. **Forecasts indicate a stable growth trajectory, with projections for 2033 suggesting that 96% of total global lithium demand will be attributed to batteries alone.**

Figure 2: Expected lithium demand growth 2023-2033



In 2023, China accounted for 46% of the global demand. With an expected annual growth rate of 21% over the next decade, forecasts suggest a gradual reduction in China's market share to 39% by 2033, as the European Union and the United States take the lead in lithium consumption. As a result, new trade flows for lithium hydroxide (the raw material consumed in the production of cathode materials for lithium-ion batteries) are anticipated to emerge in the market.

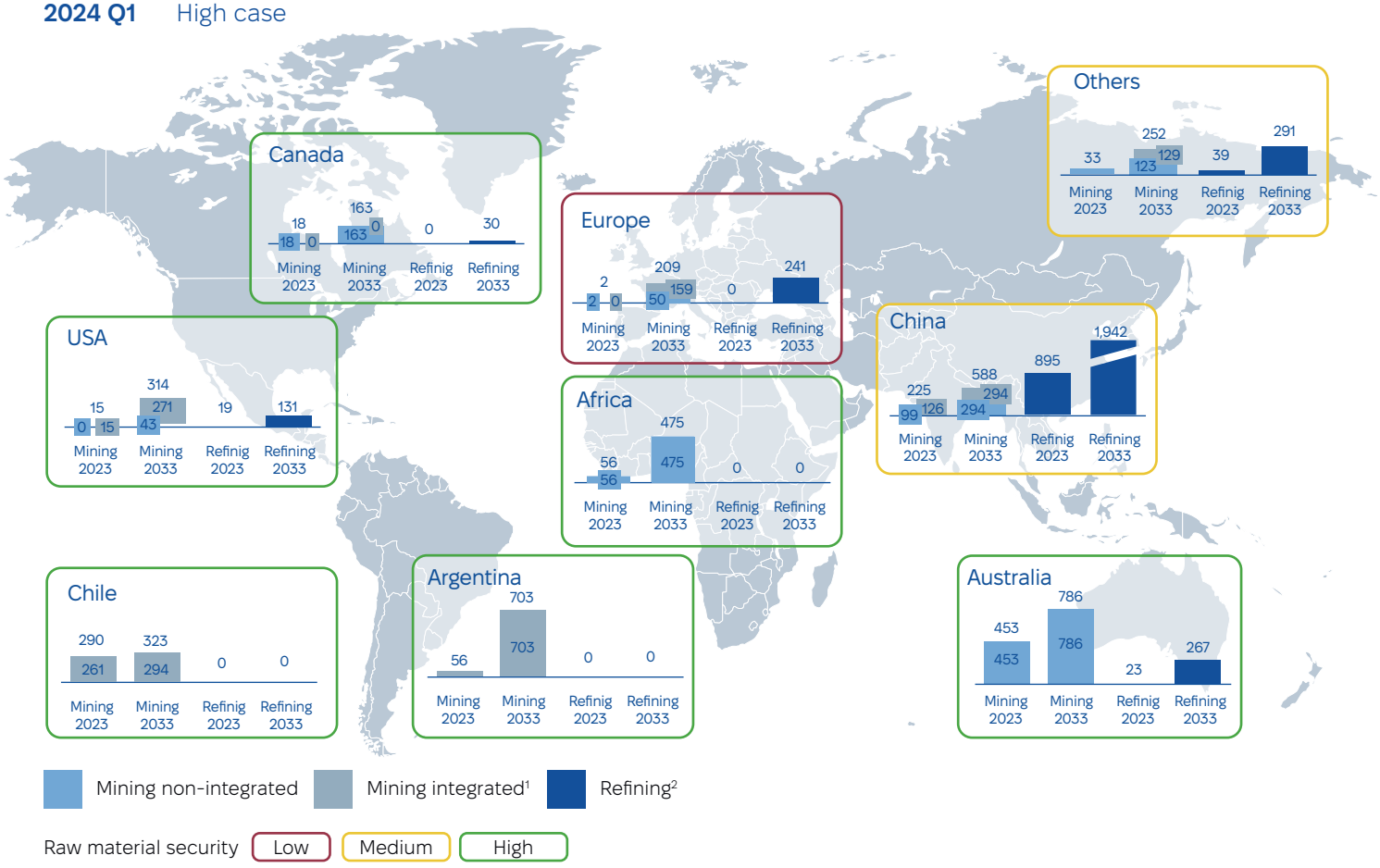
LITHIUM SUPPLY

The historical demand for lithium ore has predominantly been met by reserves that have been explored and developed in key regions such as Australia, Chile, Argentina, and China, which collectively hold the majority of known reserves.

China, serving as a prominent global refinery hub and the largest producer of batteries, is projected to maintain its position as the primary refining hub. In contrast, Europe, Australia, and the United States are actively pursuing strategies to diversify supply risks and reduce their carbon footprint, unveiling ambitious growth initiatives and making investments to increase their integrated or refinery capacity.

Figure 3: Forecasted capacity of lithium refining in 2023-2033

2024 Q1 High case

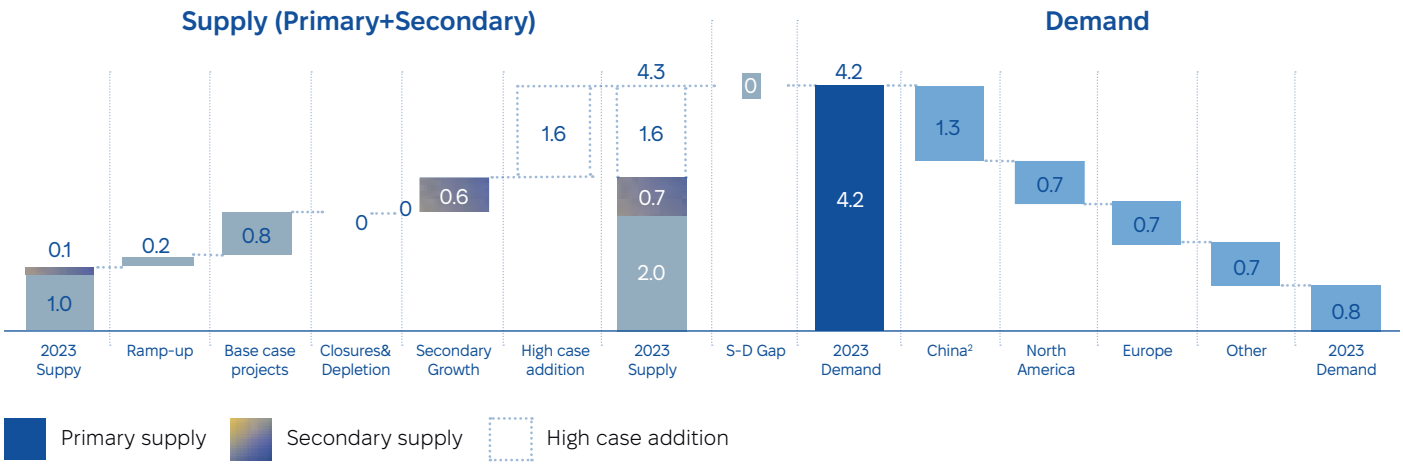


LITHIUM SUPPLY-DEMAND BALANCE

Amid the extremely strong growth in projected demand, the industry is expected to face a significant undersupply primarily due to delays in the development and construction of new mining facilities, as well as constrained refining capacities. **In a base case scenario, it is estimated that by 2033, there will be a supply-demand gap of approximately 1.6 million tonnes of LCE.** However, this gap has the potential to be filled if all new projects are successfully commissioned according to the planned timeline

Figure 4: Forecasted lithium supply-demand balance 2023-2033, Mt, LCE

2024 Q1 Further Acceleration



It is important to note that the global supply chains continue to face ongoing challenges, compounded by geopolitical tensions. These factors pose a high risk of significant delays in the establishment of new processing capacity, which in turn could have a significant impact on the battery industry itself.

EUROPEAN LITHIUM MARKET SITUATION

The European Union has taken proactive steps to safeguard its competitive edge by establishing The European Battery Alliance, with the primary objective of fostering innovation, competitiveness, and sustainability within the battery value chain in Europe. In 2018, the Commission introduced a strategic action plan for batteries, outlining a comprehensive framework of regulatory and non-regulatory measures to bolster all facets of the battery value chain.

Major players in the battery industry have already announced plans or commenced construction of plants to meet the region's material requirements across the battery production spectrum.

The challenge of securing raw material supply looms large for non-integrated refining projects and battery and cell manufacturers and OEMs, particularly in Europe, highlighting the potential role of Ukraine's resources in addressing this critical aspect and securing a stable supply of raw materials.

As the mining and refining infrastructure continues to evolve, the focus shifts towards the development and construction of cell manufacturing facilities and gigafactories across various European nations. Companies such as Northvolt, Freyr, ACC, CATL, and the Volkswagen Group are either in the planning stages or already underway with their construction projects. This expansion aligns with the existing presence of LG Chem in Poland and Samsung SDI in Hungary.

Automotive OEMs are actively seeking to secure a stable supply of lithium materials and are making strategic investments in assets. Their focus is primarily on late-stage projects that have reached at least the feasibility stage of development.

GRAPHITE

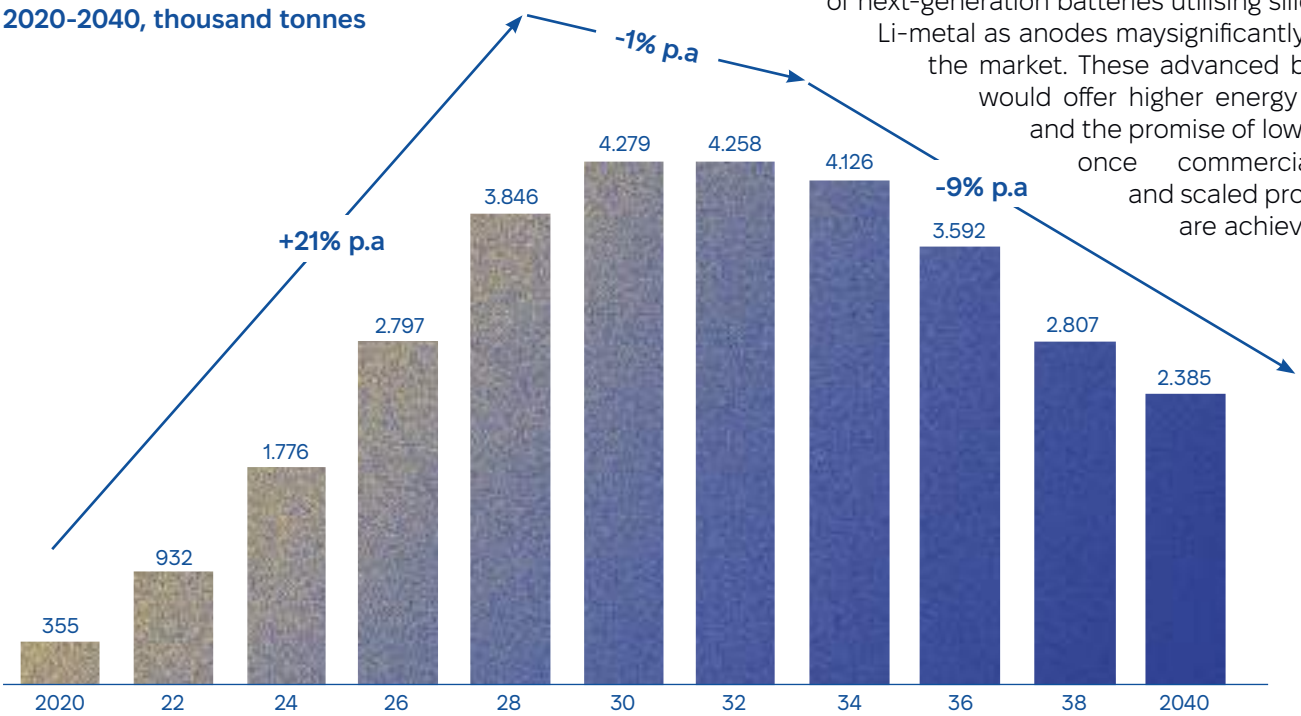
Similarly to lithium, graphite plays a crucial role as a primary component in lithium-ion battery anodes. This positions graphite as a vital material in satisfying the increasing demand for electric vehicles and serving as a valuable resource for battery manufacturing.

GRAPHITE DEMAND

Overall demand for graphite may grow significantly, by 21% within the next 5-7 years, however this growth in demand is expected to be moderated and ultimately capped by emergence and development of alternative technologies. This highlights the importance of accelerating current natural graphite projects, to the extent possible, to take the new supply to market while demand is still growing significantly.

The anticipated evolution of chemical technologies in the active anode materials sector over the next decade may scale down the role of graphite. The emergence of next-generation batteries utilising silicon and Li-metal as anodes maysignificantly impact the market. These advanced batteries would offer higher energy density and the promise of lower costs once commercialization and scaled production are achieved.

Figure 5: Global graphite anode demand balance 2020-2040, thousand tonnes

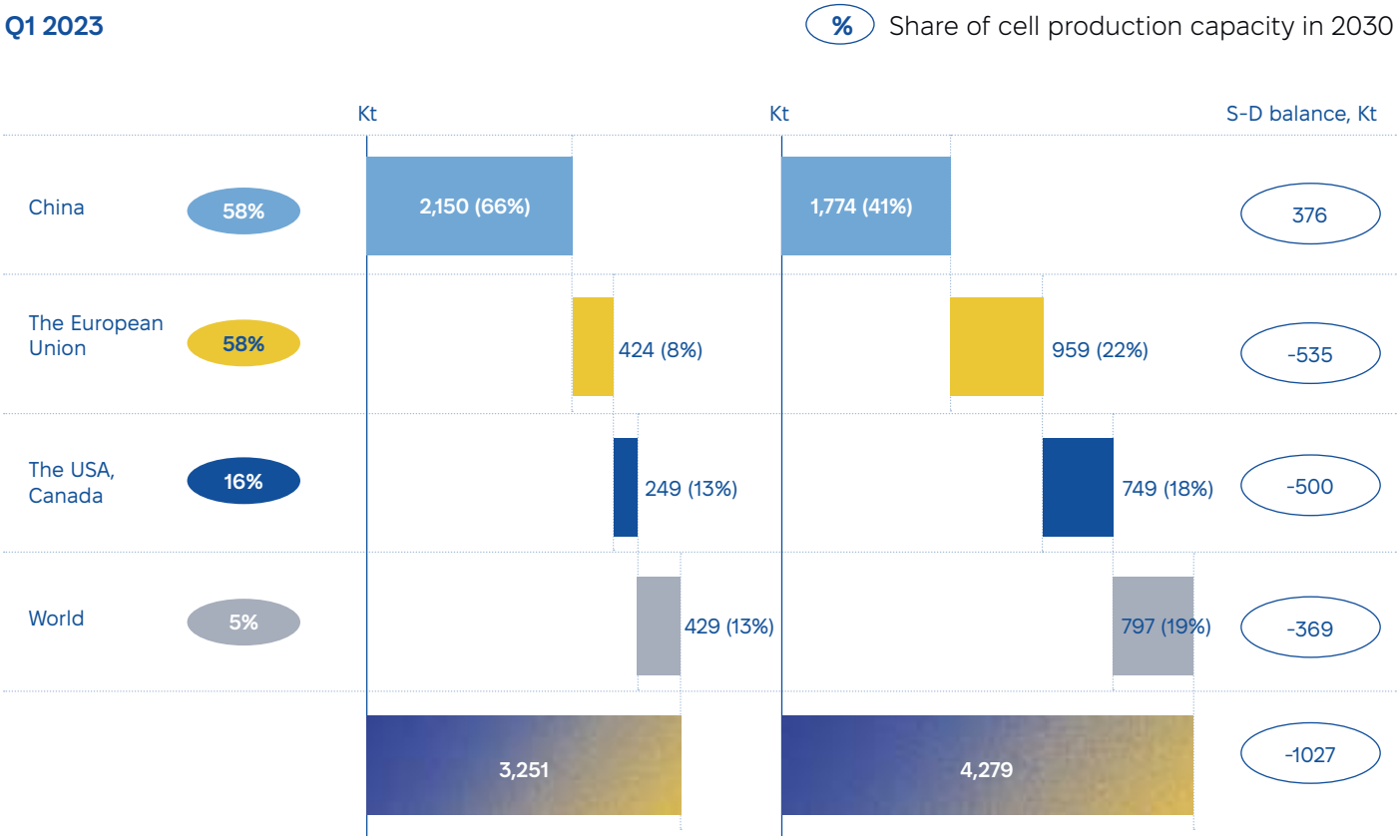


By 2030, the market is forecasted to transition from pure graphite anodes to graphite-silicon composites. Beyond 2030, the market is expected to witness a further shift towards pure silicon and Li-metal anodes as the technology matures. This progression may cause a gradual decline in graphite demand in the second half of 2030s, signifying the importance of launching new natural graphite supply projects soon, while demand is growing and there is enough "runway".

GRAPHITE SUPPLY

China currently holds a dominant position in the production of EV batteries, particularly in the active anode materials segment, with approximately three-quarters share of global graphite supplies.

Figure 6: Li-ion battery graphite supply by region 2030, thousand tonnes



This trend is expected to persist until 2030, with China maintaining its stronghold in this crucial sector producing 2.1 million tonnes of graphite anode per year. It is expected that announcements regarding the establishment of new graphite anode capacity will be made in the coming years leading up to 2030, further solidifying China's position as a key player in the EV battery supply chain.

GRAPHITE SUPPLY-DEMAND GAP

Simultaneously, the European and North American markets are poised to witness a substantial surge in demand coupled with minimal growth in production capacity, resulting in an undersupply scenario and heightened reliance on imports from China. This presents notable risk to the supply chain, particularly given China's intentions and recent actions to regulate its graphite exports.

Thus, market participants in the EU and NA regions aim to prioritise the development of local graphite production sources. Given the imperative for decarbonization and the energy-intensive nature of synthetic graphite production, coupled with anticipated decarbonization mandates and energy constraints, the future supply and role of synthetic graphite is expected to be constrained. Consequently, there is a projected shift towards customer preference for natural graphite and local supply chains over distant sources, particularly those in Asia.

Leveraging its abundant resources and strategic proximity to the EU, as well as its partnership with the US, Ukraine is well-positioned to help its allies in strengthening their graphite supply chains and securing supply of premium-quality raw and semi-processed materials.

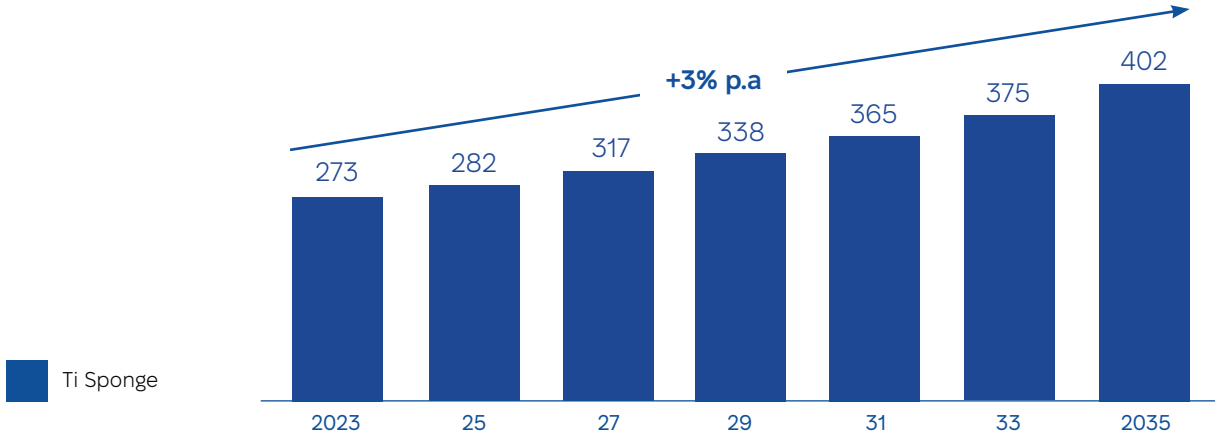
TITANIUM

Titanium is one of the most important materials for several strategic parts of today's civilization, including the construction of aircrafts, spacecrafts, and in applications in the defence sector. Titanium was one of the materials included in the list of critical and strategic raw materials by the European Commission, US Department of Energy and US Geological Survey, designed to incentivize investments and de-risk supply of these materials. There is a recent push by the EU and the US for diversification away from China and Russia, where significant reserves and processing capacities for titanium are concentrated.

TITANIUM DEMAND

Historically the global demand for titanium was stably growing" на "has grown steadily with respective growth of production / processing capacity.

Figure 7: Global titanium sponge demand 2023-2035, thousand tonnes Ti



Titanium sponge demand is projected to grow at 3% p.a. from 273 thousand tonnes to 402 thousand tonnes by 2035, mainly driven by aerospace industries.

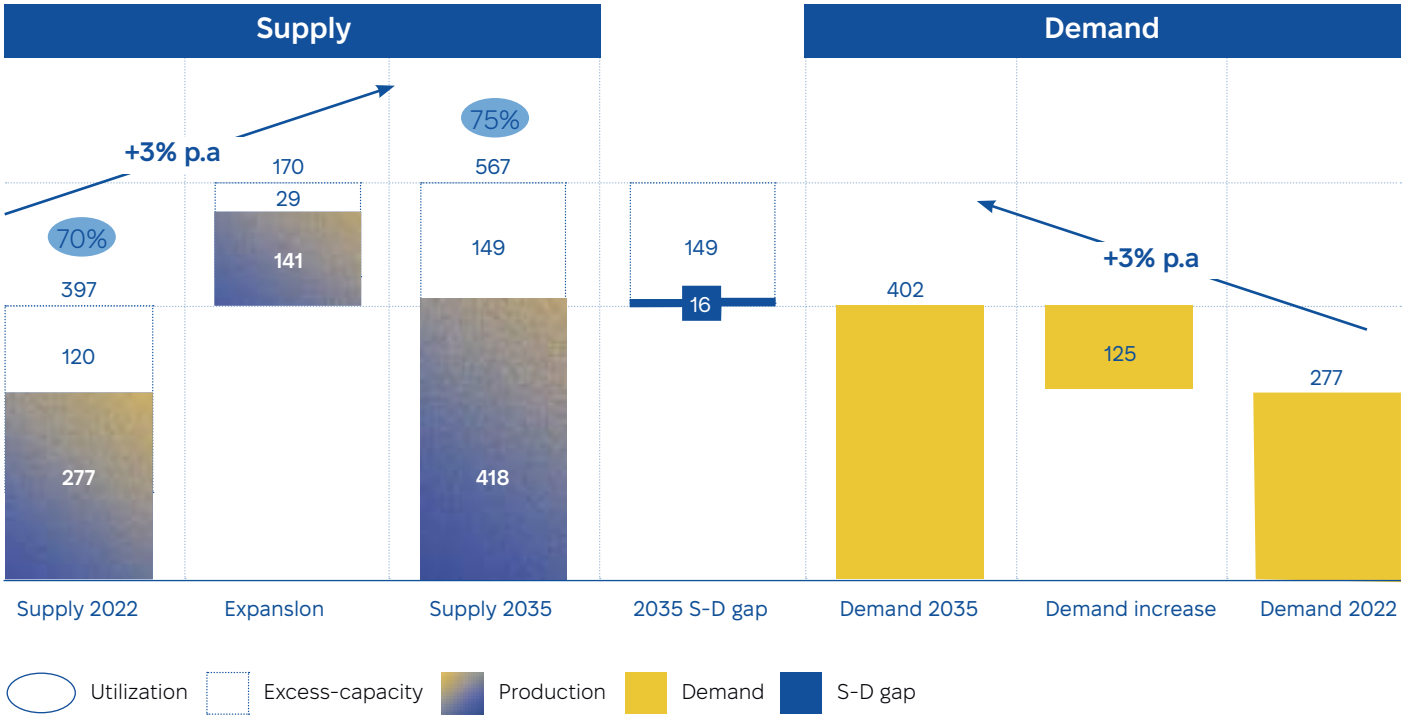
TITANIUM SUPPLY

There is currently an excess of titanium sponge production capacity It is expected that capacity expansion may lead to further oversupply of titanium sponge production. However, a large share of this production capacity is located in China and Russia, and the biggest part of capacity expansion is expected to be covered by China and its new production facilities (397 thousand tonnes p.a. in 2025).

TITANIUM SUPPLY-DEMAND BALANCE

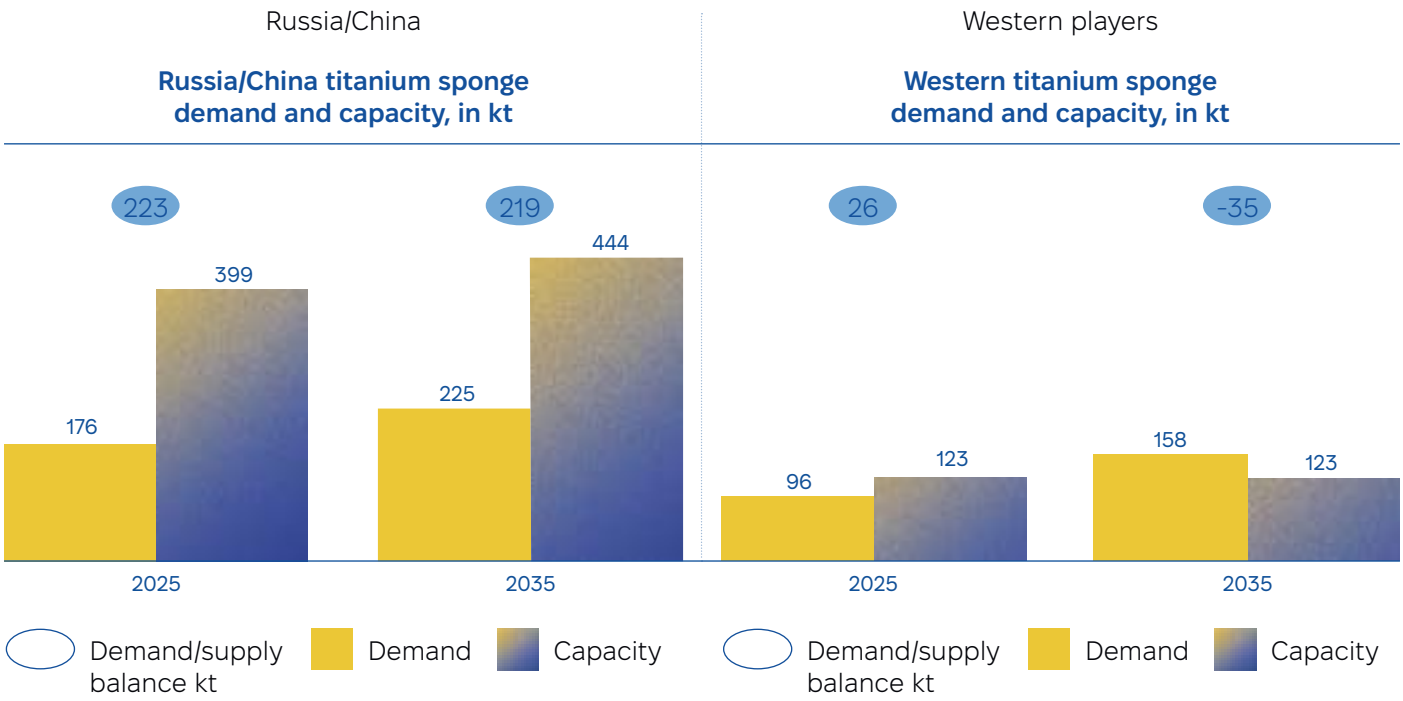
As of the 2022 majority of titanium production/processing facilities for titanium sponge were located in China and Russia with western countries depend on supplies from these two countries. Geopolitical tensions, dependence on energy sources and lessons learned by western players made it clear that supply chains for such strategic sectors like aerospace and defence should be maximally protected and supplied with raw materials from their own processing capacities or the capacities of allied countries.

Figure 8: Titanium sponge supply and demand 2022-2035, thousand tonnes



As market polarisation continues to increase, with potential restrictions on titanium product trading between Russia/China and Western players, Western companies may face supply constraints. However, there is a potential solution to this issue through the revitalization of idled capacity in the US' sponge facilities, which could help bridge the supply gap. This would require the sourcing of raw materials for sponge production from countries such as Australia, Canada, and Ukraine.

Figure 9: Projected titanium sponge demand and capacity 2025-2033, thousand tonnes



In 2023, the EU commission adopted the Critical Raw Materials Act, stating regional production/processing targets for strategic minerals, incl. titanium, and goals by 2030 with regards to: recycled (>25%), processed (>40%) and mining shares (>10%), single country reliance (<65%) for strategic minerals on the list. Such steps from the European Union will most probably lead to potential increases in local titanium ingot and sponge production, lower availability of exported processing scrap from the EU to other regions (especially USA), and lower reliance on imports from China and Russia.

In an effort to safeguard its interests, the United States has taken steps to fortify its position by unveiling the US Critical Minerals List. This list serves as a tool to assess the nation's susceptibility to potential disruptions in the global supply chain of essential minerals and metals crucial for various industries, economic stability, and national security. To ensure a stable supply of titanium sponge, US working groups and committees are actively exploring options for enhancing and modernising the existing production capacity within the country, as well as raw materials sourcing.

In response to the ongoing war in Ukraine, global players in the aerospace industry are actively seeking to diversify their procurement and secure their supply chains. For example, titanium consumers such as Boeing and Airbus have made strategic shifts in their supply chains, leading to a reduction or cessation of sourcing from Russia, the largest manufacturer of aerospace-grade titanium.

Another example of companies taking proactive steps in securing supply of titanium is Airbus's recent acquisition of the European titanium producer and manufacturer Aubert & Duval. This strategic move allows Airbus to integrate the titanium value chain and reduce its dependence on external suppliers.

Similarly, Boeing is also taking steps to diversify its procurement and ensure a stable supply of titanium. The company has signed a memorandum of understanding (MoU) to develop an aviation-grade titanium alloy value chain in Saudi Arabia. This partnership aims to establish a localised supply chain for titanium alloys, reducing Boeing's reliance on a single source and enhancing its supply chain resilience.

Ukraine's resources and existing production assets in the titanium value chain fit well for the closer integration into European and global value chains.

4.6.4. Advantages of industry development in Ukraine

LITHIUM AND GRAPHITE

Ukraine possesses proven reserves of a number of critical raw materials including lithium and graphite.

Ukraine's abundant lithium resources present investment prospects for international players. The current reserves, strategically situated far from the front line and in close proximity to EU borders in the central and western parts of the country, account for 1-2% of the world's explored lithium reserves and 6% of the world's explored graphite reserves.

As of 2023, multiple entities in Ukraine have initiated the development of lithium and graphite deposits, with a focus on attracting foreign partners for collaborative mining ventures and integrating Ukraine's CRM sector into the global or European battery production value chains.

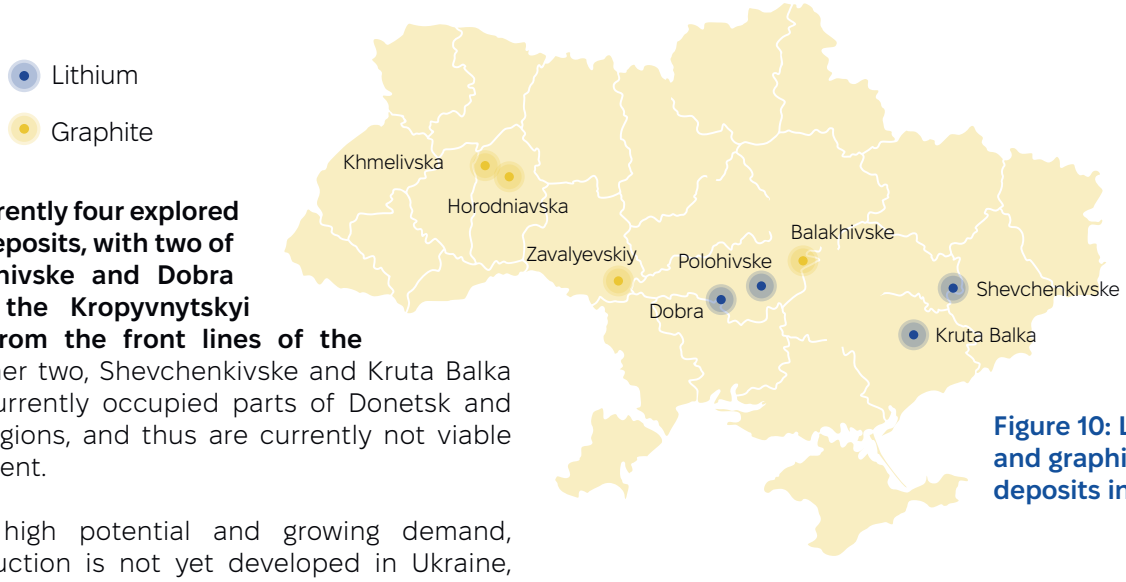


Figure 10: Lithium and graphite deposits in Ukraine

There are currently four explored lithium ore deposits, with two of them, Polokhivske and Dobra situated in the Kropyvnytskyi region, far from the front lines of the war. The other two, Shevchenkivske and Kruta Balka are in the currently occupied parts of Donetsk and Zaporizhia regions, and thus are currently not viable for development.

Despite its high potential and growing demand, lithium production is not yet developed in Ukraine, thus creating significant opportunity for international investors.

Similar to lithium, graphite deposits in Ukraine are strategically located close to European borders and far from the front lines, and are widespread across the Khmelnytsky and Kropyvnytskyi regions in the western and central parts of the country. Notably, the Horodniavska, Khmelivska, and Zavallivske deposits serve as key sites where graphite deposits are being actively extracted and developed by several local and international players.
Among these, the Zavallivske deposit stands out as Ukraine's largest graphite ore reserve and one of the world's largest, boasting estimated reserves of 6.1 million tonnes of ordinary graphite (equivalent to 97 million tonnes of graphite ore). The current production capacity of the Zavallivske deposit amounts to 30 thousand tons per year and secure production of 25 different types of high-quality graphite products.

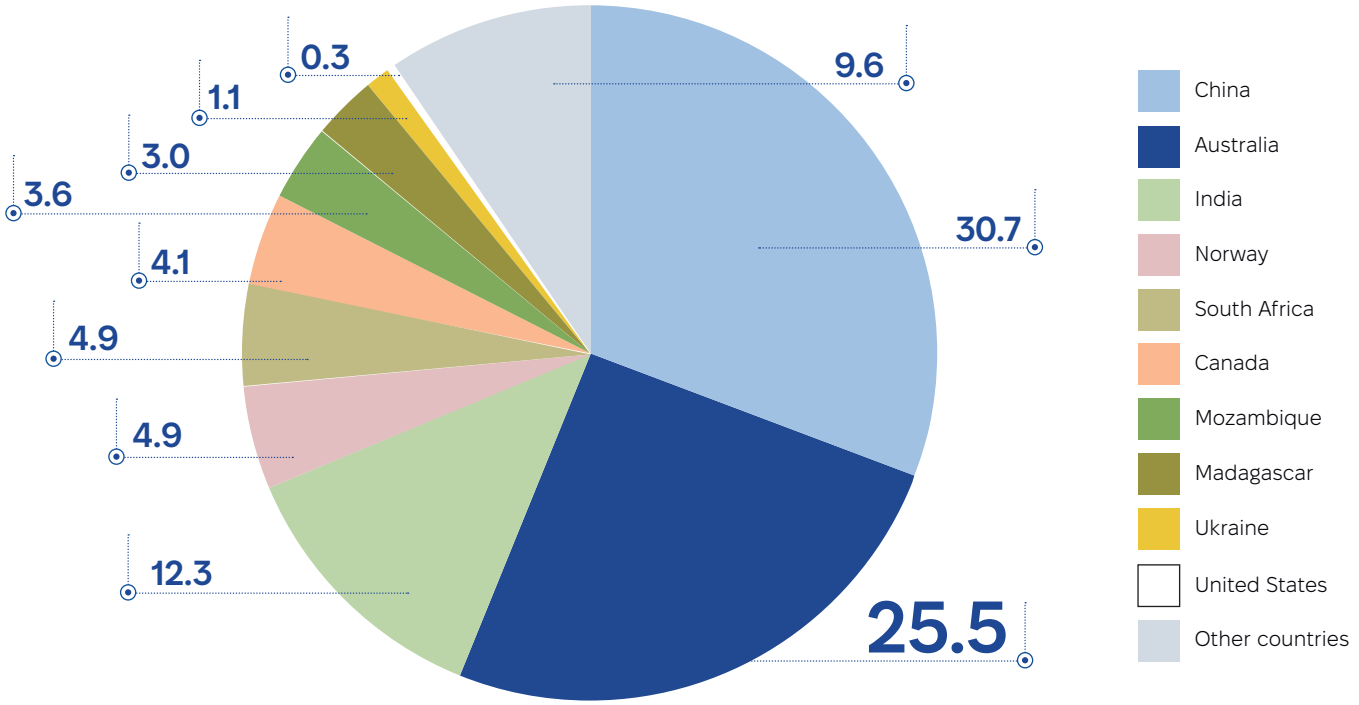
Ukrainian lithium industry is currently in its early stages, with licence holders for deposit development representing the industry. However, active mining has yet to commence, and further investments are necessary to kickstart the industry.
In contrast, the graphite industry in Ukraine began its development in the 20th century and is currently represented by 6 deposits, one of which is actively developed by Zavallivsky Graphite, while other players, such as BGV Group Management, are working on the development of other deposits.

- **Zavalivsky Graphite (owned by Volt Resources):** located in the Kropyvnytskyi region of Ukraine, with a focus on the exploration of natural flake graphite deposits. a type of graphite that is particularly valuable due to its use in many high-tech applications. The 2017-2021 period saw an average annual production of 7,300 tonnes.
- **BGV Group Management:** the company's activities are aimed at the development of the Balakhivka deposit and the extraction of graphite. The company has owned a licence for the extraction of graphite ores for a period of 20 years Despite the impact of the war and challenges in attracting investments, Ukraine's mining industry holds promising prospects. Foreign representatives recognize the sector's attractiveness and continue to invest, despite the slowdown caused by the conflict. The following are some instances of investments made in Ukraine since 2022. The Ukrainian investment company BGV Group Management and its founder Gennady Butkevich have invested more than USD 100 million in Ukrainian mining projects, including graphite mining of the biggest graphite deposits in Europe, the Balakhivka deposit.
- **Turkish Onur Group** allocated USD 50 million for the extraction of natural graphite in Ukraine. The extracted graphite can be utilised in the production of car batteries. Spice Ukraine LLC, a Ukrainian company under the Onur Group, has obtained a special permit from the Ukrainian Geological Survey (UGS) to extract graphite ore from the Burtynsky deposit in the Khmelnytsky region.

TITANIUM

According to data from the US Geological Survey in 2021, Ukraine's titanium ore reserves totaled 8,400 thousand tons, with 2,500 thousand tonnes of rutile and 5,900 thousand tonnes of ilmenite. This positions Ukraine at # 9 globally in terms of titanium ore reserves by volume, and #5 in terms of rutile reserves.

Figure 11: Global titanium reserves, 2021 thousand tonnes



The upstream infrastructure comprises multiple mines situated across central regions of Ukraine, producing titanium ore concentrate and pigment, as well as titanium metal sponge in Zaporizhzhia.

Some of the prominent companies in the Ukrainian Titanium sector include:

United Mining and Chemical Company (UMCC Titanium)	one of the world's leading producers of titanium and zirconium concentrates. The company's production capacity in 2021 was approximately 300,000 tons of ilmenite concentrate and 70,000 tonnes of zircon concentrate per year. UMCC's key assets include two major production facilities: Irshansk Mining and Processing Plant (one of the world's largest producers of ilmenite, a titanium-iron oxide mineral) and Vilnohirsk Mining.
Zaporizhzhia Titanium and Magnesium Combine (ZTMC)	one of the largest European producers of titanium sponge with production capacity of up to 12,000 tons of titanium sponge per year. The company is located in Zaporizhzhia and, due to its proximity to the front line, has limited production since 2022.
Velta	company owns a deposit of ilmenite ores in the Kropyvnytskyi region. The Velta mining and processing plant is located near the city of Novomyrhorod in the Kirovohrad region and has been providing commercial supplies of titanium raw materials since 2012. The capacity of the plant is up to 270,000 tons of ilmenite concentrate per year.

Sumykhimprom

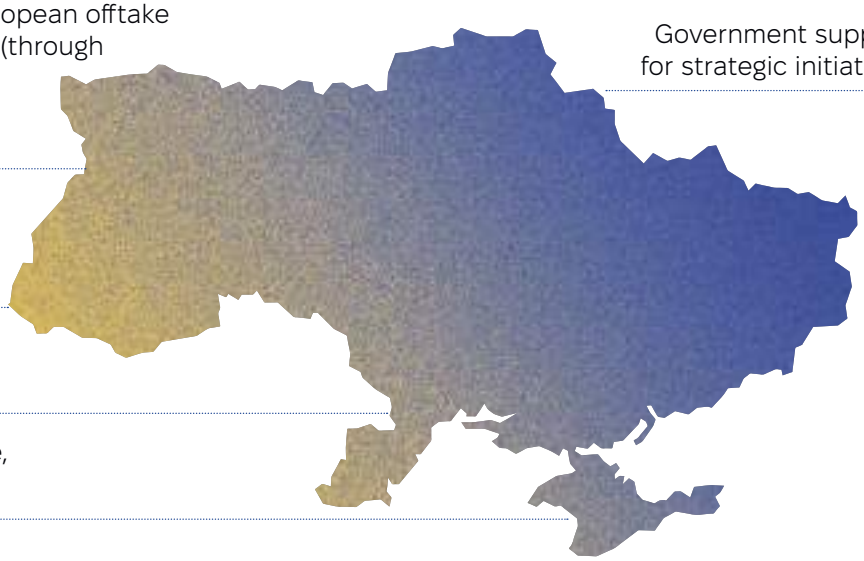
one of the largest Ukrainian enterprises producing complex mineral fertilizers, titanium dioxide, and other chemical products. The company had ceased operations for an extended period after operating at a loss. The company is managed by the State Property Fund of Ukraine. Ukraine's economy has significant opportunities in the titanium sector. About 80% of the feedstock for Russia's titanium metal products previously relied on Ukrainian titanium concentrates. Ukraine now has the opportunity to upgrade its titanium sector through the modernization of existing infrastructure and shifting its focus towards strategic partnerships with Europe and North America.

Despite having a well-established foundation for titanium production, investment projects focused on development (rather than on maintenance) have been limited in Ukraine since the start of the war in 2022.

OTHER ADVANTAGES OF THE OPPORTUNITY IN UKRAINE

In addition to rich resources of the critical materials, there are some other potential advantages offurther developing this sector in Ukraine, including:

- Fast and low-cost delivery to key European offtake markets with low Scope 3 emissions (through railway connections, seaports and river transportation via the Danube river)
- Low-cost clean energy, contributing to low Scope 2 emissions
- Capabilities and knowledge in mining and materials processing
- Well-educated and mobile workforce, competitive cost of labour
- Government support for strategic initiatives



However, to fully capitalise on these opportunities, international involvement is necessary. This involvement would bring in investments and advanced technologies, as well as secure potential offtake partnerships with major international industry players.

PROJECT MATURATION/FEASIBILITY AND FINANCING

Economic and technical feasibility study

Most projects in the CRM sector require additional rigorous economical assessment considering specifics within each value chain. Where production has not yet started, deposit characterization and the high level of due diligence expected of this is of utmost importance in order to assess the economic viability of the deposit and be able to engage international investors with credibility. Where processing of an ore is new to Ukraine (e.g., lithium), the feasibility of localizing the technical know-how of these chemistries will also have to be assessed. Further investigation is also required to determine potential offtakers' requirements of the product (e.g., quality of minerals, type and form of end products, required certification, carbon footprint, etc.).

FINANCING NEED

Investment requirements of the project could be separated into two main stages:

1. Project preparation finance (pre-FID);
2. Capital investment (post-FID).

POTENTIAL SOURCES OF FINANCE

Considering the scale of projects and current economic situation in Ukraine, the majority of CRM-related projects will require involvement of public and private investors, as well as financial institutions. International Finance Institutions (IFIs) will have a vital role to play in providing risk mitigation and blended finance instruments, as well as technical assistance. National development finance

institutions (DFIs) and export credit agencies (ECAs) can play an important role in providing additional capital for securing contracts for import of equipment, services and technologies from international players. A syndicate of private banks will be required to provide commercial financing, led by a major international project finance specialist organisation.

A range of financial support mechanisms from public organisations can be used to reduce project risks. Grant funding is available across multiple IFIs during the ongoing war for the project preparation stage.

The EU Ukraine Facility Pillar 2 is set to unlock a further EUR 7 billion for the provision of guarantees to mobilise investment into reconstruction efforts, substantially increasing availability of financing, including for CRM sector.

ENGAGEMENT OF GLOBAL INVESTORS/OFFTAKE/TECHNOLOGY PARTNERS

- Engagement of global companies: Involving global companies as investors, offtakers, and technology partners brings expertise, resources, and market access to the project.
- Fit of proposed project's products to international value chains: Ensuring that the project's products align with international value chains increases market opportunities and competitiveness.

ROADMAP FOR DEVELOPMENT

Development of CRM mining and refining in Ukraine can be accomplished in 3 steps, notably:

- Horizon 1 (1-2 years): project feasibility assessment and FID;
- Horizon 2 (3-5 years from now): pilot project launch;
- Horizon 3 (5-10 years from now): scale-up of mining and refining operations;
- Horizon 4 (10-25 years from now): long-term vision for CRM sector development

Horizon 1
Feasibility assessment

FID in 2025-2026
- Pre-feasibility assessment
- Stakeholder engagement
- Securing project financing
- Feasibility assessment (mining, refining)
- Basic engineering

Horizon 2
Pilot project launch

First plant online 2028-2030
- Financing of the pilot project
- Procurement of equipment, machinery and EPC

Securing offtake for pilot
- Construction works
- Start of operations

Horizon 3
Mining and processing scale-up

Gradual buiki-out a 2030-2034
- Securing at-scale CRM offtake
- Further infrastructure and deposits development
- Assessment of sector development (e.g., battery cells production)

Horizon 4
Long-term vision forCRM sector development

Long-term vision for the sector development 2035-2050
- Start of EV batteries production
- Titanium metal production

Illustration: Development horizons of the CRM sector

By addressing these aspects, projects can move closer to successful implementation and contribute to overall development objectives.

CRITICAL RAW MATERIALS (CRMS)

Highlighted investment projects

TITANIUM

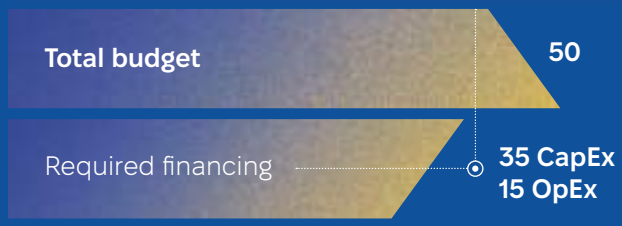
NEW VELTA SPV

TITANIUM ORE MINING & PROCESSING (DEVELOPMENT & CONSTRUCTION)

LOCATION: UKRAINE, KROPYVNYTSKYI REGION

- **Brief Description:** the Project considers extension of Velta's 1st class ilmenite resource base by the development of the second Titanium ore deposit in Kropyvnytskyi region, Ukraine, and construction of mining and processing plant.
- **Products/Services:** High grade titanium feedstock with up to 60% TIO2 and low impurities, a intermediary source for the production of high added value titanium powders and finished products.
- **Target Market:** Holding 2% of global titanium feedstock market share and long-term Off-Take agreements with industry leaders we plan to start export of titanium production with high added value to U.S. and EU.
- **Unique Selling Proposition:** In 2018 titanium receives the official status of a critical mineral in the USA. In 2020 the EU issued a Critical Minerals List Investigation with 30 items, including titanium. Titanium is identified as the most critical material for Defense, Aerospace, Healthcare, Renewable energy, Automotive.
- **Technologies and Innovations:** Velta R&D invented Velta TI Process, a technology which revolutionizes titanium production and replaces conventional "Kroll Process" with remarkably.

Projects Highlights[1] ($, mln)



Type of financing - equity, project finance, working capital

Financing structure: Debt – 70% / Equity – 30%

Expected Financial Indicators:

- NPV15 – 50 (9 years)
- DPP (years) – 6
- Avg. 5Y Revenue – $ 57 mln
- RR – 56%
- Project launch period – 1.5 year
- Avg. 5Y EBITDA – 24

- **Project Status:** In 2019 Velta received commercial development license for the second Titanium ore deposit in Kropyvnytskyi region, Ukraine, and aims to conduct resources and reserves estimation according to international standards (JORC or CIM) with CPR and Feasibility study obtained in H12025.

BUSINESS MODEL

- Velta, founded by Andriy Brodsky in 2006 and headquartered in Dnipro, Ukraine, commenced first production at Berzulivske deposit in 2012. Since 2012 we retained 2% of titanium feedstock global market share, continuing ilmenite deliveries during the Russian-Ukrainian War in 2022-2024. We target to expand our recourse base with a new ilmenite deposit and double annual production. The ilmenite feedstock produced by Velta can be naturally embedded in the Titanium Powders and Finished products Manufacturing with high value added titanium production described in the later slides.

Key figures

2006 year of foundation	**17** years of intensive growth	**UP TO 60%** TIO2 contained in Velta's ilmenite
650 + employees	**650 +** years ahead with a sufficient resource base	**2%** of the titanium feedstock market share

Implementation of the project 2025 – 2026 - increase in mining and processing capacities

[1] The project information and financial indicators are provided by company-initiator of the project.

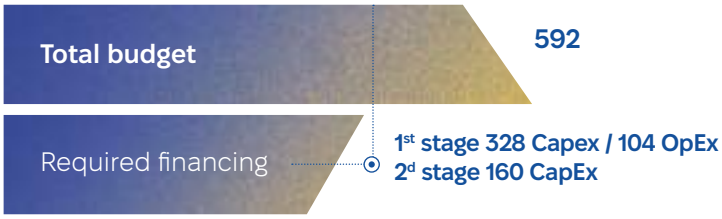
NEW VELTA SPV

TITANIUM POWDERS AND FINISHED PRODUCTS MANUFACTURING FACILITY

LOCATION: UKRAINE, KROPYVNYTSKYI REGION

- **Brief Description:** the Project will continue Velta's vertical integration strategy from a titanium feedstock provider, holding extensive 19 years resource base, to a high added value titanium producer and exporter.
- **Products/Services:**
  - 1st stage construction of facilities for the production of titanium metal powders with high added value
  - 2d stage construction of facilities for the production of finished parts, demanded by pivotal sectors such as Aerospace & Defense, Medical and Automotive
- **Target Market:** Possessing a strong market position and being well-recognized worldwide, Velta targets to complete vertical integration and start export of high added value titanium production to U.S. and EU for industrial Off-Takers.
- **Unique Selling Proposition:** Titanium powder market, including Additive Manufacturing, is poised for a substantial growth with CAGR of 15% and market value USD 4.5 billion reached by 2032.
- **Technologies and Innovations:** Technologies and Innovations: Velta R&D invented Velta TI Process, a technology and replaces conventional "Kroll Process" with remarkably efficient, low-cost metal powder production.

Projects Highlights for the 1st stage[1] ($, mln)



Type of financing - equity, project finance, working capital

Financing structure: Debt – 70% / Equity – 30%

Expected Financial Indicators:

- NPV – $ 774 mln (9 years)
- IRR – 54%
- DPP (years) – 6.9
- Project launch period – 2 years
- Avg. 5Y Revenue – $ 507 mln
- Avg. 5Y EBITDA – $ 240 mln

- **Project Status:** Velta patented unique Velta Ti Process, underlying the manufacturing process. Base on the technology assessment and commercial test-runs well-known EU Institutes confirmed titanium powder's suitability for a range of additive manufacturing applications. The Project will start after second Titanium ore Mine commencement.

BUSINESS MODEL

- The industrial titanium site targets to revitalize an industrial enterprise closed 25 years ago. Located 20 km away from raw material deposits operating and developing by Velta the site geography provides logistics benefits to lock-up high added value titanium production in Ukraine. At the 1st stage we target to start 5 thousand tones annual production of titanium powders & alloys and at the 2d stage to expand with manufacturing titanium finished parts & end-products.
- Bolstered by the vertical integration strategy, Velta invented a unique technology to convert titanium feedstock into titanium powders and alloys. The technology has been patented in Ukraine and vetted by widely-respected EU institutions. Velta's Ti Process complies with sustainable standards, with no solid waste, full circularity and significantly lower carbon footprint. It reduces the cost of end-products within Powder metallurgy, Additive manufacturing and Metal Injection Molding.

Implementation of the project	
2025 – 2027 - 1st stage	2027 – 2028 - 2d stage

[1] The project information and financial indicators are provided by company-initiator of the project.

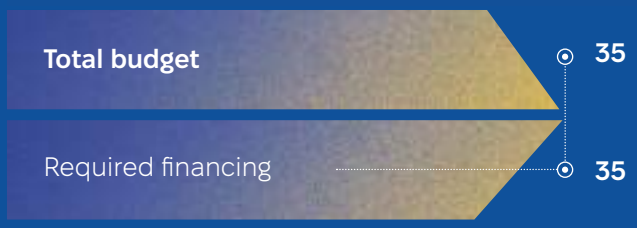
JSC UMCC TITANIUM

SELYSHCHANSKA DEPOSIT (ILMENITE)

ZHYTOMYR REGION

- **Brief Description:** Management of the company aims to expand the resource base/develop new deposits, which holds reserves of 30-35 million cubic meters within the licensed area. The expected volume of production is 800 thousand cubic meters of ore per year.
- **Products/Services:** Ilmenite Concentrate (titanium).
- **Target Market:** Holding 2% of global titanium feedstock market share and long-term Off-Take agreements with industry leaders we plan to start export of titanium production with high added value to U.S. and EU.
- **Unique Selling Proposition:** UMCC owns several mines and beneficiation plants in central and western part of Ukraine that allow integrated processing of mined ore and fast delivery to international off-takers.
- **Technologies and Innovations:** construction of an open pit, stripping and mining operations with draglines, and beneficiation at the existing facilities of the Irshansk Mining & Processing Plant.

Projects Highlights[1] ($ mln)



Type of financing - project finance

Financing structure: CAPEX – 100%

Expected Financial Indicators:

- NPV – [n/a]
- IRR – 14%
- DPP (months) – 79 (PP)
- Project launch period – 2024
- Revenue – 500 / 31 per year.
- EBITDA – [n/a] (n/a year)

- **Project Status:** In 2021, the company acquired special permit No. 6028 for the pilot commercial development of the deposit. As of Q1 2024, work is underway to obtain permits for geological exploration and change the status of the special permit from "pilot development" to "ilmenite mining"

- Titanium pigment is a higher value-added product than ilmenite concentrate with a positioning at the "downstream" stages of the titanium value chain. It is in stable demand (with regular growth) on global markets due to its coverage of a wide range of industries – including plastics, paints, anti-corrosion chemicals, cosmetics, food coloring, medical drugs. This project will allow UMCC to have strong positions across the titanium value chain, vertically integrating all stages until actual TiO2 pigment production.

Key Points of Project Implementation:

geological exploration, project documentation,
construction of an open pit and primary processing plant

[1] The project information and financial indicators are provided by company-initiator of the project.

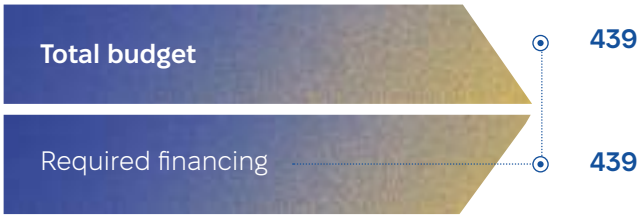
JSC UMCC TITANIUM

PRODUCTION OF TIO2 PIGMENT

ZHYTOMYR REGION

- **Brief Description:** Movement "downstream" through the titanium value chain with the construction of an ilmenite processing facility into TiO2 pigment using sulfate technology. Estimated production capacity is 65,000 tons of high-quality TiO2 pigment. Can be integrated with Titanium Slag production.
- **Products/Services:** Titanium pigment.
- **Target Market:** Possessing a strong market position and being well-recognized worldwide, Velta targets to complete vertical integration and start export of high added value titanium production to U.S. and EU for industrial Off-Takers.
- **Unique Selling Proposition:** UMCC owns several mines and beneficiation plants in central and western part of Ukraine that allow integrated processing of mined ore and fast delivery to international off-takers.
- **Technologies and Innovations:** Sulfate technology.
- **Project Status:** Concept (early stage concept)

Projects Highlights[1] ($ mln)



Type of financing - project financing
Financing structure: CAPEX – 100%

Expected Financial Indicators:

- NPV – n/a
- IRR – n/a%
- DPP (months) – n/a
- Project launch period – 2025
- Revenue – 202 per year

BUSINESS MODEL

- Titanium pigment is a higher value-added product than ilmenite concentrate with a positioning at the "downstream" stages of the titanium value chain. It is in stable demand (with regular growth) on global markets due to its coverage of a wide range of industries – including plastics, paints, anti-corrosion chemicals, cosmetics, food coloring, medical drugs. This project will allow UMCC to have strong positions across the titanium value chain, vertically integrating all stages until actual TiO2 pigment production.

Implementation of the project

2025 – 2027 - 1st stage	2027 – 2028 - 2d stage

[1] The project information and financial indicators are provided by company-initiator of the project.

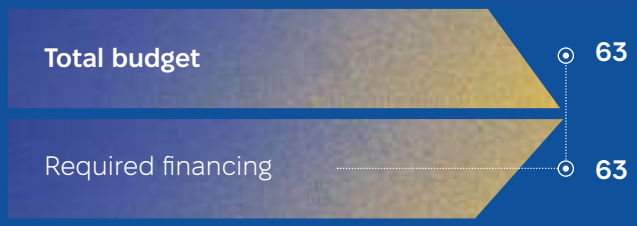
JSC UMCC TITANIUM

PRODUCTION OF TITANIUM SLAG

ZHYTOMYR REGION

- **Brief Description:** Introduction of additional technological chains for the processing of existing raw materials into titanium slag with a production capacity of 30,000 tons per year. Can be integrated with TiO2 pigment production.
- **Products/Services:** Titanium slag.
- **Target Market:** Holding 2% of global titanium feedstock market share and long-term Off-Take agreements with industry leaders we plan to start export of titanium production with high added value to U.S. and EU.
- **Unique Selling Proposition:** UMCC is the largest producer of titanium and zirconium ores in Europe, which produces more than 350,000 tons of concentrates ores of the highest quality logistical advantages, cost-effective case that will allow to take a competitive position in the market.
- **Technologies and Innovations:** High-performance technology of reduction smelting of ilmenite concentrates in closed ore-thermal furnaces with a 5000-25500 KVA power range.
- **Project Status:** Concept (early stage concept)

Projects Highlights[1] ($ mln)



Type of financing - project financing

Financing structure: CAPEX – 100%

Expected Financial Indicators:

- NPV – n/a
- IRR – n/a%
- DPP (months) – n/a
- Project launch period – 2024
- Revenue – 25 per year

BUSINESS MODEL

- Titanium slag is a higher value-added product, of the "feedstock" category in the titanium value chain. Titanium Slag has a higher TiO2 content and sits right after ilmenite concentrate in the titanium value chain. It has a definitive target audience in global markets and is an effective way of moving "downstream" for UMCC in the titanium value chain. Ideally, this is a first step in moving towards the production of other higher-margin products.

VOLT RESOURCES LTD

DEVELOPMENT OF THE ZAVALIVSKIY GRAPHITE DEPOSIT

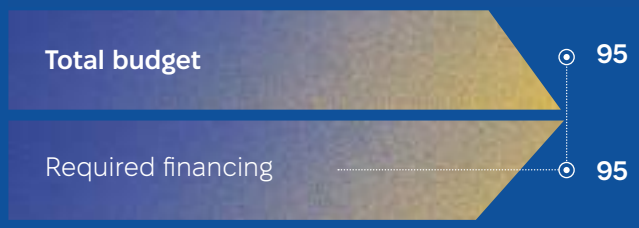
ZHYTOMYR REGION

- **Brief Description:** Volt Resources Ltd (Volt) and its Ukraine subsidiary, Zavalievsky Graphite LLC (ZG) have developed a three-staged corporate development plan for the Zavalievsky natural graphite mine and processing facility in Ukraine. Average graphite concentrate production of 7,300 TPA in 2017-2021.
- **Stage 1:** for sustaining ZG operations and upgrading the production
- **Stage 2:** boosting production and modernising processing facilities up to 30k tpa. capacity (with the option to increase to 60 ktpa.)
- **Stage 3:** for initial capacity; (6,000 USD/t, incl. 12% continency), for building a CSPG facility
- **Unique Selling Proposition:** The site (636ha) is adjacent to Zavallya,~280 kms south of the Ukraine capital Kyiv, and 230 kms north of Odessa's main port.

  Long life multi-decade producing graphite mine with exploration upside. Permits for subsoil use - mining licence equivalent - valid until November 2035.

  According classification standard NAEN the Graphite mineralization estimate of 22.9mt @ 6.8% carbon. Is one of Europe's largest graphite resources.

Projects Highlights[1] ($ mln)



Stage 1: 5
Stage 2: 10
Stage 3: 80

Financing structure: CAPEX – 100%

- **Project Status:** Pre-feasibility

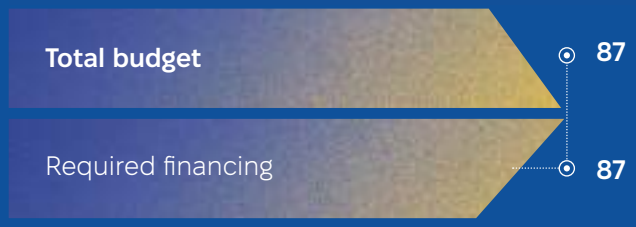
BGV GROUP MANAGEMENT, LLC

DEVELOPMENT OF THE BGV GRAPHITE - STAGE 1

ZHYTOMYR REGION

- **Brief Description:** The project focuses on developing the Balakhivka graphite deposit in Central Ukraine, which has 44Mt reserves in the licensed area (185Mt of explored reserves in total).
- **Products/Services:** Graphite concentrate.
- **Target Market:** European Union countries.
- **Unique Selling Proposition:** Large proven reserves with 44Mt of graphite ore available in the most productive Southern area. High-quality graphite suitable for anode material: 74% fine flake graphite produced (-150µm, -100 mesh for SPG production) shows above-average performance for Li-ion batteries. Advantageous location for EU customers with good immediate highway and railway links.
- **Technologies and Innovations:** Technology for graphite concentrate production developed by ANZAPLAN Dorfner Group (Germany) with application of EU standardst.
- **Project Status:** accomplished PEA, PFS and updated PFS in 2023, successfully finalized pilot tests for the concentrator plant and started Basic Engineering in 2024. Currently project is in the FS stage according to Ukrainian standards (1st stage – Technical-Economic Assessment; 2nd stage - Design).

Projects Highlights[1] ($ mln)



Type of financing - 60%/40% (debt/equity)

Financing structure: CAPEX – 87 / OPEX –12

Expected Financial Indicators:

- NPV – 169
- IRR – 35%
- DPP (months) – 62
- Project launch period – 2027
- Revenue – 52 (per year)
- EBITDA >50% (per year)

* These numbers given with consideration of potential debt financing

BUSINESS MODEL

- Construction of graphite mining and processing plant with further downstream production of SPG for battery anodes to lock in full graphite value chain.
- Sale of Spherical Purified Graphite (SPG) for Li-ion battery anodes to the EU market (19,000 tons) and graphite concentrate.
- Basic production capacity of the concentrator plant - 50K tons with upscaling possibilities to 100K tons, out of which SPG will make 38,000 tons.

GRAPHITE

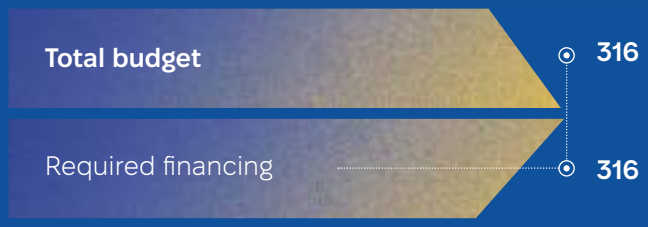
BGV GROUP MANAGEMENT, LLC

DEVELOPMENT OF THE BGV GRAPHITE - STAGE 2

KROPYVNYTSKY REGION

- **Brief Description:** Construction of a spherical graphite plant to lock in full graphite value chain. Production of 19,000 tons of SPG (basic scenario) for Li-ion battery anodes.
- **Target Market:** European Union countries, North America.
- **Products/Services:** Spherical Purified Graphite (SPG) for Li-ion battery anodes.
- **Technologies and Innovations:** Technology for SPG production developed by German and USA companies as more ecological alternative to the existing conventional SPG technology.
- **Unique Selling Proposition:** strategic European SPG supplier with advantageous location and good immediate highway and railway links for EU Gigafactories, ESS and anode producers. Basic supply volume 19K tons SPG with scaling possibilities up to 38K tons at further project stages.
- **Project Status:** Updated PFS (accomplished).

Projects Highlights[1] ($ mln)



Type of financing - 60%/40% (debt/equity)

Financing structure: CAPEX – 316 / OPEX – 12

Expected Financial Indicators:

- NPV – 299
- IRR – 18%
- DPP (months) – 84
- Project launch period – 2028
- Revenue – 89 (per year)
- EBITDA >50% (per year)

The model includes production of graphite concentrate 50,000 tpa, 41,000 tpa out of which goes for SPG production

* These numbers given with consideration of potential debt financing

DEVELOPMENT OF THE BGV GRAPHITE – 1ST AND 2ND STAGES

Key partners

- European anode producers, Gigafactories, EV and ESS producers (strategic);
- EU industrials in metallurgy, refractory;
- IFIs (financial) for equity; discussions ongoing with off-takers, lenders and export finance on debt.

Stage 1:

- Pre-feasibility Q1 2023
- Feasibility Q2 2025
- Construction Q1 2026
- Expected launch Q4 2027

Stage 2:

- Pre-feasibility Q2 2025
- Feasibility Q1 2026
- Construction Q1 2027
- Expected launch Q4 2028

LITHIUM

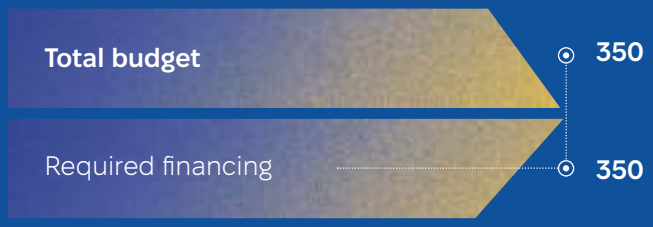
UKRLITHIUMMINING, LLC

POLOKHIVSKE LITHIUM PROJECT DEVELOPMENT

ZHYTOMYR REGION

- **Brief Description:** The upstream component of the project involves construction of:
  - 1.5Mtpa lithium ore mine with 15-year life of mine (current reserve based); and
  - concentrate plant with ~ 300 ktpa petalite concentrate production capacity
  - The project sponsor also considers lithium conversion facility, which shall produce ~ 20 ktpa of lithium carbonate
  -
- **Products/Services:** Lithium concentrate/chemicals.
- **Target Market:** European Union, global markets.
- **Unique Selling Proposition:** Large and high-quality proven resource base with 22Mt confirmed reserves in licensed area and over 50Mt potential total resource; ~3,5% lithium grade in petalite concentrate.
- **Technologies and Innovations:** one of few large scale Ukraine projects with ESIA underway.
- **Project Status:** Pre-feasibility completed/start of DFS (subject to financing)

Projects Highlights[1] ($ mln)



Type of financing - 70/30 (debt/equity)

Financing structure: CAPEX – 95% / working capital and development costs – 5%

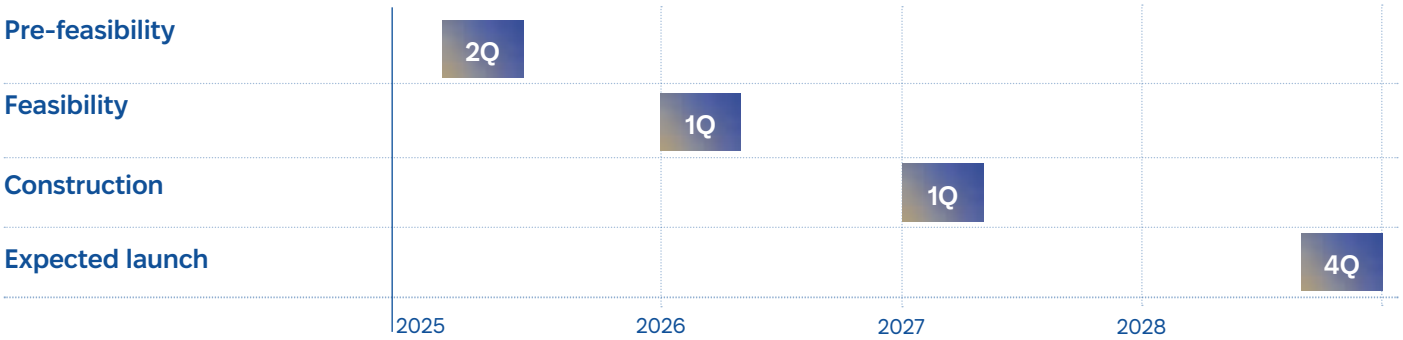
Expected Financial Indicators:

- NPV (post tax) – 800
- DPP (months) – 48
- Revenue – 400 per annum
- RR – 50%
- Project launch period – 2024
- EBITDA – 250 per annum

BUSINESS MODEL

- Construction of graphite mining and processing plant with further downstream production of SPG for battery anodes to lock in full graphite value chain.
- Sale of Spherical Purified Graphite (SPG) for Li-ion battery anodes to the EU market (19,000 tons) and graphite concentrate.
- Basic production capacity of the concentrator plant - 50K tons with upscaling possibilities to 100K tons, out of which SPG will make 38,000 tons.

Key Points Of Project Implementation



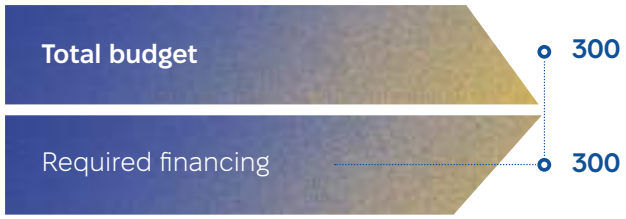
UKRAINIAN GEOLOGICAL SURVEY

DOBRA LITHIUM PROJECT DEVELOPMENT

KROPYVNYTSKY REGION

- **Brief Description:**
  - The deposit (hard rocks) was opened in 1989 and owned by state.
  - The project is an opportunity to invest in obtaining a license (special permit) for the development of the Dobra lithium ore deposit, located in the Kropyvnytsia region, for a period of 50 years.
  - The area of the deposit is 1707 hectares and contains associated minerals - tantalum, niobium, rubidium, cesium, beryllium and gold.
- **Products/Services:** Lithium.
- **Target Market:** European Union countriess.
- **Unique Selling Proposition:** long-term license.
- **Technologies and Innovations:** n/a
- **Project Status:** Concept

Projects Highlights[1] ($ mln)



Type of financing - n/a

Financing structure: CAPEX –100%

Expected Financial Indicators:

- NPV – n/a
- DPP (months) – n/a
- Revenue – n/a (n/a year)
- IRR – n/a
- Project launch period – n/a
- EBITDA – n/a (n/a year)

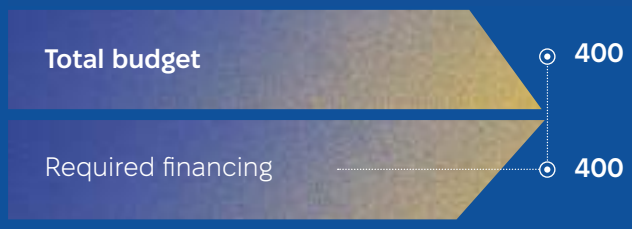
UKRAINIAN GEOLOGICAL SURVEY

STREMYHORODSKE DEPOSIT OF ILMENITE ORES

KROPYVNYTSKY REGION

- **Brief Description:**
  - The deposit was opened in 1954 and is owned by the state.
  - The project is an opportunity to invest in obtaining a license (special permit) for the development of the Stremyhorodske ilmenite ore deposit, located in the Zhytomyr region, for a period of 50 years..
  - The area of the deposit is 225 hectares and contains associated minerals - scandium and vanadium ores.
- **Products/Services:** Ilmenite ore.
- **Target Market:** Global market.
- **Unique Selling Proposition:** Long-term license for one of the largest titanium ore deposits in Europe.
- **Technologies and Innovations:** n/a
- **Project Status:** Concept

Projects Highlights[1] **($ mln)** (if applicable)



Type of financing - n/a

Financing structure: CAPEX –100%

Expected Financial Indicators:

- NPV – n/a
- DPP (months) – n/a
- Revenue – n/a (n/a year)
- IRR – n/a
- Project launch period – n/a
- EBITDA – n/a (n/a year)

4.7. HOUSING, RECONSTRUCTION AND BUILDING MATERIALS

4.7.1. Current situation and sector role

HOUSING

The total reconstruction and recovery needs are estimated at

USD 80.3 billion

for the 10 years from 2024–2033

Over 10% of the total housing stock either damaged or destroyed and close to 2 million households affected, housing continues to be one of the most impacted sectors. Given the sheer volume of damage to the housing sector and the resulting needs and negative impact on prolonged displacement, the GoU, including local authorities, as well as international partners and donors have prioritised housing recovery and building back better since the onset of the war. Thus far, the housing sector has incurred an estimated USD 55.9 billion in damages.

WATER SUPPLY AND SANITATION SERVICE

Since the onset of the war, the water supply and sanitation sector has experienced damage and losses and has struggled to provide services in difficult circumstances. The ongoing fighting and attacks on critical civil infrastructure have significantly affected water supply and sanitation service provision. In addition, the power outages and problems with electricity supply have significantly affected service delivery throughout the country.

The total reconstruction and recovery needs are estimated at

USD 11.1 billion

for the 10 years from 2024–2033

MUNICIPAL SERVICES

Continued damage to communal infrastructure has widened gaps in service delivery and has further strained the capacity of local governments. Prior to the war, service provision of utilities and infrastructure across all regions was irregular and had low coverage rates. The solid waste management sector was especially in need of urgent investment and reforms. The gaps in infrastructure and service delivery can also be seen in commonly delayed repairs to local roads. Central heating systems, however, had high penetration (about 47%), particularly in Ukraine's larger cities. Centralised heat supply systems undergo significant destruction as a result of regular shelling and lack of electricity, which significantly hinders the life of large cities.

The total reconstruction and recovery needs are estimated at

USD 11.4 billion

over a period of 10 years

41.6% **In 2023, construction production and services output increased by 41.6% in hryvnia terms (25.2% in USD) compared to 2022 but did not reach the pre-war level even in hryvnia terms (adjusted for inflation)**

At the same time, the shares of residential and non-residential construction works in the total volume of construction production and services are 13.7% and 25.6%, respectively. Given the significant destruction and damage to real estate (including residential) due to the full-scale invasion of Russia, the volume of construction products produced in the years following the war's end, according to market experts, is likely to exceed the pre-war figure of USD 6.6 billion.

The construction materials market has significant role in renovating housing stock and other real estate. In residential real estate construction, 60% of the total construction cost (depending on the complexity and type of the object) is related to the cost of construction materials. Considering the above, procurement of construction materials from outside Ukraine can significantly increase expenditure, as additional logistics and customs costs can be high. In addition, there is a significant demand for construction materials from private households whose housing has been completely destroyed, estimated at approximately 59 million square metres.

Since the beginning of the full-scale war and until 2024, the construction materials industry has undergone several changes due to the occupation of Ukrainian territories, disruption of supply chains and military operations. According to «the Institute for International Economic Research», about 15% of building materials producers have suffered varying degrees of damage.

Restoration of these enterprises in the war is complicated, and the following are among the main reasons:

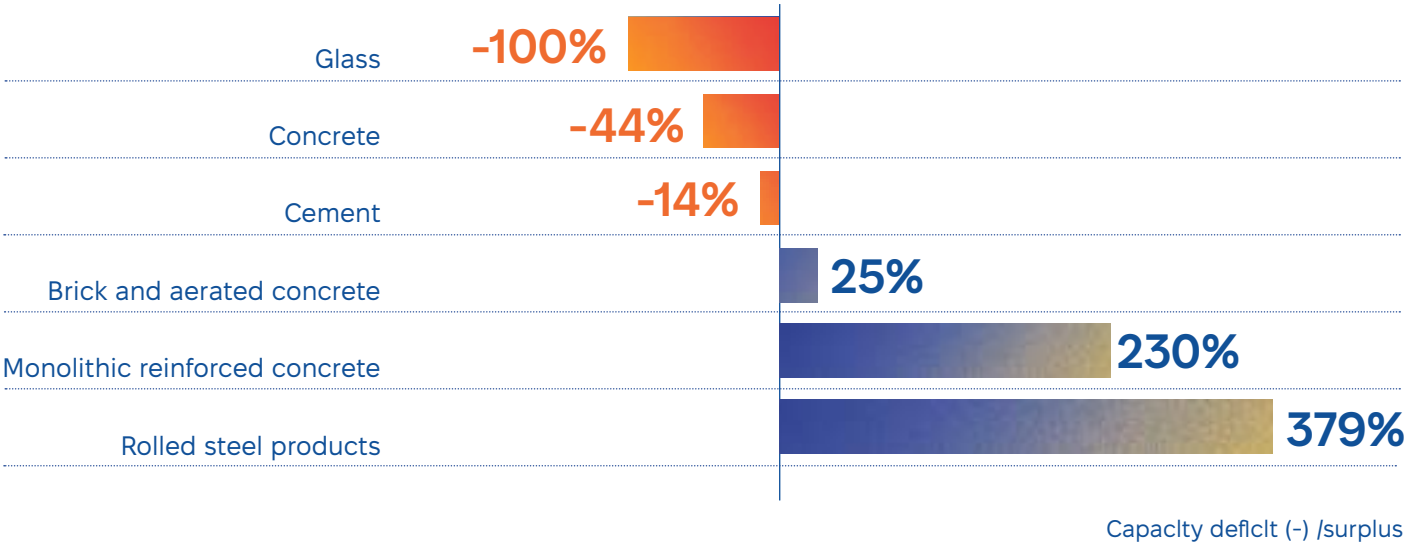
- **possible shortage of electricity supply**
- **expensive loans**
- **shortage of personnel**

Given the damage and/or destruction of domestic enterprises, experts say that the share of imported construction materials in the Ukrainian market has increased from 14% in 2021 to 23% in 2023, and the domestic construction materials market needs systematic support from the state.

Different sectors of the construction materials market are asymmetrically developed. The exact structure and volumes are unknown, as producers have the right not to report to conceal information from the enemy.

Based on the data of the State-Owned Enterprise Ukrpromzovnishekspertyza, it is possible to make judgments about the adequacy of the capacity of several key sectors to cover the needs during the recovery:

Figure 1: The balance of domestic demand and supply for building materials[1]



[1] SE Ukrpromvneshexpertiza, Interfax-Ukraine

GLASS PRODUCTION SECTOR

For example, the local market had almost no presence of the glass production sector. **According to the website construction-market.korfor.com.ua, as of the beginning of 2023, only 29 companies reported about their business activity within sheet glass production.** At the same time, the largest glass production plants, such as Lysychansk Proletar, Kostiantyniv Glassworks, Avtosklo, and Zaporizhzhia Glassworks, are located in eastern and southern Ukraine, where there are high risks of missile attack or seizure of territory and loss of business. Even before the war broke out, the Glass of Ukraine Association of Glass Industry Enterprises reported that the critical cost of energy resources was putting additional pressure on the producers' capabilities. According to the latest data, there is no any sheet glass produced in Ukraine.

CEMENT INDUSTRY

As of early 2024, the cement industry in Ukraine is capable of producing a maximum of 13.6 million tonns of products, with the possibility of expanding by 2.4 million additional tonns, according to the Ukrcement Association. This could partially cover demand during the post-war recovery, but the current demand is less than 10 million tonns per year. Before the war (2021), the industry was export-oriented, with Romania (67.0%), Hungary (15.6%), and Moldova (9.2%) being the main importers. The leading supplier of foreign cement was Turkey (90.5%). Today, the sector remains self-sufficient, and imports are mainly specialised types of cement that are not produced in Ukraine. The cement market is concentrated in the hands of a few companies, and as of 2023, according to forbes.ua, Cemark (14%), Dyckerhoff (32%), Ivano-Frankivsk Cement (44%), and Kryvyi Rig Cement (10%) held almost 100% of the market. Ivano-Frankivsk Cement has the largest plant in Ukraine. Only one of the remaining 8 plants in Balakliya was damaged during the invasion. Potentially, after the liberation of all territories, a cement plant in Bakhchisarai and 2 plants in the Donetsk region will join the market. Ready-mix concrete production is heavily dependent on cement as the main ingredient. Unlike the cement market, about 250 companies produce ready-mixed concrete. The cost of concrete has increased by 2-3 times on average compared to 2021.

ROLLED STEEL INDUSTRY

The aerated concrete market in Ukraine is quite large, with Ukraine ranking 5th in terms of production in Europe, according to the Inventure group. According to Pro-Consulting, over the past 3 years before the war, the market grew by an average of ~13%, which is attributed to the absorption of brick market share. Since the beginning of the war, the sector has fallen by almost half. Difficulties in business development during the war are similar to those in other sectors: low demand, mobilisation of men and the price of energy. Additionally, the rising cost of raw materials, which accounts for ~65% of the cost of aerated concrete, has an impact. The sector depends on cement producers, who have difficulties with production facilities and operation liquidity.

BRICK MARKET

The aerated concrete market in Ukraine is quite large, with Ukraine ranking 5th in terms of production in Europe, according to the Inventure group. According to Pro-Consulting, over the past 3 years before the war, the market grew by an average of ~13%, which is attributed to the absorption of brick market share. Since the beginning of the war, the sector has fallen by almost half. Difficulties in business development during the war are similar to those in other sectors: low demand, mobilisation of men and the price of energy. Additionally, the rising cost of raw materials, which accounts for ~65% of the cost of aerated concrete, has an impact. The sector depends on cement producers, who have difficulties with production facilities and operation liquidity.

AERATED CONCENTRATE MARKET

The takeover of the brick market by the gas block is supported by a review by the Korfor analytical group, according to which ceramic brick production has declined by 17.3% in physical terms over the past 5 years. **At the beginning of 2023, 651 companies were registered as brick producers.** The current demand is covered mainly by domestic production of 1.5 billion bricks annually, but according to his estimates, the demand could grow by a multiple of up to 14 billion. There are 9 companies among the largest producers of different types of bricks in Ukraine: "Litos", "Land Brick", "DZBM", "Euroton", "Kerameya", "SBK", "Fahot","Silta Brick", and "Bila Tserkva Brick Plant".

The global market for building materials is actively growing, with an annual increase of approximately 3.9%, according to the expert group SkyQuest. China remains the largest local market, while the Indian market is experiencing the fastest growth. The largest segment is reinforced concrete, accounting for about 45%. Among the trends, analysts highlight two main ones: increasing the use of technologies in production and construction (including building information modelling, the use of drones in construction, 3D printing of buildings), as well as the growing popularity of modular constructions. In addition, the market for «green» building materials is actively growing, which as of 2023 amounted to USD 422 billion, according to Fortune Business Insights. With optimistic estimates, the market is expected to grow by about 15% annually. For the Ukrainian market, this may result in additional competition, as against the backdrop of tightening regulations in the production of building materials, foreign competitors may appear with more environmentally friendly and energy-efficient materials.

4.7.2. Overview and outlook of key reforms

Reform 1.

On December 16, 2015, the Cabinet of Ministers of Ukraine adopted a resolution "On determining the areas of activity in which the central executive authorities and the Security Service of Ukraine perform technical regulation functions", which identified the central body that will conduct technical regulation of the production of construction materials, this function is assigned to the Ministry of Community Development, Territories and Infrastructure of Ukraine.

Reform 2.

In mid-2020, the requirements for construction materials were updated, namely, the list of standards was amended by Order No. 153 "On Approval of the Lists of National Standards, Compliance with Which Gives Presumption of Compliance of Products with the Requirements of the Technical Regulations for Construction Products, Buildings and Structures". According to the law, construction products must meet the basic requirements set out in the Technical Regulations for the structures in which they are used, in particular, national «DSTU» standards and harmonised European «DSTU B EN» standards, building codes and must be marked with a national conformity mark. Only such products can be freely sold and used in construction in Ukraine.

Reform 3.

The Law of Ukraine, "On the Provision of Construction Products on the Market", adopted in 2020, came into force on January 1, 2023. The law regulates the organisational and legal aspects of declaring the characteristics of construction materials and putting them on the market. The adoption of this law marked the first preparatory stage for the implementation of Regulation (EU) 305/2011. Subsequently, the practical implementation of this standard will take place, which involves the adoption of standards for the purposes of the law, the preparation and accreditation of laboratories, and regulatory assessment bodies, as well as the designation of accredited laboratories and bodies. The full effect of the law was originally intended to take place at the beginning of 2023, but due to complications associated with the war, this implementation has been extended until the beginning of 2025. Overall, according to publicly available data, around 1300 standards in the relevant field have been implemented in Ukraine, but it is noted that not all necessary standards have been implemented yet.

Reform 4.

There is also the issue of construction waste. According to estimates by the Ministry of Environmental Protection and Natural Resources of Ukraine, the amount of demolition waste in Ukraine due to the military aggression of Russiathe russia is already comparable to the amount of solid waste generated in the country on average per year, which is about 10-12 million tonns. At the same time, there is no sufficient legal framework to regulate the implementation of recycling. So far, at least 2 acts regulating the management of this waste have been introduced during the war: The Law of Ukraine "On Waste Management" and the Resolution of the Cabinet of Ministers of Ukraine "On Approval of the Procedure for Waste Management Generated in Connection with Damage (Destruction) of Buildings and Structures as a Result of Hostilities, Terrorist Acts, Sabotage or Works to Eliminate Their Consequences and Amendments to Certain Resolutions of the Cabinet of Ministers of Ukraine".

Reform 5.

Another unresolved issue is the entry into force of Regulation No. 305 under the Law of Ukraine "On the Provision of Construction Products on the Market". The innovation obliges manufacturers of construction materials to conduct testing of their product in the relevant laboratories and meet many technical requirements to obtain a product safety label.

4.7.3. Advantages of industry

Given existing and potential logistics bottlenecks, local producers can meet most of the domestic demand in the construction materials sector. However, in some sub-segments of the sector, such as glass, PVC, cement, concrete, and mineral wool, there is not enough capacity to fully meet potential demand, and thus, companies in this segment are expected to have high utilisation and, accordingly, a shorter return on assets.

EXTRA JOBS, BUDGET CONTRIBUTIONS AND ENCOURAGEMENT TO RETURN IDPS

It is reasonable that the government, facing a budget deficit, encourages the development of domestic production. Companies that create added value in key areas will fill the budget and add value to the local market. Migration processes will generate a supply in the labour market and, during peak periods, seriously expand the staff. This will further encourage the return of some Ukrainians who have left Ukraine and/or are considered internally displaced.

ACCESSIBILITY OF RAW MATERIALS

As of 2024, Ukraine has lost significant territory and most of its mining industry. However, this industry is well developed, and most raw materials (clay, sand, stone) can be extracted in the territory controlled by the GoU. This is an important fact that will ensure the industry's sustainability, even in the changed environment, and can serve as a basis for further increasing economic activity in the sector.

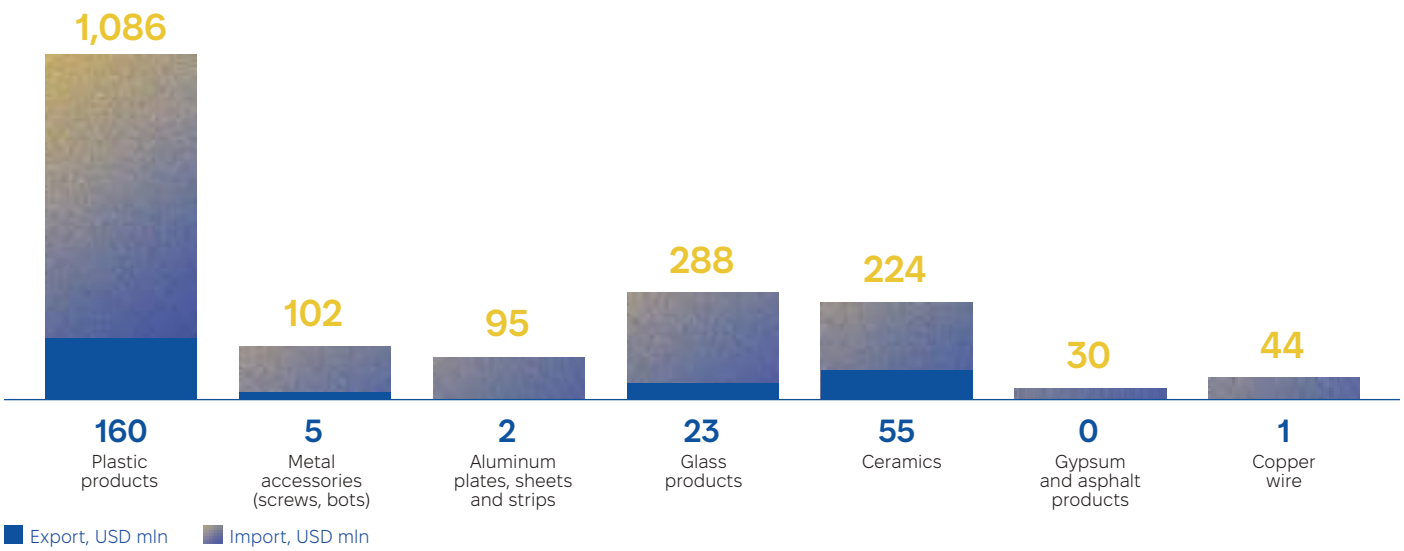
LOGISTICS

The extraction of raw materials and the production of construction materials in Ukraine allow for a complete cycle in the country's construction sector, thus avoiding the need for imports burdened by transportation costs and restrictions. Ukraine's transport and port infrastructure suffers from damage, but the current conditions allow the sector's products to be exported by road, rail and sea. Therefore, with a reliable supplier, it is possible to significantly reduce transportation risks across borders.

SUBSTITUTION OF IMPORTED FOREIGN BUILDING MATERIALS

As of 2024, the share of imported construction materials continues to increase. According to data from the state resource export.gov.ua, among the key selected materials for the results of 2023, the largest imbalance in favor of imports exists in: plastics and polymers (including construction products made of plastic, pipes, baths, showers, silicone, and other building products), metal fasteners (screws, bolts, nuts, etc.), glass products (excluding glass containers), ceramic products (including bricks), gypsum products, and asphalt. The potential deficit in the trade balance, which can be avoided, amounts to USD 1.6 billion.

Figure 2: Trade balance of building materials, USD million, 2023[2]



[2] Glass product - the group does not include glassware https://export.gov.ua/770-dashbord_shchodo_eksportu_ta_importu_ukraini Plastic products - The group includes only building materials and related goods

4.7.4. Prospects and potential for the sector

PUBLIC PROCUREMENT AS A TOOL TO STRENGTHEN THE NATIONAL PRODUCER

The first and key goal is the reconstruction of Ukraine, which is being carried out even while military operations continue on its territory. According to information provided by the «Destruction and Recovery Map» project , approximately 20% of damaged or destroyed facilities are already being repaired or restored. However, despite this, the authorities are using imports of foreign products as a stopgap measure, although a study by Ukrpromvneshexpertiza found that domestic production could meet the demand for reconstruction in several key sectors of construction materials. Market players are interested in limiting imports of construction materials to groups sufficiently developed in the local market. The government will be the leading consumer of construction materials in the coming years. In addition to constructing and restoring destroyed civilian infrastructure, military procurement for constructing fortifications will generate a significant demand for rolled metal and cement. Therefore, with the active support of the national producer, the domestic market is expected to see growth in the industry's enterprises due to increased demand through public procurement.

AMENDMENTS TO THE LEGISLATION IN THE FIELD OF CONSTRUCTION MATERIALS PRODUCTION IN TERMS OF ENVIRONMENTAL FRIENDLINESS

Another opportunity for development is to reduce the gap in environmental policy between Ukraine and the EU. In addition to the law "On the provision of construction products on the market," it is considered necessary to create state incentives for producing and using environmentally friendly materials. Unlike in the EU, Ukraine does not require disclosure of all information about the environmental friendliness of materials. Also, there are no additional benefits for producers of eco-friendly building materials and eco-friendly construction projects. A significant amount of construction waste, which continues to increase due to destruction, needs to be recycled. One possible tool is a direct requirement to use a certain percentage of recycled secondary building materials, as in Germany and Denmark.

CREATING ABSENT SECTORS FOR SELF-SUFFICIENCY

In the medium term, the lack of production of certain categories of construction materials in Ukraine should be resolved. According to Forbes, a segment such as the production of sheet glass is likely to be restored thanks to three new production plants. In addition, the City of Glass industrial park was created in the Kyiv region for similar purposes, where it is planned to create a whole cluster of this sector.

RECYCLING OF CONSTRUCTION WASTE

The large amount of construction waste in Ukraine is a challenge, as simply burying it can seriously impact the environment. Materials recycling will solve the pollution problem and provide additional construction materials for reconstruction. As a first step to start recycling, 3 waste recycling lines are planned to be set up in Kyiv, one of the most affected regions.

NEW CONSTRUCTION METHODS

Due to the extensive damage and limited budgets, households will likely choose modular houses. The market for these products was growing rapidly even before the war, but now they have the main advantages at a critical time - speed of construction and price. Therefore, in the future, the market for the production of SIP panels will expand for these houses, which, along with metal structures, are the main types of materials in the construction of modular houses. Another significant trend that may increase demand for concrete is the 3D printing of buildings. This industry is still in its infancy in Ukraine, but the speed of construction and high level of automation are advantages over traditional construction. According to Forbes, at the end of 2023, the first private house in Ukraine was built using 3D printing in Irpin. There is also a case of building a school in Lviv utilising this technology.

HOUSING, RECONSTRUCTION AND BUILDING MATERIALS

Highlighted investment projects

HOUSING

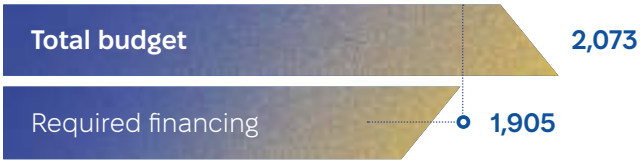
DESTROYED AND DAMAGED HOUSING COMPENSATION

PUBLIC SECTOR SPONSOR: MINISTRY FOR COMMUNITIES, TERRITORIES AND INFRASTRUCTURE DEVELOPMENT OF UKRAINE

WAR AFFECTED REGIONS

- **Brief Description: Provide compensation to +93 thousand families for:**
  - Damaged housing: restricted funds for repairs.
  - Destroyed housing: restricted funds for purchase of a new home or construction of new housing on existing land.
- **Impacted Populations:** Project will be implemented in at least 417 territorial communities that suffered from russian attacks (including Kharkiv, Zaporizhzhia, Kherson, Dnipropetrovsk, Sumy, Mykolayiv, and Kyiv regions).
- **Impact:** Improved housing for ~92.6 thousand families (~277.6 thousand individuals), including ~60.4 thousand families (~181.0 thousand individuals) in damaged housing and ~32.2 thousand families (~96.9 thousand people) in destroyed housing.
- **Value Proposition:** Provide housing and quality of life necessary for people to remain in Ukraine and encourage refugees to return home. Project will drive growth and employment in the construction sector, economic growth overall, and encourage Build Back Better.
- **Trigger Event:** Half of Ukrainian territory has suffered from constant missile and drone attacks across Kharkiv, Odesa, Zaporizhzhia, Kherson, Dnipropetrovsk, Donetsk, Sumy, Luhansk, Mykolayiv, and Kyiv regions, causing massive destruction to housing

Projects Highlights ($, mln)



Implementation Period: Project will be ongoing until war ends.

Additional Details:

Damaged housing

- Compensation is provided via bank cards to be used at authorized retailers or service providers for repairs
- Average damage compensation is $1,625 for multi-family dwelling (MFD) and $3,450 for individual private dwelling

Destroyed housing

- Compensation is provided via e-certificates to be used for new home purchase; or via a bank card if reconstructing
- Average compensation is $20 thousand for MFD and $477 for individual private dwelling.

- **Project Status:** Ongoing.

BUSINESS MODEL:

Possible business models may include financing of compensation for (i) damaged housing in the form of restricted funds for repairs; (ii) destroyed housing in the form of either electronic housing certificates for the purchase of a new individual private dwelling or restricted funds for the construction of new housing.

LINK TO REFORMS:

Project addresses Human Capital indicator 'Investment 4a. Compensation for damaged housing', by providing compensation to individuals whose housing was damaged or destroyed because of hostilities caused by the military aggression of russia.

Key partners

- Project implemented by Ministry of Restoration, including verifica-tion of damages on State Register
- Council of Europe Development Bank ($108 million loan commitment)
- World Bank ($60 million commitment under Project HOPE)

Key Points of Project Implementation:

Project implemented with available funding but requires additional financing to meet existing and future housing demand

HOUSING

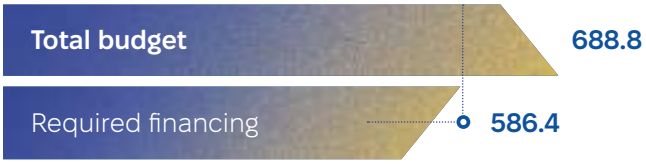
MULTIFAMILY DWELLINGS RECOVERY

WAR AFFECTED REGIONS

PUBLIC SECTOR SPONSOR: MINISTRY FOR COMMUNITIES, TERRITORIES AND INFRASTRUCTURE DEVELOPMENT OF UKRAINE

- **Brief Description:** Repair of damaged and new construction of Multi-Family Dwellings (MFDs), and conversion of existing non-residential buildings into MFDs for ~81,260 families to provide living facilities to internally-displaced persons (IDPs) in Ukraine.
- **Impacted Populations:** Construction to be implemented in at least 11 regions affected by russian attacks, including Kharkiv, Zaporizhzhia, Kherson, Dnipropetrovsk, Mykolayiv, Odesa, Sumy, Chernihiv, Zhytomyr, Kyiv and Cherkasy. These communities would become hubs for IDPs from occupied and front-line communities.
- **Impact:** Housing for ~81 thousand families (~244 thousand people) and enable ~500 IDPs to return to 104 MFDs in three regions; up to ~36.6 thousand private sector jobs will be created during implementation by engaging ~5 thousand construction and engineering firms.
- **Value Proposition:** Provide housing and quality of life necessary for people to remain in Ukraine and encourage refugees to return home. Drive growth and employment in the construction sector, economic growth overall, and encourage Build Back Better.
- **Trigger Event:** Half of Ukrainian territory has suffered from constant missile and drone attacks, across Kharkiv, Odesa, Zaporizhzhia, Kherson, Dnipropetrovsk, Donetsk, Sumy, Luhansk, Mykolayiv and Kyiv regions, causing massive destruction to housing and generating 4.9 million IDPs and 4.2 million refugees.

Projects Highlights ($ mln)



Implementation Period: Project will be ongoing until war ends.

Additional Details: Project includes four key components:

- Develop design and budget documentation for 160 MFDs.
- Capital repair, construction and/or reconstruction for 676 MFDs and conversion of one non-residential building to an MFD.
- Preparation of tender documents, procurement, design, state expertise, implementation, commissioning, and handover.
- Repair work selected based on local community applications utilizing a bottoms-up approach to identify needs using World Bank indicators and methodology.

Project Status: Ongoing.

BUSINESS MODEL:

Possible business models may include: Build-only or Design-Build (DB) model based on the particular component needs.

LINK TO REFORMS:

Project facilitates key recommendation from EU Enlargement report relating to coordination framework for engagement of regional and local stakeholders throughout policymaking; a coordinating role for MoR; and adequate regional angle for the Agency for Restoration by establishing and implementing coordination mechanisms within projects activities, including with WB and CEB support and expertise.

Key partners

- Ministry of Restoration
- Agency for Restoration to assist local authorities ($90m committed from the State budget)
- World Bank ($12m commitment under Project HOPE)
- CEB to potentially share expertise

Key Points of Project Implementation:

Project has been implemented with available funding but requires additional financing to meet existing and future housing demands

HOUSING

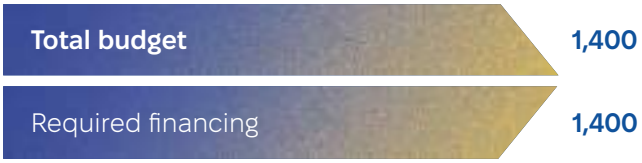
SOCIAL AND AFFORDABLE HOUSING FUND

PUBLIC SECTOR SPONSOR: MINISTRY FOR COMMUNITIES, TERRITORIES AND INFRASTRUCTURE DEVELOPMENT OF UKRAINE

CHERNIVTSI, LVIV, IVANO-FRANKIVSK, ZAKARPATTIA AND KYIV

- **Brief Description:** Seeks to address needs of IDPs and others unable to afford housing due to loss of income or other impacts of the war, including those who are disabled, elderly, children, veterans, and families of veterans killed during the war.
- **Impacted Populations:** Targets 7.9 thousand families on temporary housing registers and 7.9 thousand families on social housing registers. Project also benefits ~33% of Ukrainians that are low-income (households making <$390 per month). War exacerbated negative economic impacts, with homes, assets and jobs lost.
- **Impact:** ~24 thousand social housing units in 5 regions will provide ~9.5 thousand families on temporary housing rosters and others with affordable housing rental rates, affordable rentals for ~60 thousand families, affordable mortgages for ~4.4 thousand families.
- **Value Proposition:** Provide housing and quality of life necessary for people to remain in Ukraine and encourage refugees to return home. Drive growth and employment in the construction sector, and economic growth overall.
- **Trigger Event:** Russian aggression has destroyed/damaged over 10% of housing stock, causing ~$46.9b of damage to residential sector. Communities strained to provide adequate housing to IDPs due to antiquated Soviet laws and population shifts

Projects Highlights ($ mln)



Implementation Period: Ongoing, ~2 years (i.e., until social housing is sufficient).

Additional Details: Includes three key components:

- Technical assistance to amend laws to enable housing fund and build software to create Unified Information and Analytical Housing System
- Creation of state/municipal social housing fund to construct new housing, rebuild existing housing, convert non-residential premises, overhaul housing facilities, other activities to provide housing with social rent to IDPs and those in need
- Affordable mortgages to IDPs via State Fund for Support of Youth Housing Construction.

Project Status: Ongoing.

BUSINESS MODEL:

Possibilities include: Design-Build (DB), Build, Design Build Finance (DBF), as well as Maintenance and Operation in different combinations (DBFM, DBFOM), or only Operate/Maintain of social housing. Finance model may be appropriate for provision of affordable mortgages.

LINK TO REFORMS:

Completes the following GoU indicators:

- Creation of framework to ensure sufficient supply of social housing.
- Creation of a transparent system of registration of citizens' housing needs to ensure a prompt response at the local level.
- Provide financial mechanisms for affordable mortgages.

Key partners

Ministry of Restoration

Key Points of Project Implementation:

Project implementation has begun with available funding but requires additional financing to meet demand. Project required until need of social and affordable housing is met.

UTILITIES

MYKOLAYIV WATER SUPPLY AND SANITATION PROJECT

MYKOLAYIV

PUBLIC SECTOR SPONSOR: MINISTRY FOR COMMUNITIES, TERRITORIES AND INFRASTRUCTURE DEVELOPMENT OF UKRAINE

- **Brief Description:** Improvement of water supply and sanitation in Mykolayiv, aiming to ensure reliable, centralized drinking water supply for residents and businesses currently relying on bottled potable water.

- **Impacted Populations:** Sufficient and stable access to clean water supply can greatly enhance quality of life for entire population of Mykolayiv (~400 thousand people). This also includes necessary water supply for emergency services (e.g., firefighters).

- **Value Proposition:** Will significantly improve living conditions by providing stable access to clean water for ~400 thousand residents, including essential services like firefighting. Water infrastructure construction will create jobs and make Mykolayiv more attractive to returning IDPs and refugees, thus stimulating economic growth and local output. Reliable access to potable water will reduce dependency on bottled water, freeing up financial resources. Public health and environmental pollution will be improved through efficient water treatment and reduced transportation of bottled water.

Projects Highlights ($, mln)

Total budget	436
Required financing	436

Implementation Period: 2-3 years.

Additional Details: Includes:

- Construction of new water intake, pumping station, and main water pipeline to transport raw water from Pivdennyi Buh River
- Construction of new water treatment facilities in Mykolayivto convert raw water to potable water
- Reconstruction of Zhovtneve reservoir, including restoration of existing pumping station and water intake tower.

Trigger Event: City of Mykolayiv lacks centralized drinking water supply due to russia's armed aggression, which damaged Kakhovka dam and destroyed existing water transportation infrastructure, forcing local authorities to use salt water, further damaging pipelines. Currently, Mykolayiv is without potable water, presenting serious challenges to residents and businessese.

Project Status: Feasibility study is complete.

BUSINESS MODEL:

Possible business model may be Design-Build (DB) model. Project funding will be used to finance development of project documentation and procurement of necessary equipment and construction works.

LINK TO REFORMS:

Aligns with Ukraine's reform agenda to enhance sustainable water management, ensuring compliance with EU water legislation, improving water quality, and developing water management infrastructure.

Key partners

- Feasibility study funded by the EIB.
- Implementation by military administration, local authorities, Mykolayivvodokanal.

Key Points of Project Implementation:

- Project documentation and material procurement
- Construction of water intake, pump station, pipeline
- Construction of water treatment facilities
- Reconstruction of Zhovtneve reservoir

UTILITIES

REGIONAL WATER AND SANITATION IMPROVEMENT PROJECT

PUBLIC SECTOR SPONSOR: MINISTRY FOR COMMUNITIES, TERRITORIES AND INFRASTRUCTURE DEVELOPMENT OF UKRAINE

KHARKIV, KHMELNYTSKYI, POLTAVA, CHERKASY, SUMY

- **Brief Description:** Improvement of 7 water supply and sanitation components across five regions, including reconstruction of sewage treatment facilities and drinking water supply system infrastructurer.

- **Impacted Populations:** Restore essential water supply and sanitation services for ~1.37 million people across five regions, greatly enhancing quality of life for residents and businesses.

- **Impact and Value Proposition:** Will restore essential water supply and sanitation services in five different regions, enhancing the quality of life. Improvement works will generate direct and indirect jobs during the construction and operational phases. The project will enable IDPs and refugees to return and spur economic growth, leading to an increase in local economic output. Reliable access to potable water will reduce costs of residents, authorities, and businesses for potable water, releasing financial resources for other needs. Public health and environmental pollution will be improved through efficient water treatment and reduced transportation of bottled water.

Projects Highlights ($, mln)

Total budget	156
Required financing	156

Implementation Period: 1-4 years (Varies by region).

Additional Details: **Project includes:**

- Reconstruction of sewage treatment facilities and collectors to ensure access to critical water sanitation services for various communities in Kharkiv, Khmelnytskyi, Poltava, Cherkasy and Sumy oblasts.
- Reconstruction and repairs of drinking water supply systems in Kharkiv and Poltava oblasts.

Trigger Event: Need in Kharkiv arises from significant disruptions due to ongoing russian shelling and technical deterioration. In other areas, outdated infrastructure coupled with increased demands from growing populations due to IDPs, leading to water supply and sanitation issues.

Project Status: Varies by components (from development of project documentation to implementation).

BUSINESS MODEL:

Possible business models may include: build-only models for partially complete facilities and Design-Build (DB) models for new assets.

LINK TO REFORMS:

Aligns with Ukraine's reform agenda to enhance sustainable water management, ensuring compliance with EU water legislation, improving water quality, and developing modernized water management infrastructure.

Key partners

- Local authorities.
- Related municipal entities.

Key Points of Project Implementation:

- Public tender through Prozorro platform
- Construction work
- Independent oversight

WASTE MANAGEMENT IMPROVEMENT PROJECT

11 REGIONS ACROSS UKRAINE

PUBLIC SECTOR SPONSOR: MINISTRY FOR COMMUNITIES, TERRITORIES AND INFRASTRUCTURE DEVELOPMENT OF UKRAINE

- **Brief Description:** Improvement of 3 key waste management components across 11 regions: waste collection trucks, processing facilities, and recycling and solid waste processing equipment
- **Impacted Populations:** +825 thousand households across 11 regions will benefit from comprehensive waste management improvements, significantly enhancing their overall quality of life, health and safety. 11 regions include Mykolaiv, Lviv, Kharkiv, Dnipropetrovsk, Kirovohrad, Zhytomyr, Khmelnytskyi, Donetsk, Zakarpattia, Vinnytsia, and Kherson oblasts.
- **Impact:** Reduced environmental harm as waste reaches proper end-of-life location; up to 90% recycling rate at Vinnytsia facility; up to 9 thousand tons of construction waste processing at Vysokopillia facility; improved waste services for ~825 thousand households; 260+ new jobs created.
- **Impact and Value Proposition:** Expected to improve sanitation, minimize epidemiological risk, and process additional waste volume driven by internal displacement. In the longer term, Project promotes sustainable reconstruction, increases recycling and minimizing landfill waste, supporting both economic growth and environmental health.

Projects Highlights ($, mln)

Total budget	36
Required financing	36

Implementation Period: 1-3 years (varies by component).

Additional Details: Project includes:

- Waste collection truck procurement: Procurement and distribution of 41 waste collection trucks across nine oblasts
- Vinnytsia waste processing facility: development of final details and project plans; examination of facility; and construction of waste management facility
- Vysokopillia recycling and solid waste processing equipment: procurement of specialized equipment for the removal and processing of waste.

Trigger Event: russian aggression has severely compromised Ukraine's municipal waste management by damaging infrastructure. Internal displacement strains local finances through decreased tax revenues and increased demands from IDP movement.

Project Status: Varies by components (from development of project documentation to implementation).

BUSINESS MODEL:

Possible business models varies by project components. For Vinnytsia project component it may be Design-Build (DB) model or various other models in case of PPP funding model (e.g., DBFM-DBFOM, etc.), however no exact model is currently defined. Other project components involve procurement of equipment only.

LINK TO REFORMS:

Adheres to European Commission's Effective Waste Management reforms, including the incorporation of a modern model of household waste management in accordance with European standards.

Key partners

MoR, various local authorities and municipal entities

Key Points of Project Implementation:

- Procurement of waste collection trucks
- Vinnytsia waste processing facility
  - Plan development
  - Facility examination
  - Construction
- Procurement of recycling, solid waste processing equipment for Vysokopillia facility

UTILITIES

RESILIENCE OF DISTRICT HEATING TO WAR RISKS

9 REGIONS[1]

PUBLIC SECTOR SPONSOR: MINISTRY FOR COMMUNITIES, TERRITORIES AND INFRASTRUCTURE DEVELOPMENT OF UKRAINE

- **Brief Description:** Improvement of 11 key components of district heating across 9 regions, providing essential heating services to local residents, which is critical in winter. Project targets 270 thousand Ukrainians at high risk due to continued russian attacks.
- **Impacted Populations:** 622 thousand Ukrainians will benefit from high-quality, stable district heating services, which will be essential as russia continues to target Ukraine's critical energy infrastructure moving into the winter and beyond.
- **Impact:** Up to 10% cost reduction during distribution due to installation of insulated steel pipes, reduced reliance on fossil fuels through emission treatment and alternative energy sources, reduced operating costs through equipment modernization, increased service life of equipment, reduced risk of accidents and outages, increased predictability of maintenance and service.
- **Impact and Value Proposition:** Will ensure reliable, stable, and efficient heat network in key Ukrainian cities, reduce operational costs, support other public services, and facilitate alignment with UN Sustainable Development Goals (SDGs) and EU frameworks.

Projects Highlights ($, mln)

Total budget	104
Required financing	102

Implementation Period: 1-3 years.

Additional Details:

- Capital repair and reconstruction of district heating systems to eliminate redundancies, increase service quality and expand coverage
- Reconstruction of entire boiler houses, and re-equipping boiler houses and other equipment of boiler houses
- Reconstruction of heat pipelines and shut-off valves
- Installation of co-generation equipment to ensure a functioning heating supply during power outages.

Trigger Event: District heating provides ~33% of Ukraine's heating needs and was available to 48% of population before war. However, ~55% of boiler houses and majority of network need replacement or repair, due to damage/destruction by russian aggression or being fully depreciated and no longer operating efficiently.

Project Status: Ready for implementation.

BUSINESS MODEL:

Project implies mostly Build only (B) model, as well as Design-Build (DB) and procurement of equipment for some of components.

LINK TO REFORMS:

Facilitates alignment with UN Sustainable Development Goals (SDGs) 7, 9, 11, 13, and 14. Project contributes towards EU integration through better efficiency and lower emissions. Project meets GoU and regional authorities' goals through regional development strategies and Reform 6 of Ukraine Plan.

Key partners

- Ministry of Restoration (MoR).
- Local authorities.
- Related municipal entities.

Key Points of Project Implementation:

- MoR to coordinate procurement
- Local Departments of Public Utilities and Village Councils to oversee projects

1 - Regions include Lutsk, Kremenchuk, Monastyryshche, Obukiv (Kyiv region), Kropyvnytskyi, Podilsk (Odesa region), Kherson, Kharkiv, Kyiv

UKRBAZALTIZOL LLC

MANUFACTURING OF BUILDING MATERIALS BASED ON BASALT FIBER

KYIV REGION, UKRAINE

- **Brief Description:** Construction of vertically integrated manufacturing of basalt fiber and building materials made from it. Projected includes 4 part: building basalt fiber production line, basalt needle-punched material production line, basalt composite material and basalt composite profile.
- **Target Market:** Building material industry (road, door and window manufacturing); military industry (drones).
- **Products/Services:** Basalt fibre, basalt needle-punched material, basalt composite material and profile.
- **Unique Selling Proposition:** The project will be a pioneer in developing the new basalt raw materials market in Ukraine, with manufacturing and products aimed at capturing export opportunities.

Projects Highlights[1] ($ mln)

Type of financing – debt or project finance

Expected Financial Indicators:
- NPV – 4.5 (up to 5 years)
- DPP (months) – 602
- IRR – 30%
- Project launch period – 1 year

- **Project Status:** basalt fiber manufacturing – ready for realization; basalt needle-punched material, basalt composite material and profile – prefeasibility study.

'UKRBASALTIZOL'

is a small manufacturing company established in 2012. The company is engaged in the production of artificial and synthetic fibres.

KEY FINANCIALS IN $ THOUSAND, AS OF 2023 VS. 2022

Revenue	Net income	Net income
81.4	-56.3	155.9
-45.8%	-22.0%	-47.6%

Key partners

Could include construction companies, automobile manufacturers, energy companies, and exporters of building materials

Key Points of Project Implementation:

2024 Beginning of construction works

2025 Production of the first batch

1 – The project information and financial indicators are provided by the company initiator of the project.
2 – Related to the initial project (construction of basalt fibre factory)
3 – 15% related to the initial project (construction of basalt fibre factory), while other – facility expansion

BUILDING MATERIAL

ECO GLASS LLC

FLOAT GLASS MANUFACTURING

POLTAVA REGION

- **Brief Description:** The project involves the construction of a modern float glass manufacturing plant, which will fulfill internal demand and reduce reliance on imports.
- **Target Market:** B2C and B2B consumer of float glass (window & door segment construction industry, furniture, etc.).
- **Products/Services:** Transparent and colourful glass, production of various types of glass with different coatings (energy-efficient, self-cleaning, anti-glare, etc).
- **Technologies and Innovations**: the Project represents a transformative initiative that integrates advanced technologies, utilizes domestic resources, disrupts import-dependent markets.
- **Unique Selling Proposition**: The project will establish a manufacturing with daily capacity 600 tons, displacing Ukraine's float glass import, which cover almost all local demand. Estimated potential market volume – USD180 million.

Projects Highlights[1] ($ mln)

Total budget	243.7
Required financing	243.7

Type of financing – debt, equity, project finance

Financing structure: CAPEX – 92.8% / Working capital – 7.2%

Expected Financial Indicators:

- NPV – 373.0 (18 years)
- DPP (months) – 72
- Revenue – 122.4 (4-th year)
- IRR – 18.4%
- Project launch period – 3 years
- EBITDA – 62.9
- **Project Status:** ready for realization.

STATUS OF THE PROJECT 'ECO GLASS'

is a newly funded manufacturing company established in 2024 and set up the Project within:

1. Developed Business Plan
2. Selected Land Plot
3. Assembled Team of Key Specialists
4. Identified Key Project Collaborators

Key partners

Could include construction companies, relevant investors and exporters of building materials

Key Points of Project Implementation:

2024 Beginning of construction works

2027 Production of the first batch

16.9 million m² of glass annually

1 - The project information and financial indicators are provided by company-initiator of the project.

EFI GROUP LLC

GLASS PRODUCTION "NOVASKLO"

ZHYTOMYR REGION

- **Brief Description:** NovaSklo is a manufacturing plant that will produce float and coated glass in Ukraine. The facility will have two production lines, which will allow it to meet the growing demand for products within the country.
- **Target Market:** B2C and B2B consumer of float glass (window&door segment, construction industry, furniture manufacturing, electronic, etc.).
- **Products/Services:** Production of float and coated glass.
- **Technologies and Innovations:** represents a transformative initiative that integrates advanced technologies, utilizes domestic resources, disrupts import-dependent markets.
- **Unique Selling Proposition:** The Ukrainian market does not currently have any domestic glass producers. Therefore, the project proposes to build a facility with a daily capacity of 800 tons, which has the potential to fulfill up to 50% of the country's demand for glass during its post-war recovery

Projects Highlights[1] ($ mln)

Type of financing – equity

Expected Financial Indicators:
- NPV – 349.2
- DPP (months) – 94
- IRR – 27.9%
- Project launch period – 3 year
- EBITDA – 94.7

- **Project Status:** ready for realization.

«EFI GROUP»

is an investment company in Ukraine with a diverse portfolio in eHealth, paper, food, woodworking, energy-saving solutions, gas trading, agricultural supplies, and more. Their investments span across five regions with a control center in Kyiv.

KEY FINANCIALS IN $ THOUSAND, AS OF 2023 VS 2022

Revenue	Net income	Total assets
1.843.9	-56.3	63.6
+503.8%	-195.9%[1]	-37.8%

Key partners

Could include construction companies, relevant investors and exporters of building materials

Key Points of Project Implementation:

2024 Starting of permission design

2025 Starting of construction

2027 Production of the first batch

800 tonnes of products per day (~50% of internal demand)

1 – In 2022 company has loss

UKRGLASS INDUSTRY LLC

SHEET GLASS FACTORY

ZAKARPATIIA, CHERNIHIV REGIONS

- **Brief Description:** The project includes construction of two glass factory: in Zakarpatiia region within industrial parks with all the original advantages (VAT exempt, tax incentives etc.) and Chernihiv region.
- **Target Market:** construction industry; consumer market; automotive; furniture; window & door segment.
- **Products/Services:** Clear glass, Ultra-clear glass, Low-E glass, Tempered glass, Laminated glass, Automotive glass (windshield, rear, side, sunroof), Enriched silica sand.
- **Technologies and Innovations**: represents a transformative initiative that integrates advanced technologies, utilizes domestic resources, disrupts import-dependent markets.
- **Unique Selling Proposition**: The project propose complex decision of manufacturing glass and related product on the market without local producer. According to the project, 3 factory with 700 tonnes daily capacity each can fully cover domestic demand.

Projects Highlights[1] ($ mln)

Type of financing – debt, equity, project finance

Expected Financial Indicators:
- NPV – 365.1
- IRR – 31.4%
- DPP (months) – 61
- EBITDA – 63.0

- **Project Status:** prefeasibility study.

"UKRGLASS INDUSTRY"

is Ukrainian private company funded in 2019, which according to official data is engaged in supplying of sheet glass.

KEY FINANCIALS IN $ THOUSAND, AS OF 2023 VS. 2022

Revenue	Net income	Total assets
17.0	1.2	117.0
+43.9%	+81.0%	-11.7%

Key partners

Grenzebach, Glasstech, Bando, New Hudson Corporation, SEFPRO, AKW, Harrison Walker International Lahti, ITALCARRELLI, PT MULIA INDUSTRINDO TBK

Key Points of Project Implementation:

2024 Beginning of construction works

2028 Production of the first batch

700 tonnes of daily capacity

1 - The project information and financial indicators are provided by company-initiator of the project.

UKRTRADE CAPITAL

PREFABRICATED CONCRETE STRUCTURES FACTORY

ZHYTOMYR REGION

- **Brief Description:** Construction of a precast concrete products factory with total annual capacity 100,000 m3 to build affordable quality housing for the Ukrainian market (up to 170,000 m2 of housing per year).
- **Target Market:** Affordable housing, national and local government programs.
- **Products/Services:** Concrete products for housing and infrastructure blocks, i.e. concrete panels of various kinds.
- **Technologies and Innovations:** Construction is 2 times faster with using prefabricated structures. Compared to traditional construction methods, this method is 30% cheaper as it requires 50% less labor, 30% less steel, and 20% less concrete.
- **Unique Selling Proposition:** Construction speed is twice faster than typical construction, 25% cheaper per 1m2 , finished apartments ready to move in.

Projects Highlights[1] ($ mln)

Required financing	33.3

Type of financing – project finance

Financing structure: CAPEX – 28/ OPEX – 5.3

Expected Financial Indicators:

- NPV – 14.5 (10 years)
- IRR – 21.4%
- DPP (years) – 6.13
- Project launch period – 1 year
- Revenue – [full cap.] 329.3 (10 years)
- EBITDA – [full cap.] 48 (10 years)

- **Project Status:** prefeasibility study.

COMPANY DESCRIPTION

"UKRTRADE CAPITAL" is an investment company and business consultancy firm founded in 2018 in the USA. It has investments in real estate and renewable energy sector. Given the estimated need of 90 mn m2 of housing after the war, the company aims to build a number of prefabricated structures factories to quickly build affordable housing in the different regions. 10 such factories could supply about 20% of the estimated need over 10 year period.

Key partners

Could include construction companies, relevant investors and exporters of building materials

Key Points of Project Implementation:

2025 Beginning of construction works

2026 Production of the first batch

100 000 m³ output per year

1 – In 2022 company has loss

ZMIIV VAL

INDUSTRIAL PARK "ZMIIV VAL"

KYIV REGION

- **Brief Description:** Creating industrial park, construction brick manufacturing and build-to-rent property within the park.
- **Target Market:** Construction industry; brick and aerated concrete block segment, B2B consumer of logistic service (mainly retail).
- **Products/Services:** Clay product (clay block, roof tiles, facing brick, concrete pavers, ceramic, etc.), logistic service.
- **Technologies and Innovations**: Decentralized renewable generation unit is planned to build within the park, which enables the power supply of park and neighbor communities.
- **Unique Selling Proposition**: The project proposes a full cycle of manufacturing clay products, which, in combination with the availability of raw materials, skilled labor, and tax incentives, will enable quick market penetration and sustainability.

Projects Highlights[1] ($ mln)

Total budget	86.4
Required financing	86.4

Type of financing – debt, equity, project finance etc

Expected Financial Indicators:
- NPV – 58.5[2] (12 years)
- IRR – 17.6%
- DPP (months) – 120
- Project launch period – 3 years
- Revenue – 212.1 (12-th year)
- EBITDA 39.0

- **Project Status:** ready for realization.

BUSINESS MODEL

The industrial park features a clay quarry with 45 years of proven reserves, ensuring a reliable and cost-effective supply of the key raw materials for construction materials production. The industrial park provides purposes-built production facilities, logistics infrastructure, and office spaces for tenants, creating an integrating ecosystem to support operations.

Key partners

Plam
URenew

Byshiv community
Savtec LTD

Key Points of Project Implementation:

2024 Start of construction works

2026 Commissioning logistic part

2027 Commissioning manufacturing part

600,000 tonnes of production per annum

1 - The project information and financial indicators are provided by company-initiator of the project.

KRYVYI RIG CEMENT

KRYVYI RIG CEMENT KILN MODERNIZATION

KRYVYI RIG

- **Brief Description:** The purpose of the mentioned project is to modernize the kiln for burning alternative fuels and increase its productivity to 4000 t/day (15% increase) to the maximum possible given the current design of the existing kiln).
- **This project pursues two goals:** Achieving the share of coal substitution with alternative fuel. Increase kiln productivity to 4,000 t/day from the current 3,500 t/day.
- **Technologies and Innovations:** Construction is 2 times faster with using prefabricated structures. Compared to traditional construction methods, this method is 30% cheaper as it requires 50% less labor, 30% less steel, and 20% less concrete.
- **Unique Selling Proposition:** Reducing the negative impact on the environment due to the rejection of the use of fossil fuel sources, reducing the cost of production and reducing the impact of fluctuations in the market of traditional types of fuel, disposal of waste.
- **Target Market:** The innovative technical solution proposed by the FLS company will give the Company the opportunity to use different types of alternative fuel (AF/pre-RDF/RDF, car tires, bio-fuel, used railway sleepers), in terms of type and quality, at the same installation

Projects Highlights[1] ($ mln)

Total budget	16.4
Required financing	16.4

Type of financing – debt

Financing structure: CAPEX – 100% / OPEX –0%

Expected Financial Indicators:

- NPV – 12.1
- IRR – 24%
- DPP (months) – 60
- Project launch period - 3years
- Revenue – 1055 (6 year)
- Extra EBITDA – 23.1 (2025-2031)

- **Project Status:** Developed technical solutions and implementation stages, waiting for final equipment commercial proposal, looking for local construction contractor, looking for/expect for confirmation of financial partner.

BUSINESS MODEL

Sale	2024B	2025F	2026F	2027F	2028F	2029F
Cement (thnd tons)	1038	1120	1240	1390	1706	1974
Granite (thnd tons)	1291	1450	1700	1800	1900	2000
Concrete (thnd m3)	10	20	30	45	50	55
USD 000000						
Revenue	102,8	115,8	129,3	145,2	175,3	201,4
Cement	94,0	104,0	115,0	129,0	158,0	183,0
Granite	8,0	10,2	11,9	12,6	13,3	14,0
Concrete	0,8	1,6	2,4	3,6	4,0	4,4
EBITDA	10,4	14,5	18,1	25,5	33,3	38,2

Key partners

FLSmidth – suppliers of equipment, technologies, EIFO – financing

Project implementation plan

THE STRATEGY OF INTRODUCING ALTERNATIVE FUEL AT KRYVYI RIG CEMENT IS PLANNED TO BE IMPLEMENTED IN 3 STAGES:

Stage 1

AP: 2...5% replacement + Kiln capacity: 4,000 t/h, 4th quarter of 2024 - 4th quarter of 2025:
- Stage 1.1 – reaching 5%...10% replacement on the calciner:
- Stage 1.2 – increase kiln productivity to 4,000 t/day of clinker

Stage 2

achievement of 20%...30% substitution on the calciner, 2026-2027

Stage 3

achieving 50% or more substitution on the calciner, 2027-2029

1 - Regions include Lutsk, Kremenchuk, Monastyryshche, Obukiv (Kyiv region), Kropyvnytskyi, Podilsk (Odesa region), Kherson, Kharkiv, Kyiv

HEALTHCARE

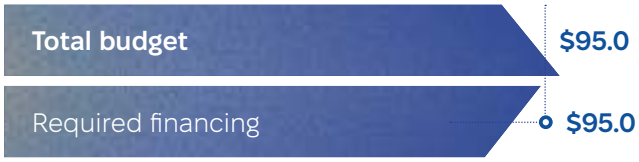
ZHYTOMYR CITY COUNCIL

ZHYTOMYR, UKRAINE

PPP PROJECT "NEW MULTIDISCIPLINARY HOSPITAL IN ZHYTOMYR"

- **Brief Description:** building a new consolidated multidisciplinary hospital for the entire community's needs. The hospital with a centralized location of departments for diagnosing and treating a wide range of diseases.
- **Target Market:** The hospital will serve the population of Zhytomyr city (261,600 residents) and Zhytomyr oblast (1,667 settlements; ~1,337,719 people).
- **Products/Services:** Surgical, both scheduled and urgent, therapeutic, and outpatient care will be provided. The hospital admits patients requiring treatment for childbirth, stroke, or heart attack and handles neonatal cases during emergencies. It also treats patients with multiple traumas and communicable diseases and provides pediatric care in separate departments tailored to the specific type of healthcare facility
- **Technologies and Innovations:** sustainable infrastructure using energy-efficient solutions and innovations are to be implemented
- **Unique Selling Proposition:** Specialized companies will be involved in implementing solutions based on advanced practices of functional and spatial planning of healthcare facilities. Availability payments from the public partner cover all costs of the private partner for implementation, as well as the expected return on investment.

Projects Highlights[1] ($ mln)



Type of financing – Initial CAPEX are financed by a private partner through equity and debt capital

Financing structure: CAPEX – 95.0
OPEX: Maintenance costs – 5% for equipment and 2% for facilities

- **Project Status:** The project was identified and selected with the support of the International Finance Corporation (IFC) as a strategic advisor to the Government of Ukraine. Cooperation with IFC includes the involvement of consultants (advisors) in conducting a preliminary project assessment. In October 2023, a preliminary assessment of the project was initiated. As of May 2024, a PPP Concept Note has been prepared.

PPP BUSINESS MODEL

"DBFM without services" or an Availability-based PPP Model - provides for the involvement of a private partner to finance, design, construct, equip, and subsequently maintain the buildings, facilities, and medical equipment of the new consolidated hospital during the term of the PPP agreement by the output specifications and key performance indicators established by the Zhytomyr City Council. Medical services are not included in the Project and will be provided by municipal medical service providers and their employees. The source of reimbursement for the private partner's investment and financing of the maintenance costs (including the renewal of medical equipment) of the PPP facility will be availability payments.

Key partners

The project was identified and selected as one of the priority PPP projects in the healthcare sector in 2023 in cooperation with the Zhytomyr City Council, the Ministry of Health of Ukraine and in pursuance of the Memorandum of Understanding between the Government of Ukraine and the International Finance Corporation.

Key Points of Project Implementation:

2025
Tender for private partner selection

→

Construction term3 years

→

2028
Start of operation

→

New hospital maintenance period 20 years

1 - The project information and financial indicators are provided by company-initiator of the project.

4.8. PHARMA-CEUTICAL AND MEDICAL SECTORS

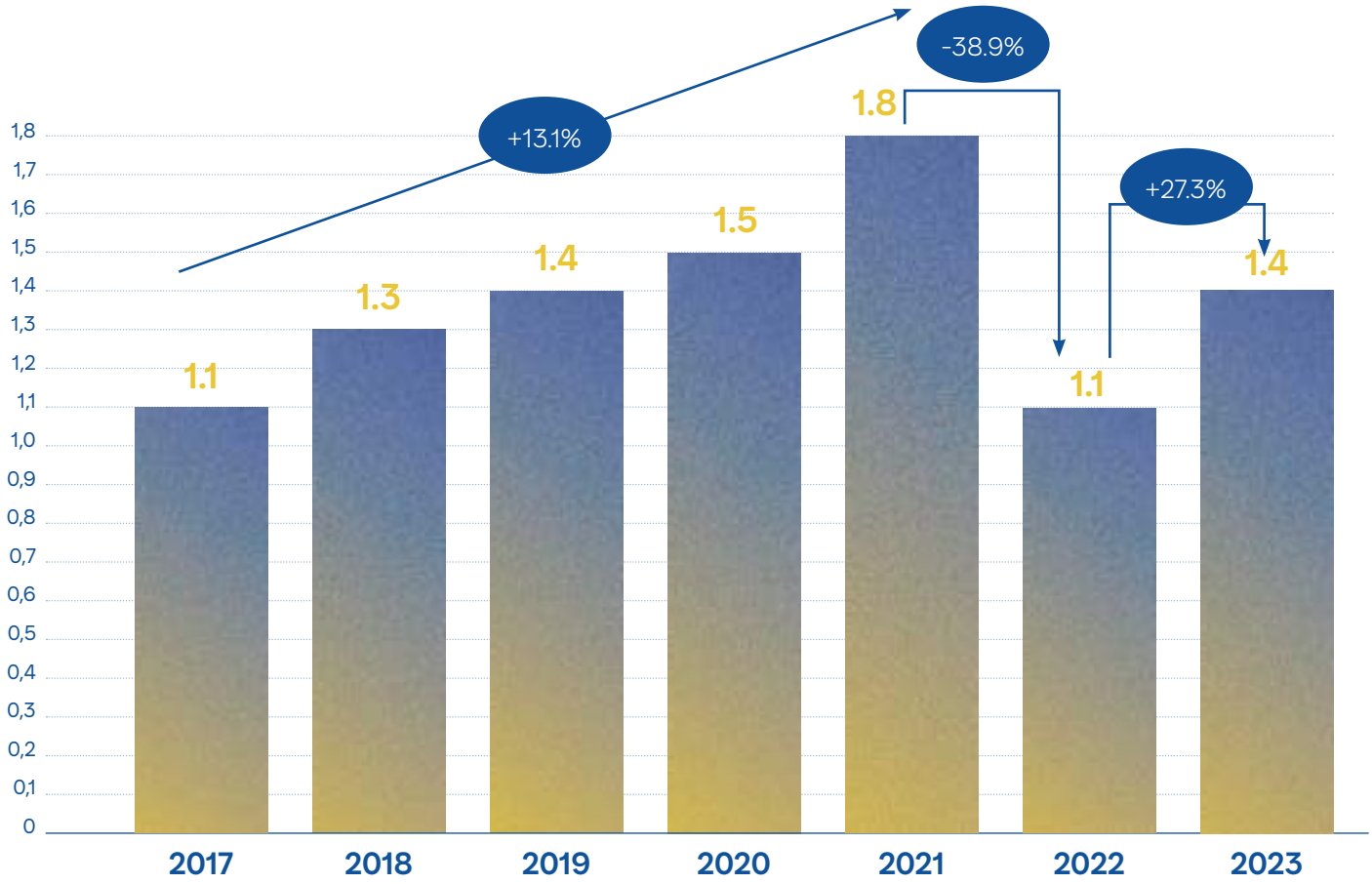
4.8.1. Current situation and the sector role

In the period from 2016 to 2021, the GDP of the Ukrainian pharmaceutical sector increased from USD 0.8 billion up to USD 1.8 billion, reaching a share of 0.9% of the total GDP in 2021. This strengthening of the industry was supported by an increase in capital investment in pharmaceutical production. Namely, from 2016 to 2021, the volume of capital investments grew steadily, increasing from USD 65 to 106 million during the specified period. The stability of capital investments, which was maintained during the crisis period of the COVID-19 pandemic in 2020-2021, emphasises the orientation of the industry to long-term development.

According to the State Statistics Service of Ukraine, in 2021, Ukraine demonstrated a significant volume of pharmaceutical product sales, accounting for 0.9% of the country's total GDP.

However, the positive trend in sales during 2017-2021 was disrupted by a substantial decline in pharmaceutical product sales volumes due to the negative impact of the full-scale invasion in 2022.

Figure 1: The dynamics of sales volumes of the main pharmaceutical products in Ukraine, USD billion[1]



[1] - State Statistics Service of Ukraine

Meanwhile, production volumes for the full year of 2023 reached USD 1.4 billion, demonstrating a 27.3% increase compared to 2022. This indicates a rapid recovery of the industry after challenging periods and the strengthening of production stability.

TABLE 1: The largest pharmaceutical companies in Ukraine by revenue, 2023[2]

		Revenue, USD million		Growth rates
№	Company	2023	2022	2022-2023
1	Farmak	265.0	238.1	+11.3%
2	Pharmaceutical company «Darnytsia»	190.6	160.8	+18.5%
3	YURIA-PHARM	131.4	117.5	+11.8%
4	Kyiv Vitamin Plant	117.8	95.8	+22.9%
5	Arterium	112.3	94.3	+19.2%
6	Biopharma Plasma	60.8	37.1	+63.9%
7	Borshchahivskiy CPP	49.7	49.5	+0.5%
8	Pharma Start, part of Acino Group	40.5	34.0	+19.0%
9	InterChem	34.7	37.1	-6.4%
10	Lekhim-Kharkiv	15.3	18.6	-17.4%

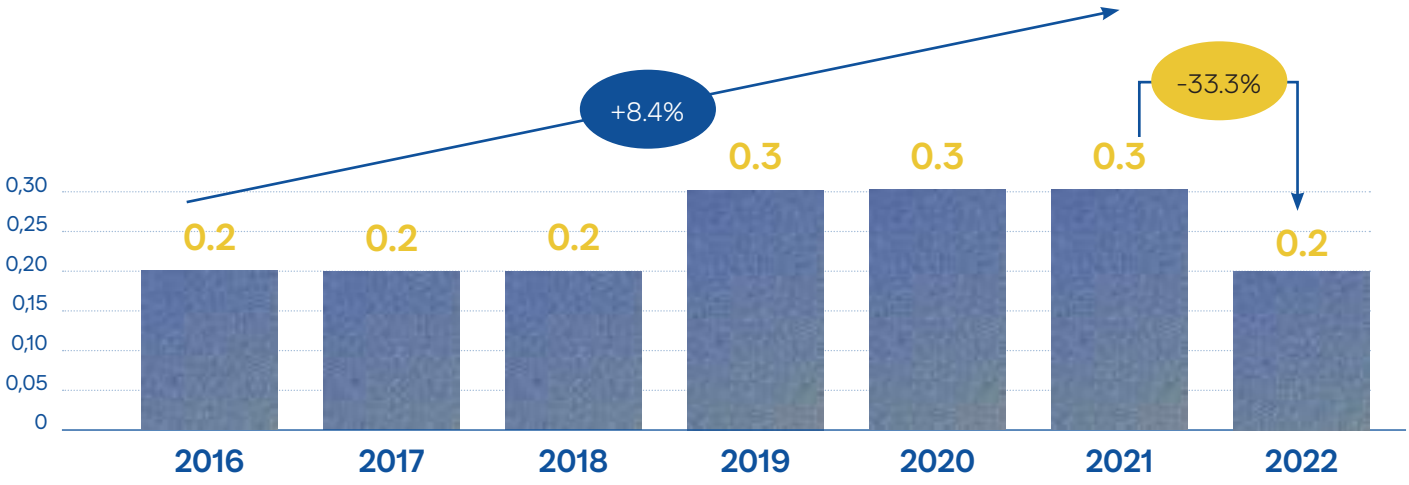
Market leaders continue to invest in expansion of the production capacities and companies' development: «Farmak» has increased its presence in EU countries by acquiring marketing pharmaceutical companies in the Czech Republic and Slovakia in 2023, as well as in Poland in 2024. Additionally, in 2022, «Farmak» invested: USD ~20 million in construction of a new production facility in Spain and more than USD 22.4 million in the development of its production facilities in Kyiv and Shostka (Ukraine).

In 2023, the pharmaceutical company «Darnytsia» invested in the company's digital leadership in the industry and became the first Ukrainian company in the pharmaceutical market to implement the latest version of the SAP S/4HANA ERP system.

In 2023, the pharmaceutical company «YURIA-PHARM» acquired the Uzbek pharmaceutical company «Reka-Med» for USD 10.8 million, obtained from the existing loan of the EBRD. This agreement will allow «YURIA-PHARM» which exports 15% of its products to Uzbekistan, to produce goods for the Uzbek market locally and release around 10% of its Ukrainian capacities for the production of products that are critically important for the domestic market.

The decrease in production volumes caused by the full-scale war has also impacted the volumes of pharmaceutical product exports. Namely, in 2022, the volume of pharmaceutical exports decreased by 24.3% compared to 2021.

Figure 2: The volume of export of pharmaceuticals, USD billion[3]



[2] - Opendatabot; Pharmacompass; The Page
[3] - ITC Trade Map

At the same time, the pharmaceutical import was even more severely affected, showing a 38.7% decline in volumes in 2022 compared to the year before the full-scale invasion.

Figure 3: The volume of import of pharmaceuticals, USD billion

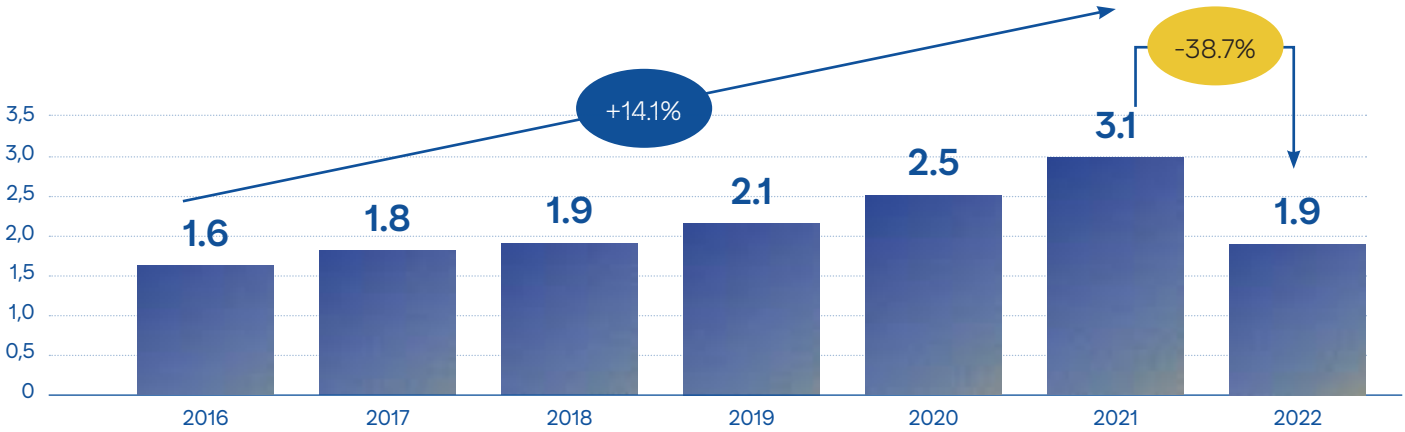
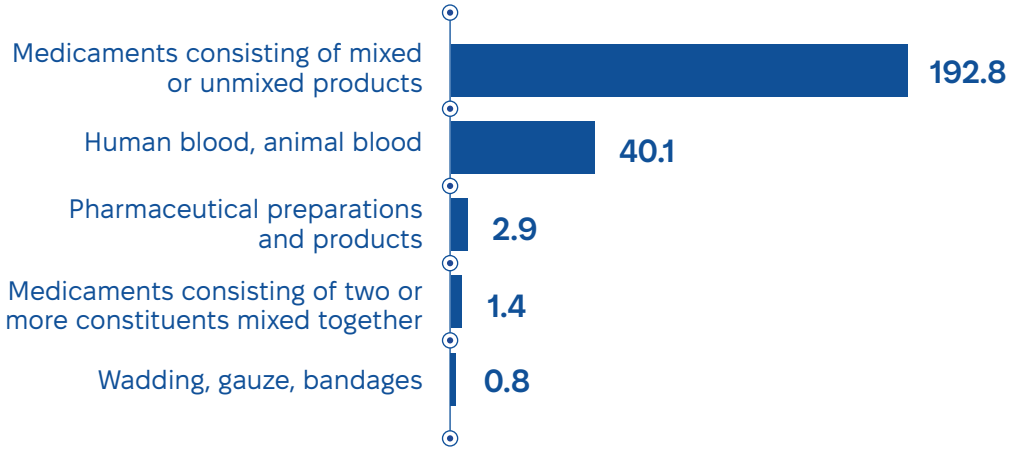
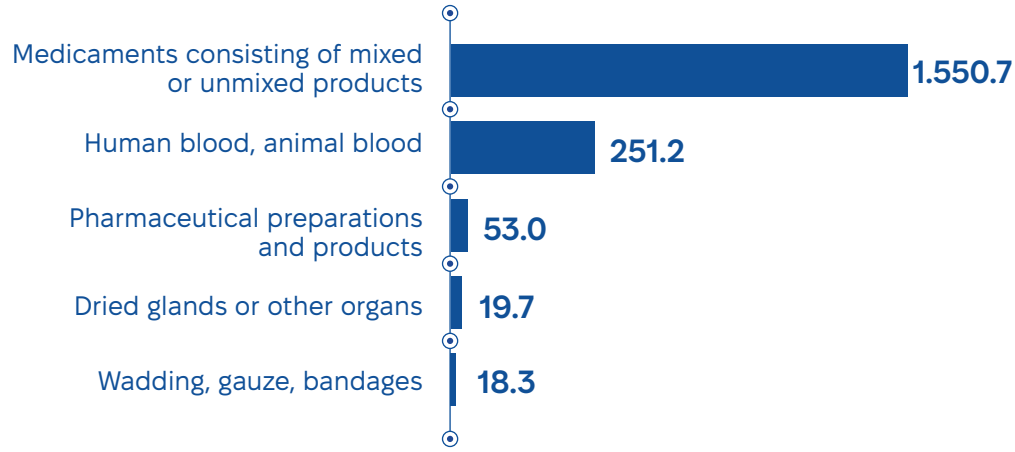


Figure 4: The largest categories of export of pharmaceuticals, USD million, 2022



	CAGR 2018-2022	YoY Change 2021-2022
Medicaments consisting of mixed or unmixed products	+1,3%	+29,4%
Human blood, animal blood	+12,3%	+12,7%
Pharmaceutical preparations and products	-15,6%	-12,4%
Medicaments consisting of two or more constituents mixed together	+15,3%	+18,7%
Wadding, gauze, bandages	-8,1%	-19,6%

Figure 5: The largest categories of import of pharmaceuticals, USD million, 2022



	CAGR 2018-2022	YoY Change 2021-2022
Medicaments consisting of mixed or unmixed products	+0,3%	-28,9%
Human blood, animal blood	-7,3%	-65,7%
Pharmaceutical preparations and products	+6,4%	-23,9%
Dried glands or other organs	+31,2%	-52,5%
Wadding, gauze, bandages	+4,9%	-3,0%

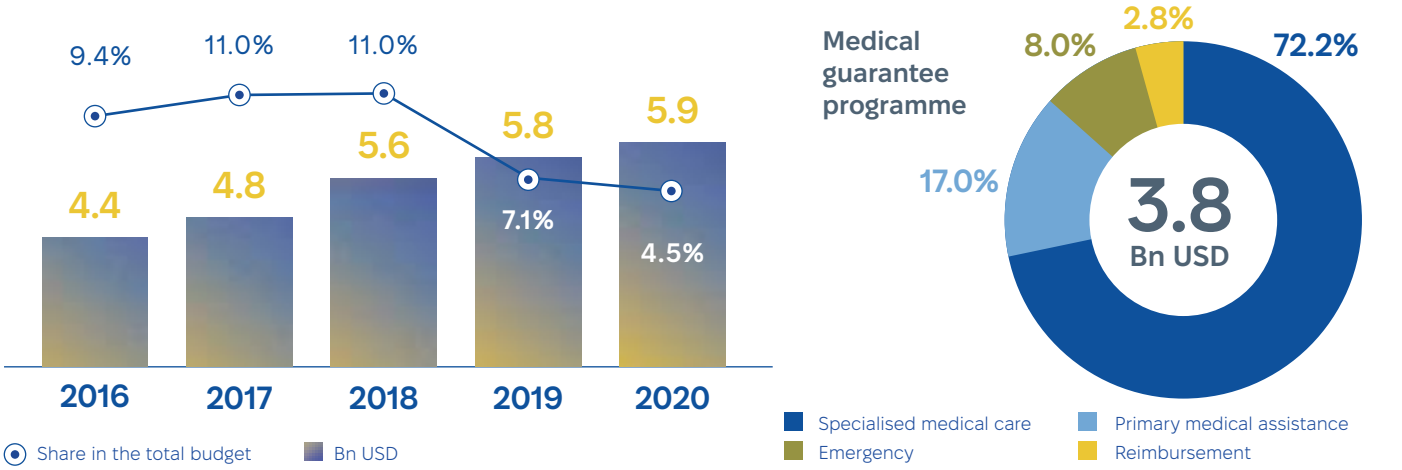
The largest categories of pharmaceutical imports in 2022 were: medicaments consisting of mixed or unmixed products (USD 1.5 billion) and human and animal blood (USD 0.2 billion). The largest category of pharmaceutical exports was medicaments consisting of mixed or unmixed products (USD 0.2 billion). However, considering that the sales volumes of key pharmaceutical products in Ukraine began to recover in 2023, approaching pre-invasion levels, and the largest pharmaceutical companies in Ukraine demonstrated positive changes in income indicators in 2023, it can be concluded that the Ukrainian pharmaceutical industry continues to show signs of recovery and demonstrates prospects for further growth in the future.

MEDICAL SECTOR

In recent years, the healthcare system in Ukraine has undergone a significant transformation towards the Beveridge model, which guarantee a free access to medical services for all Ukrainian citizens. Until 2017, the population of Ukraine was assigned to doctors based on their registration address, doctors were paid fixed salaries regardless of services' quality, and state medical institutions received funds directly for infrastructure capacity. Instead of these, in 2017, the GoU launched a Medical Guarantee Programme (MGP), which established a new model of the healthcare sector financing with a single tariff for guaranteed medical services. Since 2018, the state funds have been allocated to patients entitled to choose family doctors and sign a declaration on the provision of medical service with them. The costs have been compensated to medical institutions and doctors through the National Health Service of Ukraine (NHSU).

Thus, the medical sector in Ukraine is gradually transforming into a patient-centred and anti-corruption healthcare model, while doctors and medical institutions became motivated to provide quality healthcare services due to the direct dependence of their income on the number of patients. In addition, public spending on healthcare in Ukraine grew steadily over the past five years at a CAGR of +7.6%. Despite the decrease in the healthcare sector's share in the overall budget of Ukraine since the start of the russian war due to a greater focus on defence, the MGP remained in effect.

Figure 6: Healthcare spending in Ukraine[4]



However, the russian invasion in 2022 hampered the access to medical services as a result of damaged infrastructure, massive population displacement and loss of medical specialists.

TABLE 2. Top private medical clinics in Ukraine in 2023 according to the UBA Ranking[5]

№	Company	Score of UBA (out of 100)	Revenue, USD million		Foundation year	Number of facilities	Number of medical fields
			2023	% from 2022			
1	Medical network 'Dobrobut'	87.30	61.4	+71.6%	2001	41	62
2	Medicom clinic	86.93	10.7	+41.0%	1992	5	42
3	Smart Medical Center LLC	64.12	8.9	+48.5%	2017	3	70
4	Medical network 'VIVA'	54.99	n/a	n/a	2005	12	30
5	Oxford Medical	54.14	5,7	+48.5%	2005	43	20
6	Medical centre 'Omega-Kyiv'	50.07	n/a	n/a	2003	4	37
7	'Clinic Verum Expert' LLC	49.94	2.9	+52.4%	2018	2	41
8	Medical centre network 'On Clinic'	48.20	0.7	+20.2%	2007	25	22
9	EUROLAB LLC	47.03	1.5	+32.5%	2004	1	56
10	Medical centre 'Helyos'	37.77	n/a	n/a	2007	4	19

[4] - Official website of the Ministry of Finance of Ukraine; State website of the budget for citizens 'open budget'
[5] - Ukrainian Business Award website, Opendatabot

The key private medical clinics in Ukraine from the UBA Ranking increased their revenues in 2023 compared to 2022, primarily due to the higher demand for medical services related to the russian invasion. In addition, the medical services market in Ukraine has expanding with new medical facilities, as well as the medical networks have investing in the development of new medical fields. Among selected investment projects in Ukraine are:

- In 2023, Medical network 'Dobrobut' opened a new multidisciplinary hospital in Kyiv with more than 200 medical specialists, investment in which amounted to approximately USD 20 million. The new hospital occupies 8 floors with a total area of over 10.000 square metres.
- In April 2023, the ADONIS medical group of companies with 11 medical facilities in Kyiv and Kyiv region opened a new physical rehabilitation centre in Kyiv.
- In February 2024, Fozzy Group, a trade group of companies in Ukraine, opened a multidisciplinary medical centre 'Doctor Sam' in Kyiv with a licence for 34 medical fields and a total area of 1.000 square metres.

In summary, despite the war challenges, the medical services sector in Ukraine demonstrated resiliency in terms of operations and receiving public funding.

4.8.2. Overview and outlook of key reforms

With the start of Health Reform 2016, Ukraine has improved its position in the Health component of the Legatum Prosperity Index, ranking 101st in 2023 compared to 135th in 2017. This component measures the overall level of public health and population's access to healthcare services, as well as includes the efficiency of the healthcare system, level of diseases, risk factors, and mortality rates. The improvement of Ukrainian position was resulted primarily from the rise in indicators of preventive healthcare measures and public satisfaction with the healthcare system, owing to the establishment of access to constant communication with family doctors and the expansion of guaranteed medical services' list.

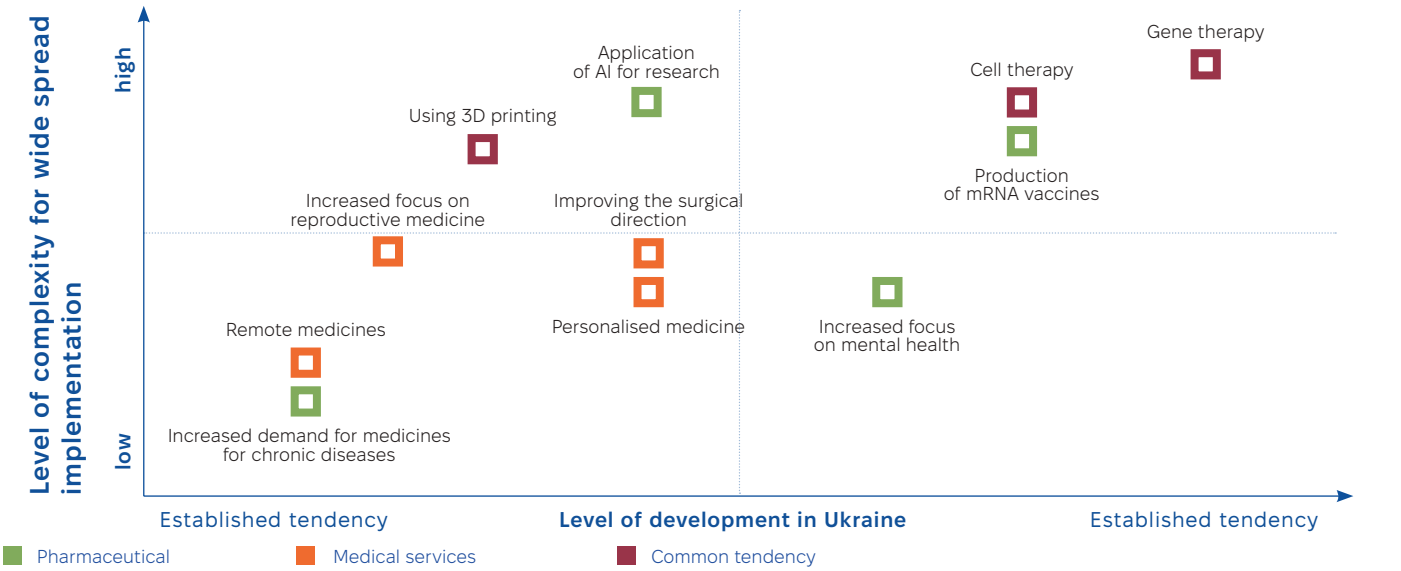
Since 2016, the regulatory framework of the pharmaceutical sector in Ukraine has undergone a period of significant transformation, driven by the introduction of initiatives to strengthen the healthcare sector. In addition to the primary focus on reorganising the healthcare facilities' structure in Ukraine, the Health reform of 2016 aimed to regulate the turnover of medicines, which contributed positively to consumer demand for pharmaceutical products.

Despite the urgent healthcare priorities on the back of martial law, Ukraine continues to improve its pharmaceutical legislation to harmonise it with the EU requirements.

4.8.3. Tendencies and trends

Current global issues along with a number of technological advances are transforming the pharmaceutical and medical services sectors for the improvement of public access to medical services and the promotion of sustainable development goals:

Figure 7: Implementation of global tendencies in the pharmaceutical and medical services sectors in Ukraine[6]



The russian invasion of Ukraine, demographic and climate changes, the COVID-19 crisis and other factors are forcing Ukrainian pharmaceutical manufacturers and medical facilities to move towards global trends in these areas.

[6] - Visualisation of the KPMG analysis

1 Tendencies in the pharmaceutical sector:

- Production of mRNA vaccines.
- Application of AI for research.
- Increased demand for medicines for chronic diseases.
- Increased focus on mental health.

2 Tendencies in the medical services sector:

- Remote medicine.
- Personalised medicine.
- Improving surgical direction.
- Increased focus on reproductive medicine.

3 Common tendencies:

- Using 3D printing.
- Cell therapy.
- Gene therapy.

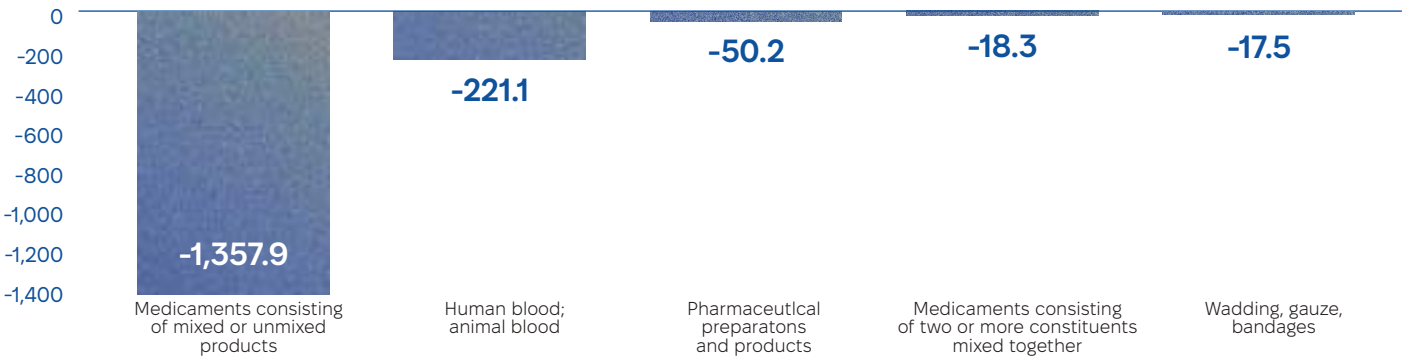
4.8.4. Advantages of industry development in Ukraine

High domestic demand

The full-scale war has significantly impacted the trade of pharmaceuticals, leading to negative changes in procurement and supply volumes. Specifically, the import of pharmaceutical products decreased by 37.5%, declining from USD 3.1 billion in 2021 to USD 1.9 billion in 2022.

At the same time, all categories of Group 30 'Pharmaceutical Products' demonstrated a negative trade balance in 2022, indicating Ukraine's dependence on the import of certain categories of pharmaceuticals and the high domestic demand.

Figure 8: Trade balance of pharmaceuticals in Ukraine, million USD, 2022[7]



As in previous years, the category 3002, which includes blood, immune serums, immunological products and vaccines, remained the second-largest category of imports, comprising 13.2% of the total import volume in 2022.

Overall, nearly 95% of imported pharmaceutical products consisted of Medicaments in measured doses or packaged for retail sale and serums, along with vaccines, indicating that a large portion of the demand for pharmaceuticals (such as antibiotics, vaccines, etc.) can be met by domestic producers. Provision of domestic demand with local productions will initiate an increase in internal consumption of goods and services in the country, promoting economic growth.

Medical sector

The full-scale invasion has significantly impacted Ukraine's medical infrastructure. As of July 2023, 1,389 medical facility objects were damaged, while 186 objects completely destroyed. However, the restoration of medical infrastructure remains a key and prioritised aspect for ensuring accessibility of medical care to the population. Therefore, Ukraine has already managed to restore part of the medical facilities. Specifically, as of the end of July 2023, 343 medical facility objects have been fully restored, with an additional 414 objects partially restored.

The development of medical infrastructure in Ukraine is a key factor in providing accessible and quality healthcare to the population. Despite the challenges faced by the healthcare system due to military events, the implementation of the medical infrastructure restoration program aims to further improve accessibility and quality of medical services for the Ukrainian population, serving as a prerequisite.

4.8.5. Prospects and potential for the sector

The harmonisation of Ukrainian legislation with EU laws in the pharmaceutical and biopharmaceutical sectors will contribute to the creation of a favourable and predictable regulatory environment for the development and expansion of pharmaceutical enterprises.

Partnerships with international companies and institutions can help attract new technologies and investments, promote entry into the global market, increase competitiveness, and, accordingly, facilitate the development of exports of Ukrainian pharmaceutical products.

[7] - ITC TradeMap

PHARMACEUTICAL AND MEDICAL SECTORS

Highlighted investment projects

PHARMACEUTICAL AND HEALTHCARE

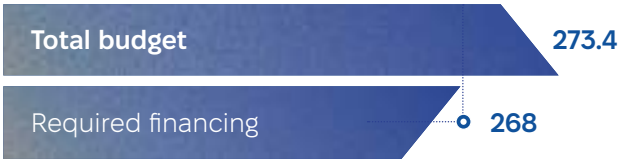
PRJSC PHARMACEUTICAL FIRM 'DARNYTSIA'

KYIV, UKRAINE

ESTABLISHING A PRODUCTION FACILITY OF mRNA VACCINES

- **Brief Description:** Construction of a full-cycle mRNA vaccine production, including a research laboratory, with a production capacity of 100 million doses per year, aimed to improve health security through local production.
- **Target Market:** The mRNA vaccine production facility will serve the domestic market, thereby reducing reliance on imported vaccines. The facility will also serve foreign markets to fill the gap during a pandemic.
- **Products/Services:** mRNA vaccines.
- **Value Proposition:** Provide housing and quality of life necessary for people to remain in Ukraine and encourage refugees to return home. Drive growth and employment in the construction sector, economic growth overall, and encourage Build Back Better
- **Technologies and Innovations:** mRNA-based vaccine production technology, transferred from the World Health Organization (WHO) and the Medicines Patent Pool (MPP).
- **Unique Selling Proposition**: The project involves producing top-tier vaccines with technology from WHO/MPP, and anticipating sales to low and middle-income countries under WHO/MPP mandate.

Projects Highlights[1] ($ mln)



Type of financing – debt finance

Financing structure: CAPEX – 90% / OPEX – 10%

Expected Financial Indicators:

- NPV – 35.0 (4 years)
- DPP (months) – 180
- IRR – 40%
- Project launch period – 2025-2029
- **Non-pandemic year** Revenue – 5 EBITDA – (1.5)
- **Pandemic year** Revenue – 300 EBITDA – 205

Indicators are calculated based on the assumption that the pandemic year appears twice in a decade

- **Project Status:** The conceptualization phase of the project has been completed

'DARNYTSIA'

is a pharmaceutical company established in 1930, producing more than 180 products with a focus on cardiology, neurology, and pain management. As of H1 2023, 'Darnytsia' was a leader of the Ukrainian market in terms of sales volume.

SELECTED ADVANCEMENTS OF 'DARNYTSIA'

The only
pharmaceutical company in the rating of sustainable businesses of Ukraine (Forbes, 2022)
Certification since 2002
Certification since 2002
Products in the development portfolio

Key partners

In 2022, 'Darnytsia' became the sole Ukrainian company chosen by WHO/MPP for the mRNA technology transfer program, which implies gaining technology and training from the transfer "hub" Afrigen Biologics and Vaccines, South Africa.

Key Points of Project Implementation:

2024 Beginning of construction works → **2028** Production of the first batch → **100 million doses annual capacity**

1 - The project information and financial indicators are provided by company-initiator of the project.

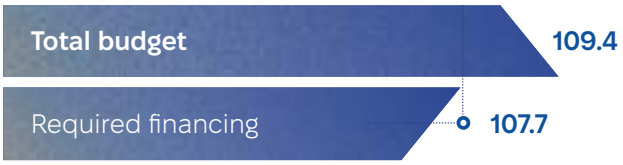
PRJSC PHARMACEUTICAL FIRM 'DARNYTSIA'

KYIV, UKRAINE

ESTABLISHMENT OF API* PRODUCTION FACILITY IN UKRAINE

- **Brief Description:** Construction of the API production facility in Ukraine, with an annual capacity of 200 tonnes, intended to supply the EU with API, manufactured in close proximity to its market.
- **Target Market:** The new facility will enhance diversification of API supplies to the EU market, mitigating supply chain risks and reducing dependance on India and China.
- **Products/Services:** Active Pharmaceutical Ingredients (API).
- **Technologies and Innovations:** Fully GMP-compliant multi-purpose flexible production site with a total reactor volume of 100 cubic meters.
- **Unique Selling Proposition**: Lower costs for construction, ecological compliance and subsequent production in Ukraine, compared to EU, alongside access to skilled local personnel, will expand EU's API procurement channels at reduced costs.

Projects Highlights[1] ($ mln)



Type of financing – debt finance

Financing structure: CAPEX – 90% / OPEX – 10%

Expected Financial Indicators:

- NPV – 0.4 (4 years)
- DPP (months) – 132
- Revenue – 25 (1 year)
- IRR – 20%
- Project launch period – [2025-2029]
- EBITDA – 9 (1 year)

- **Project Status:** The conceptualization phase of the project has been completed

'DARNYTSIA'

is a pharmaceutical company, established in 1930, producing more than 180 products with a focus on cardiology, neurology, and pain management. As of H1 2023, 'Darnytsia' was a leader of the Ukrainian market in terms of sales volume.

KEY FINANCIALS IN $ MLN, AS OF 2023 VS. 2022

Revenue	Net income	Total assets
190.6	36.1	179.8
+32.8%	+238.1%	+17.7%

Key partners

Medical equipment suppliers, pharmaceutical companies, non-profits, construction companies, and financial institutions.

Key Points of Project Implementation:

2024 Beginning of construction works → **2028** Production of the first batch → **200 tonnes of API output annually**

*API - Active Pharmaceutical Ingredients
1 - The project information and financial indicators are provided by company-initiator of the project.

PHARMACEUTICAL AND HEALTHCARE

LLC MEDICAL CENTER "DOBROBUT-CLINIC"

KYIV, UKRAINE

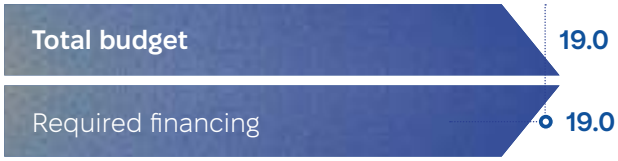
MEDICAL CENTER «DOBROBUT" WITH EXPANDED REHABILITATION SERVICES

- **Brief Description:** Expansion of the clinic capacity and concentrating medical expertise in one location. The three buildings (A, B, C) of the Medical Diagnostic Center are already operational. Dobrobut plans to start the reconstruction of an integrated property complex (area 7,523 sq m) that was built in 1990 and formerly functioned as a scientific research institute

- **Target Market:** The ongoing war has created a critical need for medical services, specifically rehabilitation. The Project aims at ensuring Kyiv region inhabitants with access to the crucial medical and rehabilitation services.

- **Unique Selling Proposition:** Improved access to high quality, healthcare services by providing the effective and affordable rehabilitative and therapeutic medicine in Kyiv. New emergency department will comly with high international healthcare standards. Separated inpatient and outpatient pathflows will be provided.

Projects Highlights[1] ($ mln)



Type of financing – debt
Financing structure: CAPEX – 100%:Capital construction 65.8%, medical equipment 34.2%

Expected Financial Indicators:
- NPV – 35.0 (10 year)
- DPP (months) – 60
- Revenue – 22.0 (5th year)
- IRR – 15%
- Project launch period – [2024-2025]
- EBITDA – 6 (5th year)

Indicators are calculated based on the assumption that the pandemic year appears twice in a decade
Project Status: Prepared and approved the medical task and pre-project solution (medical technology) for multi-profile medical center.

- **Products/Services: Dobrobut's facilities offer medical services across +75 specialties, including the following:**
  - General Medicine
  - Pediatrics
  - Gynecology
  - Cardiology
  - Dermatology
  - Gastroenterology
  - Neurology
  - Orthopedics
  - Ophthalmology
  - ... and more

  Key rehabilitation services
  - Orthopedic Care
  - Neurological Care
  - Therapy

«DOBROBUT» MEDICAL NETWORK

is the first Ukraine's network of private clinics, adhering to contemporary standards of medical care. "Dobrobut" medical centers are located in every district of Kyiv and provide a full range of outpatient and inpatient health care services.

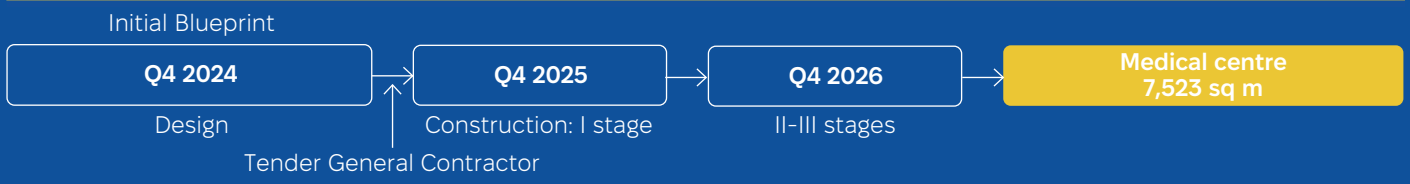
PROJECT'S GOALS

- Reconstruction of the existing property complex
- Transfer of outpatient care in a separate building
- Expansion of rehabilitation assistance

Key partners

Dobrobut has established trusted relationships with a broad range of equipment suppliers, engineering and construction firms. Among key partners are Siemens Ukraine, Protech Solutions (GE), Medlogistics (ALVO), Klemann Ukraine, Astis Engineering, Climate PRO, Bbraun, Harwind, etc

Key Points of Project Implementation:



1 - The project information and financial indicators are provided by company-initiator of the project.

PHARMACEUTICAL AND HEALTHCARE

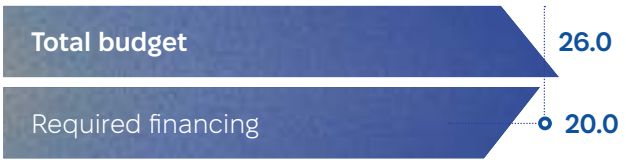
LLC MEDICAL CENTER "DOBROBUT-CLINIC"

KYIV, UKRAINE

MULTIDISCIPLINARY REGIONAL MEDICAL CENTER «DOBROBUT" IN LVIV

- **Brief Description:** Building a new multi-profile hospital in Lviv which will be a full-fledged facility within the diagnostic and treatment center of Medical network Dobrobut. The total area of new facility is around 11,000 sq.m.
- **Target Market:** Residents of the Lviv region and individuals from across Ukraine who need medical care. The private healthcare sector reports a rising demand in Ukraine due to better access to and quality of services.
- **Products/Services:** A full range of medical services for children and adults, including emergency, diagnostic, operation block, intensive, inpatient and outpatient care, rehabilitation and recovery facilities, dental clinic, ophthalmological clinic, laboratory and pharmacy.
- **Unique Selling Proposition:** The project aims to establish Ukraine's only medical centre offering all four levels of care, provide jobs for displaced medical professionals in Lviv and improve healthcare infrastructure nationwide.

Projects Highlights[1] ($ mln)

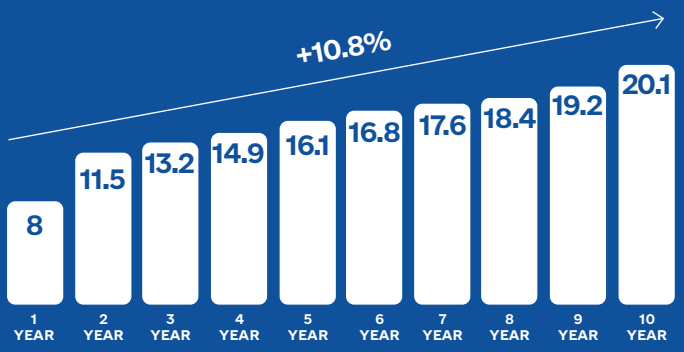


Type of financing – debt
Financing structure: CAPEX – 100%:Capital construction 38.5%, medical equipment 55.8%, other equipment 5,7%

Expected Financial Indicators:
- NPV – 27.1 (10 year)
- DPP (months) – 60
- Revenue – 16.1 (5th year)
- IRR – 15%
- Project launch period – [2025-2026]
- EBITDA – 5.0 (5th year)

- **Project Status:** Prepared and approved the medical task and pre-project solution (medical technology)

REVENUE EXPECTED, $ MLN



SERVICES AND STRUCTURE

Ambulance	3 equipped cars | 12 staff group
Diagnostics	CT, MRI, X-Ray, mammography, Endoscopy, Laboratory
Operation block	3 operation rooms
Outpatients care	11 pediatric rooms | 17adult rooms
Inpatients care	15 pediatric beds | 30 adult beds
Rehabilitation	2 outpatient halls, 2 inpatient halls, 8 rooms
Ophthalmological Clinic	**Dental Clinic**

Key partners

Siemens Ukraine, Protech Solutions (GE), Medlogistics (ALVO), Klemann Ukraine, Astis Engineering, Climate PRO, Bbraun, Harwind

Key Points of Project Implementation:

Design 5-6 months — Construction 6-8 months

Q4 2024 Initial Blueprints & Design → **Q4 2025** Tender to select General Contractor → **Q4 2025** Installation & Engineering → **Q2 2026 Launch**

1 - The project information and financial indicators are provided by company-initiator of the project.

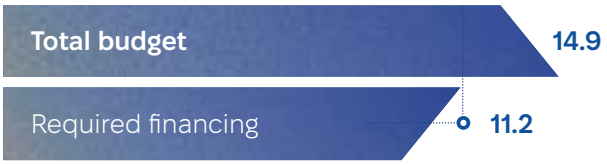
GARVIS GROUP OF COMPANIES

DNIPRO, UKRAINE

A MODERN CLINIC IN THE HEALTHCARE SYSTEM OF DNIPRO – GARVIS-2 CLINIC

- **Brief Description:** the construction and subsequent operation of the Garvis-2 Clinic in Dnipro, Ukraine, aimed at improving the life quality and expectancy of the local population from 73 to 77 years within the next ten years
- **Target Market:** Dnipropetrovs`k Region (Ukraine) with the population about 4,0 mln people. Also, the war in Ukraine caused a migration of additional 466,000 people to the city as of 2023.
- **Products/Services:** a full range of medical services from disease diagnostics and surgical intervention to rehabilitation
- Technologies and Innovations: the Clinic should be equipped with modern diagnostic technologies (CT, MRI, Mammography, X-Ray, USG, endoscopy), the state-of-art operating theatres, rehabilitation and physiotherapy equipment
- **Unique Selling Proposition**: the multidisciplinary approach, participation in the State Medical Guarantee Program, the wide range of affordable medical services within one facility will ensure a strong customer flow. The Clinic has a potential to perform 6,000-8,000 surgeries per year.

Projects Highlights[1] ($ mln)



Type of financing – project finance

Financing structure: CAPEX – 100%

Expected Financial Indicators:
- NPV – 13.6 (5 years)
- DPP (months) – 70
- Revenue – 18.1 (5th year)
- IRR – 8%
- Project launch period – 2025-2027
- EBITDA – 5.5 (5th year)

- **Project Status:** stands at the ready for implementation stage. Garvis has signed a land lease agreement for 15 years and engaged in the process of purchasing a building for reconstruction (a down payment has been made on the building, a buy-out by the end of 2024).

GARVIS GROUP

Garvis Group of companies is a network consisting of family medicine (8 facilities), diagnostic (1 facility), surgery (1 facility) and rehabilitation (1 facility) centres in Dnipro, Ukraine. The first healthcare facility of Garvis Group of companies was founded in 1997.

GARVIS IN DNIPRO REGION

- **in gastro-/colonoscopy** among 60 healthcare facilities
- **in mammographya** mong 32 healthcare facilities
- **in family medicine** among 199 healthcare facilities
- ranked 1st among private facilities
- **in surgery** among 61 healthcare facilities (ranked 1st among private facilitie)

KEY FINANCIALS IN $ MLN, AS OF 2023 VS. 2022

Revenue	Net income
1,628.9	38.3
+39.4%	+92.6%

SERVICE PORTFOLIO OF GARVIS-2 CLINIC

Family Medicine /specialized doctors

Diagnostics (CT, MRI, MAM, X-ray, endoscopy)

Inpatient care 10 surgical specialities /40-50 beds + 10 intensive care beds 4 operating theatres: 1-2 of them meet the highest standard "class A", chemotherapy
Rehabilitation with physiotherapy

Key partners

KARL STORZ, Philips, Medtronic

Key Points of Project Implementation:

Purchase of a building → Construction of additional space → Building renovation → Purchasing of medical equipment → **Garvis-2 clinic 8,500-9,000 m2**

1 - The project information and financial indicators are provided by company-initiator of the project.

PHARMACEUTICAL AND HEALTHCARE

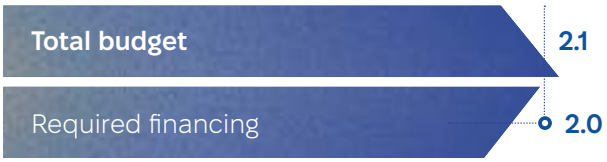
TITAN-MED LLC

KYIV, UKRAINE

PRODUCTION OF ENDOPROSTHESES AND EXOPROSTHESES

- **Brief Description:** purchase of advanced equipment for modernising the production of endoprostheses and exoprostheses, which may allow covering the needs of nearly 100,000 injured Ukrainians and replace imports.
- **Target Market:** injured people throughout Ukraine requiring prosthetics, including military and civilians affected by the hostilities in Ukraine
- **Products/Services:** customised and serialized 3D-printed endoprostheses and exoprostheses with a focus on large joints
- **Technologies and Innovations:** 3D printing with titanium powder, including 3D medical imaging technologies, 3D-printer and related materials
- **Unique Selling Proposition:** production will be arranged promptly by purchasing the modern 3D-printing equipment, which may ensure the fast ROI. Besides, the project will contribute to inclusivity and social responsibility goals

Projects Highlights[1] ($ mln)



Type of financing – debt, equity, project finance

Financing structure: CAPEX – 76.9% / OPEX – 20.0%

Expected Financial Indicators:
- NPV – 8.7 (1 year)
- DPP (months) – 31
- Revenue – 1.8 (1st year)
- IRR – 88.28%
- Project launch period – [2024-2025]
- EBITDA – 0.1 (1st year)

- **Project Status:** stands at the implementation stage. The Company has started investing own funds in a part of necessary equipment (nearly 16.1% of total budget).

TITAN-MED LLC

is a Ukrainian producer of endoprostheses, as well as dental instruments and materials. The Company primarily focuses on the production of metal-polyethylene, ceramics-polyethylene, and ceramics **endoprostheses of joints.**

Foundation year: **2017**
Average serve of endoprostheses: **15-20 years**

Key partners

Charitable Organisation 'Brightened by the light'
Provides prosthetics for military and civilians affected by the war in Ukraine
Ukrainian producer of 3D-printed medical and non-medical products

Key Points of Project Implementation:

2024 Purchasing of 3D medical imaging technologies → Accumulation of finished goods stocks → **2025** Start of production for distribution → **Established endo- and exoprotheses production**

1 - The project information and financial indicators are provided by company-initiator of the project.

HEALTHCARE

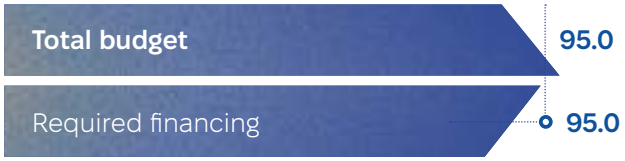
ZHYTOMYR CITY COUNCIL

ZHYTOMYR, UKRAINE

PPP PROJECT "NEW MULTIDISCIPLINARY HOSPITAL IN ZHYTOMYR"

- **Brief Description:** building a new consolidated multidisciplinary hospital for the entire community's needs. The hospital with a centralized location of departments for diagnosing and treating a wide range of diseases.
- **Target Market:** The hospital will serve the population of Zhytomyr city (261,600 residents) and Zhytomyr oblast (1,667 settlements; ~1,337,719 people).
- **Products/Services:** Surgical, both scheduled and urgent, therapeutic, and outpatient care will be provided. The hospital admits patients requiring treatment for childbirth, stroke, or heart attack and handles neonatal cases during emergencies. It also treats patients with multiple traumas and communicable diseases and provides pediatric care in separate departments tailored to the specific type of healthcare facility
- **Technologies and Innovations:** sustainable infrastructure using energy-efficient solutions and innovations are to be implemented
- **Unique Selling Proposition:** Specialized companies will be involved in implementing solutions based on advanced practices of functional and spatial planning of healthcare facilities. Availability payments from the public partner cover all costs of the private partner for implementation, as well as the expected return on investment.

Projects Highlights[1] ($ mln)



Type of financing – Initial CAPEX are financed by a private partner through equity and debt capital

Financing structure: CAPEX – 95.0
OPEX: Maintenance costs – 5% for equipment and 2% for facilities

- **Project Status:** The project was identified and selected with the support of the International Finance Corporation (IFC) as a strategic advisor to the Government of Ukraine. Cooperation with IFC includes the involvement of consultants (advisors) in conducting a preliminary project assessment. In October 2023, a preliminary assessment of the project was initiated. As of May 2024, a PPP Concept Note has been prepared.

PPP BUSINESS MODEL

"DBFM without services" or an Availability-based PPP Model - provides for the involvement of a private partner to finance, design, construct, equip, and subsequently maintain the buildings, facilities, and medical equipment of the new consolidated hospital during the term of the PPP agreement by the output specifications and key performance indicators established by the Zhytomyr City Council. Medical services are not included in the Project and will be provided by municipal medical service providers and their employees. The source of reimbursement for the private partner's investment and financing of the maintenance costs (including the renewal of medical equipment) of the PPP facility will be availability payments.

Key partners

The project was identified and selected as one of the priority PPP projects in the healthcare sector in 2023 in cooperation with the Zhytomyr City Council, the Ministry of Health of Ukraine and in pursuance of the Memorandum of Understanding between the Government of Ukraine and the International Finance Corporation.

Key Points of Project Implementation:

2025
Tender for private partner selection
→
Construction term3 years
→
2028
Start of operation
→
New hospital maintenance period 20 years

1 - The project information and financial indicators are provided by company-initiator of the project.

4.9. ICT AND DIGITAL SECTOR

4.9.1. Current situation and the sector role

Ukraine had a **booming Information and Communications Technology (ICT) and digital sector** before full-scale invasion, with thousands of ICT companies and skilled ICT workforce, large 4G network.

< 80%	population covered by broadband Internet access.

Ukraine does not have 5G yet, but all key mobile operators announced their interest in testing and deployment nation-wide 5G networks in the coming years. Moreover, 4G networks in Ukraine were implemented in 2018 only and are quite advanced in comparison with other 4G peers.

War damaged all parts of the Ukrainian economy and in particular ICT infrastructure: according to the World Bank, full-scale invasion has resulted in more than USD 2 billion in direct damage, USD 2.27 billion in losses, and USD 4.67 billion in recovery needs for the telecommunications and digital sector by the end of 2023. This figure covers lower income from mobile and fixed internet services, and higher expenses of backup power generators for internet service continuity[1].

USD 2 billion	direct damage
USD 2.27 billion	losses
USD 4.67 billion	recovery needs for the telecommunications and digital sector by the end of 2023

At least 726 operators of electronic communications of fixed access to Internet networks have suffered losses. In some areas, the destruction of networks reaches 100%, and the quality of data transmission over fixed Internet access networks has decreased by an average of 13%. Mobile communication was also affected, with no access in 12.2% of settlements and partial availability in 3.1%.

13%	the decrease in the quality of data transmission over fixed Internet access networks
12.2%	no access of settlements to mobile communication
3.1%	partial access of settlements to mobile communication

Despite the destruction, the **ICT sector showed resilience.** It was the only sector to **increase its exports** from 2021 to 2022, earning over USD 6 billion in IT services exports in 2022. The government did not draft IT workers and gave tax breaks to ICT businesses.

USD 6 billion	IT services exports in 2022

These actions helped ICT businesses survive and keep exporting services. Many technology workers left the country or moved west, but the industry kept going[2].

> The recovery phase presented an opportunity to innovate and integrate advanced digital solutions. Efforts were aimed at enhancing the digital ecosystem, including the expansion of broadband services, the adoption of 5G technology, and the strengthening of cybersecurity measures. These initiatives aimed to not only restore services but also to position Ukraine as a forward-looking digital economy[3].

[1] World Bank. Updated Ukraine Recovery and Reconstruction Needs Assessment Released (https://www.worldbank.org/en/news/press-release/2024/02/15/updated-ukraine-recovery-and-reconstruction-needs-assessment-released)
[2] Rebuilding and Modernizing Ukraine's ICT Infrastructure Will Be Essential to Attract Private Investment (Rebuilding and Modernizing Ukraine's ICT Infrastructure Will Be Essential to Attract Private Investment (csis.org))
[3] World Bank. Updated Ukraine Recovery and Reconstruction Needs Assessment Released (https://www.worldbank.org/en/news/press-release/2024/02/15/updated-ukraine-recovery-and-reconstruction-needs-assessment-released)

The ICT sector has emerged as a significant component of Ukraine's economic framework, demonstrating constant growth and a substantial contribution to the nation's GDP.

Rapid Expansion:

The ICT industry in Ukraine has witnessed exponential growth (**more than doubled** in terms of value added between 2015 and 2023), establishing itself as a cornerstone of economic fortification.

GDP Contribution:

A significant increase of 35.3 pp. over the past decade has led to the ICT sector accounting for **4% of the GDP** (about 2.5% IT and 1.5% Communications), equivalent to USD 6.7 billion (2023).

Tax Contributions:

In 2023, the IT industry contributed nearly USD 1 billion in taxes, underscoring its economic significance.

Turnover and Export Growth:

Turnover surged from USD 5 billion to USD 8 billion, while IT service exports differentiated from USD 4.2 billion to USD 6.7 billion between 2019 and 2023.

Export Share:

The export share of IT services increased from 23.9% in 2019 to an impressive 44% in 2022, reflecting the sector's global competitiveness[4].

Capital expenditures (Communications):

The 3 top companies of the communications market invested USD 444 million in 2023. The total amount of capital investment in the communication infrastructure in Ukraine reached USD 516 million in 2023.

Population employment:

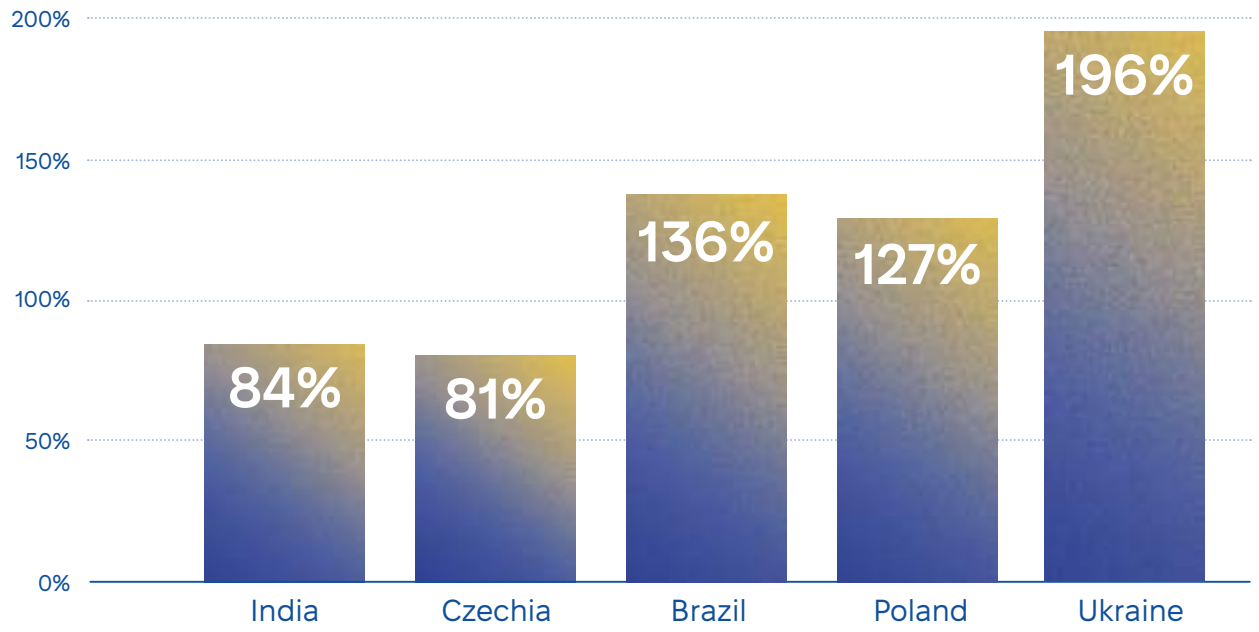
42.2 thousand people worked in the sphere of electronic communications in 2023. 346.3 thousand people worked in IT sphere in 2023.

[4] Digital Tiger the Power of Ukrainian IT 2023 (https://itukraine.org.ua/en/digital-tiger-the-power-of-ukrainian-it-2023/)

Ukraine's presence in the global IT market is marked by two primary features: exponential growth in IT service exports and a high level of technology skill proficiencies.

Between 2017 to 2022, Ukraine experienced a **196% increase in IT service export growth.** Furthermore, per capita IT service export demonstrated an astounding 249% growth during this period.

Figure 1: IT service export growth in 2017-2022



According to Coursera's Global Skills Report, Ukraine has shown consistent improvement in technology skill proficiencies over the years. In terms of technical skills, **Ukraine ranks 15th globally - an indication of the country's commitment to fostering education and skill development**[5].

Technological Adaptation:

The country's success in the IT market is partly due to its agility in embracing technological advancements. This adaptability has fostered a conducive environment for innovation and growth within the sector.

Skilled Workforce:

A focus on education and skill development has resulted in a workforce that is well-equipped to navigate the complexities of the modern technological landscape. This has been a crucial factor in Ukraine's IT market success.

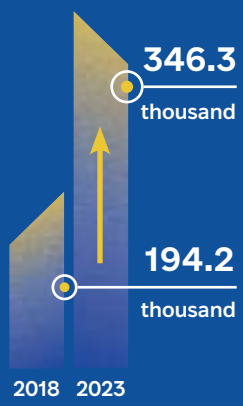
ICT AND DIGITAL IN UKRAINE: RESOURCES AND SEGMENTS

With 316 universities, Ukraine has a solid educational infrastructure that graduated

31.5 thousand IT specialists in 2023 alone.

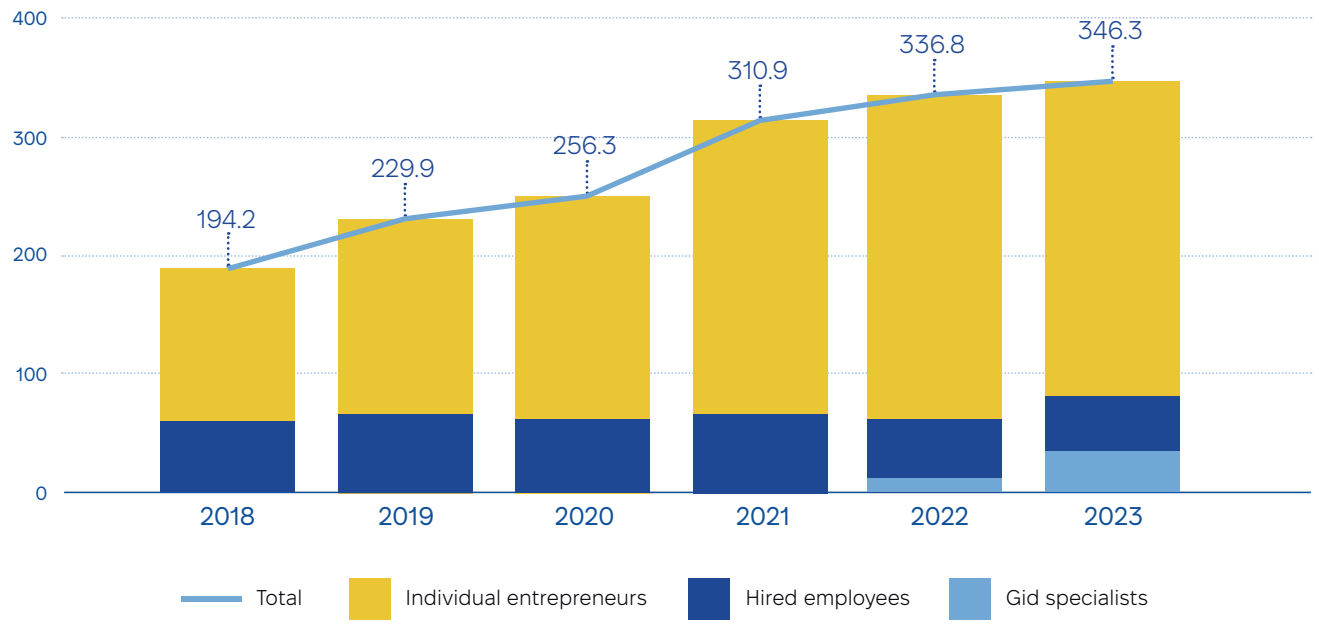
Kyiv stands out as the leader in both the number of institutions and graduates, highlighting the city's role as a central hub for IT education.

Between 2018 and 2023, the **IT workforce grew from 194.2 thousand to 346.3 thousand.** The median monthly income for IT specialists in 2023 reached **USD 2,630**, an 11% increase from the previous year. The median income for middle, senior, and lead technical specialists is projected at **USD 4,217** per month[6].



[5] Global Skills Report (https://www.coursera.org/skills-reports/global)
[6] Digital Tiger the Power of Ukrainian IT 2023 (https://itukraine.org.ua/en/digital-tiger-the-power-of-ukrainian-it-2023/)

Figure 2: Number of employees in the IT industry, thousand



The trend in IT education reveals a consistent number of junior bachelor graduates, with a slight decrease from 33 thousand in 2020 to 31.4 thousand in 2021, stabilising at 31.5 thousand for 2022 and 2023.

2,150 Ukraine boasts active verified IT companies, as of 2023

8,100 Ukraine boasts legal entities, as of 2023

This intricate structure reflects the complexity and diversity within the Ukrainian IT landscape.

The industry is segmented into various specialisations, with the largest shares being:

14% Business Productivity Software

13.7% Martech & Media

10% Fintech & Insurtech

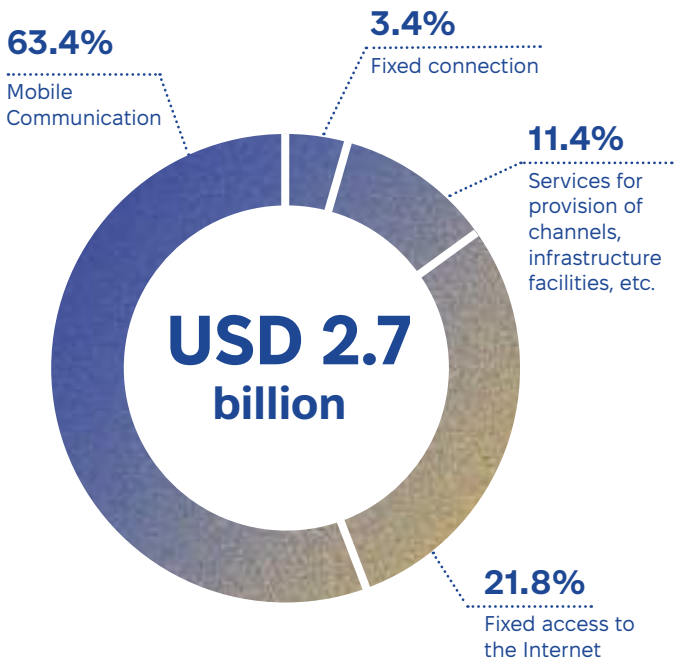
These segments demonstrate the breadth of expertise and innovation that Ukrainian IT companies bring to the global market.

A notable trend in the sector is the growth in the number of operating legal entities providing IT services, which peaked in 2021 with 9.6 thousand entities. Although there was a slight decline to 8.1 thousand in 2023, the trend indicates a robust and expanding industry.

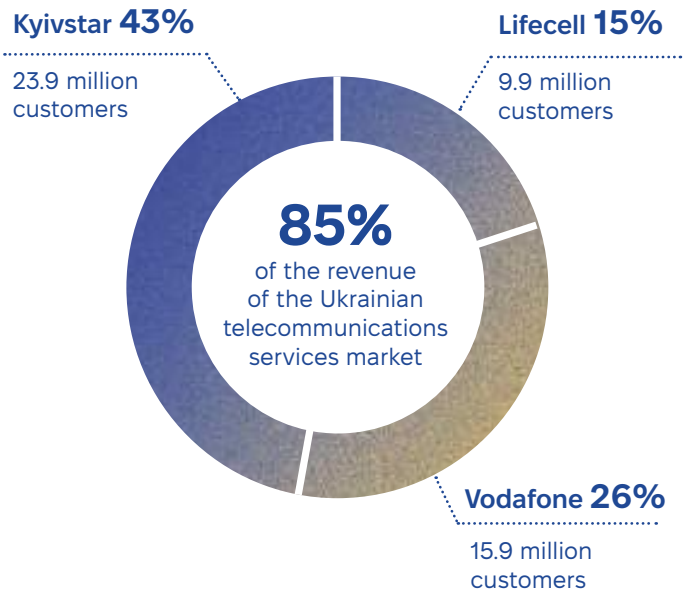
In terms of employment, the data reveals that most IT companies in Ukraine are small, with up to 50 employees, accounting for 74.7% of the total. Medium-sized companies with fifty to two hundred employees make up 16.8%, while larger companies with two hundred to one thousand employees constitute 6.9%. This distribution suggests that the Ukrainian IT sector is largely composed of small but agile firms capable of rapid innovation and adaptation.

Communication market in Ukraine is estimated at the level of USD 2.7 billion in 2023 with the largest share of mobile communication part.

Figure 3: The share of mobile communication market



Mobile communication market is quite concentrated: 85% of the revenue of the Ukrainian telecommunications services market is divided between the three largest companies.



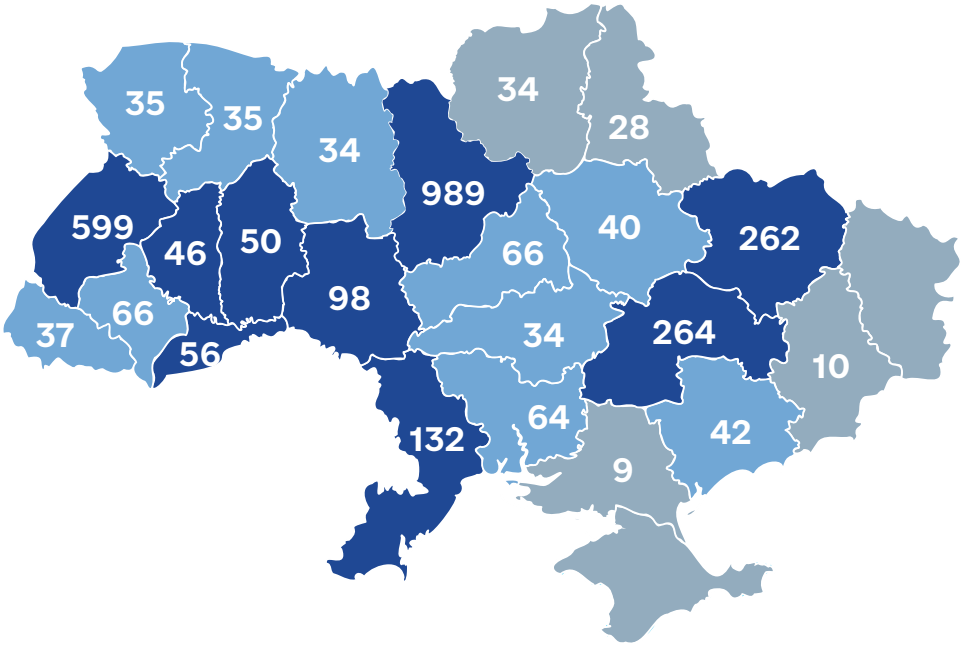
In the recent years, mobile operators started their **expansion in both fixed internet and media services** segment: in 2023 Vodafone acquired one of the largest fixed Internet access providers Freenet (about 160 thousand subscribers) and there is one even larger expected acquisition of Lifecell (mobile), Ukrtower (cell towers), Datagroup (provision of infrastructure) and Volia (TV and fixed Internet access) by NJJ Capital (France) which is going to combine the assets after the deal.

FEATURES OF LOCAL INDUSTRIES IN IT

Ukraine's local IT industries are characterised by **regional disparities** yet collective growth. In 2023, the distribution of IT specialists across Ukraine was diverse, reflecting the country's vast talent pool. Each **region contributed uniquely** to the IT sector, fostering a dynamic and advanced tech ecosystem.

The central and northern regions, known for their innovative environment, had a balanced mix of specialists working on product development and outsourcing. In contrast, the western region, with its service-oriented market, was dominated by outsourcing specialists catering to international clients. The southern and eastern regions showed flexibility with a mix of business models, catering to a wide range of client needs and market demands.

Figure 4: Distribution of IT company representatives by region in 2023[7]



Northern macroregion

In 2023, the city of Kyiv and the Kyiv region remained key leaders in the Ukrainian market, both in terms of the number of employed people and the number of IT company representatives. This dominance underscores the region's strong IT infrastructure and talent pool. Kyiv, the capital city, is a hub to 37% of the country's IT professionals. This region has historically been the epicentre of Ukraine's IT growth, attracting talent and investment alike.

The concentration of IT professionals in this region has made it a hub for innovation and technological advancement. The city's IT companies contributed USD 256.0 million in taxes in the first half of 2023, highlighting its significant economic impact. The Northern macroregion, with Kyiv at its core, has created or saved approximately 230-233 thousand jobs through its IT sector, affirming its status as an employment powerhouse.

[7] IT Research Ukraine 2023 (https://itcluster.lviv.ua/dynamika-it-industriyi-pid-chas-vijny-rezultaty-it-research-ukraine-2023/)

Western macroregion

Full-scale invasion has significantly affected the regional structure of the industry. The western city of Lviv has also seen a 5% increase in the number of IT specialists, now accounting for 29% of the total, mostly due to migration caused by the ongoing state of war. This shift highlights the region's resilience and adaptability in the face of adversity. As of 2023, Lviv hub accumulated nearly USD 60 million to the local budget, reflecting a high consolidated tax share of 47%.

Eastern and Southern macroregions: Emerging IT Destinations

In the eastern macro-region, Kharkiv and Dnipropetrovsk regions are the leaders of the industry, partially because of relocation of specialists from regions close to the frontline. The Dnipro hub and Kharkiv hub contributed respectively 7.5% and 15.6% of share to the nominal industry turnover in 2022.

As for the southern macro-region, the Odesa region remains the industry leader. These trends indicate a diverse distribution of IT professionals across the country, contributing to a vibrant and dynamic tech ecosystem. Odesa has seen a 15.4% increase in the number of individual entrepreneurs in the IT sector, reflecting a strong drive for innovation and entrepreneurship within the region. The Southern macroregion, with Odesa as its hub, offers a 5% turnover share and USD 27.2 million in company-paid taxes[8].

Involvement of IT specialists by business model

The Ukrainian IT sector is divided into product companies and outsourcing firms. In the northern and southern macro-regions, product companies constitute 40% and 51% respectively, indicating a strong inclination towards innovation and self-driven projects. Conversely, outsourcing companies are more prevalent in the western and eastern regions, with 53% and 38% respectively, engaging in service-based operations for international clients.

Despite the dominance of established business models, the startup ecosystem is launching across all regions. However, startups account for no more than 10% of the industry, suggesting that while there is entrepreneurial enthusiasm, it is yet to reach a scale where it can compete with the traditional models[9].

The involvement of specialists in companies by business model in 2023 further underscores the adaptability of Ukraine's IT sector. Companies were not solely focused on outsourcing; they also invested significantly in product development and mixed business models. This diversity in business models allowed companies to enhance their competitiveness globally, meet varied client requirements, and stay resilient in the face of challenges.

Startup ecosystem of ITC and Digital sector

From 2017 to 2022, the market size for startups in Ukraine surged from EUR 2.6 billion to EUR 23.3 billion, a nearly ninefold increase. As of January 24th, Ukraine boasts over 2,600 startups, with more than 200 established in the last year alone. This growth trajectory is supported by 90% of startups seeing high potential for future expansion. Ukraine has also produced unicorn startups like Grammarly, GitLab, and AJAX Systems etc., each contributing to the country's economic reputation and development.

Flexibility and adaptability are identified as core strengths by 62% of startups, which they believe will enable them to navigate effectively through changing circumstances.

A striking feature of Ukraine's IT landscape is the geographical expansion of companies. While 64% have no plans for new offices, 28% aim for international growth, targeting countries like Poland, Portugal, the US, and other European nations. Meanwhile, 8% are considering establishing offices in Ukraine's burgeoning regions such as Kyiv, Mykolayiv, Lviv, Ivano-Frankivsk, and Vinnytsia[10].

Diia.City's special tax regime as a transformative initiative has positioned Ukraine as a hub for IT innovation. With its reduced tax burdens, operational flexibility, and enhanced legal framework, Diia.City is set to continue to accelerate growth of the IT industry in Ukraine[11].

In addition, the GoU has taken a significant step forward by introducing the "Diia Portal" - now the Unified State Web Portal for Electronic Services. On December 4, 2019 the government approved a resolution to regulate the functioning of the "Diia Portal". This move is a testament to the government's commitment to modernise public services and make them more user-friendly. The "Diia Portal" offers a wide range of services. It allows citizens to access public services, submit applications, complaints, petitions, and engage in electronic correspondence with authorities. This initiative aims to eliminate outdated interfaces, inconvenient mechanisms, overlapping functions, and duplication of services that are inherent in numerous service portals of state bodies. The "Diia Portal" not only simplifies the process of accessing public services but also ensures transparency and efficiency in the system[12]. Application for acceptance to the public licence for the use of the open source software of the mobile application of the Unified State Electronic Services Web Portal (Diia): an Annex to the public licence for the use of the open source software of the Diia mobile application, which is part of the Unified State Electronic Services Web Portal in Ukraine. By signing the annex, the applicant agrees to the terms and conditions of the public licence and is granted permission to use the Diia mobile application software after approval of The Ministry of Digital Transformation. The applicant cannot propose their own terms and conditions to the License[13].

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[8] IT Research Ukraine 2023 (https://itcluster.lviv.ua/dynamika-it-industriyi-pid-chas-vijny-rezultaty-it-research-ukraine-2023/)
[9] The indicator is based on data from "Digital Tiger: the Power of Ukrainian IT—2023" on the number of active IT companies (2,150) and the number of implemented startups for the period 2022-2023
[10] Digital Tiger the Power of Ukrainian IT (https://itukraine.org.ua/en/digital-tiger-the-power-of-ukrainian-it-2023/)
[11] Diia.City portal (https://city.diia.gov.ua/)
[12] Ministry of Digital Transformation (https://thedigital.gov.ua/news/ofitsiyno-portal-diya-vidteper-ediniy-derzhavniy-vebportal-elektronnikh-poslug)
[13] Application for acceptance to the public licence for the use of the open source software of the mobile application of the Unified State Electronic Services Web Portal (Diia) (https://cms.thedigital.gov.ua/storage/uploads/files/page/community/docs/international/Application_for_acceptance.pdf)

Selected IT and Digital projects in Ukraine

GitLab

- a complete DevOps platform, is one of the leading startups with Ukrainian roots. Founded by Dmitriy Zaporozhets, GitLab offers a single application for project planning, source code management, CI/CD, monitoring, and security.

Grammarly

- an AI-powered digital writing assistant used by 30 million people daily to enhance their communication. Founders Max Lytvyn, Alex Shevchenko, and Dmytro Lider have made Grammarly a household name in digital writing assistance.

Ajax Systems

- is the most award-winning wireless security system in Europe. Founded by Aleksandr Konotopskyi, Ajax Systems offers a smart wireless security system for commercial and residential properties.

People.ai

- founded by Oleg Rogynskyi, is an AI platform that automates and improves the work of sales and other customer-facing specialists. The platform collects data from over 90 sources to form business intelligence.

Restream

- founded by Alexander Khuda and Andrew Surzhynskyi, is the world's largest distribution service for live video broadcasts. It helps creators broadcast video live to Twitch, YouTube, Facebook Live, Periscope, and 30+ other streaming services simultaneously.

MacPaw

- a macOS and iOS software development company, is known for its key products CleanMyMac and Setapp. Founded by Oleksandr Kosovan, MacPaw has made a significant impact in the software development industry.

Jiji

- a Pan-African digital classifieds company, is the biggest online market of 400 million people across its operating countries. Founded by Anton Wolyansky, Jiji has revolutionised the digital classifieds industry.

Preply

- a global online marketplace for tutoring, helps individuals find the best tutor for improving foreign languages and a range of other subjects. Founders Kirill Bigai, Dmytro Voloshyn, and Serge Lukyanov have made Preply a go-to platform for online tutoring.

Depositphotos

- the world's fastest-growing photo bank, is an online platform that sells high-quality licensed stock photos, graphics, vectors, and videos. Founded by Dmitry Sergeyev, Depositphotos has become a leading player in the photo bank industry.

Jooble

- a search engine that enables individuals to find and apply for suitable jobs from numerous countries around the world. Founded by Roman Prokofiev, Jooble has made job searching easier and more efficient.

GSC Game World

- Ukrainian game developer known by its S.T.A.L.K.E.R series, S.T.A.L.K.E.R 2 game is among long-awaited projects for PC and consoles.

4A Games

- well-known Ukrainian game developer (since 2020 – part of Saber Interactive / Embracer Group, Sweden) founded by ex-GSC Game World employees. Key projects – Metro game franchise (Metro 2033, Metro Last Light, Metro Exodus).

Frogwares

- Ukrainian video game development studio headquartered in Kyiv with subsidiary offices in Dublin, Ireland. The studio and its subsidiaries develop adventure games for PlayStation 4, Xbox One, Microsoft Windows, Nintendo Switch as well as PlayStation 3, Xbox 360, Nintendo DS, Nintendo 3DS, Wii, and mobile (Sherlock Holmes and Sinking City franchises and other games).

International R&D Centers in Ukraine

There are more than 400 R&D companies in Ukraine, including both local and international players. Several examples of the global tech giants that have R&D centres in Ukraine are the following:

- **Samsung:** The Korean company has two R&D centres in Kyiv and Lviv, focusing on software development, testing, and quality assurance for Samsung products.
- **Siemens:** The German company has an R&D centre in Kyiv, working on digitalization, automation, and electrification projects for energy, transportation, and healthcare sectors.
- **Oracle:** The American company has an R&D centre in Lviv, developing cloud-based applications and platforms for various industries.
- **Boeing:** The American company has an R&D centre in Kyiv, conducting research and engineering projects for aerospace and aviation.
- **Wargaming:** The Belarusian company has an R&D centre in Kyiv, creating and supporting online games, such as World of Tanks and World of Warships.
- **Ericsson:** The Swedish company has an R&D centre in Lviv, developing software solutions and services for telecommunications and IoT.
- **Huawei:** The Chinese company has an R&D centre in Kyiv, working on wireless technologies, cloud computing, big data, and artificial intelligence.
- **Microsoft:** The American company has an R&D centre in Kyiv, developing software and hardware solutions for cloud computing, gaming, and artificial intelligence.
- **IBM:** The American company has an R&D centre in Kyiv, providing software development, consulting, and technical support for IBM products and clients.
- **Intel:** The American company has an R&D centre in Kyiv, working on hardware design, software engineering, and machine learning for Intel products and platforms.

4.9.2. Overview and outlook of key reforms

The IT industry in Ukraine offers **diverse employment structures,** allowing professionals to work as hired employees, individual entrepreneurs, or gig-specialists. The rise of individual entrepreneurship and gig-specialty, supported by legal frameworks of Diia City, indicates a preference for flexible work arrangements and project-based employment.

The IT industry in Ukraine has experienced a **transformative evolution, driven by strategic reforms** aimed at enhancing growth, innovation, and efficiency. These reforms have positioned Ukraine as an emerging tech hub, attracting global attention[14].

- **E-Residency and Business Registration:** One of the most significant reforms is the introduction of an e-residency system in April 2023, which simplified business registration for foreigners in the IT sector. This reform has removed bureaucratic barriers, making Ukraine an attractive destination for foreign investments. The digitization initiative launched in 2022 further streamlined the process, allowing individual entrepreneurs to register online in just ten minutes. Since its inception, over 10,000 individual entrepreneurs and approximately 1,200 companies have registered, indicating a substantial increase in business activities.
- **Migration Quotas for IT Specialists:** In 2020 and 2021, the Ukrainian government allocated 5,000 migration quotas each year for foreign IT specialists. This strategic move has not only enhanced the local market's capacity but also facilitated knowledge transfer and skill diversity. The influx of highly qualified personnel has contributed to the industry's robust growth.
- **Copyright Law Amendments:** Amendments to copyright law have provided legal clarity for software and AI development, ensuring that any product created for a client is owned by them from inception. This legal assurance has encouraged innovation and protected developers' intellectual property rights.
- **IT Education Reform:** December 2021 marked the unveiling of a roadmap for IT education reform, extending until 2030. The reform focuses on industry-academia collaboration and diverse training programs, ensuring that the skills developed align with industry needs. This long-term commitment to education is expected to sustain the industry's growth trajectory[15].
- **Dia City Regime:** The "Dia City" regime, initiated on February 8th, 2022, offers a unique tax and legal environment, providing significant incentives for business development. This regime has made Ukraine an attractive hub for global tech giants seeking expansion opportunities while benefiting from operational efficiency and reduced costs[16].

Ukraine is constantly implementing new reforms in the ICT area. During 2023 a number of steps were performed in harmonisation of legislation with EU legal acts (development and adoption of 29 normative legal acts), development and implementation of the effective operator model (LRIC – Long Run Incremental Costs), implementation of practical steps on the way to the accession of Ukraine to the single roaming zone of the EU – «Roaming like at home».

These reforms are part of a broader strategic initiative designed to position Ukraine as a leading player in the European IT landscape during the whole EU integration process. The primary focus is on the compatibility and interoperability of Ukrainian IT products and services with the European market, as well as the enhancement of personal data protection and consumer rights[17].

[14] Ukraine reform tracker (https://cdn.vev.design/private/BCwBc9ZFZyVz8yQQKr9VeLxSnjf1/QsEtzJC50A_ECO065-SDC-UkraineReport-ALL.pdf.pdf)[9]
[15] Official website of the Parliament of Ukraine (https://zakon.rada.gov.ua/laws)
[16] Diia.City portal (https://city.diia.gov.ua/)
[17] Eurointegrational portal. EU Law (https://eu-ua.kmu.gov.ua/en/law/rekomendatsiyi-shhodo-nablyzhennya-ukrayinskogo-zakonodavstva-do-prava-yes/)

The Ukraine Facility program introduced future reforms in Ukraine Plan 2024-2027. Regarding the IT and Digital sector two prior amendments are projected.

Reform 1. Secure and Efficient Digital Infrastructure (Q1 2025)

- **Objective:** To establish a secure and efficient digital infrastructure in Ukraine, focusing on the launch of 5G networks and the development of broadband internet infrastructure.
- **5G Launch:** Financial support is needed to release the 700 MHz band from broadcasting and special users. Investments in 5G pilots are considered essential.
- **EU Association Agreement:** The reform aligns with Ukraine's spectrum harmonisation obligations under the Association Agreement with the EU.
- **Challenges:** The full-scale aggression against Ukraine has slowed down the 5G launch. Despite this, efforts are being made to harmonise spectrum policy and create cross-border 5G corridors with the EU.
- **Cybersecurity:** The National Security and Defense Council of Ukraine is implementing a national cybersecurity strategy to secure data traffic, especially along main railways and roads connecting Ukraine with EU member states.
- **EU Cooperation:** Steps are being taken towards closer institutional cooperation with EU counterparts, including the EU Agency for Cybersecurity (ENISA) and CERT-EU.

Reform 2. Digital Transformation in Public Administration (Q2 2026)

- **Progress:** Ukraine has made significant strides in digital transformation, particularly in public administration.
- **Mobile Accessibility:** The government plans to increase the availability of electronic public services through mobile phones and the Diia Portal.
- **Diia Engine Platform:** An innovative solution launched to help ministries and government agencies create and manage registers efficiently.

Enhancing Transparency and Efficiency

- **Register of Damaged and Destroyed Property:** A popular register developed using Diia Engine, containing over 520,000 reports from Ukrainians.
- **eRecovery Program:** A comprehensive program based on the register for Ukraine's transparent reconstruction.

Cybersecurity and Technological Modernization

- **Diia Engine Platform:** A system solution that changes the approach to creating and managing registries, with 20 ministries and central executive authorities currently using it to create over 50 registers and 100 public services.

EU Integration and Legislation Harmonization

- **EU Digital Single Market:** Ukraine aims to integrate into the EU Digital Single Market, focusing on electronic identification, authentication, and trust services.
- **Legislation Harmonisation:** Ukraine has harmonised its legislation according to the Association Agreement and is the first non-EU country included in the EU Trust List under e-IDAS Regulation.
- **Legislative Work:** Further legislative work is required to fully approximate the revised e-IDAS Regulation requirements[18].

DIIA CITY – UNIQUE TAX REGIME FOR IT INDUSTRY IN UKRAINE

The GoU actively supports the IT industry by creating favourable conditions for its development and sustainability. The Ministry of Digital Transformation acts as an ambassador for the IT industry, ensuring its stability and attractiveness to foreign investors.

Recognizing the IT industry among key drivers of the Ukrainian economy, the GoU established a special tax regime **Diia City** for IT companies and their employees, making Ukraine a favourable jurisdiction for developing IT-related projects. **Diia City** offers a range of incentives for IT business development:

- Special taxation conditions for resident companies and for their employees and gig specialists. The tax burden is almost **five times lower** than in the general taxation system.

[18] Ukraine Facility. Ukraine Plan 2024-2027 https://www.ukrainefacility.me.gov.ua/en/

- A company can choose **different forms of cooperation:** an employment contract, an individual entrepreneur's model, or a gig contract.
- Elements of English law have been implemented, specifically, universal tools for protecting corporate rights and stimulating venture capital investment.

41% active verified IT companies in Ukraine that are residents of Diia City

Special taxation conditions include:

- **Labour:** Personal income tax — 5% vs 18% on general taxation
- **Labour:** Social Security fee — 22% of the min wage vs 22% on full gross salary on general taxation
- **Corporate:** 9% withdrawal capital tax or 18% income tax
- **Investment promotion:**
  - **0%** on the income of individuals as dividends accrued by a resident company, provided that they are paid no more than once in 2 years term
  - **Tax rebate** (with personal income tax) on the amount of investments in Ukrainian startups

Companies operating within Diia City can enjoy significantly lower tax rates compared to other countries. For example, a company with EUR 200,000 in revenue and a staff of 10 employees with an average salary of EUR 1,200 per month would pay only EUR 16,600 in taxes per year. This includes EUR 0 income tax, EUR 1,800 exit capital tax, and EUR 14,760 total taxes including personal income tax plus military tax and social security[19].

Table 1. Comparison of taxes payable in different countries with special frameworks (EUR per year)

Diia City	India	Kazakhstan Astana Hub	the U.S. Delaware	Georgia IT virtual zone	Poland	
—	5,500	—	2,175	—	—	Income tax
1,800	—	—	—	1,000	—	Exit capital tax
9,360	7,200	9,360	4,976	28,800	7,200	PIT (+Military)
5,400	5,760	14,400	22,032	2,880	30,925	Social security tax
16,560	**18,460**	**23,760**	**29,680**	**32,680**	**38,125**	**Total taxes**

4.9.3. Prospects and potential for the sector

Over the past two years, despite the challenges of the full-scale invasion, a **growing trend** has been observed in the number of companies experiencing a steady increase in income.

In 2023, a significant majority of companies (74%) reported that their **income either remained stable or increased** compared to 2022.

84% of IT companies have long-term projects, 66% of IT companies have short-term projects. However, only 15% of IT companies report that their active projects are approaching completion, with no new projects on the horizon.

84% IT companies have long-term projects

66% IT companies have short-term projects

15% of IT companies have active projects, with no new projects on the horizon

Data from 2023 indicates a **notable shift in workforce dynamics:**

38% of companies reported a decrease in their Ukrainian workforce

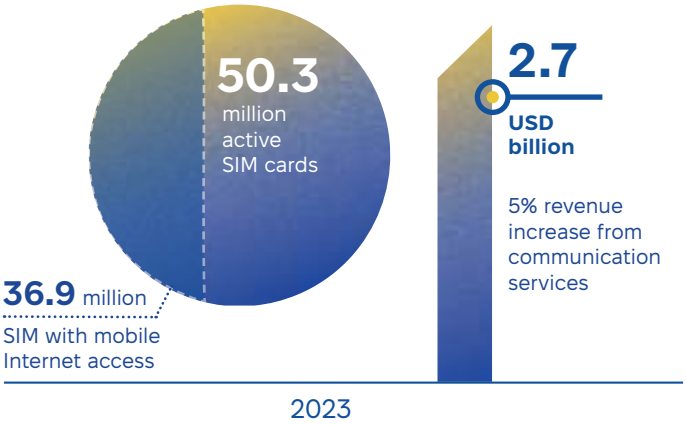
40% of companies noted an increase in their workforce abroad

This trend indicates a significant relocation of IT specialists abroad due to full-scale invasion. Besides, 85% of companies continue to hire specialists for open positions, with 56% of them seeking candidates from external sources.

[19] Diia.City portal (https://city.diia.gov.ua/)

The Ukrainian IT industry's initiatives to integrate veterans through education and job opportunities reflect a forward-thinking approach that not only aids in the reintegration of service members but also strengthens the industry's talent pool. Initiatives like Choice31's courses for military personnel offer free education in Project Management, Business Analyst, PPC, and ASO. These programs are not time-bound and prioritise veterans for employment within the Netpeak Group companies. EPAM Ukraine piloted various educational product formats in 2023 to meet modern demands. The project includes foundational computer science education followed by IT specialisation, with mentorship support. Platforms like ITVDN and Mate academy provide free video lectures and full-day courses in various IT fields. They require proof of combatant status and sometimes completion of tests for further progression. New Horizon Hub aids veterans in transitioning to IT careers through online courses in Python development, cybersecurity, QA, and more, including English language learning and psychological support[20].

Trends in the Communication industry in many ways are driven by full-scale invasion and related migration. Demand for stable communication is growing, so total revenues from the provision of electronic communication services increased in 2023 by 5% to USD 2.7 billion in 2023. The number of active SIM cards as of the end of 2023 amounted to **50.3 million units**, which is 1 million units more than by the end of 2022, but by 5.6 million units less than at the end of 2021 (decrease in total amount was primarily due to migration of more than 6 million people abroad).



More SIM cards are used for mobile Internet access with a total amount of 36.9 million as of the end of 2023 (+4.2% to 2022), while revenues from the provision of fixed Internet access services in 2023 decreased by 2% to USD 0.6 billion. These trends can be explained with more autonomous capabilities of mobile operators who can provide their services even during blackouts, so more people are using mobile Internet access.

Development prospects in Ukraine

The full-scale invasion stimulated the emergence of many companies that tested their developments on the battlefield. As a result, the share of the product sector in IT and new export capabilities through unique developments is expected to increase. Companies should have a transparent corporate structure to attract investment, and they can join Diia.City to operate under favourable tax conditions. The Brave1 coordination platform has already been launched to support projects, with a priority on finding investors for scaling[21]. The Brave1 offers to international partners:

- Access to the Ukrainian Defense Innovations with a soft-landing procedure for a foreign partners;
- Partnership and cooperation between stakeholders from public and private sectors;
- Organisational support, access to pitches, hackathons, meetups, grants, and investments;
- Participation in networking events, pitches, demo days, etc.;
- Development and testing of Ukrainian and international advanced technologies;
- Investments opportunities in Ukrainian cutting-edge defence tech developments.

The GoU in cooperation with the EU has laid out a comprehensive framework for 2024-2027 to support the ICT and Digital sector, including tax incentives, infrastructure development, and regulatory reforms. These initiatives aim to create a conducive environment for both domestic and foreign investors[22].

- **The digitization of the economy** has a big potential and many market niches, can promote more efficient resource utilisation, unlock the potential of traditional economic sectors, reduce bureaucracy and corruption, and improve access to services for all citizens and can be scaled to other countries. A promising directions for digitization are the following: the implementation of innovative solutions in traditional economic sectors, services for the population (medical, communal, educational, etc.), which will improve the accessibility and quality of services (including in hard-to-reach regions with high military risk), increase their efficiency and productivity, enhance individualization and personalization (to meet the specific needs and capabilities of each individual), promote research

[20] DOU. Educational opportunities for veterans (https://dou.ua/lenta/articles/educational-programs-for-veterans/)
[21] United coordinational platform for defence tech powered by the government (Brave1 - Ukrainian Defense Innovations)
[22] Ukraine Facility. Ukraine Plan 2024-2027 https://www.ukrainefacility.me.gov.ua/en/

- and innovation development, stimulate innovative entrepreneurship, and improve the management and analytics system, which will contribute to making better management decisions. Another important sub-direction is the **development of SMART cities and the Internet of Things (IoT)**, which will optimise the work of municipal services, reduce city management costs, and increase the efficiency of providing public services, thus improving the quality of life for residents, and implementing an inclusive approach. This will create new business opportunities by introducing new markets and digitising processes. Additionally, the implementation of SMART technologies allows for reducing energy consumption and environmental risks, as well as improving security in urban environments.
- **Increase the number of successful startup projects:** Despite the full-scale invasion, a significant number of talented developers in Ukraine are creating unique startups, leading to the emergence of many innovative companies. This trend is expected to enhance export potential and global market competitiveness. To realise this, companies are engaging in trade missions and showcasing their developments at major technology events worldwide. The government supports this movement by promoting technological entrepreneurship among the youth and providing easier access to investments and grants. Supporting and strengthening acceleration programs for the IT sector will enable the development and scaling of startup projects, promote startup culture in Ukraine and abroad, stimulate corporate innovation and digital business transformation, and attract venture capital and investments.
- **Restore export growth in 2024:** Ukrainian IT companies have successfully adapted to working under martial law, retaining their human resources and expertise. Increased foreign exchange earnings will contribute to the industry's turnover growth, positively affecting further development. IT companies aim to enter new markets and launch new projects, including unique products. The Ministry of Digital Transformation serves as an ambassador for the IT industry, ensuring its sustainability.
- **Restoration and development of digital infrastructure.** The main areas of investment are restoration and expansion of 4G and fibre-optic networks, increasing autonomous capacities as well as the preparation for the launch of 5G services in the following years. The development of cloud infrastructure and the expansion of data centre capacity are crucial for enhancing digital capabilities.
- **Development of infrastructure and services in cybersecurity.** The risk of cyber threats and the level of their consequences for Ukraine are at their highest due to the war with Russia. With the development of the digital economy and the automation and digitization of processes, the level of risks and negative consequences will continue to increase steadily. Reducing vulnerabilities in critical infrastructure, enhancing technical capabilities in key institutions, developing, and implementing cutting-edge cybersecurity solutions, as well as fostering a qualified workforce in this field, can protect critical information assets, foster trust in digital services, and attract relevant foreign enterprises. Ukraine is working on developing the potential of existing experts and forming a dedicated workforce in the field of cybersecurity based on operational partnerships, threat data sharing, and experience exchange. Investing in advanced threat detection, encryption, and incident response capabilities will be crucial in combating and preventing growing external digital threats.
- **Increasing the number of IT professionals** with a high level of fundamental knowledge by the development of STEM specialities. Investments in educational projects aimed at increasing the quantity and level of IT professionals. Establishing ecosystems for the development of the IT sector, involving universities, training centres, enterprises, and non-governmental organisations, will facilitate the implementation of cutting-edge technologies through the preparation of professionals capable of working with new tools and concepts.
- **Innovation development** by creating and fostering the growth of technoparks and innovation clusters, as well as incentivizing R&D. Investments in creating and modernising the infrastructure of technoparks, clusters, and hubs help create a conducive environment for the development of innovative enterprises and research institutions. Additionally, infrastructure development may include establishing robotics laboratories, artificial intelligence and big data analysis research laboratories, semiconductor manufacturing clusters, implementing cloud technologies, and more. Creating favourable ecosystems that bring together businesses, universities, research centres, and government agencies to foster collaboration, technology transfer, knowledge sharing, and resource exchange. With international partnerships, supporting R&D centres in Ukraine will broaden the horizons of Ukrainian R&D teams in the global technological landscape. It is also important for international financial institutions to directly participate in financing Private Equity and Venture Capital Funds that invest in Ukrainian startups.
- **Increasing investment volumes and development of companies in the venture capital and private equity sphere.** Ukraine is working on creating programs and mechanisms for joint investments with the state and IFIs in Ukrainian projects to prevent relocation abroad of early-stage companies to gain access to capital.

The most promising startup projects are presented by the Ukrainian Startup Fund - civilian projects and Brave1 - military projects.

The Innovation Development Fund (Ukrainian Startup Fund)[23] is a leading state institution that helps innovative projects and technological startups to attract funds at the early stages and launch their own projects. The fund is a driver of the development of the startup ecosystem, provides conditions for the growth of the field, represents Ukrainian innovative solutions around the world. The fund was created in 2018 by the Cabinet of Ministers of Ukraine at the initiative of the Minister of Finance of Ukraine. From January 1, 2023, it was transferred to the sphere of management of the Ministry of Digital Transformation.

Brave1[24] is a single coordination platform created for cooperation between all stakeholders of the defense tech industry by providing them with organisational, informational and financial support for the development of innovative defense projects in Ukraine. Brave1 was created on the initiative of the Ministry of Digital Transformation together with the Ministry of Defense of Ukraine, the General Staff of the Armed Forces of Ukraine, The Ministry of Strategic Industries of Ukraine, the Ministry of Economy of Ukraine, the National Security and Defense Council of Ukraine.

Name website	Description	Year of establishment	Business model	Industries
CIVIL PROJECTS				
PRE SEED				
Haiqu www.haiqu.ai	Haiqu - is pushing the limits of modern quantum computing, enabling quantum applications that were previously impossible. Using breakthroughs in quantum circuit execution, Haiqu enhances the effective quantum volume of near-term Quantum Processors allowing quantum hardware providers and application developers to achieve orders of magnitude better performance.	2023	B2B	Deep & Spacetech, Quantum Computing
SEED				
Releaf Paper www.releaf-paper.com	Releaf Paper is an international producer of sustainable packaging materials made of green wastes with focus on manufacturing and R&D. Ukraine's most known green startup in the world and one of the most innovative SMEs from EU by European Commission.	2021	B2B, B2B2C	Greentech, Manufacturing
Aspichi www.aspichi.com	Aspichi is a technical startup that applies spatial video real-time transfer and representation in VR headsets in the area of Mental Health - for massive scaling of psychological services and AI-powered automation, and Dual use - for spatial surveillance and immersive awareness to support UAV, UGV, and special forces.	2021	B2G, B2B2C	Edtech, Militarytech, Traveltech, Healthtech & Wellness
Datrics datrics.ai	Datrics is a data intelligence platfrom: we help companies create their own digital AI analysts	2020	B2B, B2B2C	Business productivity software, Deep & Spacetech, E-commerce & Retail, Fintech & Insurtech, HR Tech
Numo ADHD numo.so	The AI-powered productivity platform for adults and teens with ADHD (Attention Deficit Hyperactivity Disorder). A clinical study by PhD in Neuroscience has proven that it helps.	2022	B2C, B2B	Healthtech & Wellness

[23] https://usf.com.ua/en/
[24] https://brave1.gov.ua/en/

Name website	Description	Year of establishment	Business model	Industries
Comeback Mobility comeback mobility.com	Startup has developed a Smart Crutch Tips - IoT device and mob apps for at-home patient compliance after lower limb injuries.	2020	B2B, B2C, B2G	Hardware & IoT, Healthtech & Wellness, Medical Device
S.Lab www.ilab-s.com	Sustainable packing on an industrial scale. S.Lab developed innovate proprietary technology to produce natural replacement of foamed plastic using out of only two plant based components.	2021	B2B	Advanced manufacturing, Deep & Spacetech
Beholder beholder.earth	Beholder is a revolutionary AI-assisted SaaS platform for minerals discovery and mining. We solve the biggest challenge of the energy transition - shortage of green tech minerals, with the help of SOTANNs that process gigabytes of geological and satellite data to discover and develop new deposits with up to 10 times more efficiency.	2021	B2B, B2C	Cleantech, Deep & Spacetech
Carbominer carbominer.com	Carbominer is developing modular and efficient Direct Air Capture technology to capture CO_2 from the open air. The startup then offers green CO_2 to help indoor farmers grow crops more sustainably.	2020	B2B	Agtech, Foodtech, Hardware & IoT
LetsData letsdata.net	LetsData is an AI radar against information operations, equipping corporations and governments with the technology to detect disinformation, spoofing, synthetic identities, and deepfakes at their inception.	2022	B2B, B2G	Business productivity software, Communication, Martech & Media, Software
SorbiForce www.sorbiforce.com	World's first non-metal sustainable battery the most cost-effective, safe, with zero environmental impact, and made from renewable raw materials.	2017	B2B, B2C	Cleantech
Deus Robotics deusrobotics.com	A robotics company focused on automating warehouses with intelligent robots. Their end-to-end solutions enhance operational efficiency, tackle labor shortages, and improve employee retention.	2018	B2B	Deep & Spacetech, E-commerce & Retail, Logistics, Hardware & IoT
AiSDR aisdr.com	AiSDR is among the leading providers of AI sales assistants, and the creator of the first AI SDR that can hold an actual conversation with the prospects and expertly tackle any incoming questions and objections with the goal to convert them. AiSDR focuses on always responding to the leads in under 10 minutes, thus securing the highest possible conversion rates, and runs on complete autopilot without needing human oversight. AiSDR makes email personalization scalable and maintains the highest AI-generated content for outreach currently available.	2023	B2B	"Business productivity software, Martech & Media, Communication
Airlogix airlogix.io	Airlogix is a Ukrainian company that specializes in the production of innovative products in the field of unmanned aerial vehicles (UAVs). Our mission is to create high-quality and reliable solutions for the effective use of UAVs in various industries. We work with state-of-the-art equipment and technologies, which allow us to develop products at the forefront of technological progress.	2020	B2B, B2C, B2G	Militarytech
Respeecher www.respeecher.com	Respeecher is a Ukrainian startup that uses artificial intelligence techniques to produce high-quality synthetic speech for Hollywood. Among the most recent works AI voice for Darth Vader and Luke Skywalker voice for Star Wars TV series. Ukrainian team was also credited in the God of War.Ragnarök. In 2019 Respeecher won its Emmy Awards for the short film In the Event of Moon Disaster.	2018	B2B, B2C	Consumer products, Martech & Media

Name website	Description	Year of establishment	Business model	Industries
SERIES A				
Esper Bionics esperbionics.com	Esper Bionics is a pioneer engineering company focused on mechatronics, artificial intelligence, and IoT technologies for human augmentation. Our first product is Esper Hand, a bionic self-learning hand prosthesis with a cloud-based software solution to individualize the control of wearables.	2019	B2B2C	Hardware & IoT
ADAM adambiop-rinting.com	A.D.A.M. offers a Point-Of-Care Medical Device Production System (POC MDPS) for bone implants and other tissues, a turnkey solution for hospitals to 3D-print personalized medical implants on-demand. A.D.A.M. holistic solution and service model are designed to be easily scaled geographically and tissue-wise, uniquely positions the company to disrupt the orthopedic implants market, and allowing hospitals to generate additional revenue.	2019	B2B2C	Advanced manufacturing, Healthtech & Wellness, biotechnologgies
Mate Academ mate.academy	EdTech startup that is on a mission to help 1M people worldwide build their careers in tech. The main product is a technological LMS platform where people learn coding, design, QA testing, and other IT-related professions.	2015	B2C	Edtech
MILITARY | DEFENCE TECH				
PRE SEED				
Farsight Vision www.farsightvision.com	Company develops a product for creating orthophotos and 3D models from photo/video/video streams from drones for planning and monitoring operations; navigation; quick familiarization with the terrain, understanding situational changes; accurate distance measurement, etc.	2017	B2B, B2C	Cleantech
Falcons www.falcons.com.ua	Falcons is a military tech company producing software and hardware for national defense. Flagman product is a full cycle system of searching-confirmation-elimination.	2018	B2B	Deep & Spacetech, E-commerce & Retail, Logistics, Hardware & IoT
Ailand Systems ailandsystems.com	Unmanned aerial mine detector. It was designed from scratch for landmine detection purposes. Its body is screened to eliminate electromagnetic noise. It has multiple sensors for situational awareness and a powerful onboard microcomputer for real-time data processing. It can operate 4x times faster than a human and is fully autonomous.	2023	B2B	"Business productivity software, Martech & Media, Communication
Drill App appdrills.com	Drill is a unique app for training in secure weapon handling and first aid. Access interactive courses on concealed carry tactics, dry fire training, first aid, and more. Gain the skills to protect yourself and your family with confidence. Practice with exclusive content, boost your expertise, and track your progress in this all-in-one app.	2020	B2B, B2C, B2G	Militarytech
Oko Camera oko.camera	An affordable thermal imager based on best in class uncooled microbolometer detector from EU manufacture. Custom electronics designed and manufactured in Ukraine/EU. Custom optics designed and manufactured in Ukraine/EU. Calibrating each module to ensure superior performance.	2018	B2B, B2C	Consumer products, Martech & Media

Name website	Description	Year of establishment	Business model	Industries
Eleek eleek.com.ua	ELEEK Company is an innovator and the first trademark of the Ukrainian electric bicycle industry. It began its activity with the production of electric bicycles in 2010. Since then, we have dedicated ourselves to providing our customers with an environmentally friendly and healthy mode of transport. Each bike is an original work with a piece of soul invested in it, which has been developed and improved over time. Our team consists of professionals who love their work and treat it with respect and enthusiasm.	2023	B2B, B2C	Logistic
Griselda www.griselda.com.ua	The system has been actively used to process intelligence data from sources of different types, structures, and origins since the first months of the full-scale invasion. The customizability of the system has allowed us to create a number of highly effective solutions based on the unique experience of our users and to go far beyond intelligence processing.	2022	B2G	Intelligence
SEED				
CryEye cryeye.net	CryEye is a cybersecurity company specializing in protecting organizations from evolving cyber threats. With over 15 years of experience and numerous projects across private businesses, government sectors, and critical infrastructure entities, CQR has established itself as a leader in the cybersecurity domain, operating globally with offices in Ukraine, the USA, Poland, Kazakhstan, and Qatar.	2018	B2B, B2G	Cybersecurity
Himera himeratech.com	Himera developed the only battlefield-ready tactical communication system that can match the current rapidly growing demand among the global defense forces. Our system is designed to operate in a harsh electronic warfare environment by combining proprietary technology and approaches with industry-standard functionality. With thousands of handsets already in use with the Ukrainian Defense Forces, we can iterate rapidly, ensuring relevance and reliability.	2022	B2G, B2B	Communication
Swarmer Getswarmer.com	Autonomy OS for coordinated robots. We empower humans to manage swarms of drones. We designed Swarmer OS - an operating system that scales to swarms of infinite size. Humans say «Go» or « No Go». Our software does the rest.	2023	B2B	UAV
SERIES A				
Roboneers roboneers.net	Roboneers is a Ukrainian engineering company with extensive expertise in manufacturing UAV, UGV, RWS, anti-aircraft and situational awareness systems. The company implements AI, Radar and Anti-Shahed solutions into its operations. Company's products are battle-proven, and since 2014, all work has been dedicated to creating advancements tailored to military needs to save their lives.	2014	B2G	Robotics

ICT AND DIGITAL SECTOR

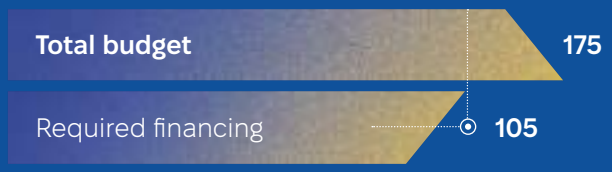
Highlighted investment projects

LLC LIFECELL | 5G NETWORK

UKRAINE

- **Brief Description:** The implementation of 5G communication technology in Ukraine aims to provide 90% of the population with access to a high-speed mobile network featuring advanced mobile connectivity
- **Target Market:** Mobile telecommunication market, government, consumer and corporate segments, 10 million in total.
- **Products/Services:** high-speed mobile communication services.
- **Technologies and Innovations:** 5G is cutting-edge communication technology to be implemented in scope of the project
- **Unique Selling Proposition** The deployment of 5G can stimulate economic growth, improve public services, enhance security, enable innovative solutions in different sectors and become foundation of the Ukraine's infrastructure and economy recovery.

Projects Highlights[1] ($, mln)



Type of financing – debt, project finance

Financing structure: CAPEX – 66% / OPEX – 34%

Expected Financial Indicators:
- NPV – 24
- DPP – 80 months
- IRR – 25%
- Project launch year – 2026

- **Project Status:** feasibility study
- 2020 - infrastructure preparation
- 2020-2023 – Modernization of radio network to "5G Ready"
- 2022-2023 – Modernization of billing to "5G Ready"
- 2024 – network design and preparation for the 5G implementation.

BUSINESS MODEL

- lifecell invests in 5G base stations and other equipment to provide network coverage.
- lifecell generates revenue primarily through subscription plans, users pay a monthly fee for access to the network.

Key partners

Suppliers of equipment: Ericsson AB (Sweden), Nokia (Finland)
Financing partners (banks): Ukrsibbank BNP Paribas Group, ING Bank Ukraine, та Raiffeisen Bank Aval
Partners: local implementation and distribution partners

Key Points of Project Implementation:

2020 - 2023	2022 - 2023	2024	2025	2026	2028
Modernization of radio network to 5G	Modernization of billing to 5G	Network design and preparation for the 5G entation	5G licensing and rollout start	5G commercial launch with limited coverage	5G planned coverage achieved

1 - The project information and financial indicators are provided by company-initiator of the project.

IT AND COMMUNICATIONS

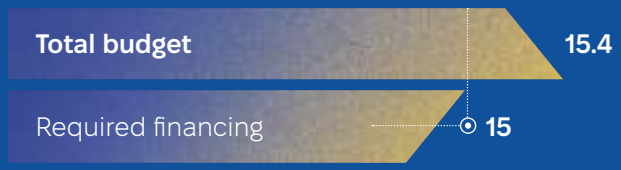
UKRAINIAN ASSOCIATION OF STARTUPS

CREAINNOVATIONS

KYIV REGION

- **The CreaInnovations** innovation ecosystem is the new Silicon Valley! The virtual hub and industrial park based on the already created community of over 300 Ukrainian satraps will help in the development of innovations.
- **Target Market:** innovators, investors, SMEs, other stakeholders of the innovation ecosystem.
- **Products/Services:** Consulting services to support innovation. Visualization of innovations. Investment attraction. R&D offices.
- **Technologies and Innovations:** Metaverse, VR, AI, blockchain, smart technologies in construction and energy.
- **Unique Selling Proposition:** Industrial, technological, scientific parks are only 30% infrastructure, and 70% are a developed ecosystem - we unite more than 300 startups that are ready for scaling.

Projects Highlights[1] ($, mln) (if applicable)



Type of financing – equity

Financing structure: CAPEX – 40% / OPEX – 60%

Expected Financial Indicators:

- NPV – 25.8
- DPP (months) – 60 months
- Revenue – 42.2 (5 year)
- IRR – 58%
- Project launch period: VR hub - 6 months a Real hub - 1 years
- EBITDA – 9.9 (5 year)

- **Project Status:** Digital Hub MVP[2], VR Hub MVP

BUSINESS MODEL

- renting out offices - 15 euros/sq.m.;
- growth of startups up to 300% per year;
- holding events in the digital hub - tickets, advertising, sponsorship

Key partners

4 national universities, business, government at the state and local level[3]

1 - The project information and financial indicators are provided by company-initiator of the project.
2 - https://platform.startups.org.ua/en/
3 - https://startups.org.ua/partners/

IT AND COMMUNICATIONS

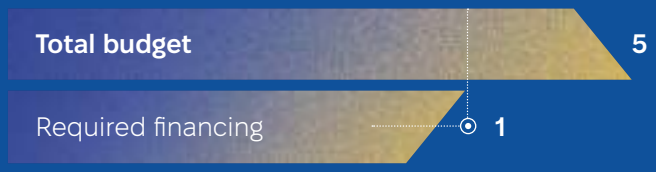
RAIL LOGISTICS MARKETPLACE LLC

RAIL LOGISTICS MARKETPLACE

UKRAINE, EUROPE, USA

- **Brief Description:** Rail Logistics Marketplace is a railway platform that easily connects cargo owners and forwarders on an Uber-like principle, automating the cost calculation for transportation
- **Target Market:** businesses involved in the global rail logistics industry, particularly in Ukraine, Europe and USA.
- **Products/Services:** market access, enabling forwarders to generate additional income and allowing cargo owners to quickly and easily find a forwarder.
- **Technologies and Innovations:** Rail ecosystem that includes a chatbot for wagon requests and offers, wagon tracking, a railway tariff calculator, etc
- **Unique Selling Proposition:** currently there is a lack of convenient services for cargo owners at market. The company offers easy access to railway logistics solutions, presenting significant potential in this sector

Projects Highlights[1] ($, mln) (if applicable)



Type of financing – project finance

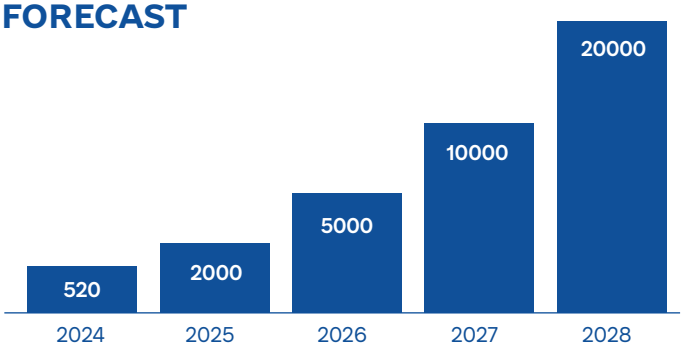
Financing structure: CAPEX – 40% / OPEX – 60%

Expected Financial Indicators:

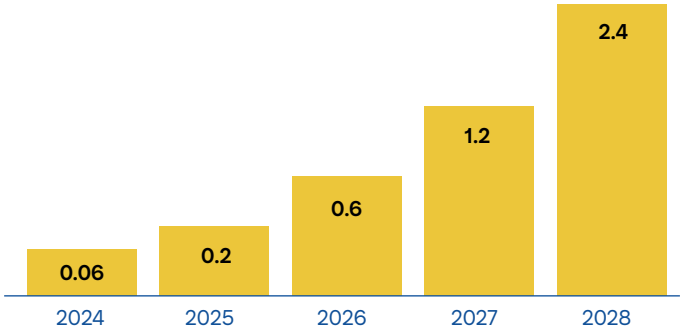
- NPV – 2.0
- DPP – 60 months
- IRR – 47%
- Project launch period – 4 years
- Revenue – 2.4 (5 year)
- EBITDA – 1.8 (5 year)

- **Project Status:** A full-fledged product that has already started making money. More than 500 users and 100 clients. The project was launched in 55 countries, starting in Ukraine, Europe, Asia and the USA.

CUSTOMER GROWTH FORECAST



PROJECTED REVENUE, MLN USD



Key partners

Ukrainian Logistics Alliance, Enterprise Europe Network, BGC Rail, Association of Ukrainian Transport Infrastructure Innovations, Sikorsky Challenge, Petrosoft.pl, Ukrainians Startup Association, In Tech, Art Port.

Mission

promote successful, innovate and ecological development of the global rail logistics industry through transparent, easy and convenient business access to it.

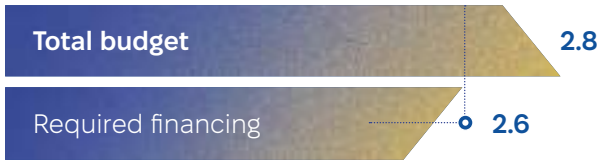
1 - The project information and financial indicators are provided by company-initiator of the project.

LLC APRICODE | EASYSELL

UKRAINE, EUROPE, USA

- **Brief Description:** EasySell is a cloud-based CRM-ERP platform that combines sales from various sources, marketing, inventory management, finances and reporting, AI assistants and communications, e-commerce creation.
- **Target Market:** small and medium-sized enterprises within Ukraine, with strategic plans to broaden our market presence across the Europe and the USA in the near future.
- **Unique Selling Proposition:** a system that brings together all the necessary tools for automation and managing a trading business in one place.
- **Technologies and Innovations:** CRM-ERP leverages cloud tech for flexibility and AI to analyze sales and personalize marketing, offering secure, global access.
- **Unique Selling Proposition:** Industrial, technological, scientific parks are only 30% infrastructure, and 70% are a developed ecosystem - we unite more than 300 startups that are ready for scaling.
- **Our mission:** to provide users in Ukraine with a worthy alternative to Russian software - which has occupied business in Ukraine with its monopoly.

Projects Highlights[1] ($, mln) (if applicable)



Type of financing – equity

Financing structure: CAPEX – 40% / OPEX – 60%

Expected Financial Indicators:

- NPV – 9.9
- DPP – 60 months
- Revenue – 18.0 (5 year)
- IRR – 43%
- Project launch period – 2 years
- EBITDA – 5.4 (5 year)

- **Project Status:** MVP, e-commerce creation module, ERP module, UI/UX

Key Points of Project Implementation:

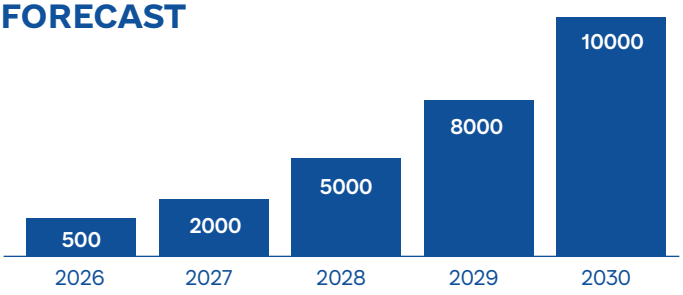
2024	2025	2026	2027	2028
Beginning of Work	Active development, including AI integration	Product launch	Expand customer base in Ukraine up to 2,500	Expand to EU and USA market

- Complexion of development and at the beginning of testing.
- Preparation for launch marketing campaign.
- Launch beta version and gather user feedback.

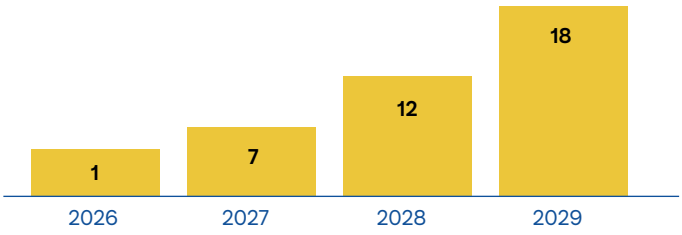
- Grow annual revenue in Ukraine to $7M
- Begin market research and preparation for expansion to EU and the USA

- Reach annual revenue of $12M (combined all markets)

CUSTOMER GROWTH FORECAST



PROJECTED REVENUE, MLN USD



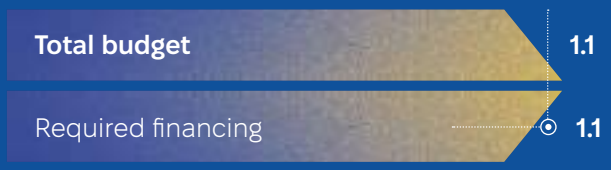
1 - The project information and financial indicators are provided by company-initiator of the project.

LLC B2B AGENCY | PRE-ORDER

UKRAINE, EUROPE

- **Brief Description:** Pre-Order - it's B2B/B2C platform for managing orders, production and processing, which connects all from manufacturers of fabrics and materials to the end consumer of clothes and shoes.
- **Target Market:** European market, encompassing both manufacturers and sellers of the fashion and textile industries.
- **Products/Services:** platform that offers access to a base of suppliers and buyers, streamlining the pre-order process to match production with actual demand
- **Technologies and Innovations:** blockchain for secure data transactions, logistics operations and AI for user personalization, suggestions, and BP automation.
- **Unique Selling Proposition:** the platform connects all links from manufacturers of fabrics and materials to the end consumer minimizing waste and overproduction

Projects Highlights[1] ($, mln) (if applicable)



Type of financing – equity

Financing structure: CAPEX – 42% / OPEX – 58%

Expected Financial Indicators:

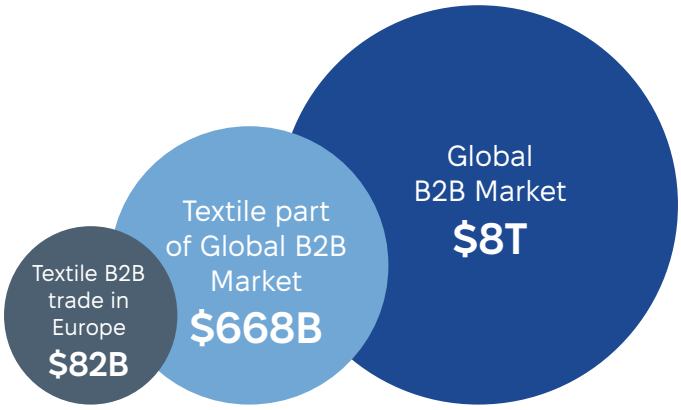
- NPV – 2.5 (3 years)
- DPP – 23 months
- Revenue – 33.5 (3 year)
- IRR – 145%
- Project launch period – 6 months
- EBITDA – 1.9 (3 year)

- **Project Status:** a minimum viable product has been launched.

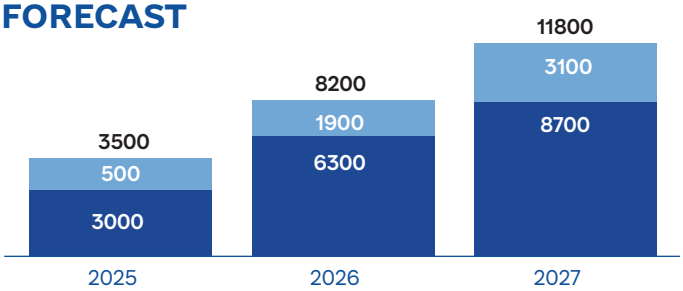
BUSINESS MODEL

- The manufacturer or wholesaler visualizes the product or service in the PRE-order application and guarantees the terms of order fulfillment
- Two levels of access: B2B and B2C
- The customer chooses an object and makes a 100% payment for it to his account
- The manufacturer/wholesaler receives the 30% minus the commission and sends the order confirmation
- When the order is ready, the manufacturer/wholesaler notifies the customer and receives the next 70%
- The manufacturer/wholesaler sends the order, reports on the shipment and receives all the funds (minus commission)
- The customer receives his order

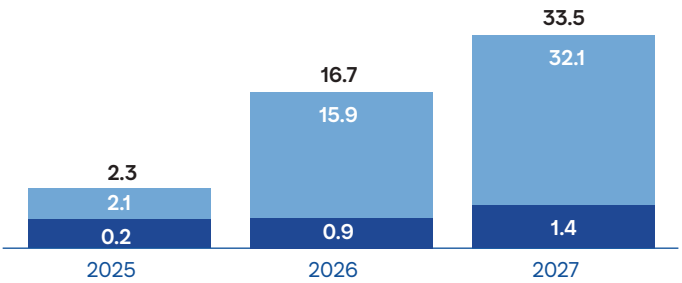
MARKET ESTIMATION



CUSTOMER GROWTH FORECAST



PROJECTED REVENUE, MLN USD



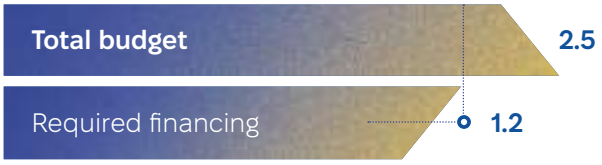
1 - The project information and financial indicators are provided by company-initiator of the project.

CHM SOFTWARE LTD | HOREKER

UKRAINE, LITHUANIA

- **Brief Description:** HOREKER developing for HoReCa, retail and services which helps with sales accounting, guest/customers service, creating receipt, accepting bank card
- **Target Market:** Our market is sales all over the world. At the first stage, these are establishments in the eastern part of the EU, Ukraine, Uzbekistan, Azerbaijan.
- **Products/Services:** A full description of what the project will produce or what services it will provide (up to 3 lines).
- **Technologies and Innovations:** Software for managing and accounting by catering, hotel, retail, and service businesses.
- **Unique Selling Proposition:** In certain countries, we saw a lot of outdated software, and in some countries, Russian software dominates, where customers are eager to change to new software. We saw a large market.

Projects Highlights[1] ($, mln) (if applicable)



Type of financing – equity

Financing structure: CAPEX – 80% / OPEX – 20%

Expected Financial Indicators:

- NPV – 12.2 (10 years)
- DPP – 72 months
- Revenue – 100 (10 year)
- IRR – 34%
- Project launch period – 1.5 years
- EBITDA – 30 (10 year)

- **Project Status:** Pre ceed stage: 5 restaurants, 1 hotel, 30 retail outlets. Completing certification in Lithuania

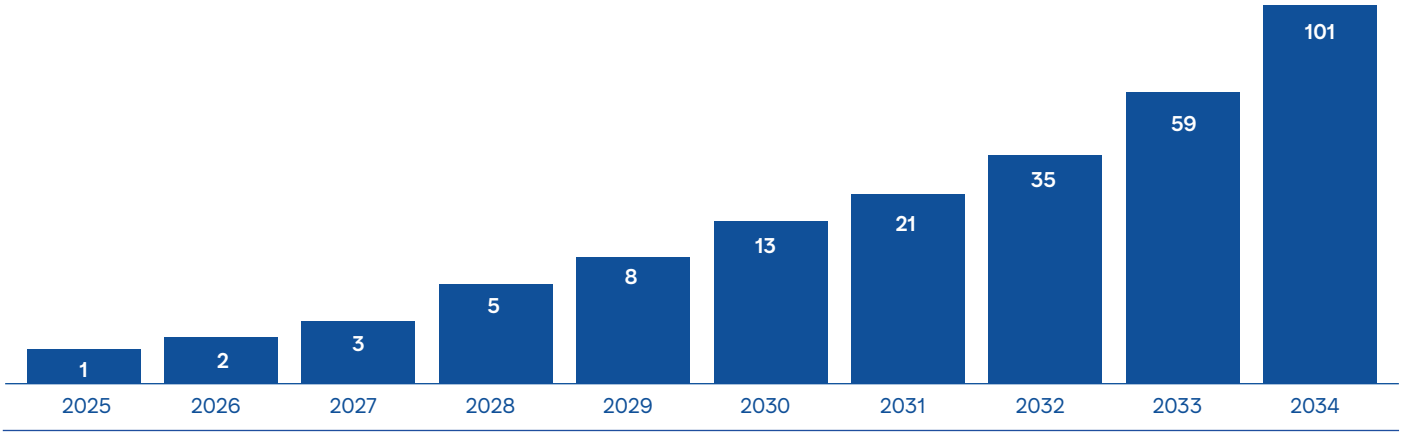
Key partners

Ingenico, Verofone, VISA, A-Bank, Mono Bank, Eurotelecom, Kulinichivskii Bread Factory, Chekis Lithuania

Key Points of Project Implementation:

2019	2020	2022	2022	2022	2023
Start of module development for hotels	Start of module development for retail	Start of module development for restaurants	Software launch in the hotel	Software launch in retail	Software launch in a restaurant

PROJECTED REVENUE, MLN USD



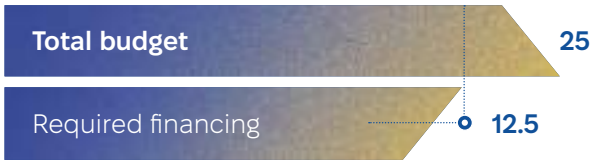
1 - The project information and financial indicators are provided by company-initiator of the project.

VOLIA DATAGROUP | GPON BROADBAND ROLLOUT

UKRAINE

- **Brief Description:** swop of legacy DOCSIS broadband technology to GPON in 3 Ukrainian big cities: Kyiv, Lviv, Vinytsa and FTTB in Kharkiv.
- **Target Market:** 1.6M households. 200K existing DOCSIS and FTTB broadband subscribers with the potential to grow up to 300K by Y2027 in case of GPON rollout.
- **Products/Services:** Broadband service based on advanced GPON technology
- **Technologies and Innovations:** Better power consumption efficiency: reducing the load of the city energy system (3 MWh).
- **Unique Selling Proposition:** Higher speed, quality and reliability of broadband service. Customers' energy resilience

Projects Highlights[1] ($, mln) (if applicable)



Type of financing – project finance, debt
Financing structure: CAPEX – 80% / OPEX – 20%

- **Disclaimer:** This project is an infrastructure initiative aimed at improving and modernizing the existing network for its continued efficient operation. The traditional financial indicators typically used for investment projects are not applied in the evaluation of such projects. This is due to the unique nature of infrastructure projects, which are intended to support and develop existing assets.
- **Project Status:** In Q2 2024 GPON rollout has been started in Kyiv, Lviv, Vinytsa. By the end of 2024 100K households to be switched to GPON.

BUSINESS MODEL

Strategic initiative to transition from outdated and energy-inefficient DOCSIS technology, which currently constitutes 35% of our network infrastructure, to the cutting-edge GPON technology. This transition is poised to revolutionize service delivery by enhancing the overall customer experience, expanding our customer base, substantially reducing energy consumption, and ensuring reliability in service delivery. Deploying GPON in Kharkiv is of utmost importance and a top priority, especially given the impact of power shortages resulting from military actions.

BENEFITS FOR CUSTOMERS AND COMMUNITIES:

- **Higher BB speed:** capacity increase, new level of data transfer speed – up to 1Gb/s, ready for 10 Gb/s
- **Better customer experience:** remote device management system ACS TR069 – 40% tickets can be managed distantly, decrease in fault engineers' visits and call-center calls
- **Higher service reliability:** decrease in # points of failure (less nodes, active equipment) – decreasing possibility of soft & hardware attacks
- **Blackout resilience:** only central node to be supported
- **Better power consumption efficiency:** reducing the load of the city energy system (3 MWh)
- **Reducing environmental pollution:** less amount of equipment requiring disposal
- **Enhancing customers' energy resilience**

Key partners

Telecom equipment suppliers: Nokia, Huawei, ZTE

Key Points of Project Implementation:

2Q 2024	2024	2025	2026	2027
GPON rollout has started	100k households connected to GPON	500k households connected to GPON	1.1 mln households connected to GPON	1.6 mln households connected to GPON

1 - The project information and financial indicators are provided by company-initiator of the project.

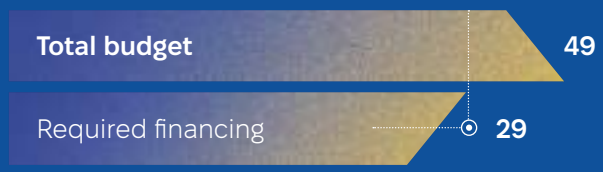
LLC LIFECELL

ENSURING THE STABILITY OF THE TELECOMMUNICATION NETWORK

UKRAINE

- **Brief Description:** Significantly enhance the resilience of the telecommunication network against frequent physical and cyber attacks by the Russian Federation
- **Target Market:** Mobile and fixed telecommunication market, government, consumer and corporate segments, 10 million in total.
- **Products/Services:** stability of telecommunication services.
- **Technologies and Innovations:** modern core network and fiber optic equipment, low emission generators and high efficient Lithium batteries, cutting-edge cyber security solutions to be implemented in scope of the project.
- **Unique Selling Proposition:** Telecommunications are essential for the operation of critical systems such as energy supply, transportation, healthcare, and other vital services. Millions of people heavily rely on telecommunications in their daily life.

Projects Highlights[1] ($, mln) (if applicable)



Type of financing – debt, project finance

- **Disclaimer:** This project is a strategic infrastructure initiative designed to enhance and modernize the network, ensuring its efficient operation for the future. Unlike typical investment projects, traditional financial metrics are not utilized to assess such initiatives. The reason lies in the distinctive characteristics of infrastructure endeavors, which aim to bolster and advance existing assets.
- **Project Status:** under implementation since 2022-2023 – more than 1,000 base stations have already been restored, generators have been installed and batteries have been updated at thousands of base stations.

BUSINESS MODEL

- lifecell invests in modern equipment and infrastructure in order to increases network resilience to physical and cyber attacks.
- lifecell generates revenue primarily through subscription plans, users pay a monthly fee for access to the network. Increased network resilience secures existing revenue stream in adverse conditions of war.

Key partners

Suppliers of equipment: Ericsson AB (Sweden), Nokia (Finland)
Financing partners (banks): Ukrsibbank BNP Paribas Group, ING Bank Ukraine, та Raiffeisen Bank Aval
Partners: local implementation and distribution partners

Key Points Of Project Implementation:

2024-2027 - it is planned to introduce another core network core, expand the backbone network, increase the number of mobile base stations and the number of generators and batteries.

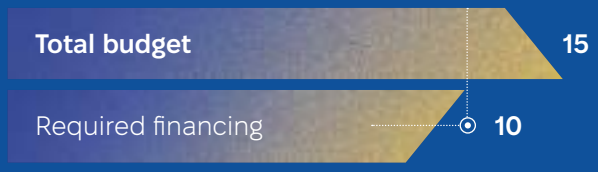
1 - The project information and financial indicators are provided by company-initiator of the project.

LLC FC ACTIVITIS | B2B BUY NOW PAY LATER

UKRAINE

- **Brief Description:** The online platform allows customers to buy from partners using instalment payments while enabling partners to receive immediate payment upon contract signing, through trade factoring services provided by a financial company.
- **Target Market:** Any B2B sales and purchase agreements. Platform participants include sellers (platform partners) and buyers (micro, small, and medium-sized businesses).
- **Products/Services:** The platform allows you to finalize purchase and sale agreements on an instalment basis via your personal account.
- **Technologies and Innovations:** Online scoring, signing, and financing without collateral, featuring a 30-minute decision-making process and fund transfers within 2 hours.
- **Unique Selling Proposition:** Installment payments have the potential to increase partner sales volumes by up to 30%, enabling buyers to preserve liquidity and optimize cash flow without direct dealings with financial institutions.

Projects Highlights[1] ($, mln) (if applicable)



Type of financing – debt, equity

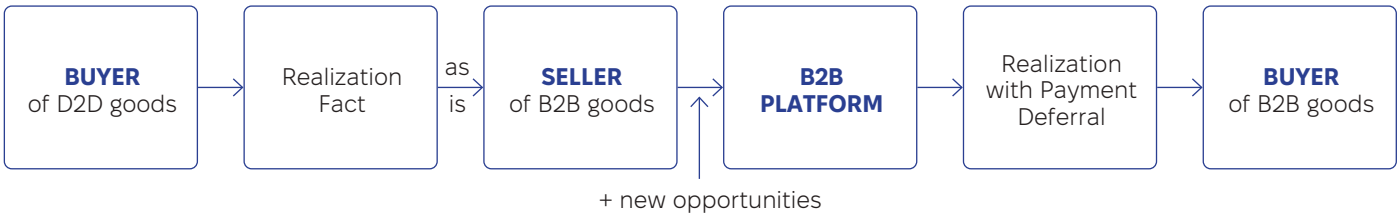
Financing structure: CAPEX – 10% / OPEX – 90%

Expected Financial Indicators:

- NPV – 11.45 (2 years)
- DPP – 16 months
- Revenue – 16.2 (2 year)
- IRR – 54%
- Project launch period – launched with own equity
- EBITDA – 2.43 (1 year)

- **Project Status:** Secured two USAID grants aimed at development and expansion efforts. It has shown progressive growth by attracting 25+ sellers and achieving a monthly transaction increase of 15-20% or more.

BUSINESS MODEL



Key partners by industry

Agriculture: LNZ Group, Agro Arena, Frendt, Agro Assistance Group, Agroresurs. Manufacturing: Stankopromimport (distributor of Okuma), Alux Group. Healthcare: Forvardmed, Academy of Advanced Aesthetics, Inkos Line, Rad Farm.
Light: Textile Contact. Automotive: Autopassage (distributor of Peugeot), Autograd (distributor of Mitsubishi Motors).

Key Points of Project Implementation:

May 2023	June 2023	March - April 2024	April - June 2024	June - September 2024	June - September 2024
Scoring Testing	Pre-Launch (first deals)	Secured two grants from USAID and launch	Marketing Content Development	Human Resources Expansion	Partner Engagement

1 - The project information and financial indicators are provided by company-initiator of the project.

TEKOM LEASE

TEKOM EXCHANGE LEASING PLATFORM

LOCATION: ODESA, BUT THE PLATFORM WILL OPERATE ONLINE ALL OVER UKRAINE

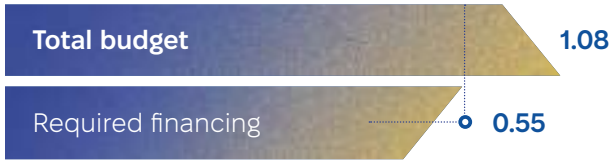
- **Brief Description:** TELP is a web-based platform that connects lessees with lessors and suppliers, simplifying and automating the process of concluding leasing transactions. The project is characterized by flexibility, transaction security, and ease of usage for all categories of users. **Project objectives:** to simplify access to leasing services for a wide range of users. Reduce the time and costs of concluding transactions. Stimulate the development of the leasing market through the digitization of processes.

- **Target Market:** project aims to carve out a niche in the rapidly growing leasing market in Ukraine through innovative technological solutions. Target audience:
  - Lessees looking for a convenient way to finance the purchase of equipment or vehicles.
  - Lessors interested in expanding their customer base and optimizing transaction processes.
  - Suppliers of equipment and vehicles who want to increase sales through leasing.

- **Products/Services:** The project will produce and provide an innovative online leasing platform, facilitating efficient communication between lessees, lessors, and equipment suppliers. TELP aims to streamline leasing transactions, offering accessibility, security, and cost reduction, thereby stimulating market growth through digitalization).

- **Technologies and Innovations:** incorporation of fintech innovations into the project development, including the integration of advanced fintech solutions to enhance transaction efficiency and security. This includes leveraging blockchain technology for data immutability and artificial intelligence for credit risk analysis.

Projects Highlights ($, mln) (if applicable)



Type of financing – project finance
Financing structure: CAPEX – 0% / OPEX – 100%

Expected Financial Indicators:
- NPV – 0.7 (3 years)
- IRR – 28.9%
- DPP – 23-24 months
- Project launch period – 1 year
- Revenue – 2.35 (3 year)
- EBITDA – 1.26 (3 year)

- **Project Status:** project is at the stage of idea and conceptualization. The technical specification for the development of the online platform has been drafted, outlining requirements for functionality, design, and security. The project's business plan has been developed and includes a development strategy, marketing plan, competitive analysis, and projected financial indicators

- **Unique Selling Proposition:** IThe unique selling proposition of the TELP project lies in creating the first online leasing platform in Ukraine and on an international level, integrating lessors, lessees, and suppliers in a single digital space. The platform utilizes advanced technologies for automating the processes of credit risk assessment and creditworthiness analysis, ensuring convenience, speed, and transparency in transactions. The project provides SMEs with easy access to financial tools, facilitating their development and contributing to the growth of Ukraine's economy.

Key partners

· Equipment and vehicle suppliers · Financial institutions · Technology partners

Key Points Of Project Implementation

1 month	6 month	3 month	2 month	1 month
Market research Competitor analysis Customer needs analysis Product concept development	Development of an online platform MPV – minimum viable product	Functional testing Performance and security testing Launching the beta version of the product, collecting a feedback	Content marketing Sales strategy Partnership relations	Technical support and updates Monitoring and optimizing performance

1 - The project information and financial indicators are provided by company-initiator of the project.

NGO E-DIALOGUE | DIGITAL TRACKING

UKRAINE, ODESA

- **Digital Tracking** – smart-platform for monitoring the technical condition and safety of building sites. Structures information about the technical condition of the building site by integrating the functions of the surveillance participants into a uniform format of electronic interaction and automated site safety assessment.

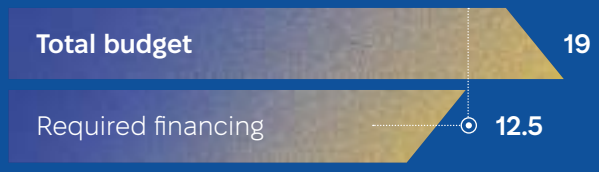
· Potential clients of the **Digital Tracking** are companies of state and private forms of ownership that operate about 150,000 different buildings and structures and more than 300,000 residential buildings above four floors with medium (CC2) and high (CC3) class.

- **Digital Tracking:** consists of a common data environment "Smart-platform" with integrated modules "Technical supervision" and "State supervision" and plug-in industry-specific modules "Waterworks", "Railway", "Roads", "Airports", and "Buildings".

· BIM, GIS, CDE, DSA, SLA, AR, Machine Learning, Decision Intelligence, Total experience

1. A functioning stable market for the building management.
2. Concentration of the main volume of the market in six large state-owned companies.
3. Absence of the need to make changes to normative legal acts, digitalization of existing regulated processes.
4. Compliance with national safety standards for the building management the requirements of Council Directive 89/106/EEC.

Projects Highlights[1] ($, mln) (if applicable)



Type of financing – equity, project finance etc

Financing structure: CAPEX – 85% / OPEX – 15%

Expected Financial Indicators:

- NPV – 2.8 (2 years)
- IRR – 26%
- DPP – 18 months
- Project launch period – 3-5 years
- Revenue – 5 (1 year)
- EBITDA – 2.75 (1 year)

Smart-platform with integrated modules "Technical supervision" and "State supervision":
Graphic Prototype - 70%
Industry-specific module "State supervision. Waterworks":
Technical documentation - 100%
Industry-specific module "Technical supervision. Waterworks":
Technical documentation - 20%

Potential clients of the Digital Tracking are companies of state and private forms of ownership that operate about 150,000 different buildings and structures and more than 300,000 residential buildings above four floors with medium (CC2) and high (CC3) class of consequences (responsibility). Digital Tracking's clients are 176 state supervision bodies authorized by the Law.

Today, the market is served by 12,085 engineering companies and 1,003 certified experts specializing in "Technical survey of buildings and structures". The market volume, code 71.12, according to the State Statistics Service of Ukraine in 2020, was 1.15 billion USD/year.
Subscription business model, the volume of the technical supervision automation market is 5 million USD/year.

Directorate of Strategic Planning and European Integration of the Ministry of Infrastructure of Ukraine
Department of State Supervision and Control of the Administration of Shipping of Ukraine
Department of digital development, digital transformations, and digitalization of the Administration of Shipping of Ukraine

The project will be developed by developing additional knowledge bases for different areas of infrastructure. Further there will be automation of technical supervision and prognosis of objects condition by means of application of laser scanning and photogrammetry.

1 - The project information and financial indicators are provided by company-initiator of the project.

CHAPTER 5.

Green Transition in Ukraine

5.1. KEY PRIORITIES OF GREEN TRANSITION IN UKRAINE

Green Transition is set to be one of the cornerstones of Ukraine's post-war economic recovery due to the internal national policy priorities and external drivers.

The key external drivers include:

- EU's Green Deal policy package (carbon pricing, CBAM and sectoral policies)
- Green transition policies of other key partners
- The ongoing reform of international development and climate finance
- Paris alignment requirements of key international financial institutions

In 2024 the draft of the Ukrainian National Energy and Climate Plan 2025-2030 (NECP) was presented envisaging a rapid green transition for the energy sector and the whole economy.

Although the plan focuses on a short-term time horizon, it includes considerations of various goals for different time perspectives up to 2060 and corresponding measures.

The key national policy priorities that would drive green transition include:

- the eagerness for EU membership
- associated requirements for EU acquis approximation
- Nationally Determined Contribution under the Paris Agreement

Target: reduce gas emissions by **65%** in 2030 from the 1990 level and the second NDC is expected to be developed in 2025.

Decarbonization commitments translate into reforms and measures announced at the national level aimed at promoting Green Transition.

Table 1: Some of the objectives and measures related to the Green Transition from NECP

Objectives	Short-term measures (Up to 2030)
Decarbonization	
• GHG emissions reduction by 65% in 2030 compared to 1990. • Share of RES in total final energy consumption at 27% by 2030. • Share of RES in the electricity generation at 25% by 2030. • Climate neutrality of the energy sector by 2050. • Climate neutrality of the economy by 2060. • Phasing out coal generation by 2035.	• Carbon tax reform. • National Emissions Trading System. • National plan for reducing emissions from large combustion plants. • Scaling up reusing components of municipal solid waste. • Market premium mechanism for RES electricity producers. • Guarantees of origin for electricity from RES. • Action Plan for Implementation of Climate Policy within the Global Methane Pledge. • State program for the just transformation of coal regions of Ukraine until 2030.

Energy efficiency	
• Primary energy consumption in 2030 not exceeding 72,224 thousand toe, final energy consumption - 42,168 thousand toe. • The cumulative amount of end-use energy savings for 2021-2030 is at least 16,405 thousand toe. • Expected energy savings in government buildings is at least 24.9 GWh/year.	• Energy efficiency obligations scheme. • State Targeted Economic Program for Buildings' Thermal Modernization Support until 2030. • Nearly zero-energy buildings. • Guarantees of origin for electricity generated by high-efficiency cogeneration units. • Implementation of State Targeted Economic Program for Energy Modernization of Heat Energy Producing Enterprises in State or Municipal Ownership, for a period up to 2030.
Energy security	
• Reducing the level of import dependence to 33%. • Diversification of energy resource providers and supply routes from third countries. • Increasing flexibility of the national energy system.	• Creation of capacities to produce fuel assemblies to meet all the needs of Ukrainian NPPs. • Development of uranium production. • Implementation of EU rules on the security of electricity and gas supply.
Internal energy market	
• Comprehensive integration of Ukraine's electricity market with the European market. • Free market-based prices for energy carriers for all consumers with effective mechanisms to support vulnerable consumers; ensuring the absence of debt burden on energy market entities. • Increasing and promoting biomethane production. • Competitive pricing with mechanisms to support vulnerable consumers.	• Liberalisation of prices on energy markets. • Spot and balancing market coupling with EU. • Ensuring the principle of energy efficiency in energy infrastructure planning. • Plans for the development of hydrogen infrastructure. • Integrated planning of energy infrastructure. • Monitoring system, reduction and phase-out of subsidies for fossil fuels. • Establishment and application of criteria for the sustainability of renewable/low-carbon gases. • Application of online services for consumers.
Research, innovation, and competitiveness	
• Development and financing of innovations and research in the field of clean technologies, renewable energy, and low-carbon production. • Implementation of clean energy solutions and low-carbon technologies.	• Development of corporate and international partnerships in the energy and climate sector. • Development of exports of climate technologies and renewable energy technologies.

The framework of post-war reconstruction of Ukraine contains critical documents forming prerequisites for Ukraine's Green Transition namely the Ukraine Facility[1] regulation and Ukraine Plan.

at least 20% of the overall amount corresponding to support under the Ukraine Investment Framework and the Ukraine Plan shall contribute to climate change mitigation and adaptation,environmental protection, including biodiversity conservation, and the Green Transition (according to the point 9 of Article 28).

Such requirements shall significantly contribute to the attraction of finance for post-war reconstruction considering "building-back-better" and "building-back-greener" principles.

The Ukraine Plan[2] has been developed by the GoU in response to the Ukraine Facility regulation and adopted by the Council of EU on May, 14th 2024[3]. The Plan contains a set of reforms aimed at forming a basis for the recovery and development of the economy and Ukraine's integration into the EU. The Ukraine Plan contains a chapter dedicated to the reforms in the Green Transition and Environmental Protection sectors as well as specific points in other sectors that enable Green Transition.

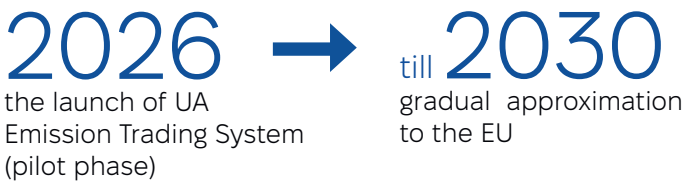
[1] - Ukraine Facility, Regulation (EU) 2024/792. https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=CELEX%3A32024R0792
[2] - The Ukraine Plan, https://www.ukrainefacility.me.gov.ua/wp-content/uploads/2024/03/ukraine-facility-plan.pdf
[3] - European Council, Press Release, https://www.consilium.europa.eu/en/press/press-releases/2024/05/14/ukraine-plan-council-greenlights-regular-payments-under-the-ukraine-facility/

Table 2: A summary of some the reforms and expected outcomes within the Ukraine Plan	
Reforms	**Expected outcomes**
Public financial management	
Improved revenue management.	• Reform of ecological and carbon taxes.
Improved public investment management.	• Integration of green/sustainable criteria into the process of transparent and economically justified selection of investment projects, primarily for economic recovery.
Management of public assets	
Improved governance and management of state-owned enterprises.	• Implementation of ESG and climate matters into corporate governance of state-owned enterprises.
Human capital	
Improved functioning of the labour market.	• Green jobs.
Business environment	
Access to finance and markets. Implementation of Stimulus and Financing Programs for Small and Medium Enterprises (SMEs).	• Implementation of social and environmental (ESG) frameworks for SMEs, including CSRD and EU taxonomy. • Simplifying access to financial instruments through the introduction of ESG frameworks.
Energy	
Improved regulatory framework for increasing renewable energy and ensuring stable operation of the energy system.	• Market-based legislative and regulatory framework for RES investments per EU rules. • Legislation on shortening the permitting procedures for renewable investments in line with the EU rules.
Improved efficiency in the district heating.	• The adoption of the State Targeted Economic Program for the Energy Modernization of Heat-generating Enterprises.
Improved energy efficiency in public buildings and improvement of public procurement procedures considering energy efficiency requirements.	• Approval of the Strategy for Thermal Modernization of Buildings until 2050. • Setting minimum energy efficiency performance levels for buildings and for products covered by the EU eco-design legislation. • Setting classes of energy efficiency performance levels for products covered by the EU energy labelling legislation. • Requirements for energy labelling and eco-design as mandatory minimum criteria during public procurement.
Transport	
Comprehensive planning of the transport sector.	• Development of a competitive and efficient transport system in line with EU standards in particular relating to TEN-T networks and the decarbonization targets of the transport sector.
Critical raw materials	
Strengthening strategic planning and ensuring optimum framework for strategic investors.	• Introduction of State Compensatory Fund for geological sector. • Publication of a report on the verification of Critical Raw Material reserves of Ukraine using an international classification system conducted and making results available to investors.
Use of Modern Extraction Technologies and Integration of Ukraine into Modern Processing Value Chains.	• A study assessing the current legislation introducing reporting ESG for the mining and extractive sector, proposing recommendations on what legislative gaps need to be covered.

Green transition and environmental protection	
Prevention, reduction and control of industrial pollution.	• Integrated approaches to permitting and controlling industrial pollution based on the application of the best available technologies. • Implementation of EU Directive 2010/75/EU on industrial emissions.
Climate policy.	• The framework climate law adopted (goals and basic principles of the state climate policy, climate governance). • Second NDC adopted.
Market mechanisms of carbon pricing.	• The resumption of a mandatory MRV system. • Launching National Greenhouse Gas Emissions Trading System in Ukraine.
Restoration and conservation of natural resources.	• Law of Ukraine that regulates the issue of confirming the sustainability of the origin of wood that may lead to deforestation and forest degradation.
Increased circular economy..	• The circular economy strategy adopted and implemented. • The National Waste Management Plan adopted and implemented.

Implementation carbon pricing in Ukraine as a key impetus for investments in green transition

Starting 2024, the EU began the implementation stage of the Cross Border Adjustment Mechanism (CBAM) aimed at enabling an additional tax burden to the EU's importers of the chemical, energy, cement, iron and steel industries. The mechanism for determining CBAM payment levels is based on the evaluation of embedded emissions of the specific product and the prices of CO2 emission allowances at the EU Emission Trading System. Simultaneously, Ukrainian government announced the launching of UA Emission Trading System in 2026 (pilot phase) with gradual approximation to the EU till 2030.



Large Ukrainian enterprises that are at risk of CBAM implementation or UA ETS shall seek to decrease embedded emissions of their products to minimise financial burdens and maintain the sustainability of supply chains. This, in turn, enables a demand for modernization of production facilities with low-carbon technologies, RES and energy-efficient equipment.

Ukrainian large enterprises within carbon-intensive industries looking for decarbonization will stimulate the application of low-carbon technologies and the development of renewable energy supplies, enhancing the Green Transition for Ukraine's economy. Therefore, access to concessional financing for the implementation of decarbonization measures will determine the recovery of Ukrainian economy.

Ukraine's aspiration towards the EU

Ukraine's path to full EU membership requires reforming the public sector and adopting key EU legislation, including those related to the Green Deal, which is a package of legislation and policies, that aims to set the EU on the path to a green transition, with the goal of EU's climate neutrality by 2050. Numerous legislative initiatives on the Green Deal were designed for a comprehensive reformation of a wide list of industry and public sectors. Adoption of such legislation in Ukraine will enable medium and long-term reinforcement of the economy's Green Transition.

5.2. PROSPECTS AND POTENTIAL OF GREEN TRANSITION

Decarbonization potential

Ukraine's economy contains sectors that are well-known for significant energy and carbon intensity. Low- priced energy carriers in the past and limited access to project financing have led to a lack of modernization and ine fficiency.

342 MtCO2e[4]

total GHG emissions in Ukraine in 2021 according to the latest available Ukraine's Greenhouse Gas Inventory Report.

51.3 gCO2e/MJ

the carbon intensity of industry energy consumption in Ukraine in 2021. That exceeds the world average rate by 3% and EU indicator by 39%[5].

The carbon-intensity of Ukraine's economy in terms of CO2 emissions per unit of GDP is significantly higher compared to the developed countries, which demonstrate potential for decarbonization without undermining the economic growth. It can become the basis for attracting investment in Ukraine's green recovery.

Available financing for Green Transition

at least **20%**

of the overall finance under Ukraine Facility amount shall contribute to the Green Transition and environmental protection.

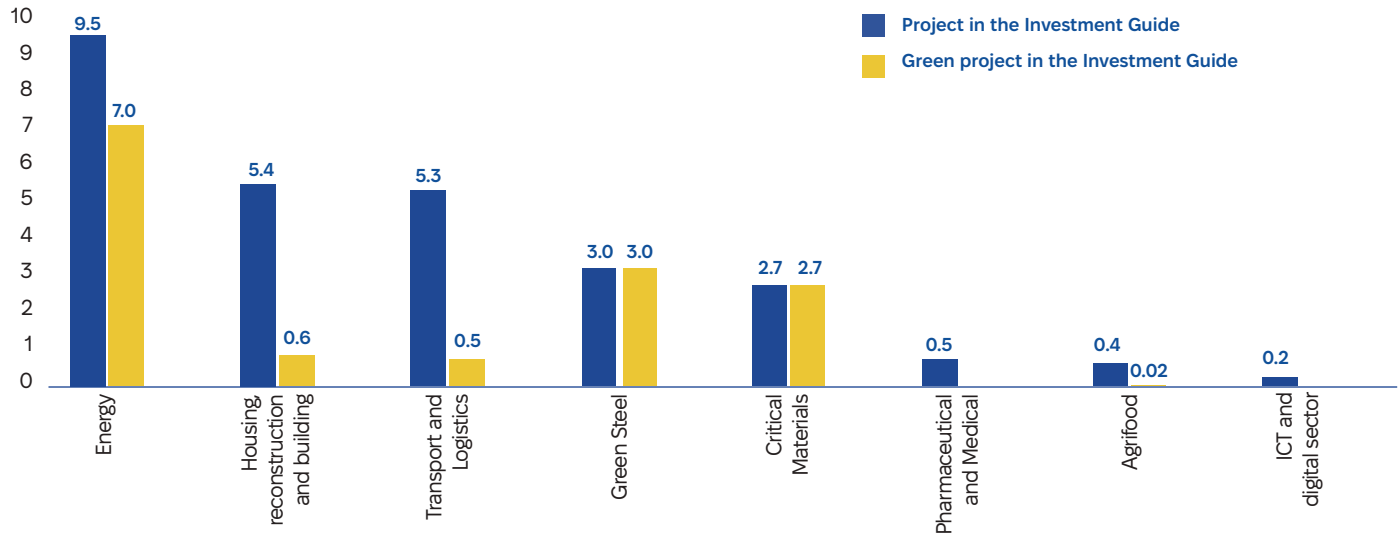
- Ukraine's EU candidate status and related reforms will strengthen investment attractiveness in the post-war period.
- Private and public sectors got an opportunity for reconstruction and modernization with IFI's financing available through concessional loans and grants.

The availability of financing will depend on:

- the extent to which business and government implement projects and policies in line with the Paris Agreement
- the environmental and social frameworks of the EU and other partners.

The availability of financing will depend on the extent to which business and government implement projects and policies in line with the Paris Agreement and the environmental and social frameworks of the EU and other partners.

Figure 1: The green projects presented in the Ukraine Investment Guide



[4] - Ukraine. 2023 National Inventory Report (NIR), https://unfccc.int/documents/628276

[5] - International Energy Agency, Energy Statistics Data Browser, https://www.iea.org/data-and-statistics/data-tools/energy-statistics-data browser?country=WORLD &fuel=Energy%20supply&indicator=TESbySource

Sectoral opportunities of Green Transition

Critical minerals

The EU is building a new critical materials policy to ensure sustainable economic growth and energy security. The EU's designation of these materials is evidence of a steady demand for these resources in the medium and long term. The availability of these resources in Ukraine, with its proximity to the EU, provides short and convenient logistical paths. These factors give a competitive advantage to the extraction and processing of these materials in Ukraine.

Hydrogen

One of the promising areas of decarbonization of Ukrainian energy supply is the production of hydrogen or other renewable gases with their subsequent supply to appropriately adapted operations of large enterprises. This area is very ambitious and has excellent prospects, but currently requires significant investments not only in infrastructure but also in research and development.

Green steel

Globally, steelmaking is one of the most carbon-intensive industries in the economy, and at the same time, it has a very significant potential for GHG emissions reduction. Green steel production is expected to grow dramatically over the next decade. Ukraine has the necessary prerequisites to become an important player in this market, namely access to high-quality iron ore and significant renewable energy develop-ment potential. From the cost side, the introduction of Carbon Border Adjustment Mechanism by the EU and efficient carbon pricing by the Ukrainian government will be a huge impetus for the decarbonization of metallurgical enterprises. The list of investment opportunities in the iron and steel industry in Ukraine includes energy efficiency measures, technological modernization, and change in energy supply to renewable energy and low-carbon gases.

Biomethane and other renewable gases

Developed agriculture sector in Ukraine is enabling a great potential for bioenergy production, namely biomethane for export to the EU. The REPowerEU plan foresees boosting biomethane production to 35 billion cubic metres by 2030 to reduce the import of natural gas. The first biomethane plant in Ukraine connected to the gas distribution system was implemented in 2023 in the Chernihiv region. More than 10 Ukrainian agricultural producers are planning the construction of over 30 biomethane plants. These facilities are anticipated to collectively achieve a substantial annual production capacity exceeding 220 million cubic metres. Given Ukraine's strong agricultural sector, Ukraine can potentially reach an impressive target of 10 billion cubic metres annually.

There are also a number of challenges Ukraine faces on the way of Green Transition. The ongoing war in Ukraine has led to extensive damage to Ukraine's private and public sectors.

USD 152 billion — the overall damage estimates presented by the World Bank in the RDNA3

Consequential losses, which include lost profits and significant additional costs for businesses and the public sector, lead to a deterioration of the economy. The destruction of generating capacity and energy infrastructure by the russian federation has led to a shortage of heat and electricity in the country. In the context of the state budget deficit and the need to finance the reconstruction, investments in modernization and Green Transition from internal sources in the public sector are postponed. Uncertainty in the macroeconomic environment is forcing investors to limit their finance portfolio in Ukraine. Large enterprises reduce investments intended for scaling, improving operational efficiency and modernization. The cost of finance for enterprises without state support has grown due to increased war risks. These factors lead to a decline in business activity and an economic downturn, which in turn slows down the Green Transition.

The Green Transition in Ukraine is represented by a rather limited number of companies and sets of projects that are under consideration or ready for implementation. This situation was caused, among other things, by prolonged and significant government intervention in pricing in many sectors of the economy, as well as by difficulties for businesses in accessing targeted external financing. Although the practice of concessional green financing is becoming more common, preparing such a transaction requires additional efforts to assess environmental and climate benefits to include associated KPIs in the negotiation.

Today, there is a significant gap between the expectations of IFIs and the ability of Ukrainian businesses to effectively absorb additional targeted financing.

CHAPTER 6

Practical information and key data for investors

6.1. ENTRY REGIME FOR FOREIGN CITIZENS IN UKRAINE

The entry regime for foreign citizens in Ukraine offers unique opportunities for outside investors to participate in the economy. Foreign nationals legally residing in Ukraine generally enjoy the same rights as Ukrainian citizens, except for certain political rights, such as voting. Those planning to visit or conduct business in Ukraine should check visa requirements applicable to their situation. Ukrainian visas are categorised as follows:

SHORT-TERM VISAS (TYPE C)

are issued for visits up to 90 days within 180 days and are suitable for purposes like business meetings, investments, and tourism.

LONG-TERM VISAS (TYPE D)

are intended for those seeking to stay beyond 90 days and are typically valid for multiple entries over 90 days. These visas are a prerequisite for applying for a temporary residence permit.

It is noted that foreign citizens of selected countries benefit from visa-free entry in relation to private, short-term travel i.e., they do not require a visa for travel to Ukraine for up to 90 days every 180 days. The full list of countries that entitle their citizens to short-term visa-free entry can be found at the Ministry of Foreign Affairs[1].

For long-term stays, foreign nationals must obtain a temporary residence permit, which is necessary for pursuits such as education and employment. Those seeking long-term visas or temporary residence permits should obtain specialised advice and prepare thoroughly to meet all immigration requirements. For information on obtaining a foreign residence permit, visit the State Migration Service of Ukraine[2].

6.2. SETTING UP BUSINESS OPERATIONS

Investors interested in formalising their business operations in Ukraine have multiple setup options. They can choose from a wide range of legal entities such as Limited Liability Companies (LLCs) or Joint-Stock Companies. Alternatively, they can conduct activities through representative offices.

The LLC is the most prevalent business form in Ukraine due to its flexibility and cost-efficiency. An LLC can be established by individuals or legal entities, either foreign or Ukrainian, with no maximum limit on the number of founders. There is no required minimum share capital; however, founders must fully pay the initial capital within six months of registration. Registration typically takes one business day, is free of charge, and can be completed through a power of attorney.

Opening a representative office is another common practice among foreign investors. A representative office is a division of a foreign company and not a separate legal entity. It is managed by a head appointed by the foreign company and must register as a permanent establishment for commercial activities. Although registration takes longer and is less regulated than an LLC, it offers certain tax advantages, such as including expenses directly in the foreign company's costs.

6.3. INVESTMENTS AND TAXATION

Restrictions to investment activity

Foreign investments in Ukraine encompass a wide range of activities. Businesses from abroad looking to enter the Ukrainian market have several options, including establishing a local presence by creating a new legal entity, acquiring shares, engaging in asset deals, or forming agreements with local partners.

Many of the restrictions affecting foreign investors in Ukraine arise due to the ongoing war. Consequently, special measures such as the martial law regime, sanctions, and capital controls have been implemented to facilitate the smooth operation of the wartime economy, in alignment with national interest. These restrictions are horizontal, meaning they apply uniformly to all investors regardless of nationality.

[1] https://mfa.gov.ua/en/consular-affairs/entry-and-stay-foreigners-ukraine/entry-regime-ukraine-foreign-citizensa
[2] https://dmsu.gov.ua/en-home/services/documenting-foreigners/issuance-of-temporary-residence-permit

Additionally, foreign investors should be aware of other key restrictions, such as the regulatory and licensing requirements that govern certain economic activities and the restrictions on land ownership.

73 bilateral investment treaties with foreign countries have been signed by Ukraine[3]. The full list can be found[4].

6.3.1. Martial law regime

Foreign investors conducting business in Ukraine are required to adhere to the regulations of the martial law regime, which mandates specific adjustments to business operations during wartime. Key adjustments include:

- Obligation to comply with local curfew laws and follow security protocols in case of emergency alerts, to ensure the safety of their employees and stakeholders.
- Introduction of mobilisation rules, according to which Ukrainian employees can be summoned for army service. Companies engaged in 'critical' economic activities may be able to retain a certain percentage of their workforce exempt from mobilisation.
- Various restrictions on international trade e.g., reduced period of export-import settlements and restrictions on financial transactions.

6.3.2. Sanctions

The National Security and Defense Council of Ukraine has the authority to impose sanctions on foreign states, legal entities, and individuals. These sanctions may be based on activities that threaten national interests, security, sovereignty, and territorial integrity, or those that support terrorism or violate human rights.

As a direct consequence, any legal entities or individuals sanctioned by Ukraine are prohibited from investing in Ukrainian companies and are not allowed to withdraw their investment and/or repatriate their capital.

It is imperative for foreign investors active in Ukraine to conduct thorough due diligence on their stakeholders by consulting the State Sanctions Registry. Engaging with sanctioned parties could lead to significant operational risks. For instance, contracts may be invalidated for violating public order, or payments might be disrupted due to the freezing of assets.

6.3.3. Capital controls

In response to the challenges posed by the full-scale war, the National Bank of Ukraine (NBU) has implemented stringent controls on foreign currency (FX) transactions to stabilise the financial system and prevent uncontrolled capital outflows.

For an overview of these measures, please refer to Chapter 3.1 of this Guide.

Prospective investors are strongly encouraged to follow the[5], as it regularly publishes updates on easing of FX restrictions.

6.3.4. Land ownership

Foreign citizens and legal entities—including Ukrainian legal entities with foreign shareholders—are currently prohibited from owning agricultural land plots in Ukraine.

Recent reforms have expanded land ownership rights for Ukrainian nationals and local entities, allowing them to own up to 10,000 hectares, a significant increase from the previous limit of 100 hectares, effective from 1 January 2024. However, this privilege does not extend to foreign investors.

[3] According to data from the United Nations Conference on Trade and Development (UNCTAD)
[4] https://investmentpolicy.unctad.org/international-investment-agreements/countries/219/ukraine
[5] https://bank.gov.ua/en/

Nonetheless, foreign parties have the opportunity to:

1. Own residential, commercial, and other types of non-agricultural land in Ukraine.
In certain cases, purchasing any existing buildings on the land may also be necessary.

2. Secure long-term leases for agricultural land with durations ranging from 7 to 25 years, depending on the land type. These leases are typically acquired through competitive auctions held on the Prozorro platform.

6.4. OVERVIEW OF UKRAINE'S BUSINESS TAX FRAMEWORK

Business entities in Ukraine are required to pay corporate income tax on their worldwide profits at a rate of 18%, which is relatively low compared to regional peers. This rate also applies uniformly to capital gains, which are classified as ordinary income. For a comparative overview of Ukraine's corporate tax rate with its regional peers and EU leaders, refer to Table 1: Selected Tax Indicators[6]: Comparison of Ukraine with Regional Peers and EU Leaders.

Table 1: Selected Tax Indicators: Comparison of Ukraine with Regional Peers and EU Leaders

	Regional Peers					EU	
	Ukraine	**Poland**	**Czech Republic**	**Romania**	**Slovakia**	**Germany**	**France**
Company tax rate	**18%**	**19%**	**19%**	**16%**	**21%**	**15%** (standard rate at federal level) 30-33% (effective rate)	**25%**
Capital gains	**18%**	**19%**	**19%** (some exemptions apply)	**16%** (some exemptions apply)	**21%** 15% for micro-tax-payers	**15-16%** (some exemptions apply)	**25%** 10% for gains from patents and software (other exemptions apply)
Tax basis and for foreign companies	Revenue from in country sources A 15% withholding tax applies to most income payments to non-residents	Revenue from in country sources	Revenue from in country sources Foreign dividends are taxed at a reduced rate of 15% and may be exempt	Revenue from citizen taxpayers, irrespective of where the services are provided.	Revenue from in country sources	Revenue from in country sources	Revenue from in country sources
Total % of taxes on profits	**45.2%**	**40.8%**	**46.1%**	**20%**	**49.7%**	**48.8%**	**60.7%**

[6] - Source: Lloyds Bank Trade; World Bank Data

In Ukraine, most corporate expenses are deductible, including organisational and start-up costs, interest payments, social security contributions, and research and development (R&D) expenses. Additionally, deductions are available for selected charitable donations, which may vary based on the recipient, such as the Ukrainian armed forces, or the type of goods and services donated, like personal protective equipment and medical devices.

Foreign companies operating in Ukraine are taxed on all locally sourced revenue and are subject to a **15%** withholding tax on most income payments. However, lower rates may apply if there is a tax treaty between Ukraine and the company's country of tax residence that aims to avoid double taxation.

Employers are responsible for withholding personal income tax at **18%** and a military duty at 1.5% from salaries. They must also contribute a unified social security payment at a rate of 22% of the payroll cost. For employees in Diia.City (see Section 6.5.3 below), lower rates may apply.

Companies operating in Ukraine may also be liable for additional taxes, including local real estate taxes, state duties, and environmental taxes. Note that these taxes can vary significantly between different regions and municipalities.

6.5. EXISTING FINANCING LANDSCAPE

Ukrainian businesses predominantly rely on two funding sources:

- **USD 110.8 billion** loans from domestic banks, issued since March 2022 (including refinancing of existing debt programes, resulting in a substantially lower net inflow of financing)
- **over USD 5 billion** funding from IFIs for the private sector since March 2022 to address urgent needs.

Despite the significant role played by Ukrainian banks, they struggle with limitations in providing independent, long-term financing at favourable rates, essential for successful investment projects. As of February 2024, the weighted average lending rates for non-financial corporations stand at 15.9%, with rates varying across enterprises, particularly affecting small businesses, which face a rate of 22%.

The GoU initiated the «Affordable Loans 5-7-9%» programe, primarily focusing on small and medium enterprises (SMEs) in agriculture, trade, and services. Managed through Ukrainian banks and partially supported by international aid, the programe intends to boost entrepreneurship and SME contribution in the recovery process.

From March 2022 to December 2023, project financing under this programe totaled around USD 4.3 billion, accounting for 40% of total net corporate banking loan portfolio. Investment projects accounted for only 6%, with a significant 82% directed towards agriculture, trade, and services.

The existing mechanisms for financing companies and projects in Ukraine are evidently insufficient. To address this gap, the GoU, in collaboration with partner countries and IFIs, is taking proactive measures to expand available funding sources and enhance financing mechanisms. These initiatives include reducing the cost of capital acquisition, implementing guarantees, fostering equity investments, and developing project financing frameworks to support investment projects at various stages of development.

6.5.1 Ukraine Investment Framework under Ukraine Facility

USD 40 billion / year — the annual requirement for maintaining Ukraine's vital needs, as long as the war persists.

To reduce this limitation and sustain reform momentum, private sector investment must become the primary driver of recovery. In order to ensure such recovery the EU has launched an initiative to establish the Ukrainian Investment Framework.

Pillar II of the Ukraine Facility outlines the establishment of a dedicated EUR 9.3 billion specific Ukraine Investment Framework aimed to mobilise investments for the reconstruction and modernisation of Ukraine.

This framework aims to mitigate the risks associated with financing programes for private and public projects in key economic sectors. The mechanism implies providing guarantees (for a maximum amount to EUR 7.8 billion) and EUR 1.5 billion designated for blending operations and grants, and technical assistance to support the implementation of the Ukraine Plan. It's important to note that these allocations do not preclude each other.

at least 15% of the guarantees are earmarked for small and medium enterprises

at least 20% of overall investment (Pillar I and Pillar II) is dedicated to green projects

25% of Ukraine Guarantee is earmarked for European Investment Bank (EIB) sovereign and non-commercial sub-sovereign operations

This initiative aims to enable Ukrainian and international companies to more easily secure funding for projects in Ukraine, thereby increasing investment in Ukrainian enterprises. However, the main channel for funding inflows are IFIs, either directly or with intermediation of Ukrainian banks.

IFIs with a track record of operating in Ukraine adhere to established procedures and requirements for potential applicants. Ukrainian businesses seeking financing must meet compliance standards, which include demonstrating enough cash flow to service interest expenses on the borrowings, a history of capital creation, and considerations regarding their reputation as a main prerequisites.

At the same time, IFIs backed by the EU Commission are expected to play a pivotal role in implementing recovery projects through various means, including grants, portfolio guaranties, risk-sharing arrangements, and project financing.

Investment guarantees are crucial for mitigating risks and attracting additional funds from Ukrainian banks and IFIs. It's estimated that this approach could potentially mobilise additional investments through various financing mechanisms. This allows partners to supplement European guarantees with their own financing, thereby reducing their own risks and multiplying the amount available for lending to Ukrainian businesses. Additionally, a combination of loans and grants, known as blended instruments, should help reduce the cost of blended financing. Technical assistance financing is also proposed to support businesses in preparing and submitting their projects.

6.5.2 Derisking mechanisms

The GoU is actively enhancing risk insurance offerings to encourage investment from both Ukrainian and international investors, particularly to mitigate war-related risks. These risks include political violence, currency inconvertibility, expropriation, and risks related to goods in transit or storage, and financial liabilities.

Table 2: The type derisking options available

	MIGA	DFC	European Bank	nexi / KUKE	Marsh / LLOYD'S	ECA Export Credit Agency
RISK TYPES COVERED	A B C	A B C E	D E	A B C	D	E
PERSONS / ASSETS COVERED	International investors only	Ukrainian and international investors	Ukrainian and international investors	International investors except for KUKE which provides options also for Ukrainian investors	Black sea shipments	Ukrainian and international investors (provided they export Ukrainian goods)
BACKED BY	Ministry of Economy, IFI/DFI Trust Funds Int'l Donors	IFI/DFI Trust Funds & Int'l Donors	IFI/DFI Trust Funds & Int'l Donors	Foreign governments	Ministry of Economy	Ministry of Economy
STATUS	✓	✓	◕	✓	✓	◕

LEGEND:
POLITICAL: A POLITICAL VIOLENCE; B INCONVERTIBILITY; C EXPROPRIATION
PROPERTY DAMAGES & FINANCIAL DEFAULT: D GOODS IN TRANSIT / STORAGE; E FINANCIAL LIABILITIES
✓ AVAILABLE; ◕ UNDER DEVELOPMENT

At the international level, the Ministry of Economy collaborates with institutions such as the Multilateral Investment Guarantee Agency (MIGA), the US International Development Finance Corporation (DFC), and the European Bank for Reconstruction and Development (EBRD) to develop comprehensive war risk insurance options. It is also engaging with foreign governments and ECAs of partner countries to craft specialised insurance solutions for global investors.

EUR 9.3 billion	the recently enacted Ukraine Facility includes the Ukraine Investment Framework, which supports these efforts
EUR 7.8 billion	the Ukraine guarantee mechanism, enhancing IFIs' capacity to finance businesses in the challenging conditions of a war economy

Nationally, recent Ukrainian legislation has broadened the national ECA mandate to include insuring direct investments and investment loans for developing export-oriented businesses.

In April 2024, the government expanded the definitions within its insurance coverage to include military risks such as military conflicts and terrorist acts, and political risks like unlawful state actions and the illegal revocation of licences.

6.5.3 State financial support and government incentives

Foreign businesses considering investing in Ukraine can explore multiple provisions offering tax and financial incentives such as:

- the Industrial Parks Law, which provides developers and tenants of industrial parks special incentives, including a 10-year corporate income tax break and import duty exemptions.
- the Significant Investments Law, which aims to stimulate the attraction of foreign and domestic investments by generous incentives, including a 5-year CIT break and import duty exemptions.
- the Diia.City Regime, a virtual economic zone that aims to attract IT companies/startups but also software professionals to Ukraine by providing a series of tax incentives and legal benefits (e.g., stock option plans, enhanced IT protection).

Table 3: Overview of key state financial assistance programes

	Eligibility requirements	State support offered
Significant Investments Law	• Investment projects should meet the following criteria: ◦ provide for investments > EUR 12 million implementable in selected industries[7] ◦ enable the construction, modernisation or re-equipment of facilities ◦ create at least 10 jobs ◦ are implementable over no more than 5 years	• Eligible projects are entitled to the following benefits: ◦ **5-year** exemption from **corporate income tax** ◦ **exemption from VAT** for import of new equipment and components ◦ **exemption from import duty** for import of new equipment and components ◦ **lease** of state or communal land plots **without auction** ◦ exceptions from or reduction in **land tax payments** ◦ **compensation for costs of connecting** to engineering or transport networks ◦ **compensation for construction** of related infrastructure (e.g., roads, utilities, lines) ◦ exemption from compensation from losses of **forestry production** • The total amount of support is capped at 30% of invested CAPEX.

[7] - Detailed list of industries includes processing industry (exceptions apply), ethyl alcohol (exceptions apply), cognac and fruit, alcoholic beverages, biogas and biomethane production, mining for further processing and/or enrichment of minerals (exceptions apply), waste management, transport, warehousing, postal and courier activities, logistics, education, scientific and scientific-technical activities, health, art, culture, sports, tourism, resort and recreational sphere, electronic communications.

	Eligibility requirements	State support offered

Industrial Parks Law	• Incentives are available to managing companies and companies that initiate and/or participate in industrial parks.
	• The land underlying the industrial parks can be either state/communal owned and meet certain requirements i.e.:
	  ◦ qualify as industry land
	  ◦ be suitable for industrial land
	  ◦ have a surface between 10 to 1000 hectares and
	  ◦ be subject to ownership or long-term lease (30-year minimum)
	  ◦ In addition, the economic activity to be carried out in the industrial parks must fall into specific sectors of the economy[8]
		• Eligible investors are entitled to the following benefits:
		  ◦ **10-year** exemption from **corporate income tax**
		  ◦ **exemption from VAT** for import of new equipment and components
		  ◦ **exemption from import duty** for import of new equipment and components
		  ◦ exceptions from or reduction in **land tax payments**
		  ◦ exemption from **real estate tax for industrial buildings**
		  ◦ **full or partial compensation of interest rates** on project-relevant loans
		  ◦ **compensation for costs of connecting** to engineering or transport networks
		  ◦ **non-refundable financing covering related construction of infrastructure** facilities to the park (highways, lines, heat etc)
		  ◦ exemption from compensation from losses of **forestry production**

Diia.City Regime	• Incentives are available to businesses that meet the following criteria:
	  ◦ are active in an eligible industry[9]
	  ◦ employ 9+ employees and gig specialists
	  ◦ pay an average monthly salary of the equivalent EUR 1,200 or more to their employees
	  ◦ obtain more than 90% of their total income as a result of IT activities
		• Eligible investors are entitled to the following benefits:
		  ◦ Special **corporate income tax regime** with election between 9% withdrawal capital tax vs. 18% on corporate income tax
		  ◦ **0% on income of individuals as dividends** accrued (if payable once every two years)
		  ◦ Tax rebates on **personal taxation**
		  ◦ **Enhanced IP protection** for rights under gig contracts
		  ◦ Applied **best practices from common law** e.g., employee stock ownership plans, warranties & indemnities

Investors can benefit from multiple incentive programes and are encouraged to engage directly with UkraineInvest, the Ukrainian Investment Promotion Agency.

In addition to the laws targeting large-scale investments, the GoU has developed several initiatives to support SMEs, include:

Made in Ukraine programe

- aimed at promoting domestically produced goods

5-7-9% affordable loans programe

- designed to facilitate the creation and expansion of domestic micro and small businesses with low-interest financing

eRobota grants

- support entrepreneurs creating new jobs through micro-business startups

eOselia programe

- off ering low-interest mortgage loans to Ukrainians

Sector-specific incentives are also available for businesses active in industries such as agri-business and transport.

[8] - List of sectors includes processing industry, recycling of industrial and/or household waste (except for waste disposal), R&D and activities in the IT sector and telecommunications.

[9] - Eligible industries include software development and testing (incl. games), publishing and distribution of software, incl. SaaS, teaching computer literacy, programming, testing, software technical support, digital marketing and advertising, R&D in IT and Telecom, cybersport and services related to virtual assets.

NOTES

We are ready to fight for every investor