War in Ukraine: Global Update & Perspective on Reconstruction

BCG Global Advantage, Financial Institutions, Social Impact, Public Sector, and Travel, Cities & Infrastructure Practice Areas

Prepared: 21 Feb 2023 – Confidential: Limited Distribution
The war in Ukraine (UA) is above all a political, social and humanitarian crisis…

As we enter the second year of war, it is impossible not to reflect on the enormous loss and suffering it has wrought. The top priority for all continues to be the safety and security of people.

The scale and duration of the war has had a profound economic impact, both within Ukraine and globally.

The one-year mark provides an occasion to reflect on the growing extent of physical and economic damage to Ukraine and the scale of rebuilding required.

It is the duty of political, societal, and business leaders to navigate through this crisis. The intent of this edition is to document and analyze the impact of the war over the past year and to discuss the reconstruction of Ukraine.

The situation surrounding Ukraine is dynamic and rapidly evolving - this document reflects information and analysis as of 21 February 2023. It is not intended as a prediction of future events and is shared only as a resource for BCG and client conversations.
This edition follows 12 prior Executive Perspectives on Ukraine in 2022

#1 Global impact (Mar 3)

#2 Supply Chain (Mar 11)

#3 Energy (Mar 18)

#4 Finance (Mar 24)

#5 Risk (Mar 31)

#6 Industry (Apr 14)

#7 Refugees (Apr 27)

#8 Scenarios (May 16)

#9 Consumer Sentiment (May 26)

#10 Energy Transition (June 15)

#11 Food Crisis (July 14)

#12 Future of Trade (Nov 3)
### Summary | Global impact - Year at a glance

#### War impact on Ukraine
- Refugee crisis grew worse as the year progressed
  - 27M Ukrainian citizens directly affected, incl. 13M refugees and internally displaced; 300k+ casualties
- Impact of war exceeded initial expectations
  - "Immediate" victory has not materialized for Russia, impact now cross-sectoral and well beyond Eastern Europe

#### Economic impact
- Global economy averted recession in 2022 but most growth forecasts dampened for 2023
  - World GDP 2023 growth forecast at 2.1%, Eurozone at 0.2%, US at 0.6%, Russia GDP to contract by 3%
- Most nations faced significant inflation, with pressures easing into 2023
  - High energy and commodity prices were among the factors causing 9.8% global inflation in 2022; forecast is 7.3% for 2023
- After initial spike, most commodity prices eased, but many stabilizing at higher levels
  - Most agriculture, metals, energy prices now between 2022 max level and pre-2022 average; some products trending up (e.g., nickel)
- Europe survived immediate energy crisis and cut Russia gas reliance
  - Diversified imports (esp. to US LNG), spent €800B on energy subsidies, fast-tracked LNG infrastructure, cut back on consumption

#### Sanctions
- Multiple waves of sanctions by Allies, approaches evolving to raise impact
  - 6k+ sanctions actions by 20+ countries; EU's 10 packages comprise diverse measures – price cap on oil now taking effect
- Russia's trade is seeing a shift away from West toward large emerging markets (EMs)
  - Gas exports sustained at high prices, but large advanced economies importing 37% less in non-energy; EMs picking up trade flow
- Companies took actions to exit Russia market or reduce exposure
  - 1k+ major companies in most sectors have reduced Russia presence

#### Implications & scenarios
- Profound second- and third-order impacts
  - Fundamental impact on food security, LNG, defense industry, EU fiscal health; plus, disruptive impacts (e.g., space travel)
- Most scenarios will require reconstruction by Ukraine and Allies
  - Five major scenarios across escalation / de-escalation
War in Ukraine: Global Update & Perspective on Reconstruction

Global economic impact of the war in Ukraine

Ukraine reconstruction & strategic rationale for businesses to engage

Implications for leaders
13M Ukrainians still displaced, but meaningful return trend observed

Movement from border to European countries
Indicative view of refugee flows thru February 8, 2023

- X% of the estimated ~8M refugees still outside of Ukraine
- Refugees per 100,000 inhabitants in destination country

- Net Outflow
- Populated directly affected by war (living in stranded areas, refugees, internally displaced, injured and killed)
- Refugees + internally displaced people
- Casualties (UA civilians and soldiers)

1. Including forced migration and travelers from occupied territories; 2. Based on estimates of civilian & military killed & wounded in UA & RU | Note: Actual number might be slightly lower as the crossing are not counted as per "unique" person, however at this point it is uncertain whether the return is permanent or temporary. Note: Indicative view; onward travel from directly neighboring countries (particularly PL, HU, SK) and hence also inflow to not directly neighboring countries (particularly DE, IT, FR) might be higher than stated. Source: UNHCR (archives); IOM; interviews with NGOs; Government websites and statistics; CEPR; NYT; BBC; OHCHR; BCG analysis
Impact of war continues to broaden, well beyond initial expectations

Interrelated dimensions

Duration

Narrower impact

<table>
<thead>
<tr>
<th>Weeks</th>
<th>Months</th>
<th>Years</th>
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<tr>
<td>Days</td>
<td></td>
<td>Decades</td>
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Narrower impact

<table>
<thead>
<tr>
<th>Duration</th>
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<td>Months</td>
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<tr>
<td>Years</td>
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<tr>
<td>Decades</td>
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</table>

Geographic scope & materiality

Initial Expectation

Russia announces "decisive and immediate" action to remove gov't in Kyiv, predicts victory within weeks

Current Reality

Protracted stalemate which most political and military experts believe will persist

Limited geographic scope and direct economic impact, few 2nd order impacts

Broad/deep sanctions regime, NATO+ allies military assistance, 2nd order impacts (growth, inflation)

Sectoral scope & materiality

Initial Expectation

Small subset of commodities with high share of Russia/Ukraine supply to suffer shortage, volatility

Current Reality

Near-crisis in energy and agrifoods, impacts on wider range of sectors, incl. T&L, machinery, defense, retail

Impact of war continues to broaden, well beyond initial expectations

1. Putin states before airstrikes begin that Russia is taking "decisive and immediate action" to remove Ukraine's leaders. Experts interviewed by Izvestia, as reported by Russia's TASS News Agency, believed that the Russian military could complete the operation in five days. Source: TASS, Wall Street Journal; BCG analysis. Note: BCG does not provide legal or regulatory advice.
### Summary snapshot | War impacts continue to be felt in global economy

#### Macro Outlook

<table>
<thead>
<tr>
<th>GDP Forecasts</th>
<th>World Bank</th>
<th>Leading FIs</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>2021</strong> Actual</td>
<td>5.9%</td>
<td>6.0%</td>
</tr>
<tr>
<td>Forecast</td>
<td>5.3%</td>
<td>5.8%</td>
</tr>
<tr>
<td><strong>2022</strong> Actual</td>
<td>4.1%</td>
<td>4.5%</td>
</tr>
<tr>
<td>Forecast</td>
<td>3.7%</td>
<td>4.0%</td>
</tr>
<tr>
<td><strong>2023F</strong> (Forecast)</td>
<td>3.4%</td>
<td>3.6%</td>
</tr>
</tbody>
</table>

#### Inflation

| **2021** Actual | 6.8% | 8.9% | +2.5 pp |
| **2022** Actual | 2.5% | 9.1% | +6.6 pp |
| Forecast | 4.7% | 6.7% | +2.0 pp |
| **2023F** (Forecast) | 6.7% | 13.2% | +6.5 pp |

#### Corporate Actions in Russia Market

- Exit: 372
- Keeping Options Open for Return: 498
- Reducing Current Operations: 164
- Holding Off New Investments/Development: 165
- Remain in Russia/Continuing business-as-usual: 221

#### Sanctions & Policy Actions

- 6K+ sanctions actions taken to date by US, UK, EU and other allies
- EU has issued 9 sanctions packages, planning the 10th including price caps on energy in 8th package an important step
- Sanctions now imposed by 20+ countries beyond EU, but still uneven
- Some sanctions require more time to demonstrate effect, if any

#### Commodity Prices

<table>
<thead>
<tr>
<th>Commodity</th>
<th>Crude Oil ($/bbl)</th>
<th>Gas ($/MWh)</th>
<th>Coal ($/t)</th>
<th>Wheat ($/bu)</th>
<th>Rapeseed ($/t)</th>
<th>Nickel ($/t)</th>
<th>Palladium ($/oz)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Jan ‘22</td>
<td>79.0</td>
<td>80.4</td>
<td>157.5</td>
<td>274.0</td>
<td>728.5</td>
<td>20430.0</td>
<td>1826.0</td>
</tr>
<tr>
<td>Feb ‘23</td>
<td>81.0</td>
<td>58.1</td>
<td>252.0</td>
<td>288.5</td>
<td>549.8</td>
<td>29110.0</td>
<td>15794.4</td>
</tr>
<tr>
<td>Change</td>
<td>3%</td>
<td>-30%</td>
<td>88%</td>
<td>5%</td>
<td>-25%</td>
<td>-12%</td>
<td>-14%</td>
</tr>
</tbody>
</table>

#### Supply Chain Metrics

<table>
<thead>
<tr>
<th>Deep Sea Cargo Port Calls</th>
<th>Deep Sea Cargo Bosporus</th>
</tr>
</thead>
<tbody>
<tr>
<td>(Avg. #/day)²</td>
<td>(Avg. #/day)²</td>
</tr>
<tr>
<td>Ukraine</td>
<td>Russia</td>
</tr>
<tr>
<td>Pre-War</td>
<td>Current</td>
</tr>
<tr>
<td>N-bound</td>
<td>S-bound</td>
</tr>
<tr>
<td>8.2</td>
<td>7.6</td>
</tr>
<tr>
<td>21.4</td>
<td>22.3</td>
</tr>
</tbody>
</table>

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1. GDP forecasts from World Bank and FIs per Bloomberg database (15-56 FIs per forecast period). Source for actual GDP figures for 2021 changed from Bloomberg to World Bank since the previous edition. 2. Ukraine 2022 GDP forecast - World Bank, October '21 report. 3. Values are World Bank estimates from 2023. 4. Consumer price % change, pa, average - Economist Intelligence Unit. 5. 2022 values for the Eurozone, Russia and Ukraine are Economist Intelligence Unit estimates. 6. S&P Capital IQ. 7. Deep Sea Cargo oil tankers MR & up, bulkcarriers, Panamax & up, containerships, TEU, VLGCs, LNG carriers, 60,000+ cbm & PCTCs, 6,000+ceu. Clarksons Research (https://www.clarksons.com/) Clarksons Research Services Limited (“Clarksons Research”). © Clarksons Research 2021. All rights in and to Clarksons Research services, information and data (“Information”) are reserved to and owned by Clarksons Research (Clarksons Research), its group companies and licensors accept no liability for any errors or omissions in any Information or for any loss or damage however arising. No party may rely on any Information contained in this communication. Please also see the disclaimer at https://www.clarksons.com/Portal/disclaimer, which also applies. No further distribution of any Information is permitted without Clarksons Research’s prior written consent. Clarksons Research does not promote, sponsor, or endorse the content of this communication. 8. Total sanctioned actions worldwide, excl. Russia, incl. duplication. Source: corrective.org 9. Yale Chief Exec Leadership Institute
Global economy underperforming pre-war forecasts, 2023 continues trend

GDP Growth (%), Selected Regions, 2021A–2023F

<table>
<thead>
<tr>
<th>Region</th>
<th>Actual 2021</th>
<th>Actual Jan 22</th>
<th>Actual 8 Feb 2022</th>
<th>2022F</th>
<th>2023F</th>
</tr>
</thead>
<tbody>
<tr>
<td>Global</td>
<td>5.9</td>
<td>4.4</td>
<td>2.9</td>
<td>2.1</td>
<td>-0.4</td>
</tr>
<tr>
<td>Eurozone</td>
<td>5.3</td>
<td>4.2</td>
<td>3.3</td>
<td>0.2</td>
<td>-1.0</td>
</tr>
<tr>
<td>Russia</td>
<td>4.8</td>
<td>2.4</td>
<td>-3.5</td>
<td>-3.0</td>
<td>-5.0</td>
</tr>
<tr>
<td>Ukraine</td>
<td>3.9</td>
<td>3.4</td>
<td>2.0</td>
<td>-2.0</td>
<td></td>
</tr>
</tbody>
</table>

1. Analysis by Carnegie Endowment, Wilson Center 2. Latest pre-war forecast (Oct 21) for Ukraine by World Bank
Note: 15 November '22-08 February '23 forecast of 27 FIs for Russia, 57 FIs for Eurozone, 36 FIs for Global, 12 FIs for Ukraine.
GDP change in 2022 are World Bank’s estimates. Forecast for Ukraine for 2022 was published in October 21. Sources: World Bank; Bloomberg; BCG Analysis

Russia GDP 6ppt below pre-war forecast, but superior to initial expectations

Enormous growth and asset value foregone
Most commodity prices stabilizing at higher levels than before the war

<table>
<thead>
<tr>
<th>Commodity</th>
<th>Symbol or Location</th>
<th>Price Unit</th>
</tr>
</thead>
<tbody>
<tr>
<td>Nickel</td>
<td>(LME, $/tonne)</td>
<td></td>
</tr>
<tr>
<td>Palladium</td>
<td>(NYMEX, $/troy oz.)</td>
<td></td>
</tr>
<tr>
<td>Aluminum</td>
<td>(LME, $/tonne)</td>
<td></td>
</tr>
<tr>
<td>Natural gas</td>
<td>(TTF, €/MWh)</td>
<td></td>
</tr>
<tr>
<td>Coal</td>
<td>(Newcastle, $/tonne)</td>
<td></td>
</tr>
<tr>
<td>Rapeseed</td>
<td>(MATIF, €/tonne)</td>
<td></td>
</tr>
<tr>
<td>Wheat</td>
<td>(MATIF, €/bu.)</td>
<td></td>
</tr>
<tr>
<td>Corn</td>
<td>(MATIF, €/tonne)</td>
<td></td>
</tr>
<tr>
<td>Crude oil</td>
<td>(Brent, $/bbl.)</td>
<td></td>
</tr>
</tbody>
</table>

- **Average '21:**
  - 70 for Nickel
  - 47 for Natural gas
  - 134 for Coal
  - 52 for Rapeseed
  - 239 for Wheat
  - 221 for Corn
  - 238 for Aluminum

- **Max since conflict:**
  - Crude oil: Conflict
  - Natural gas: Conflict
  - Coal: Conflict
  - Rapeseed: Conflict
  - Wheat: Conflict
  - Corn: Conflict
  - Aluminum: Conflict

- **Average '21:**
  - 2469 for Hydrocarbons
  - 2392 for Food
  - 238 for Metals
Europe has avoided immediate energy crisis, at significant cost of ~€800B

EU Gas supply and demand, 2022 vs. 2021
Billion cubic meters equivalent

Supply

Demand

2021

Imports RU-piped 139
Imports RU-LNG 183
Imports RoW-piped 64
Imports RoW-LNG 50
EU output 452

2022

Imports RU-piped 59
Imports RU-LNG 234
Imports RoW-piped 110
Imports RoW-LNG 46
EU output 473

Price paid by EU
- EU energy subsidies near €800B
  - High gas prices offset by price caps, payments to households, tax cuts
  - Policy support for >80% storage level
EU RePower ambitions directionally met
- Russia gas imports reduced by 73 bcm, from 38% to 19% share of EU imports
- Bulk of diversification via US (LNG), UK, Norway, Netherlands (pipeline)
Mix of demand and supply levers
- Efficiency and warm winter dampen demand
- Change in power fuel mix (coal +9%, solar +26%, wind +11%)
- China factory lockdown frees up LNG
- Rapid LNG infra buildout (e.g., +4-5 floating terminals in Germany <1yr)

1. Inferred as difference between supply and demand
Source: GasMarketCube; BCG analysis

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11
Global coalition increasing sanctions on RU; EU packages steadily evolving

### Tally of sanction actions

Sanction actions\(^1\) by imposing government

<table>
<thead>
<tr>
<th>Type</th>
<th>Package</th>
<th>Key elements</th>
<th>Impact on Russia</th>
</tr>
</thead>
<tbody>
<tr>
<td>Individual</td>
<td>1 2 4 5</td>
<td>• Travel bans and financial sanctions on Putin and family, senior govt and military officials, oligarchs, and military personnel involved in Bucha/Mariupol atrocities</td>
<td>• Potential to isolate / divide Russian elites</td>
</tr>
<tr>
<td>Technology controls</td>
<td>1 2 4 5</td>
<td>• Restrictions on semiconductors, quantum computers, other ICT products</td>
<td>• Limits access to strategic tech inputs</td>
</tr>
<tr>
<td>Financial &amp; FDI</td>
<td>1 3 4 5</td>
<td>• Removal of 10+ RU financial institutions from SWIFT</td>
<td>• Not all RU FIs covered, many transactions still feasible</td>
</tr>
<tr>
<td>Trade bans</td>
<td>1 4 5 7</td>
<td>• Import ban for products incl. gold, coal, wood, fertilizers, seafood, liquor, import restrictions on iron and steel</td>
<td>• Reduces Russia export revenue</td>
</tr>
<tr>
<td>Logistics bans</td>
<td>5 6</td>
<td>• Prohibition on Russian vessels from accessing EU ports</td>
<td>• Reduces ability to ship products, but other options exist</td>
</tr>
<tr>
<td>Media &amp; services</td>
<td>4 6</td>
<td>• Broadcasting suspension for 7 Russian media outlets</td>
<td>• Mainly symbolic assertion of EU values</td>
</tr>
<tr>
<td>Curbs on energy</td>
<td>6 8</td>
<td>• Eventual ban on Russian crude oil and petroleum products, with limited exceptions</td>
<td>• Targets Russia key source of foreign currency revenue</td>
</tr>
</tbody>
</table>

1. At least 17 other sanctioning countries imposing measures, across Asia-Pacific, LatAm, Africa, and ex-EU Europe

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1. Tracked by [https://correctiv.org](https://correctiv.org) as of 11 Feb 2023

Sources: Correctiv.org, Peterson Institute for International Economics

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Russian exports shifting to emerging markets, imports down in most sectors

Trade with Russia by major economies\(^1\) by value ($B), 2022 vs. 2021 (Mar-Dec)

**Russia exports** | Declining to advanced economies except for gas, surging to emerging markets in all major categories

<table>
<thead>
<tr>
<th></th>
<th>Advanced</th>
<th>Emerging</th>
</tr>
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<tbody>
<tr>
<td>Energy</td>
<td>134</td>
<td>131</td>
</tr>
<tr>
<td></td>
<td>31</td>
<td>47</td>
</tr>
<tr>
<td></td>
<td>61</td>
<td>47</td>
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<td></td>
<td>41</td>
<td>36</td>
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<tr>
<td></td>
<td></td>
<td>+106%</td>
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<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>2021</td>
<td>2022</td>
</tr>
<tr>
<td>Non-Energy</td>
<td>94</td>
<td>59</td>
</tr>
<tr>
<td></td>
<td>14</td>
<td>57</td>
</tr>
<tr>
<td></td>
<td>59</td>
<td>34</td>
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<td>9</td>
<td>34</td>
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</tbody>
</table>

**Russia imports** | Plummeting from advanced economies except for healthcare, growing from emerging markets in industrial goods

<table>
<thead>
<tr>
<th></th>
<th>Advanced</th>
<th>Emerging</th>
</tr>
</thead>
<tbody>
<tr>
<td>Industrial goods</td>
<td>79</td>
<td>26</td>
</tr>
<tr>
<td></td>
<td>2021</td>
<td>2022</td>
</tr>
<tr>
<td></td>
<td>15</td>
<td>6</td>
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<td></td>
<td>14</td>
<td>12</td>
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<td></td>
<td>11</td>
<td>9</td>
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<td></td>
<td></td>
<td>+22%</td>
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</tbody>
</table>

**Prices high, volumes down**

**Primarily timber and diamonds**

**Healthcare, consumer, and other**

<table>
<thead>
<tr>
<th></th>
<th>Advanced</th>
<th>Emerging</th>
</tr>
</thead>
<tbody>
<tr>
<td>Healthcare exports sustain 2021 level</td>
<td>35</td>
<td>28</td>
</tr>
<tr>
<td></td>
<td>2021</td>
<td>2022</td>
</tr>
<tr>
<td></td>
<td>14</td>
<td>9</td>
</tr>
<tr>
<td></td>
<td>8</td>
<td>5</td>
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</table>

|          |          |          |
|          |          |          |

**Autos**

**Chemicals**

**Machinery**

**Hi-tech**

**Metals & commodities**

1. Advanced economies comprise US, EU, UK, Japan, Korea; emerging markets comprise China, Turkey, India Brazil, Indonesia. Together these countries account for ~3/4 of Russia trade in 2021. Data compiled from trading partner sources due to lack of Russia data availability. 2. Includes coal, petroleum products, electrical energy. Source: IHS Markit, BCG analysis
Russia share of EU gas imports halved from 38% to 19% in 2022, while EU imports of US LNG rise by 143%

Europe LNG prices elevate to Asian levels for first time

Number of hungry people around the world rose from 282M to 345M in 2022

Ukraine conflict has increased fertilizer prices, with knock-on effects for harvest volumes and food prices, as well as reducing global supplies of corn and wheat

US will spend a record $858B on defense in 2023

French military budget for 2024-2030 set to be 40% higher than for 2019-2025

NATO + Allies military assistance to Ukraine set to increase spending further

EU energy policy response costs ~€800B, shielding households and businesses from higher gas prices

May reduce EU capacity to spend on other policy initiatives and increase debt financing costs

Sanctions/trade compliance now a top corporate concern

Sudden emergence and impact of "unlikely" conflict has raised geopolitical risk to top of corporate agendas
Second- and third-order impacts of conflict | Disruptive

Remittances of foreign workers in Russia as a % of GDP are 30% in Tajikistan, 28% in Kyrgyzstan, 12% in Uzbekistan

~14.5% of world’s seafarers come from Russia and Ukraine

Ukraine decided in September 2022 to allow its seafarers to leave the country despite wartime restrictions, to free up vital manpower for Ukrainian grain exports and the wider global shipping industry

Suspension until 2026 or later of the ExoMars program, which relies on Russian cooperation

90% drop in Russian tourists to Europe in 2022, with major impact on Greece and Spain

Key reason is increasing flight time/cost due to need to fly transit flights

Drop in Russian tourism removes $7B from global tourism spend

European launchers depend on Vega engines made in Ukraine – production now disrupted

Foreign aircraft stranded

Regional remittance flows at risk

Seafarers in short supply

Russian tourism down

Space voyages disrupted

500+ foreign owned aircrafts worth ~$10B at risk of re-registration due to new Russian laws and foreign sanctions

Could lead to large revaluation for aircraft leasing industry

90% drop in Russian tourists to Europe in 2022, with major impact on Greece and Spain

Key reason is increasing flight time/cost due to need to fly transit flights

Drop in Russian tourism removes $7B from global tourism spend

European launchers depend on Vega engines made in Ukraine – production now disrupted

Note: Select examples, not exhaustive
Source: BCG Analysis
Most scenarios imply need for Allies-supported reconstruction effort

Main factors driving conflict

- Balance of military power, and choice of tactics and weapons
- Sanctions & policy actions by "West," and Russia’s response
- Military aid & support from third countries ("West" & other)
- Peacemaking (bilateral, multilateral or third-country brokering)
- Domestic political & economic conditions in Russia

Potential conflict evolutions

<table>
<thead>
<tr>
<th>Military conflict ceases</th>
<th>Military conflict persists</th>
</tr>
</thead>
<tbody>
<tr>
<td>Fall of Ukraine</td>
<td>No end in sight (Afghanistan 3.0)</td>
</tr>
<tr>
<td>Russian forces control full country</td>
<td>Protracted stalemate</td>
</tr>
</tbody>
</table>

| David defeats Goliath                          | Global spillover |
| Ukraine repels Russian forces                  | Further conflicts in other theatres |
| Freeze in-place (Korea 2.0)                     |
| Negotiated peace / de facto partition          |

Key impacts for business

- Sanctions remain indefinitely
- Sustained isolation of Russia
- Re-build by Russia

- Sanctions remain indefinitely
- Major re-build required by Allies

- Certain sanctions lifted
- Major re-build required by Allies

- Sanctions expand to other nations engaged in aggression
- Major re-build required by Allies

Global scenarios required to go beyond war evolutions and navigate an uncertain medium term

Source: BCG analysis. Note: These analyses represent only potential scenarios and are not intended as a prediction or forecast.
Global economic impact of the war in Ukraine

Ukraine reconstruction & strategic rationale for businesses to engage

Implications for leaders
## Summary | War impact on Ukraine & reconstruction opportunities

### Economic impact on Ukraine

- **Ukraine economy contracted by ~30%, or ~$60B, in 2022**
  - Severe impact across all sectors: industry and retail/services GDP declined by ~60% and ~45% respectively

- **Damage highest in the East, West/Central regions with scale to become a foundation for future recovery**
  - Less affected West/Central regions contributing ~2/3 of pre-2022 GDP

### Reconstruction needs

- **Estimate required funding up to ~$800B, with most immediate needs of ~$150B**
  - Allied governments and IFIs expected to provide ~2/3 of financing, with private sector contributing the remaining

- **Reconstruction possible in some regions even during a lower-intensity protracted conflict**
  - Power grid in continuous repair, ~500 km of rail reconstructed with improved connectivity to the West

### Private sector participation

- **Global enterprises critical for reconstruction to co-fund and execute**
  - Given limitations of local businesses, most acute needs in logistics and industrial sectors (e.g., construction, materials)

- **Some players restored their UA operations, several starting to build-out capabilities & announcing new investments**
  - E.g., Nestlé to invest ~$43M in a new noodles production site, Kingspan to invest $214M in new building technology campus

### Strategic rationale for businesses to engage

- **Strategic rationale exists for long-term engagement in Ukraine**
  - 43M population, significant STEM talent pool, cost competitive, proximity to EU

- **Key FDI challenges remain, but Allies and IFIs working to address them**
  - Structure & financing of the reconstruction programs to help tackle challenges with rule of law and connectivity to EU

- **Regional & global trends could be favorable for Ukraine**
  - EU-UA relations boost, RU backfill, decarbonization, near-shoring

### Implications

- **Leaders should evaluate and act according to the fit of their organizations' objectives with reconstruction effort**
UA economy shrank by 1/3, driven by industry and retail/services decline

Economy changes - overview

GDP by sector and expected decrease, $B

- Agriculture: 12% (200), ~30% decrease
- Industry & Construction: 27% (~125-155), ~13% decrease
- Retail & Services: 44% (~35%), ~45% decrease
- Public Defence, Education, Health: 16% (~35%), ~35% decrease

Key sectors

- **Agriculture**: 30% of agricultural land affected by the war, 90% reduction in grain exports
- **Industry**: 80% reduction in metallurgy & mining production
- **Energy**: 100% of domestic refining capacity destroyed, 40% decrease of electricity production
- **Retail & Services**: 50% of SMEs stopped or substantially reduced operations
- **Logistics**: 65% of seaport capacity blocked
- **Municipality**: 130k housing units damaged, 33% of Ukrainians lack access to drinking water

Select consequences of the war

1. EIB, -33% according to World Bank; 2. Including Metallurgy, Manufacturing, Energy; 3 incl. Logistics | Source: EiBxBCG

Supporting UA: A Study on Potential Recovery Strategies for UA; KSE; public sources (e.g., IEA); expert interviews; BCG analysis
Damage highest in the East, regions driving ~2/3 of pre-2022 GDP less affected

GDP contribution by region and the level of disruption by war activities

Kyiv City: 24% contribution to GDP before Feb '22

- Major destruction (all remaining regions)
- Substantial disruption (Donetsk, Kherson, Zaporizhzhya)
- Moderate disruption (all other regions)

Contributions to GDP by Region before Feb '22:
- 24% Kyiv City
- 9.4% Dnipropetrovsk
- 5.3% Zhytomyr
- 4.6% Kherson
- 4.3% Kharkiv
- 4.1% Donetsk
- 3.9% Mykolaiv
- 3.7% Odessa
- 2.3% Sumy
- 2.2% Luhansk
- 1.9% Zaporizhzhya

Note: 2020 regional GDP data, excluding territories temporarily occupied after 2014 invasion - Crimea and a part of Donetsk and Luhansk. In 2013, those regions contributed 3.7%, 10.8%, 3.6% respectively.

Three steps on the journey to reconstruct and transform Ukrainian economy

Humanitarian Aid & Resilience

Reconstruction

Transformation & Modernization

Humanitarian Aid & Resilience

Humanitarian aid

Securing military supplies

Ensuring macro-financial stability

Review of war damage

Estimation of critical reconstruction needs & identification of funding sources

Facilitation of private sector participation

Reinforcement of strategic rationale for int’l businesses to engage in the long-term

Focus of this Executive Perspective

War outbreak

Ongoing active stage of conflict¹

Today

Resolution¹

Depending on the de-escalation trajectory (Cold War, negotiated peace, victory of Ukraine)

EU Single Market alignment

Stronger role of private sector, esp. SMEs

Increasing share of modern industries/services

Green transformation (beyond reconstruction)

Political & economic reforms

... and more

Note: Increasing # of UA reconstruction-focused international conferences and forums: URC 2022 (Lugano; 07/22), Ukrainian Infrastructure Forum (London; 12/22), Rapid Recovery of Ukraine (Luxembourg; 01/23), Rebuild Ukraine (Warsaw; 02/23) | Note: Ukraine has defined a 3-stage recovery plan with Resilience, Reconstruction and Transformation & Modernization phases | 1. Illustrative scale, not based on duration or resources | Source: NRC Ukraine’s National Recovery Plan 07/22; BCG analysis
Strategic assumptions for an early and successful reconstruction effort

**Accelerated reconstruction effort**
- Accelerate reconstruction to jumpstart UA economy, quick actions vital to enable recovery of already long-disrupted local businesses

**Anti-air protection of regions away from the frontline**
- Strengthen protection measures (e.g., denser anti-missile coverage) to increase stability even if peace is not achieved in the short-term

**Strong engagement of financial institutions**
- Leverage IFIs and banking sector to ensure transparency, legal protection and proper risk management

**Strengthened ties with neighbors and global actors**
- Strengthen ties to neighboring countries (e.g., through logistics and value chain integration); attract private sector investments

**Not only a reconstruction, also a transformation**
- Increase rule of law to protect investors; rebuild in spirit of green transformation

**Lessons from history leveraged**
- Take advantage of lessons learned through transition to full market economy after CEE breakup with RU in the 90's - esp. PL (similar size, economic structure, 30Y GDP CAGR of 4.1%)

Source: BCG analysis; World Bank; GUS Poland
Estimated required funding at up to ~$800B, with most immediate needs of ~$150B

Distribution of financial needs by priority and domain, $B

- Initial reconstruction focus
  - High Impact needs
  - Medium priority needs
  - Lower priority needs
  - Total funding needed

- Total funding needs – equally split between 2022-2025 (55%) and 2026-2032 (45%)

- Rebuilding infrastructure
- Economic & social
- Green energy & environment

Allies & IFIs expected to provide a bulk of financing and to reduce risk for private capital (e.g., legal protection, favorable financial instruments)

Distribution of financial needs by source, $B

- IFIs’ and Allies’ select declarative commitments and support as of Feb’23
  - ~$100B total mobilized and budgeted for military & economic support
  - ~€50B assistance made available by EU
  - More than $18B of assistance, incl. up to $880M for reconstruction efforts being mobilized
  - ~€6.5B of financing provided and committed, aiming to raise up to ~€100B for reconstruction
  - ~$1.3B of emergency assistance, with $14-16B expected later via 3-4-year lending program

1. EIB classification (abbreviated & simplified): high impact - jumpstarting the economy, addressing acute needs; medium impact - restoring UA economy to the pre-2022 state; total funding needed includes the holistic transformation effort to EU-aligned economy; all est. excluding “Defense and security topic”; 2. Based on NRC Ukraine’s National Recovery Plan and EIBxBCG report; 3. Excluding $13B of support provided through World Bank; 4. World Bank’s RELINC project and URTF, incl. envisaged funding; 5. Source: NRC Ukraine’s National Recovery Plan 07/22; EIBxBCG Supporting Ukraine: A Study on Potential Recovery Strategies for UA 01/23; Reuters; EU Council; EIB; World Bank; CRFB; BCG analysis

Prepared: 21 Feb 2023 – Confidential: Limited Distribution

Allied govts & IFIs to provide a bulk of funding, reducing risks for business

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Western / central regions have lower war risk and are key to Ukraine's economy – reconstruction possible in some areas

- Significant pre-2022 supply chains functioning in western/central Ukraine
- Lviv is only 70km from the border with the EU single market
- While residual war risk remains, improved defenses & distance from the front line means that these can be managed
- Improving connectivity with the EU and the wider world, e.g., ~500 km of rail reconstruction, continuous power grid repair

Eastern regions have higher war risk, greater levels of damage, and less early potential for reconstruction

- Intense fighting continues in eastern Ukraine and bordering regions:
  - Russia continues to occupy Crimea and most of the four Eastern regions
  - Economic infrastructure in Donetsk & Luhansk destroyed in 2014, not operational since
  - Substantially higher reconstruction needs for the Eastern regions, however it is unlikely to start unless deescalation is achieved

Major cities

<table>
<thead>
<tr>
<th>City</th>
<th>Population</th>
</tr>
</thead>
<tbody>
<tr>
<td>Kyiv</td>
<td>2.9M</td>
</tr>
<tr>
<td>Kharkiv</td>
<td>1.4M</td>
</tr>
<tr>
<td>Donetsk</td>
<td>0.9M</td>
</tr>
<tr>
<td>Odesa</td>
<td>1M</td>
</tr>
<tr>
<td>Mykolaiv</td>
<td>0.5M</td>
</tr>
<tr>
<td>Dnipro</td>
<td>0.9M</td>
</tr>
<tr>
<td>Lviv</td>
<td>0.7M</td>
</tr>
<tr>
<td>Donetsk</td>
<td>0.9M</td>
</tr>
<tr>
<td>Kharkiv</td>
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<td>0.7M</td>
</tr>
<tr>
<td>Odesa</td>
<td>1M</td>
</tr>
</tbody>
</table>

Regions to be considered for investment in early reconstruction stage

- Considerable risk – focused investments to be closely discussed with UA, scaling possible once the conflict cools down / ends
- Active war zone - no investment advised unless circumstances change

Focused investment activity possible mindful of military risk

Source: ISW; expert interviews; BCG analysis based on State Statistics Service of Ukraine data and media reports
A number of private sector players restored Ukrainian operations; some began scaling capabilities.

**Resuming operations in Ukraine**

- In September 2022 resumed production of Skoda for UA local market in Solomonovo plant (Western UA), almost reaching pre-2022 levels.
- In September 2022 resumed operations focusing on Kyiv and Western regions.
- In December 2022 started to export crops from Ukraine’s 2022 harvest.

**Decoupling Ukraine operations from Russia-centric structures**

- Removed UA from RU-centric regional organizational and supply-chain structures, moved to newly formed Poland, Baltics & Ukraine.

**Scaling pre-2022 capabilities**

- PKO BP, one of the few EU-based (PL) banking groups with Ukrainian subsidiary announced an expansion of UA-focused capabilities to support corporate clients in their participation in the reconstruction.

Source: company websites and press releases; Bloomberg; NYTimes; BCG analysis.
Private sector actors announcing new investments and launching reconstruction-focused financing vehicles

**Planned investments**

- In June 2022 announced the investment of $214M in a new **Building Technology campus** in Ukraine
- In December 2022 announced the investment of ~$43M in a new **noodle production site** in Western Ukraine, aiming to grow its regional hub for food & culinary products up to 1500 employees
- In January 2023 announced $35M investments in rebuilding Ukraine **agricultural sector**, aiming to boost seed processing capacity
- In February 2023 expressed **interest in continuing investments** in Ukraine
- In September 2022 raised $125M from international investors to back Ukraine’s high-growth tech and export-oriented firms
- In November 2022 announced $0.5B seed investment in a $25B fund for reconstruction of primary infrastructure
- Announced $40M round for the development of Ukraine-focused debt and equity funds, targeting SMEs

**Source:** company websites and press releases; State Property Fund of Ukraine; USAID; BBC; FT; BCG analysis
International partners needed in all sectors, especially in logistics & industry

For a number of sectors, key investment needs are already defined

**Industry** | Building capacity in reconstruction-oriented materials, in line with green transformation principles

**Logistics** | Increasing transport capacity to EU economies, securing and increasing sea transport capacity, esp. through routes to Constanta port (RO)

**Construction** | Reorientation towards reconstruction, international companies likely to be essential to ensure effective use of reconstruction and recovery funds

**Retail and services** | Supporting liquidity through capital investments/M&A, compensating for lost domestic demand & supply

**Agriculture** | Investments in harvest storage, processing, and sowing: supporting military with recovery of land areas (removal of land mines)

**Municipal** | Wide-scale reconstruction of housing units, restoration of water/sewage networks & power connectivity

**Fuel** | Increasing transport of refined fuels and reconstruction of domestic refining capacity

**Energy** | Grid and generating capacity repair and improvement

Source: NRC Ukraine’s National Recovery Plan 07/22; 2022 World Steel in Figures; BCG analysis

Reconstruction effort likely to drive up prices of construction raw materials

<table>
<thead>
<tr>
<th>Material</th>
<th>2021 Capacity</th>
<th>2021 Reconstruction needs</th>
</tr>
</thead>
<tbody>
<tr>
<td>Steel, M tonnes</td>
<td>13</td>
<td>~9-33</td>
</tr>
<tr>
<td>Cement, M tonnes</td>
<td>~11</td>
<td>~14-125</td>
</tr>
<tr>
<td>Float glass, M m2</td>
<td>0</td>
<td>~28-255</td>
</tr>
</tbody>
</table>

Source: NRC Ukraine’s National Recovery Plan 07/22; 2022 World Steel in Figures; BCG analysis
Opportunities and challenges exist for long-term engagement

**Opportunities**

- **Talent & innovation**
  - 130K STEM graduates annually, more than in PL, DE, or FR
  - 250k developers (leading IT hub in CEE)

- **Market size**
  - Total population of 43M (4x larger than most regional peers)
  - 7th largest European country (similar to PL)
  - High convergence potential with CEE

- **Cost competitiveness**
  - Labor cost 3x times lower than in PL
  - Electricity cost for business customers 16% lower than in PL

- **Business environment**
  - Allies and IFIs investing in strengthening governance and transparency as a part of reconstruction programme

- **Connectivity**
  - More proximate to EU than most other emerging markets

**Challenges**

- Significant talent lost due to war
- Reduced buying power per capita due to war
- Geo distribution of population in flux due to war
- Short-term rise in transport costs until new infrastructure completed
- Labor shortages may increase wage costs
- Low rule of law ratings
- Among highest levels of corruption in Europe
- 3-day lead time to export (vs. 1 day for PL)
- Bottlenecks on EU border due to lack of standard gauge rail
- Constrained access to sea due to RU

Source: BCG analysis
Changing global and regional trends with impact on UA economy

Hypercharged relationship with EU | EU being a main trade partner for UA (55%), Ukraine officially recognized as an EU Candidate country

Infrastructure re-orientation to the West | Agreement for construction of standard gauge railroad from Lviv to Warsaw (PL) signed in January 2023

Near-shoring | As the EU seeks to improve supply chain resilience, Ukraine’s proximity to European manufacturers could be an advantage

EU seeking new import sources | With investment, Ukraine could increase exports of key products such as iron, titanium and cereals, replacing Russian trade blocked by sanctions

A decarbonized economy | International reconstruction funds will focus on supporting Ukraine’s transformation to a green economy while rebuilding

Example:
A major green steel supplier could be built in the Kryvyi Rih close to the EU borders. Ukraine already has key factors needed to support such an investment:

- **Access to raw materials**: 6th iron ore producer globally, 90% mining capacity near Kryvyi Rih
- **Water supply**: Large river (Dnipro) nearby
- **Know-how and skilled workforce**: from, among others, destroyed Azovstal
- **Access to low-carbon power**: (nuclear)

Source: Literature and media review; BCG analysis
Global economic impact of the war in Ukraine

Ukraine reconstruction & strategic rationale for businesses to engage

Implications for leaders
Leaders should determine if organizations' objectives fit with reconstruction

**Shorter Term**

- Consider changes to your earlier evaluations of Ukraine, accounting for war-related disruption and also favorable trends for operations and investment
- Integrate Ukraine westward into your EU operations
- Ensure supplies of key products to Ukrainian customers by strengthening and building distribution
- Identify specific opportunities in your industry to engage in reconstruction plans and scale local/regional operations
- Engage with political leaders, IFIs, and other public sector stakeholders early – to gauge policy support for investment, risk mitigators, etc.

**Longer Term**

- Embed scenario planning into your business planning processes. Test resiliency of business plans, and develop contingency plans as necessary
- Understand how investments in Ukraine can enhance your global footprint and become a platform for exports to Europe
- Test local FDI conditions, starting with smaller investments and safer options, with continual evaluation and adaptation
- Work with IFIs on financing support needed (e.g., guarantees) to maximize your Ukraine investments

Source: BCG case experience & analysis
Explore the topic further: EIB x BCG report Supporting Ukraine: A Study on Potential Recovery Strategies for Ukraine
Teams across BCG are actively monitoring the situation

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