

# SUN4Ukraine

## Technical report on the frontrunners Needs

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Among the 5 missions, SUN4Ukraine is part of the **100 Climate-Neutral and Smart Cities by 2030.**

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# Document information

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| Lead Organisation      | Arup                                                                                                                   |
| Contributing Partners  | Ecoaction                                                                                                              |
| Report Authors         | Anastasiia Ivashyna, Adam Farenden, Joanna Malanowska, Luxmi Shanmuganantha, Jakub Bamburski, Katarzyna Solarek-Pancic |
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# Abbreviations and acronyms

| Acronym         | Description                               |
|-----------------|-------------------------------------------|
| AI              | Artificial Intelligence                   |
| C&D             | Communication & Dissemination             |
| EPA             | Environmental Protection Agency           |
| EPBD            | Energy Performance of Buildings Directive |
| EU              | European Union                            |
| EV              | Electric Vehicle                          |
| FM              | Flagship Municipality                     |
| FRC             | Front-Runner City                         |
| GIS             | Geographic Information System             |
| GPS             | Global Positioning System                 |
| HVAC            | Heating, Ventilation and Air Conditioning |
| IDP             | Internally Displaced Person               |
| IFIs            | International Finance Institutions        |
| IoT             | Internet of Things                        |
| km              | Kilometres                                |
| km <sup>2</sup> | Square kilometres                         |
| LED             | Light-Emitting Diode                      |
| MBT             | Mechanical Biological Treatment           |
| MFA             | Material Flow Analysis                    |
| MMC             | Modern Methods of Construction            |
| NbS             | Nature-based solutions                    |
| NGO             | Non Governmental Organization             |

| Acronym     | Description                                                      |
|-------------|------------------------------------------------------------------|
| NZC         | NetZeroCities                                                    |
| PDNA        | Post-Disaster Needs Assessment                                   |
| PJSC        | Public Joint-Stock Company                                       |
| PV          | Photovoltaics                                                    |
| RDF         | Refuse-Derived Fuel                                              |
| RES         | Renewable Energy Sources                                         |
| SMEs        | Small and Medium-sized Enterprises                               |
| SuDS        | Sustainable Drainage System                                      |
| SUN4Ukraine | Sustainable Urban Net Zero Network for Ukraine                   |
| EU          | European Union                                                   |
| UNDP        | United Nations Development Programme                             |
| UNESCO      | United Nations Educational, Scientific and Cultural Organization |
| USD         | United States Dollar                                             |
| U-SNAP      | Ukrainian Support Needs Assessment process                       |
| UV          | Ultraviolet radiation                                            |
| VR/AI       | Virtual Reality/ Artificial Intelligence                         |
| WP          | Work package                                                     |
| WtE         | Waste to Energy                                                  |
| WTP         | Water Treatment Plants                                           |
| WWTPs       | Wastewater Treatment Plants                                      |



# Notice on the use of the term frontrunner

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SUN4Ukraine has changed the term FRC (Front-Runner City), as stated in the Grant Agreement, to FM (Flagship Municipality). This decision was made to better adapt the project to the Ukrainian context, since Flagship Municipality provides a more accurate translation into Ukrainian, better reflects the country's territorial structure, where the term "city" is not fully appropriate, and provides a clearer verbal identity to the project, by distinguishing itself from other initiatives that use the term Front-Runner City. This decision was taken by the project's Executive Committee meeting held on 7 August 2024 and coordinated with the European Commission's team working on the Mission for 100 Climate-Neutral and Smart Cities by 2030.

Accordingly, this report will consistently use the term Flagship Municipality (FM) in place of Front-Runner City (FRC).



# Executive Summary

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## Project Overview:

SUN4Ukraine is a major European initiative supporting the climate-neutral recovery of 12 Ukrainian Flagship Municipalities (FMs) by 2050. The project brings together Arup, Eurocities, EcoAction, and other partners to deliver technical assistance, capacity building, and knowledge exchange, aligning local recovery with the EU's Climate-Neutral and Smart Cities Mission.

The needs assessment for SUN4Ukraine was conducted across seven strategic sectors: Energy, Buildings, Water, Mobility, Waste, Green Infrastructure, and Digital. The team adopted an evidence-based approach, which involved a thorough review of municipal policies and plans, the organisation of expert workshops, and the synthesis of local priorities identified by participating cities. These workshops brought together international specialists across Arup who helped validate the findings and tailor recommendations to Ukraine's post-war context, ensuring that the proposed strategies are both technically robust and locally relevant.

## Key Findings:

Key characteristics were identified across the 12 selected municipalities to establish a baseline context, including geography, size, population, city profile and war impacts. Municipalities differ significantly in profile, and the extent of war impacts—ranging from small towns of cultural importance to large metropolitan centres of core strategic industrial importance.

For each flagship municipality, sector-specific infrastructure, construction, and community needs were identified. These were then compared to highlight commonalities, revealing needs shared across all or majority of cities. Overall findings include:

- **Infrastructure & Resilience:** Urgent need to rebuild and modernise energy, water, and transport systems, prioritising decentralisation, renewables, and resilience to conflict-related risks.
- **Urban Modernisation:** Deep retrofit of buildings, expansion of green and digital infrastructure, and adoption of circular economy and nature-based solutions.
- **Social & Community Needs:** Addressing acute housing, healthcare, and community infrastructure gaps, with a focus on vulnerable groups and social cohesion.
- **Strategic Recommendations:** Integrated planning, robust governance, and targeted investment are essential for a climate-neutral, future-ready Ukraine. Collaboration with EU Mission Cities and alignment with national climate policy are critical success factors.

Overall, this task report provides a starting point for Ukraine's green recovery—combining immediate reconstruction with long-term transformation towards sustainable, resilient, and inclusive cities.



# PROJECT OVERVIEW



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# Mission and Partners

SUN4Ukraine (Sustainable Urban Net Zero Network for Ukraine) is a Horizon Europe project designed to support Ukrainian cities in aligning their post-war recovery with long-term climate neutrality goals.

The project is rooted in the belief that rebuilding efforts present a unique opportunity to accelerate the transition toward sustainable, low-carbon urban development. Through technical assistance, capacity building, and knowledge exchange, SUN4Ukraine empowers local governments to plan and implement climate-resilient strategies that are aligned with the EU's Climate-Neutral and Smart Cities Mission.

Twelve Ukrainian Flagship Municipalities (FMs) have been selected to participate in the project. These cities are at the forefront of Ukraine's climate transition and are committed to achieving climate neutrality by 2050. Their participation in SUN4Ukraine reflects a broader national commitment to sustainable development, as enshrined in the Law "On the Basic Principles of State Climate Policy" (Ukrainian Parliament, October 2024). This law provides a legal and organizational framework for low-carbon development and mandates local governments to develop and implement climate-aligned local plans.



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# Project Objectives

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One of the project objectives is to provide technical support and expertise to Ukrainian cities through a structured capacity-building programme. The project fosters collaboration between Ukrainian municipalities and EU Mission Cities, enabling the exchange of best practices, innovative solutions, and governance models that support the climate transition.

This report focuses on Work Package 1 (WP1), where Arup provided targeted support to EcoAction in developing a comprehensive needs assessment for all 12 Flagship Municipalities.

## Purpose of the Needs Assessment

The primary objective of the needs assessment was to understand the baseline conditions and development priorities of each FM in relation to their climate neutrality ambitions. Specifically, the assessment sought to identify:

- how cities define their climate-related needs and ambitions,
- the documents and data sources they have developed so far and they rely on,
- the sectors they prioritize in their planning.

This foundational work is critical to ensuring that future planning and investment efforts are grounded in a clear understanding of local contexts and challenges.

The Needs Assessment was performed for 7 key strategic sectors, following NZC categorisation:

- Energy
- Buildings and related infrastructure
- Water
- Mobility and transport
- Waste and the circular economy
- Green Infrastructure & Nature Based Solutions
- Digital



# Methodology and Approach

Arup's approach to the needs assessment was systematic and evidence-based. The task was structured in six phases:

1. We reviewed all available documentation provided by the Flagship Municipalities, including policies, strategies, and action plans. This was complemented by city publicly available materials.
2. We reviewed and included conclusions from the Ukrainian Support Needs Assessment Process (U-SNAP), prepared by EcoAction.
3. For each Flagship Municipality, we developed a long list of identified needs, organized by the strategic sectors and identifying data sources.
4. From these long lists, we derived short lists of critical infrastructure needs, focusing on those that were either nationally or regionally significant, or frequently recurring across multiple cities.
5. To ensure the robustness of the findings, we convened three workshop sessions with Arup international specialists from each of the sectors. The experts were provided with an overview of each of the FMs (including city location, population economic profile, war impact) and with the shortlisted needs.

The three workshops covered various strategic sectors and experts were aligned to the sessions according to their fields of expertise. Experts were asked to:

- review the identified infrastructure needs through a net-zero and climate mitigation lens,

- provide guidance on the capacities cities will require to meet these needs,
  - offer insights into long-term planning, risks, and opportunities,
  - highlight key considerations that should not be overlooked,
  - share relevant case studies and international best practices, adapted to the Ukrainian context, including war-related damage and economic constraints.
6. Core findings, recommendations and reflections from the sessions were captured.

A city profile has been prepared for each Flagship Municipality, including details specific to each city. Historical and cultural aspects are emphasized where they are particularly important, while industry and economic factors are highlighted for cities where they are most relevant. This information will be essential for developing a net zero strategy.

All figures, including IDP-related dates, are provided directly by the Flagship Municipalities.

This report presents a synthesis of the outcomes of these workshops, offering a technically grounded, forward-looking perspective on the infrastructure needs of Ukraine's Flagship Municipalities as they embark on their climate-neutral recovery journey.



# Workshops Structure and Arup Experts

**Workshop 1 (17 June 2025)** covered the following sectors:

- Energy
- Water
- Transport and Mobility

Experts engaged in this session included:

- [Lean Doody](#): Cities & Masterplanning
- [Pasquale Capizzi](#): Climate and Infrastructure
- [Rafał Janus](#): Energy
- [Sean Lockie](#): Capacity/Capability Building
- [Tiago Oliveira](#): Transport and Mobility
- [Stefan Obłąkowski](#): Water and Environment

**Workshop 2 (30 June 2025)** covered the sector of Buildings and related infrastructure.

Experts engaged in this session included:

- [Lean Doody](#): Cities & Masterplanning
- [Pasquale Capizzi](#): Climate and Infrastructure
- [Sean Lockie](#): Capacity/Capability Building
- [Sara Candiracci](#): Social Infrastructure & Human Development
- [Becci Taylor](#): Residential Development
- [Alice Charles](#): Cities and Masterplanning
- [Łukasz Olbromski](#): Buildings, Energy Efficiency

**Workshop 3 (1 July 2025)** covered the following sectors:

- Waste and the circular economy
- Green Infrastructure & Nature Based Solutions
- Digital

Experts engaged in this session included:

- [Lean Doody](#): Cities & Masterplanning
- [Sean Lockie](#): Capacity/Capability Building
- [Sara Candiracci](#): Social Infrastructure & Human Development
- [Ersoy Pehlivan](#): Smart City & Digital

Each of the workshop sessions was facilitated by:

- Adam Farenden: Project Manager
- Joanna Malanowska
- Luxmi Shanmuganatha
- Jakub Bamburski
- Katarzyna Solarek-Pancic



# Workshop Outputs

- Expert insights from each workshop were captured through a Whiteboard
- Key considerations related to each identified need were captured
- Workshop insights have been summarised in sections below

| Waste and the circular economy                                                                       |                                                                                                                                                                      |  |  |                                                                                                                                  |  |  |                                                                                                             |  |  |                                                                                                                            |  |  |                                                                                                                                          |  |  |                                                                    |  |  |
|------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------|--|--|----------------------------------------------------------------------------------------------------------------------------------|--|--|-------------------------------------------------------------------------------------------------------------|--|--|----------------------------------------------------------------------------------------------------------------------------|--|--|------------------------------------------------------------------------------------------------------------------------------------------|--|--|--------------------------------------------------------------------|--|--|
| <br>Identified need | Purchase and installation of equipment and machinery for the collection, transportation, sorting, pressing, recovery, recycling and disposal of various waste types. |  |  | Procurement of containers and deployment of city-wide infrastructure for the separate collection of solid household waste.       |  |  | Development of MBT complexes for the efficient treatment and reduction of solid household waste volumes.    |  |  | Construction of modern recycling plants to process and repurpose recyclable materials, reducing landfill dependency.       |  |  | Recultivation and environmental restoration of existing landfills to mitigate pollution and reclaim land for future use.                 |  |  |                                                                    |  |  |
|                                                                                                      | Public resources<br>Investment in waste management infrastructure                                                                                                    |  |  | Private resources<br>Investment in waste management infrastructure                                                               |  |  | Public resources<br>Investment in waste management infrastructure                                           |  |  | Private resources<br>Investment in waste management infrastructure                                                         |  |  | Public resources<br>Investment in waste management infrastructure                                                                        |  |  | Private resources<br>Investment in waste management infrastructure |  |  |
|                                                                                                      | 2024-2025                                                                                                                                                            |  |  | 2024-2025                                                                                                                        |  |  | 2024-2025                                                                                                   |  |  | 2024-2025                                                                                                                  |  |  | 2024-2025                                                                                                                                |  |  | 2024-2025                                                          |  |  |
|                                                                                                      | 2024-2025                                                                                                                                                            |  |  | 2024-2025                                                                                                                        |  |  | 2024-2025                                                                                                   |  |  | 2024-2025                                                                                                                  |  |  | 2024-2025                                                                                                                                |  |  | 2024-2025                                                          |  |  |
| Comments                                                                                             |                                                                                                                                                                      |  |  |                                                                                                                                  |  |  |                                                                                                             |  |  |                                                                                                                            |  |  |                                                                                                                                          |  |  |                                                                    |  |  |
|                                                                                                      |                                                                                                                                                                      |  |  |                                                                                                                                  |  |  |                                                                                                             |  |  |                                                                                                                            |  |  |                                                                                                                                          |  |  |                                                                    |  |  |
|                                                                                                      |                                                                                                                                                                      |  |  |                                                                                                                                  |  |  |                                                                                                             |  |  |                                                                                                                            |  |  |                                                                                                                                          |  |  |                                                                    |  |  |
|                                                                                                      |                                                                                                                                                                      |  |  |                                                                                                                                  |  |  |                                                                                                             |  |  |                                                                                                                            |  |  |                                                                                                                                          |  |  |                                                                    |  |  |
| Identified need                                                                                      | Establishment of accessible waste collection centers to support community-level waste management.                                                                    |  |  | Restoration and reclamation of polluted land in former industrial zones to enable safe redevelopment and environmental recovery. |  |  | Creation of composting areas and organic waste processing lines to reduce biodegradable waste in landfills. |  |  | Development of specialized systems for managing debris and waste resulting from destruction caused by military activities. |  |  | Establishment of integrated recycling centers with sorting lines and public education components to promote sustainable waste practices. |  |  |                                                                    |  |  |
|                                                                                                      | Public resources<br>Investment in waste management infrastructure                                                                                                    |  |  | Private resources<br>Investment in waste management infrastructure                                                               |  |  | Public resources<br>Investment in waste management infrastructure                                           |  |  | Private resources<br>Investment in waste management infrastructure                                                         |  |  | Public resources<br>Investment in waste management infrastructure                                                                        |  |  | Private resources<br>Investment in waste management infrastructure |  |  |
|                                                                                                      | 2024-2025                                                                                                                                                            |  |  | 2024-2025                                                                                                                        |  |  | 2024-2025                                                                                                   |  |  | 2024-2025                                                                                                                  |  |  | 2024-2025                                                                                                                                |  |  | 2024-2025                                                          |  |  |
|                                                                                                      | 2024-2025                                                                                                                                                            |  |  | 2024-2025                                                                                                                        |  |  | 2024-2025                                                                                                   |  |  | 2024-2025                                                                                                                  |  |  | 2024-2025                                                                                                                                |  |  | 2024-2025                                                          |  |  |
| Comments                                                                                             |                                                                                                                                                                      |  |  |                                                                                                                                  |  |  |                                                                                                             |  |  |                                                                                                                            |  |  |                                                                                                                                          |  |  |                                                                    |  |  |
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| Sector comments:                                                                                                                                                 |  |  |  |  |  |  |  |  |  |
|------------------------------------------------------------------------------------------------------------------------------------------------------------------|--|--|--|--|--|--|--|--|--|
| Guiding questions:                                                                                                                                               |  |  |  |  |  |  |  |  |  |
| 1. What infrastructure and built environment priorities should cities focus on to align with net-zero and climate resilience goals?                              |  |  |  |  |  |  |  |  |  |
| 2. What capacities—technical, institutional, and financial—do cities need to plan and implement climate-aligned reconstruction, especially in post-war contexts? |  |  |  |  |  |  |  |  |  |
| 3. Case study—adapted to the Ukrainian context, taking into account war-related damage and current economic conditions.                                          |  |  |  |  |  |  |  |  |  |
| 4. What are we missing?                                                                                                                                          |  |  |  |  |  |  |  |  |  |
| 5. What must we not forget during implementation of these actions?                                                                                               |  |  |  |  |  |  |  |  |  |
| 6. What does the city need to consider in order to realise this action?                                                                                          |  |  |  |  |  |  |  |  |  |

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|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--|--------------------------------------------------------------------------------------------------------------------------------------------------|--|-------------------------------------------------------------------------------------------------------------------------------------------------|--|
|  | Buildings                                                                                                                                                                                                                                                                           |                                                                                                                                                                                                                                                                                             |                                                                                                                                                                                                                                                                                                   |                                                                                                                                                                                                                                                                                                  |                                                                                                                                                                                                                                                                                                                                   |  |                                                                                                                                                  |  |                                                                                                                                                 |  |
| Identified need<br>→                                                                | Restoration and modernization of educational institutions to meet current standards and community needs.                                                                                                                                                                            |                                                                                                                                                                                                                                                                                             | Rehabilitation of healthcare, social protection, and administrative facilities to ensure essential public services.                                                                                                                                                                               |                                                                                                                                                                                                                                                                                                  | Restoration of damaged cultural landmarks, historical monuments, and sites of architectural and landscape significance.                                                                                                                                                                                                           |  | Installation of modular homes and construction of temporary housing for displaced residents and those affected by war-related destruction.       |  | Repair of damaged residential buildings, construction of new energy-efficient housing, and implementation of affordable housing programs.       |  |
| Comments<br>→                                                                       | <p><b>Goal:</b> Enhance the quality of education and provide safe learning environments for students.</p> <p><b>Key Results:</b> Modernized classrooms, updated infrastructure, and improved learning facilities.</p> <p><b>Timeline:</b> 2024-2026</p>                             | <p><b>Goal:</b> Provide accessible healthcare and social services to the community.</p> <p><b>Key Results:</b> Rehabilitated clinics, updated medical equipment, and improved patient care facilities.</p> <p><b>Timeline:</b> 2024-2026</p>                                                | <p><b>Goal:</b> Restore and preserve cultural heritage sites.</p> <p><b>Key Results:</b> Restored landmarks, improved site management, and enhanced visitor experience.</p> <p><b>Timeline:</b> 2024-2026</p>                                                                                     | <p><b>Goal:</b> Provide safe and affordable housing for displaced residents.</p> <p><b>Key Results:</b> Constructed modular homes, improved temporary housing, and enhanced community support.</p> <p><b>Timeline:</b> 2024-2026</p>                                                             | <p><b>Goal:</b> Improve the quality of residential housing and provide affordable options.</p> <p><b>Key Results:</b> Repaired damaged buildings, constructed new energy-efficient housing, and implemented affordable housing programs.</p> <p><b>Timeline:</b> 2024-2026</p>                                                    |  |                                                                                                                                                  |  |                                                                                                                                                 |  |
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|                                                                                     | <p><b>Goal:</b> Enhance the quality of education and provide safe learning environments for students.</p> <p><b>Key Results:</b> Modernized classrooms, updated infrastructure, and improved learning facilities.</p> <p><b>Timeline:</b> 2024-2026</p>                             | <p><b>Goal:</b> Provide accessible healthcare and social services to the community.</p> <p><b>Key Results:</b> Rehabilitated clinics, updated medical equipment, and improved patient care facilities.</p> <p><b>Timeline:</b> 2024-2026</p>                                                | <p><b>Goal:</b> Restore and preserve cultural heritage sites.</p> <p><b>Key Results:</b> Restored landmarks, improved site management, and enhanced visitor experience.</p> <p><b>Timeline:</b> 2024-2026</p>                                                                                     | <p><b>Goal:</b> Provide safe and affordable housing for displaced residents.</p> <p><b>Key Results:</b> Constructed modular homes, improved temporary housing, and enhanced community support.</p> <p><b>Timeline:</b> 2024-2026</p>                                                             | <p><b>Goal:</b> Improve the quality of residential housing and provide affordable options.</p> <p><b>Key Results:</b> Repaired damaged buildings, constructed new energy-efficient housing, and implemented affordable housing programs.</p> <p><b>Timeline:</b> 2024-2026</p>                                                    |  |                                                                                                                                                  |  |                                                                                                                                                 |  |
| Identified need<br>→                                                                | Comprehensive upgrades to public and private buildings, including insulation, energy management systems, and replacement of outdated heating and ventilation systems.                                                                                                               |                                                                                                                                                                                                                                                                                             | Modernization and expansion of sports facilities, including inclusive design and support for physical education institutions.                                                                                                                                                                     |                                                                                                                                                                                                                                                                                                  | Revitalization of abandoned buildings and old industrial zones for new community, cultural, or economic uses.                                                                                                                                                                                                                     |  | Expansion and diversification of hotel services, including guesthouses, conference facilities, wellness centers, and cultural tourism offerings. |  | Improvement of courtyards in historical areas and construction of public shelter and civil protection facilities in line with safety standards. |  |
| Comments<br>→                                                                       | <p><b>Goal:</b> Enhance the energy efficiency and sustainability of public and private buildings.</p> <p><b>Key Results:</b> Upgraded insulation, installed energy management systems, and replaced outdated heating and ventilation systems.</p> <p><b>Timeline:</b> 2024-2026</p> | <p><b>Goal:</b> Modernize and expand sports facilities to support physical education and inclusive design.</p> <p><b>Key Results:</b> Upgraded sports facilities, installed inclusive design features, and supported physical education institutions.</p> <p><b>Timeline:</b> 2024-2026</p> | <p><b>Goal:</b> Revitalize abandoned buildings and old industrial zones for new community, cultural, or economic uses.</p> <p><b>Key Results:</b> Restored buildings, repurposed industrial zones, and supported new community, cultural, or economic uses.</p> <p><b>Timeline:</b> 2024-2026</p> | <p><b>Goal:</b> Expand and diversify hotel services to attract tourists and support the local economy.</p> <p><b>Key Results:</b> Expanded hotel services, installed guesthouses, conference facilities, wellness centers, and cultural tourism offerings.</p> <p><b>Timeline:</b> 2024-2026</p> | <p><b>Goal:</b> Improve the safety and security of courtyards in historical areas and construct public shelter and civil protection facilities.</p> <p><b>Key Results:</b> Improved courtyards, constructed public shelter and civil protection facilities, and supported safety standards.</p> <p><b>Timeline:</b> 2024-2026</p> |  |                                                                                                                                                  |  |                                                                                                                                                 |  |
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| Sector comments:                                                                                                                                                 |  |  |  |  |  |  |  |  |  |
|------------------------------------------------------------------------------------------------------------------------------------------------------------------|--|--|--|--|--|--|--|--|--|
| Guiding questions:                                                                                                                                               |  |  |  |  |  |  |  |  |  |
| 1. What infrastructure and built environment priorities should cities focus on to align with net-zero and climate resilience goals?                              |  |  |  |  |  |  |  |  |  |
| 2. What capacities—technical, institutional, and financial—do cities need to plan and implement climate-aligned reconstruction, especially in post-war contexts? |  |  |  |  |  |  |  |  |  |
| 3. Case study—adapted to the Ukrainian context, taking into account war-related damage and current economic conditions.                                          |  |  |  |  |  |  |  |  |  |
| 4. What are we missing?                                                                                                                                          |  |  |  |  |  |  |  |  |  |
| 5. What must we not forget during implementation of these actions?                                                                                               |  |  |  |  |  |  |  |  |  |
| 6. What does the city need to consider in order to realise this action?                                                                                          |  |  |  |  |  |  |  |  |  |

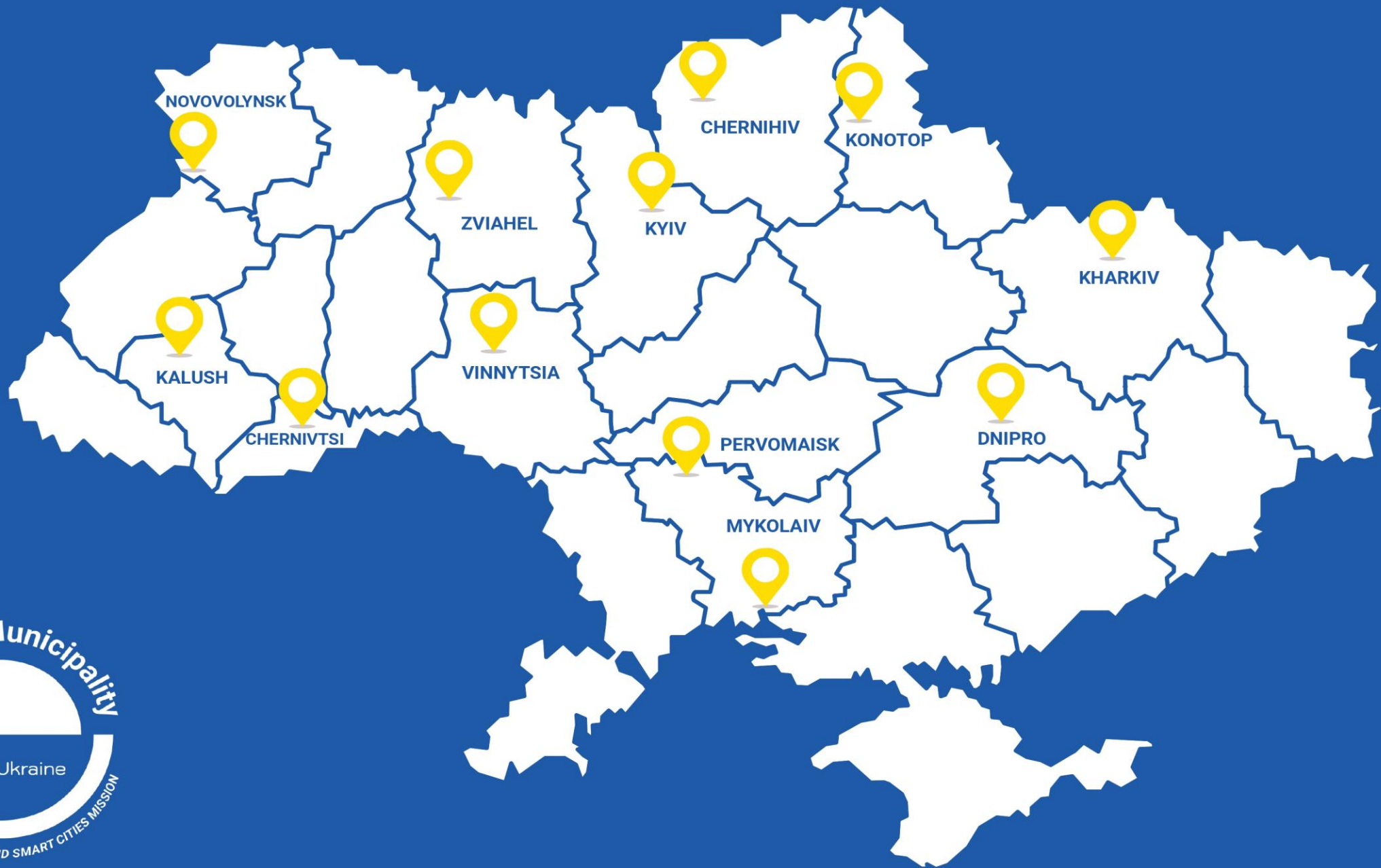
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|-------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------|
|  | Mobility and transport                                                                                                                                    |                                                                                                                                                           |                                                                                                                                                           |                                                                                                                                                           |                                                                                                                                                           |                                                                                                                                                           |                                                                                                                                                           |                                                                                                                                                           |                                                                                                                                                           |                                                                                                                                                           |                                                                                                                                                           |
| Identified need                                                                     | Investment in the construction, reconstruction, and major repairs of public roads and emergency bridges to enhance connectivity and logistics efficiency. |                                                                                                                                                           | Development and renewal of environmentally friendly public transport systems, including e-buses, trolleybuses, trams, and supporting infrastructure.      |                                                                                                                                                           | Comprehensive reconstruction/reconstruction of tram tracks, crossings, and switches using modern technologies to improve reliability and efficiency.      |                                                                                                                                                           | Installation of GPS, emergency alert systems, and real-time information tools in public transport vehicles and at stops.                                  |                                                                                                                                                           | Redesign and construction of bus stops to meet safety, accessibility, and inclusion standards for all users.                                              |                                                                                                                                                           |                                                                                                                                                           |
| Comments                                                                            | <p>Need to upgrade road network and emergency bridges to improve connectivity and logistics efficiency.</p>                                               | <p>Need to invest in public transport infrastructure, including e-buses, trolleybuses, and trams, to promote sustainable mobility.</p>                    | <p>Need to develop and renew public transport systems, including e-buses, trolleybuses, and trams, to improve connectivity and logistics efficiency.</p>  | <p>Need to develop and renew public transport systems, including e-buses, trolleybuses, and trams, to improve connectivity and logistics efficiency.</p>  | <p>Need to develop and renew public transport systems, including e-buses, trolleybuses, and trams, to improve connectivity and logistics efficiency.</p>  | <p>Need to develop and renew public transport systems, including e-buses, trolleybuses, and trams, to improve connectivity and logistics efficiency.</p>  | <p>Need to develop and renew public transport systems, including e-buses, trolleybuses, and trams, to improve connectivity and logistics efficiency.</p>  | <p>Need to develop and renew public transport systems, including e-buses, trolleybuses, and trams, to improve connectivity and logistics efficiency.</p>  | <p>Need to develop and renew public transport systems, including e-buses, trolleybuses, and trams, to improve connectivity and logistics efficiency.</p>  | <p>Need to develop and renew public transport systems, including e-buses, trolleybuses, and trams, to improve connectivity and logistics efficiency.</p>  | <p>Need to develop and renew public transport systems, including e-buses, trolleybuses, and trams, to improve connectivity and logistics efficiency.</p>  |
| Identified need                                                                     | Implementation of optimized traffic schemes, pedestrian safety lighting, and acoustic warning systems for improved urban mobility and accessibility.      |                                                                                                                                                           | Construction and modernization of transport hubs to facilitate seamless transfers between public, shared, and micromobility modes.                        |                                                                                                                                                           | Deployment of EV charging stations and support for electric and micromobility transport to reduce emissions and modernize urban fleets.                   |                                                                                                                                                           | Creation of multi-level and organized parking facilities, along with improved parking management systems in high-density areas.                           |                                                                                                                                                           | Expansion of bicycle lanes, pedestrian zones, and barrier-free sidewalks to promote safe, inclusive, and sustainable mobility.                            |                                                                                                                                                           |                                                                                                                                                           |
| Comments                                                                            | <p>Need to implement optimized traffic schemes, pedestrian safety lighting, and acoustic warning systems to improve urban mobility and accessibility.</p> | <p>Need to implement optimized traffic schemes, pedestrian safety lighting, and acoustic warning systems to improve urban mobility and accessibility.</p> | <p>Need to implement optimized traffic schemes, pedestrian safety lighting, and acoustic warning systems to improve urban mobility and accessibility.</p> | <p>Need to implement optimized traffic schemes, pedestrian safety lighting, and acoustic warning systems to improve urban mobility and accessibility.</p> | <p>Need to implement optimized traffic schemes, pedestrian safety lighting, and acoustic warning systems to improve urban mobility and accessibility.</p> | <p>Need to implement optimized traffic schemes, pedestrian safety lighting, and acoustic warning systems to improve urban mobility and accessibility.</p> | <p>Need to implement optimized traffic schemes, pedestrian safety lighting, and acoustic warning systems to improve urban mobility and accessibility.</p> | <p>Need to implement optimized traffic schemes, pedestrian safety lighting, and acoustic warning systems to improve urban mobility and accessibility.</p> | <p>Need to implement optimized traffic schemes, pedestrian safety lighting, and acoustic warning systems to improve urban mobility and accessibility.</p> | <p>Need to implement optimized traffic schemes, pedestrian safety lighting, and acoustic warning systems to improve urban mobility and accessibility.</p> | <p>Need to implement optimized traffic schemes, pedestrian safety lighting, and acoustic warning systems to improve urban mobility and accessibility.</p> |

| Sector comments:                                                                                                                                                 |  |  |  |  |  |  |  |  |  |
|------------------------------------------------------------------------------------------------------------------------------------------------------------------|--|--|--|--|--|--|--|--|--|
| Guiding questions:                                                                                                                                               |  |  |  |  |  |  |  |  |  |
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| 3. Case study—adapted to the Ukrainian context, taking into account war-related damage and current economic conditions.                                          |  |  |  |  |  |  |  |  |  |
| 4. What are we missing?                                                                                                                                          |  |  |  |  |  |  |  |  |  |
| 5. What must we not forget during implementation of these actions?                                                                                               |  |  |  |  |  |  |  |  |  |
| 6. What does the city need to consider in order to realise this action?                                                                                          |  |  |  |  |  |  |  |  |  |

# KEY CHARACTERISTICS OF FLAGSHIP MUNICIPALITIES



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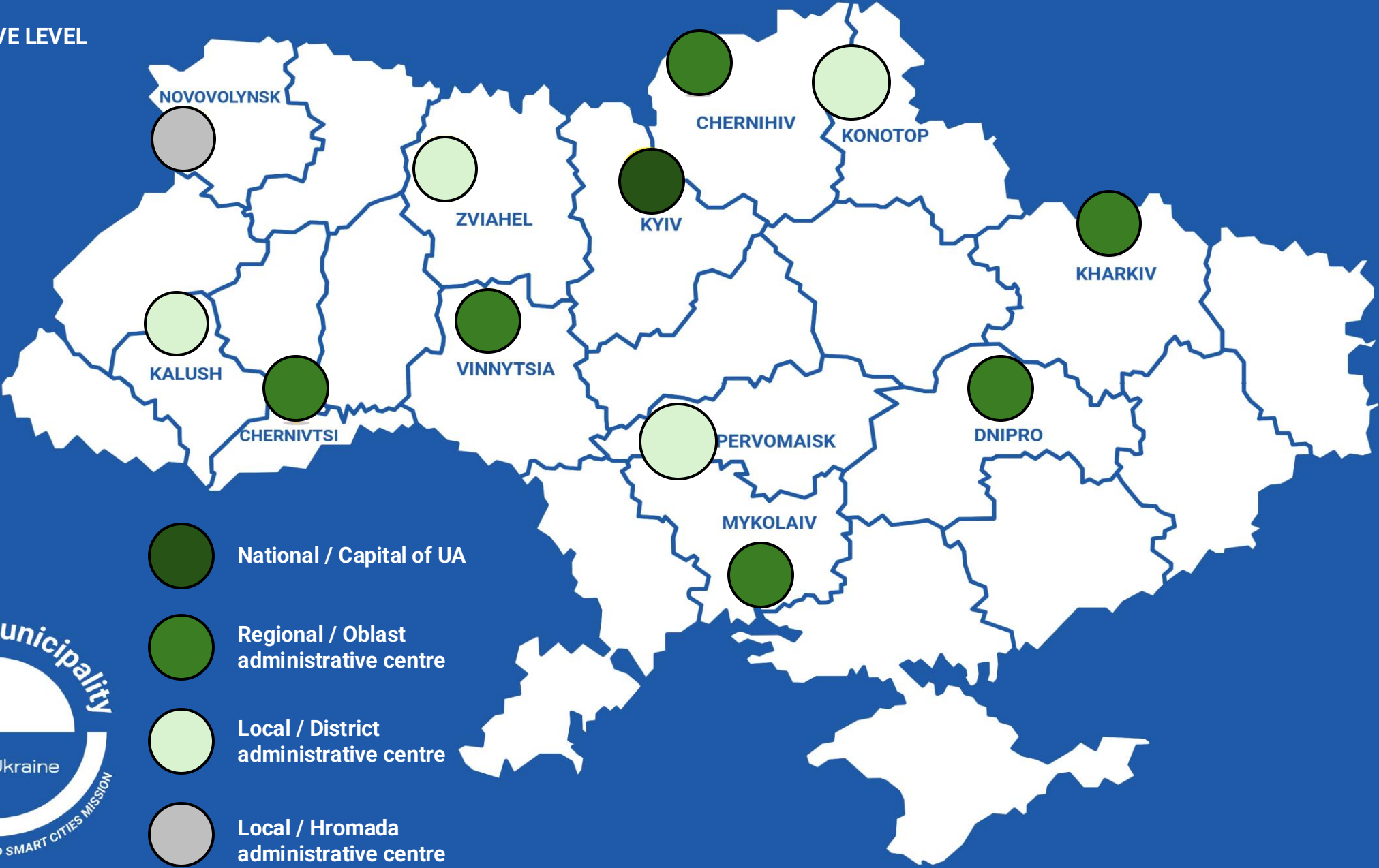


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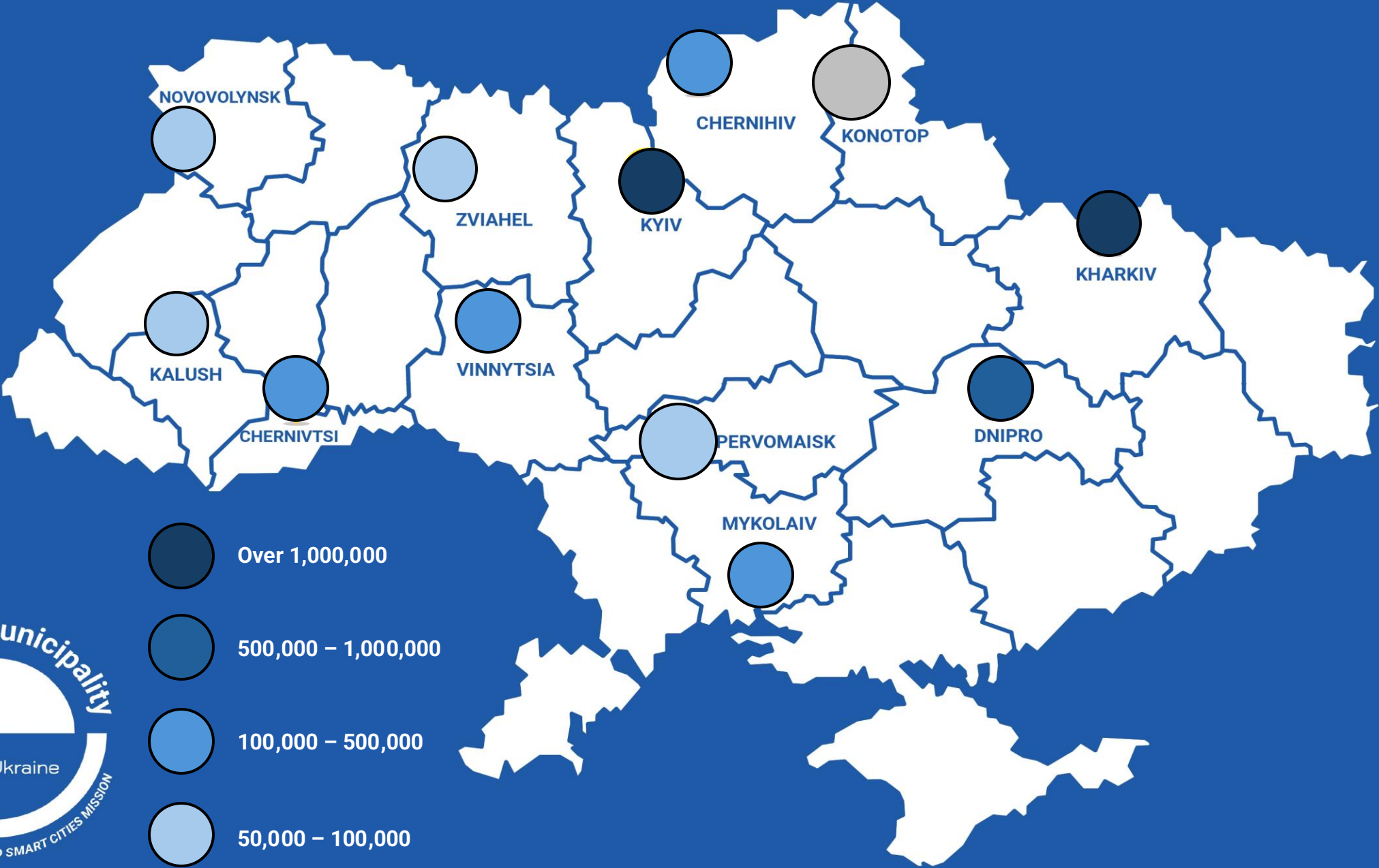
ADMINISTRATIVE LEVEL



-  National / Capital of UA
-  Regional / Oblast administrative centre
-  Local / District administrative centre
-  Local / Hromada administrative centre



POPULATION

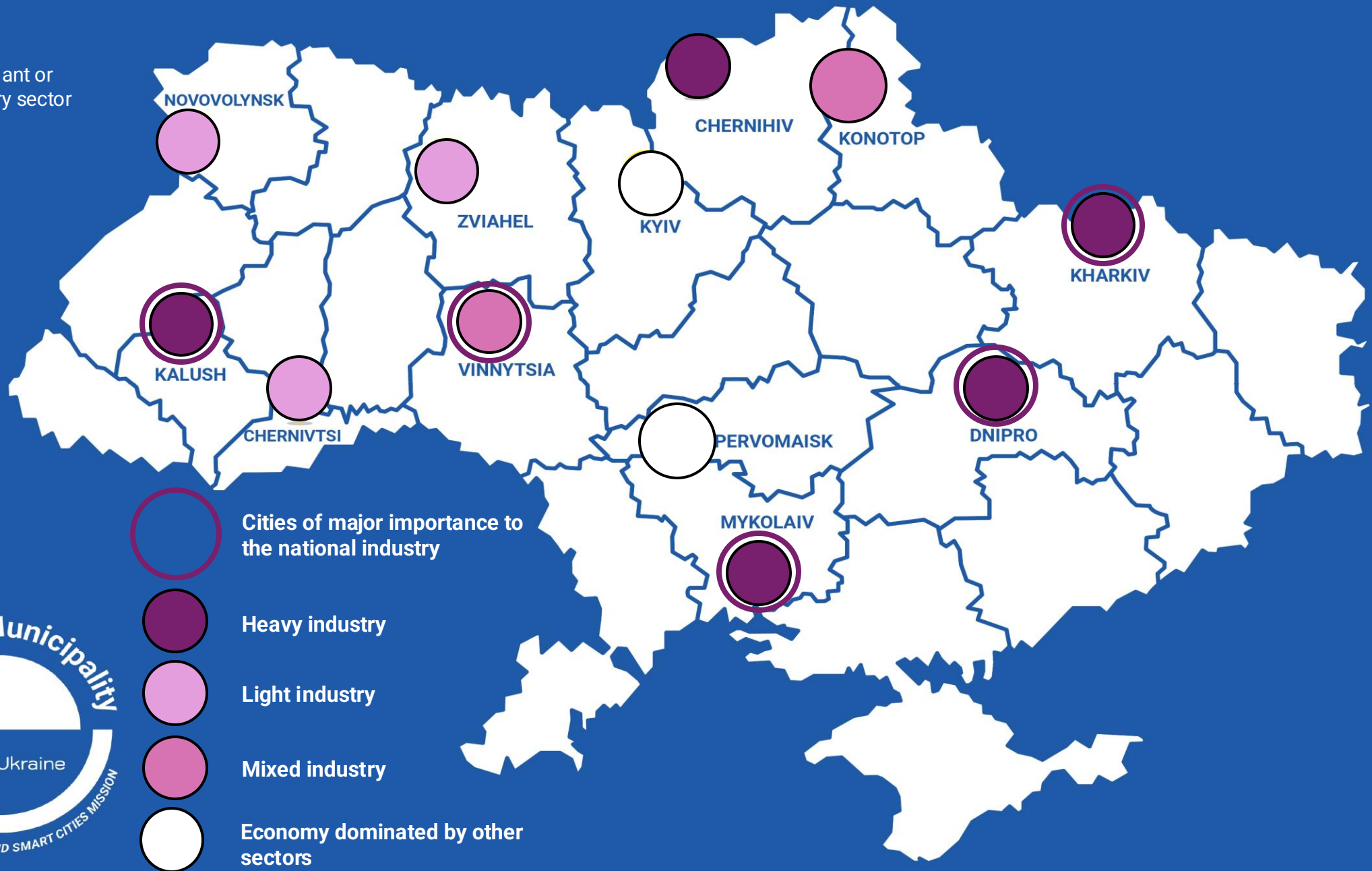


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## INDUSTRIES

Cities with dominant or important industry sector

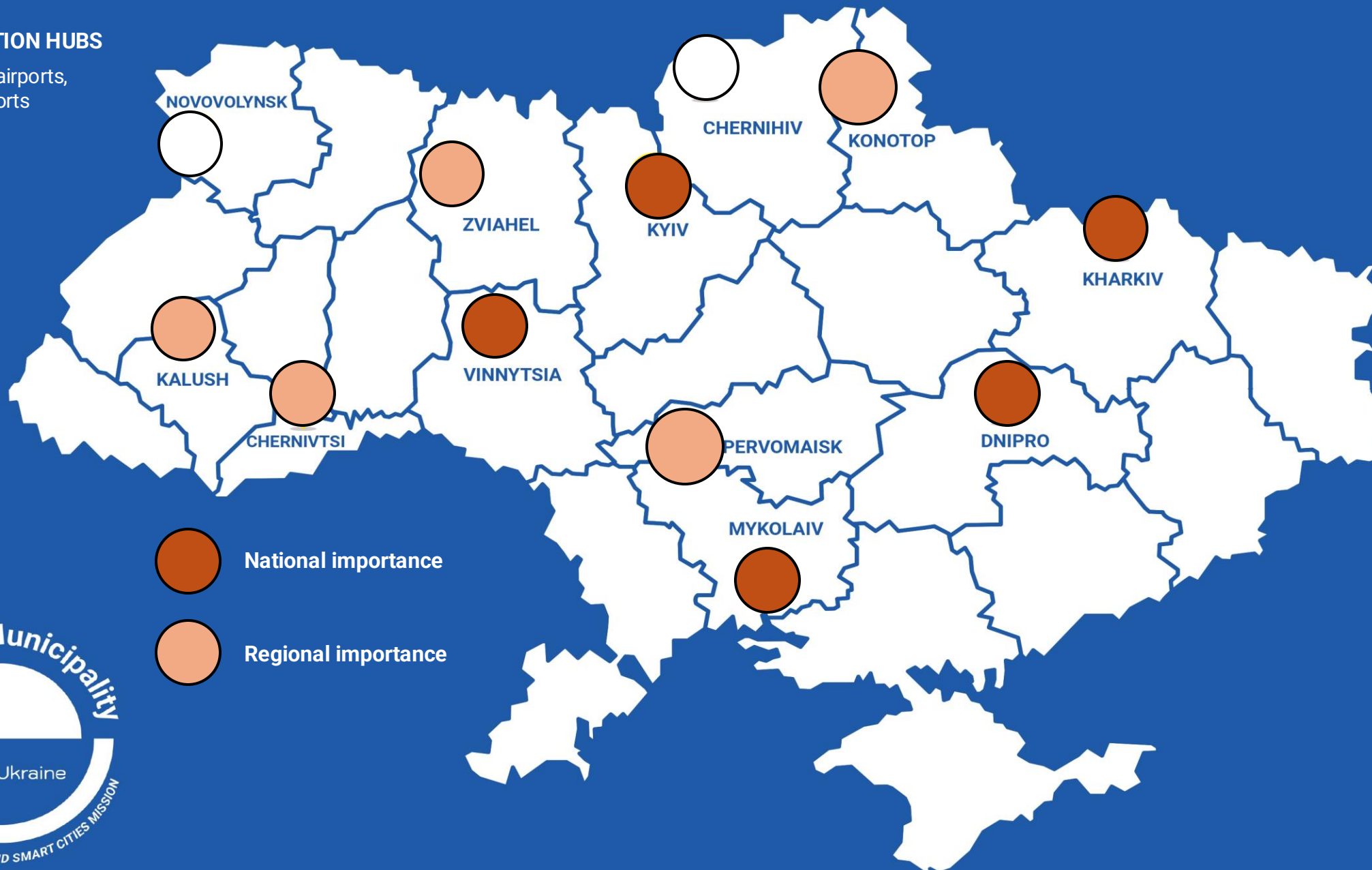


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SUN  
4Ukraine

## TRANSPORTATION HUBS

Roads, railways, airports,  
river ports, sea ports



-  National importance
-  Regional importance

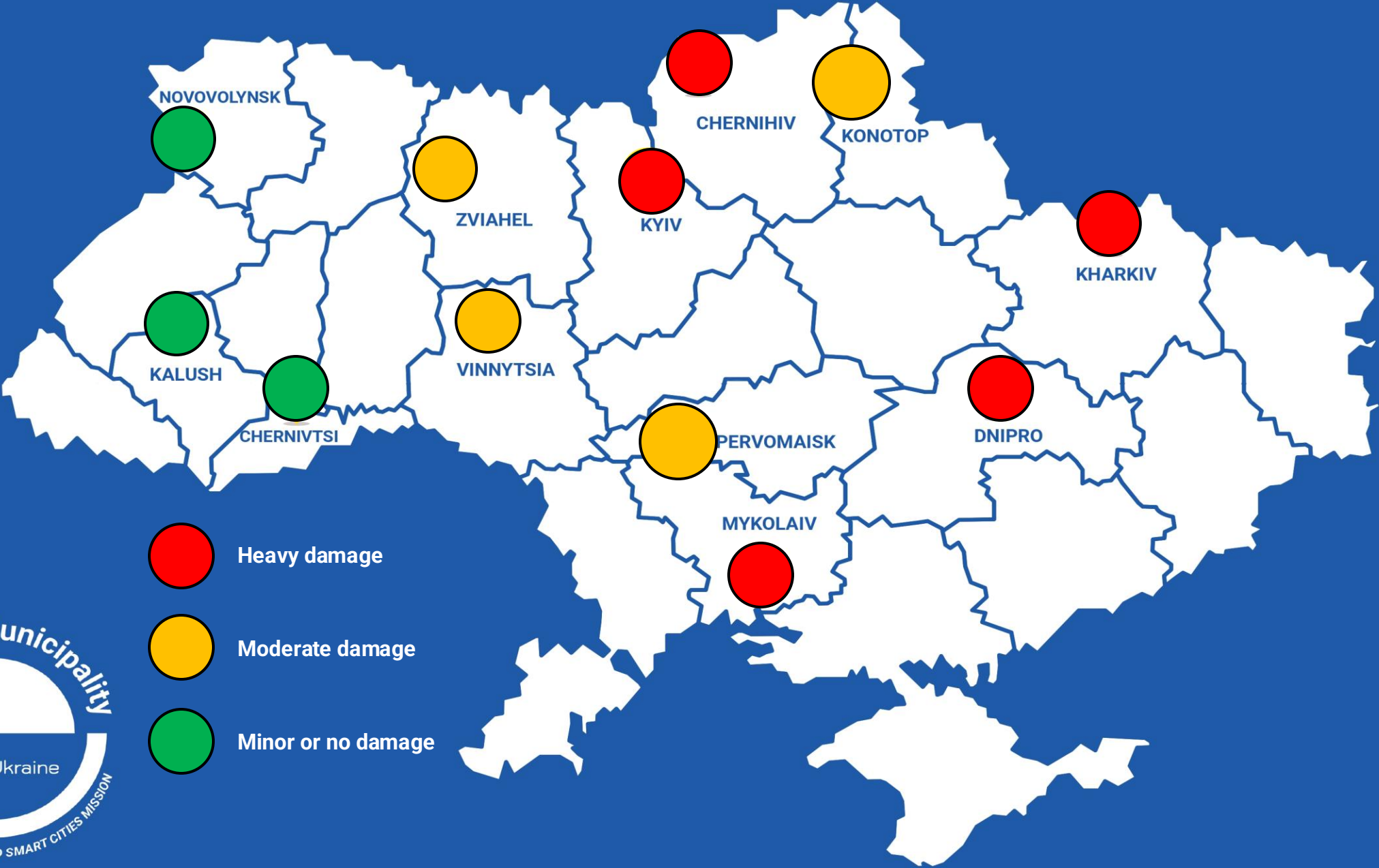


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4Ukraine



WAR DAMAGE

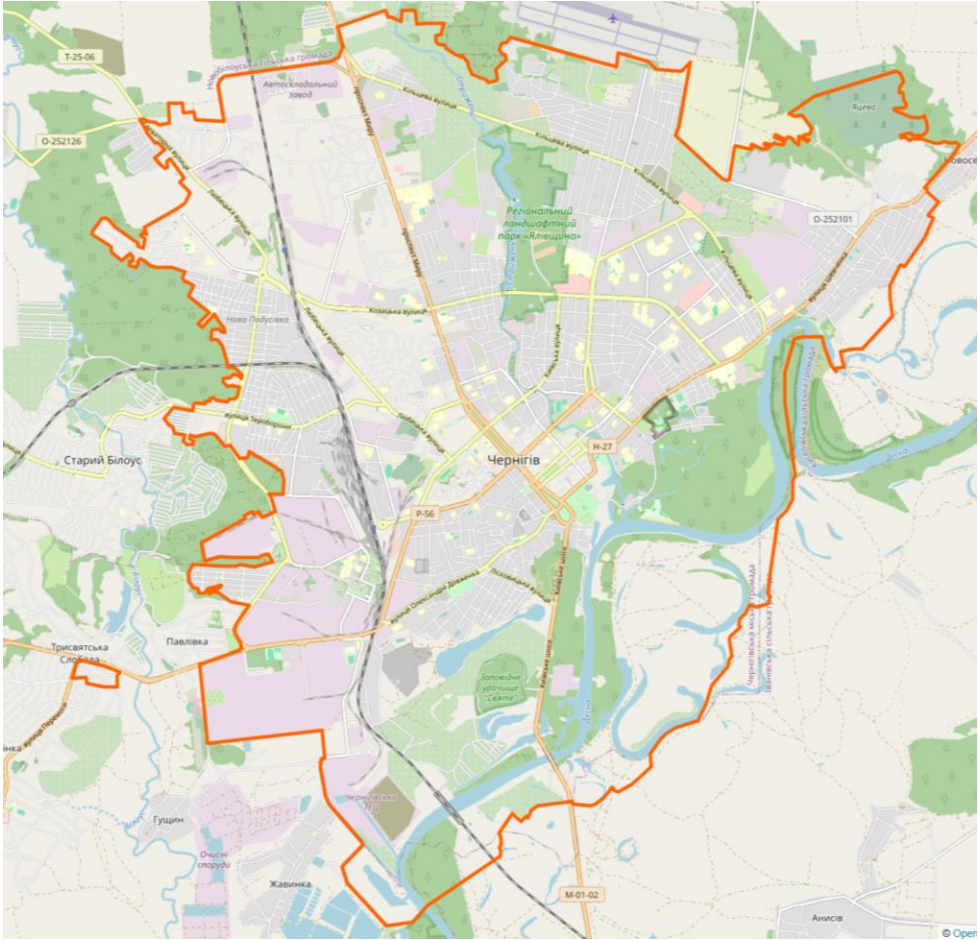


- Heavy damage
- Moderate damage
- Minor or no damage



# Chernihiv

|                     |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |
|---------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Geographic location | 51°30'19.8" N 31°17.092' E;<br>North of Ukraine, Chernihiv Oblast                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |
| Area size           | 78.6 km²                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |
| Population          | 273,513                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |
| City profile        | Chernihiv is a significant historical and cultural centre, home to many heritage landmarks, particularly from the Cossack era and the times of Kyivan Rus. The city also contains several protected natural areas and environmental sites. It features numerous green zones and alleys, offering substantial recreational potential.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |
| War impact          | IDPs: 12,113 people (as of 01.04.2025).<br>Ongoing shelling by the Russian army leads to extensive infrastructure damage and disruption of daily life. As of 06.06.2025, has been destroyed: 2 schools, 1 vocational school, 6 healthcare facilities, a summer theatre, 2 libraries, 3 out of 5 pump water supply stations, 2 sewage pumping stations, 12 buildings of workrooms and workshops of utility companies, 59 units of specialised machinery, 55 km of trolleybus contact network. Has been damaged: 875 multi-apartment residential buildings, 25 schools, 37 kindergartens, 4 vocational schools, 4 pumping stations, municipal water supply and sewerage networks, street lighting networks, production and storage facilities of utility companies, 6 trolleybuses, 50% of bus stops.<br>Source: <a href="https://www.pravda.com.ua/eng/news/2025/06/6/7515900/">https://www.pravda.com.ua/eng/news/2025/06/6/7515900/</a> |



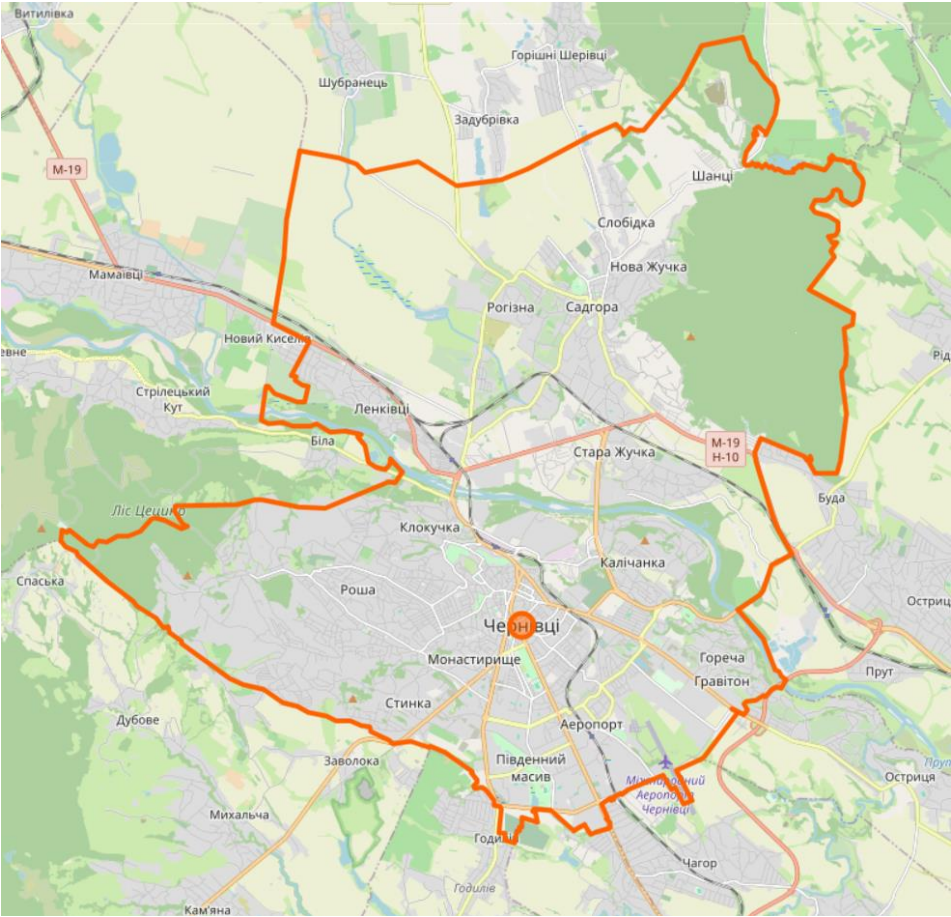
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# Chernivtsi

|                     |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |
|---------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Geographic location | 48°17'25.6" N 25°55.945' E;<br>Southwestern Ukraine, Chernivtsi Oblast                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |
| Area size           | 181.6 km²                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |
| Population          | 312,578                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |
| City profile        | Historically multicultural region where Ukrainian, Romanian, Jewish, and Austrian heritage intersect. The city of Chernivtsi is the administrative centre of the Chernivtsi oblast, one of the main educational, cultural, and logistical hubs of the Carpathian region.                                                                                                                                                                                                                                                                                                                                                    |
| War impact          | IDPs: 42,000 people. Damaged railway infrastructure (as of 23.05.2025)<br>People here and in villages nearby are building dune buggies for the front lines, providing homes to thousands of displaced Ukrainian civilians, shipping supplies to the east and using their proximity to Poland and Romania to bring in more. "The back office of the war."<br>Source: <a href="https://www.ukrinform.net/rubric-ato/3996050-russian-attack-damages-railway-infrastructure-in-chernivtsi-region.html">https://www.ukrinform.net/rubric-ato/3996050-russian-attack-damages-railway-infrastructure-in-chernivtsi-region.html</a> |



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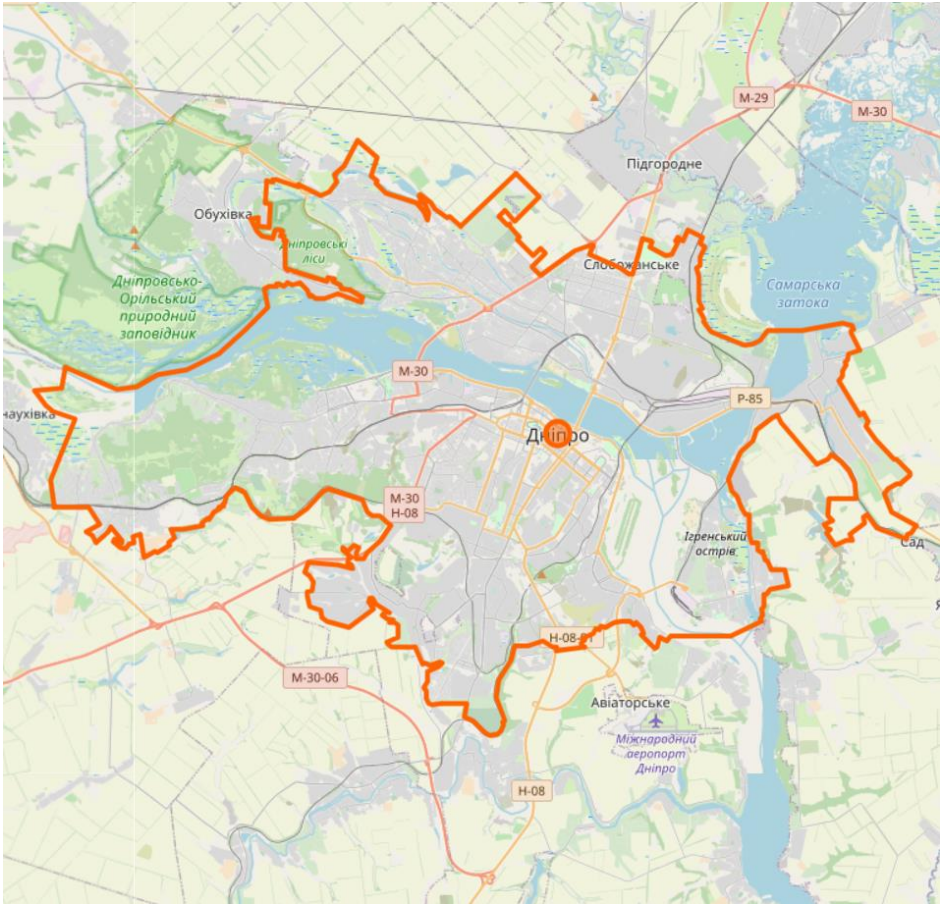






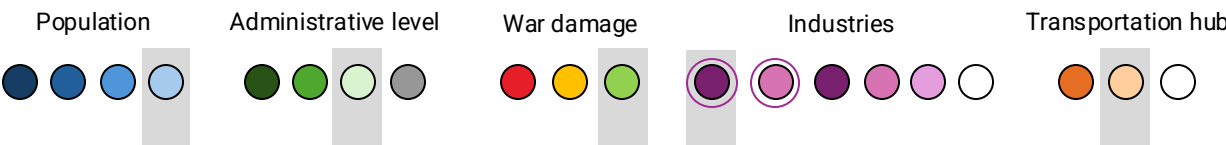
# Dnipro

|                     |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |
|---------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Geographic location | 48°27'59.9" N 35°2.44' E<br>Eastern part of central Ukraine, Dnipro Oblast                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |
| Area size           | 405 km²                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |
| Population          | 984,423                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |
| City profile        | Powerful industrial and transportation centre with high scientific and technological potential. Dnipro accounts for 7% of ferrous metallurgy production, 11% of the national machine-building industry, and 13% of industrial deposits. The city is home to large enterprises in metallurgy, machine building, energy, and space, which form the strategic basis of the economy at both the regional and national levels.                                                                                                                                                                                                                                                                                                                                                                                                      |
| War impact          | IDPs: about 172,000 people (as of April 2024). As of 24.06.2025, destroyed and damaged: 6 infrastructure facilities destroyed and 4 heavily damaged (oil terminal, energy infrastructure facility, thermal power plant, gas pipeline, railway's power facilities and others), airport and nearby infrastructure were destroyed, as well as the building of Ukrtelecom» JSC, a transport company. Five private houses destroyed and 162 damaged, 74 multi-storey buildings damaged, 14 private businesses destroyed and 26 damaged. 3 industrial enterprises destroyed and 2 more damaged.<br>Source: <a href="https://kyivindependent.com/russia-strikes-dnipro-with-ballistic-missiles-hits-civilian-train06-2025/">https://kyivindependent.com/russia-strikes-dnipro-with-ballistic-missiles-hits-civilian-train06-2025/</a> |



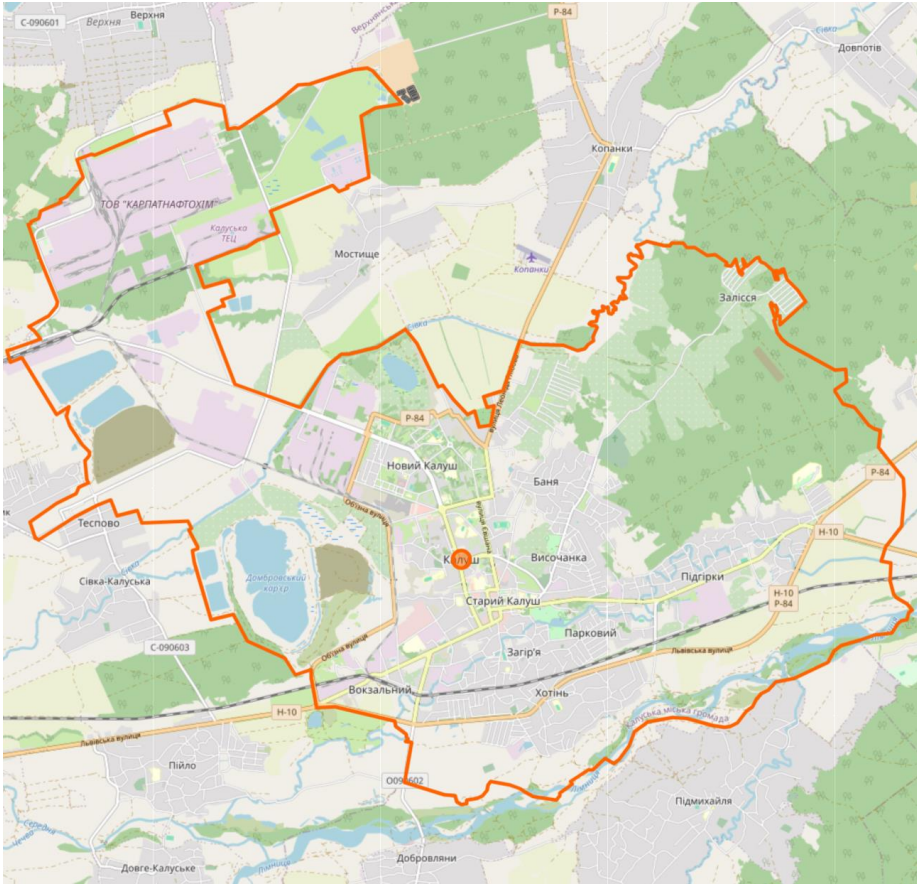
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# Kalush

|                     |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |
|---------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Geographic location | 49°1'26.3" N 24°22.324' E<br>Western Ukraine, Ivano-Frankivsk Oblast                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |
| Area size           | 263.5 km²                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |
| Population          | 92,496                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |
| City profile        | The city of Kalush is particularly known for its strong chemical industry and potash salt extraction. 20% of all Ivano-Frankivsk Oblast industrial areas are within the Kalush municipality. Its industrial potential consists of over 40 industrial enterprises. Kalush also serves as a logistics hub for the region, with many road and rail connections intersecting here.                                                                                                                                                                                                                                                                                                                                                                                             |
| War impact          | IDPs: 4,700 officially registered (as of 01.01.2024).<br>A Russian strike in December 2024 cut electricity to the water treatment plant, disrupting both water and heat supplies to the city; hospitals and critical services had to rely on generators. All petrochemical facilities run by local producer Karpatneftekhim were shut down because of the imposition of martial law.<br>The hromada has digitized key urban infrastructure documents - a critical step given the risk of loss due to Russian military aggression.<br>Source: <a href="https://antikor.info/en/articles/742280-iz-za-massirovannogo-obstrelya-kalush-ostalsja-bez-tepla-i-vody">https://antikor.info/en/articles/742280-iz-za-massirovannogo-obstrelya-kalush-ostalsja-bez-tepla-i-vody</a> |



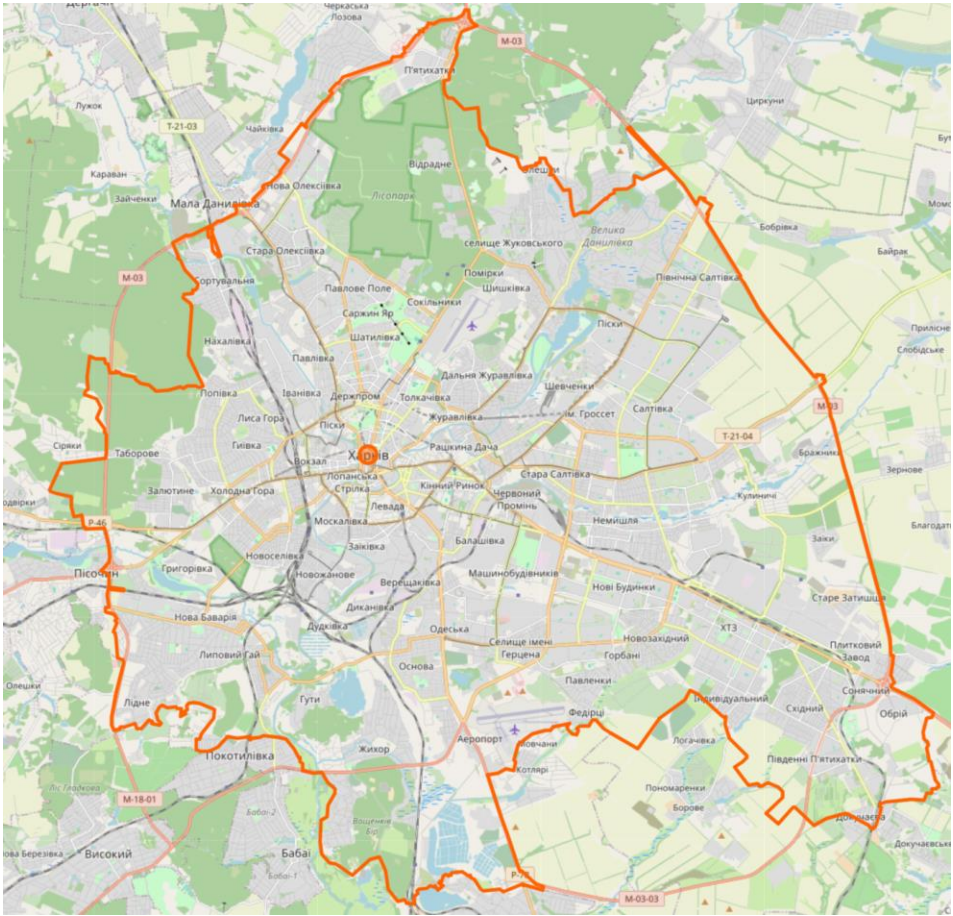
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# Kharkiv

|                     |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |
|---------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Geographic location | 49°58'50.9" N 36°15.163' E<br>Northeastern Ukraine, Kharkiv Oblast                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |
| Area size           | 370 km²                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |
| Population          | 1,406,600 (as of 01.01.2022)                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |
| City profile        | This historic city, the second most populous in Ukraine, is a central scientific and cultural hub; one of the country's largest industrial centres. Its industrial base includes machine-building (locomotive engines, power plant turbines, generators), aviation manufacturing, and enterprises in the chemical, energy, fuel, and food sectors.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |
| War impact          | IDPs: 197,300 people (as of 21.04.2024). As of 07.06.2025, destroyed and damaged objects: Dwellings: 6,271 residential buildings; Education: kindergartens – 108 buildings, schools – 127 buildings, higher educational institutions – 110 buildings; Healthcare: 83 buildings; Administrative buildings and structures of social purpose: 172 buildings; Critical infrastructure: Municipal Enterprise "Kharkivvodokanal" – 50 objects, Kharkiv Heat Networks – 100 facilities, Transport infrastructure that belongs to communal property – 97 objects, Damaged objects that do not belong to the communal form of ownership – 735 objects.<br>Source: <a href="https://www.ukrinform.net/rubric-ato/4001987-russian-attacks-on-kharkiv-region-claim-three-lives-23-people-injured.html">https://www.ukrinform.net/rubric-ato/4001987-russian-attacks-on-kharkiv-region-claim-three-lives-23-people-injured.html</a> |



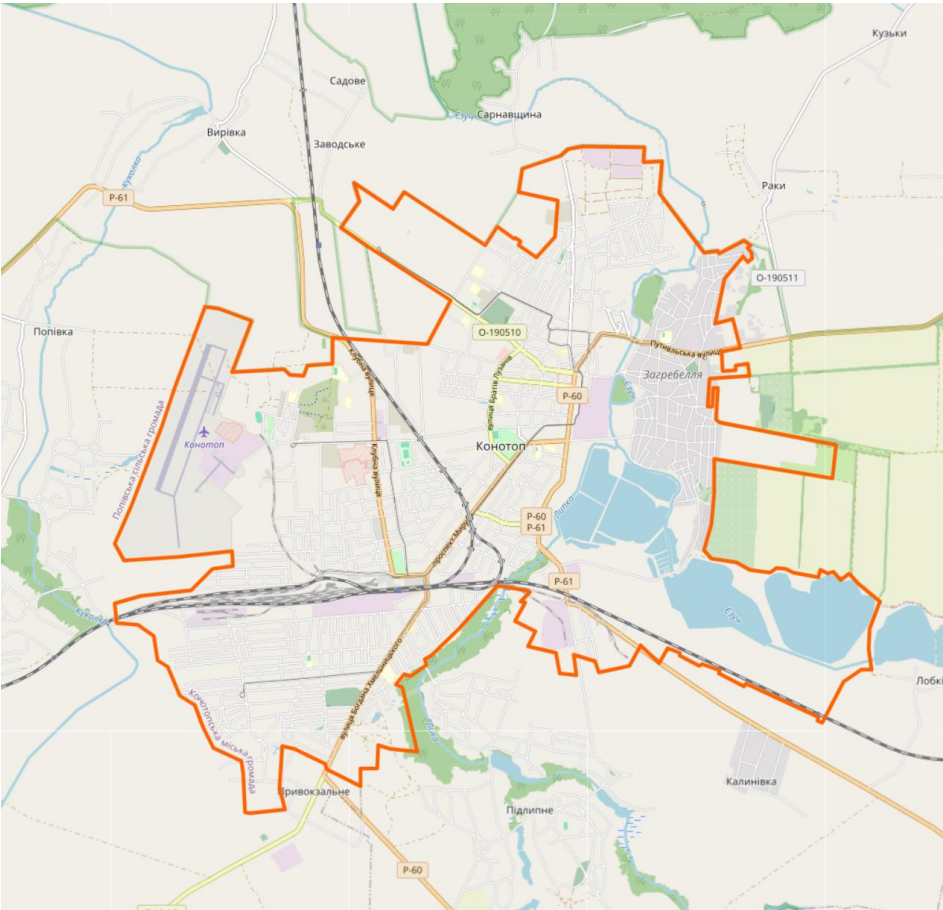
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# Konotop

|                     |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |
|---------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Geographic location | 51°14'25.2" N 33°12.158' E<br>Northeastern Ukraine, Sumy Oblast                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |
| Area size           | 101 km²                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |
| Population          | 87,403                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |
| City profile        | Konotop is the municipality's administrative, railway, industrial and cultural centre and the second-largest city in Sumy Oblast by population. Mechanical engineering dominates the industrial sector (33.3%), serving both domestic and foreign markets. The only district-level city in Ukraine with a tram network.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |
| War impact          | IDPs: 3,777 officially registered (as of 01.01.2024)<br>As of 25.10.2024, 365 objects were damaged, including:<br>Housing stock: 111 apartment buildings, 38 private households.<br>Social infrastructure: 37 facilities, incl. educational institutions (10), cultural institutions (6), religious buildings (2), social and household facilities (4), and medical institutions (15). Industrial and commercial facilities: 90 non-residential premises. Transport infrastructure: partially damaged tram network, damaged road surface in the village of Pidlipne. Engineering structures and networks: 13 boiler rooms, 2 sections of the sewer collector, 1 transformer substation.<br>Source: <a href="https://www.pravda.com.ua/eng/news/2024/10/25/7481440/">https://www.pravda.com.ua/eng/news/2024/10/25/7481440/</a> |



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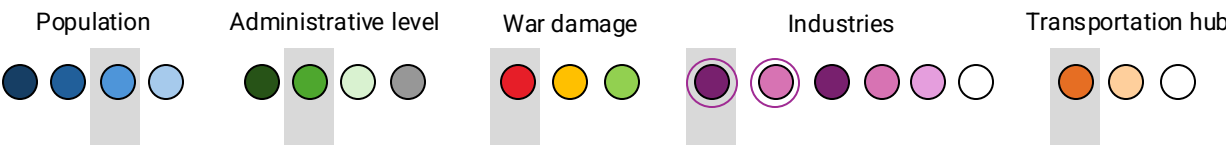


# Kyiv



|                     |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |
|---------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Geographic location | 50°27'16.8" N 30°31.428' E<br>Northern part of central Ukraine                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |
| Area size           | 826.35 km²                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |
| Population          | 3.2 million                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |
| City profile        | Ukraine's capital, one of Europe's largest and oldest cities. Political, socio-economic, cultural, educational, and scientific hub of the country. The city hosts the central government authorities, foreign diplomatic missions, and the headquarters of most companies and international organizations operating in Ukraine.                                                                                                                                                                                                                                                                               |
| War impact          | IDPs: 391,000 people (as of 01.01.2025).<br>As of 24.04.2025, since the beginning of Russia’s full-scale invasion, over 220 civilians have lost their lives in Kyiv. Over 1,200 residential buildings, 194 educational institutions, and 41 healthcare facilities have been damaged. As of April 29, 2025, air raid alerts had sounded 1,625 times in the city. The total direct damage to property, infrastructure, and vehicles in Kyiv has reached USD 2.5 billion.<br>Source: <a href="https://www.pravda.com.ua/eng/news/2025/04/24/7509015/">https://www.pravda.com.ua/eng/news/2025/04/24/7509015/</a> |





# Mykolaiv

|                     |                                                                                                                                                                                                                                                                                                                                                                               |
|---------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Geographic location | 46°58'30"N 31°59'42"E<br>Southern Ukraine, Mykolaiv Oblast                                                                                                                                                                                                                                                                                                                    |
| Area size           | 260 km²                                                                                                                                                                                                                                                                                                                                                                       |
| Population          | 425,000                                                                                                                                                                                                                                                                                                                                                                       |
| City profile        | City of ships and science with a large potential for economic recovery owing to shipbuilding, the port infrastructure, the food industry, and manufacturing of dual-purpose products. Mykolaiv has the unique geographical location at the crossing of rivers, near the Black Sea, with various landscapes combined.                                                          |
| War impact          | IDPs: 48,914 people. As of 29.06.2025, damaged or destroyed: Housing > 2800, Schools > 50, Kindergartens > 35, Institutions of higher education > 15, Cultural institutions > 50, Healthcare institutions > 80, Sports facilities > 30<br>Source: <a href="https://www.pravda.com.ua/eng/news/2025/06/29/7519278/">https://www.pravda.com.ua/eng/news/2025/06/29/7519278/</a> |



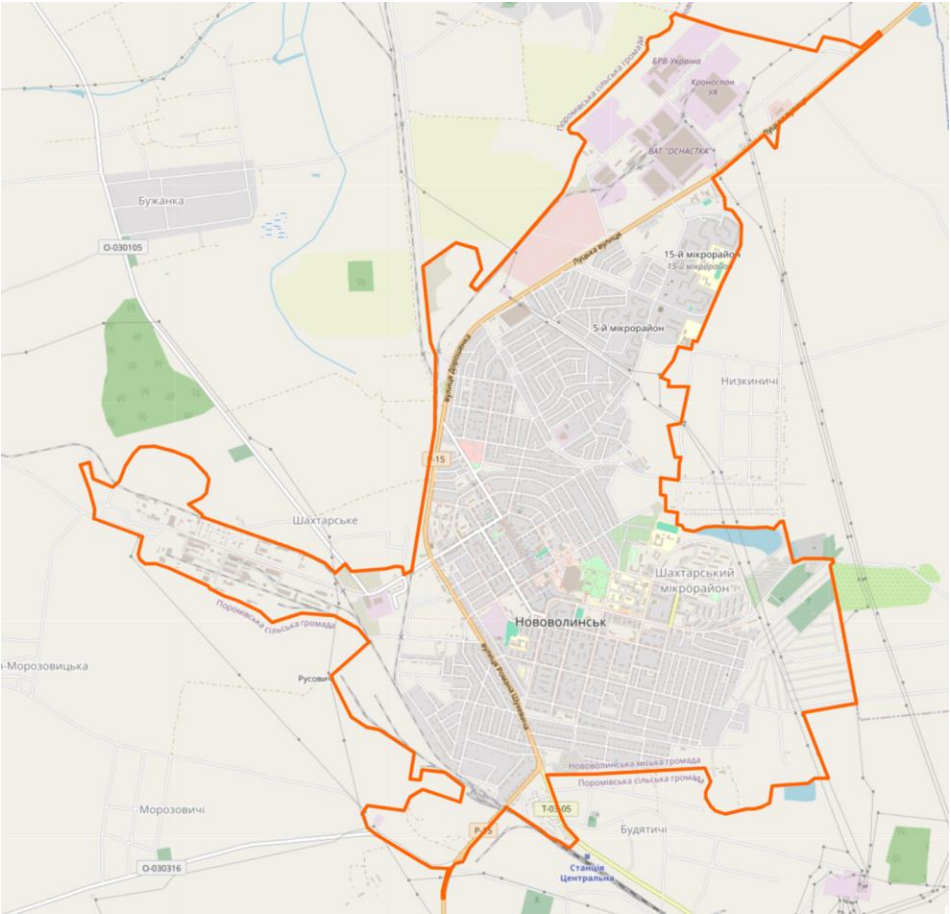
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# Novovolynsk

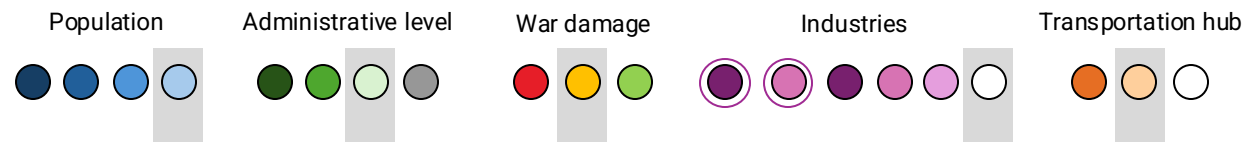
|                     |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |
|---------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Geographic location | 50°43'32.7" N 24°9.759' E<br>Northwest of Ukraine, Volyn Oblast                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |
| Area size           | 75.3 km²                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |
| Population          | 57,900                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |
| City profile        | Former coal mining embracing just transition. In the late 1990s, the coal industry ceased to play a key role in Novovolynsk's economy. Today, the municipality's economic structure is also shaped by the woodworking, light, food industries, the chemical industry, and services.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |
| War impact          | IDPs: 4,000 people (as of 01.01.2025). After the start of the military offensive, a significant number of internally displaced persons (more than 10.6 thousand people) arrived in the Novovolynsk community from the territories of active hostilities - the highest peak occurred in April 2022. One of the first challenges faced was the issue of meeting the urgent and permanent needs of internally displaced persons, and subsequently their adaptation and integration into the life of the Community. There was an additional load on the infrastructure as a whole - medical institutions, educational institutions, transport infrastructure, public infrastructure, etc.<br>Source: <a href="https://nov-rada.gov.ua/2022/04/01/ponad-500-pereselentsiv-u-novovolynsku-otrymaly-dovidky-pro-status-vnutrishno-peremishchenykh-osib/">https://nov-rada.gov.ua/2022/04/01/ponad-500-pereselentsiv-u-novovolynsku-otrymaly-dovidky-pro-status-vnutrishno-peremishchenykh-osib/</a> |



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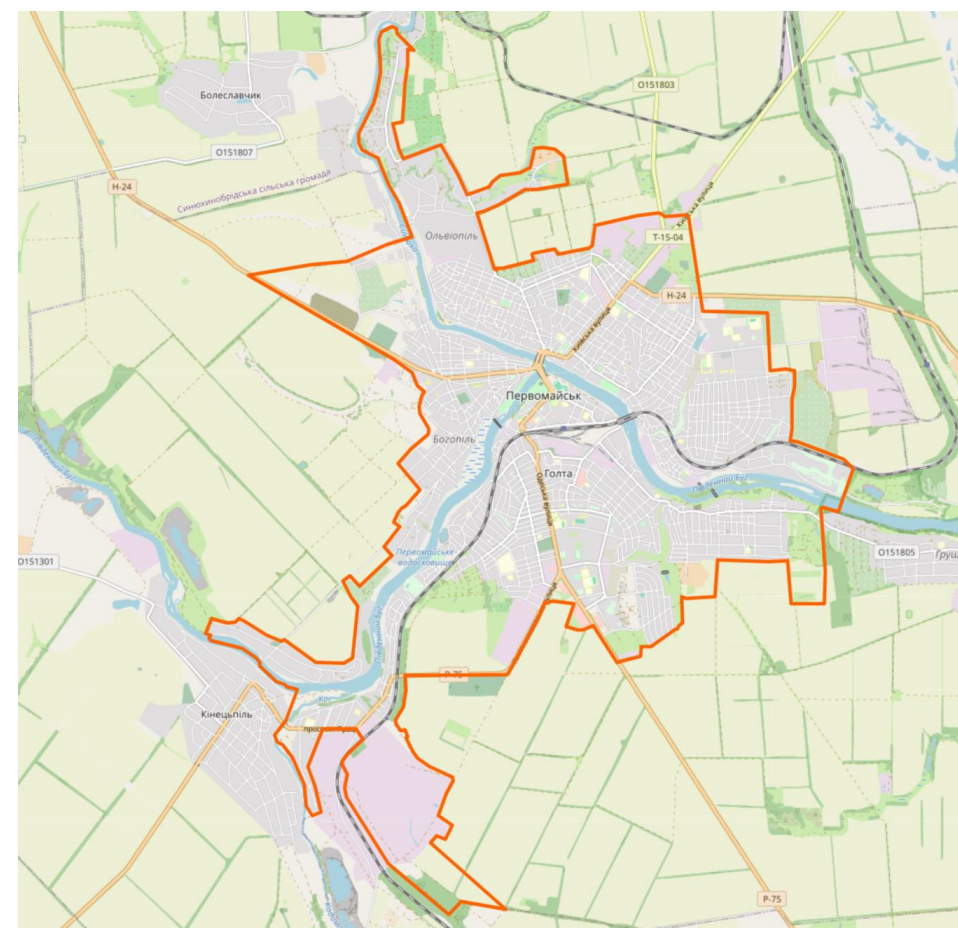




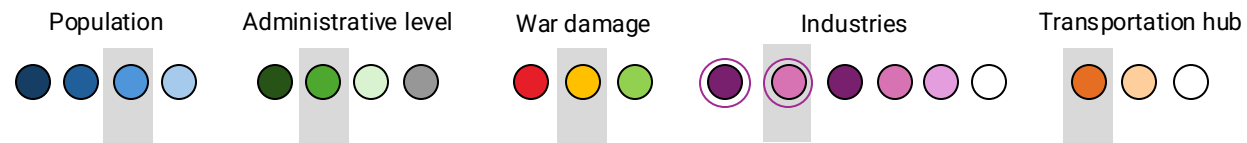


# Pervomaisk

|                            |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |
|----------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Geographic location</b> | 48°2'41.2" N 30°50.87' E<br>South of Ukraine, Mykolaiv Oblast                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |
| <b>Area size</b>           | 376.41 km <sup>2</sup>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |
| <b>Population</b>          | 57,770                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |
| <b>City profile</b>        | Former industrial city; today, only two mechanical engineering enterprises and several food industry businesses remain in operation. The municipality area is of significant historical and cultural value. It has valuable natural areas, including the river floodplains and the nature park, which also possess high recreational and tourism potential.                                                                                                                                                                                                                                                                                                                                                                                                                           |
| <b>War impact</b>          | <p>IDPs: 5,508 people (as of 01.01.2024)</p> <p>During the first 8 months of the full-scale invasion, the settlements of the territorial community were actually in the line of fire. As of 09.05.2024, a total of over 3,400 objects have been destroyed. About 40% of the objects damaged by shelling in the Pervomaisk community of the Mykolaiv oblast have already been restored. Almost 900 households have received compensation under the state program «eVidnovlennia» (as of 16.08.2024)</p> <p>Source: <a href="https://english.nv.ua/nation/drone-hit-the-former-cultural-center-in-mykolaiv-oblast-on-the-night-of-may-9-50416720.html">https://english.nv.ua/nation/drone-hit-the-former-cultural-center-in-mykolaiv-oblast-on-the-night-of-may-9-50416720.html</a></p> |

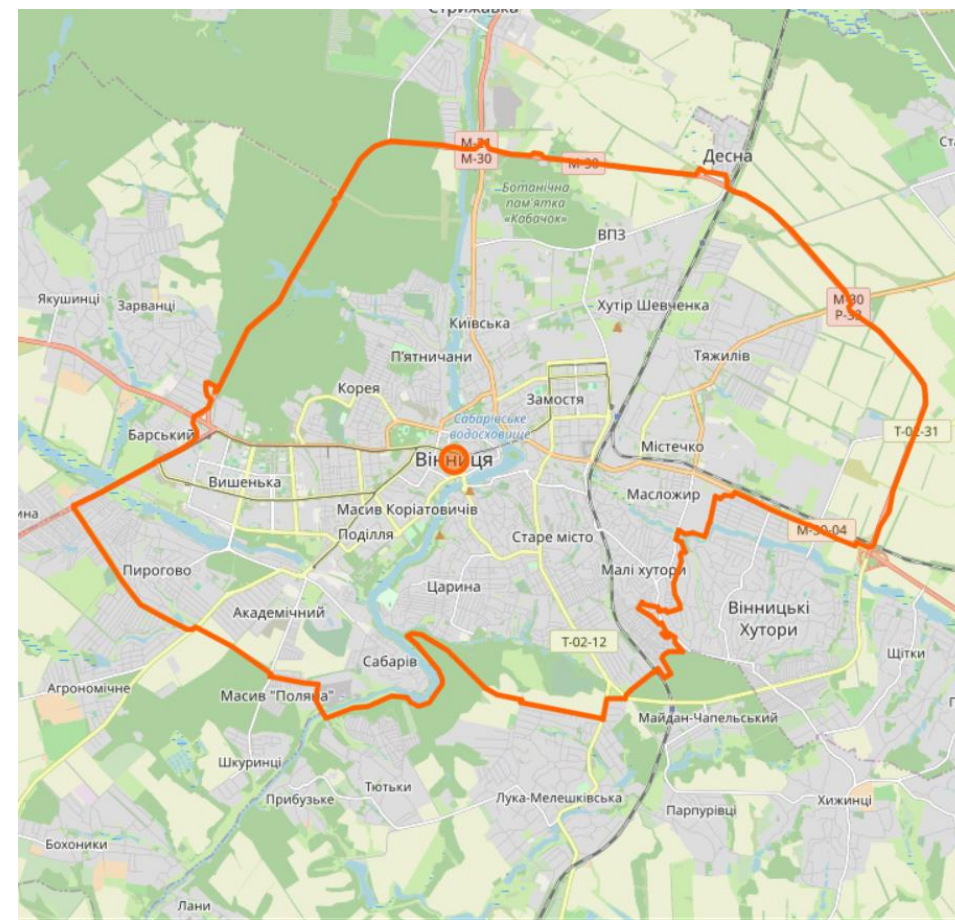


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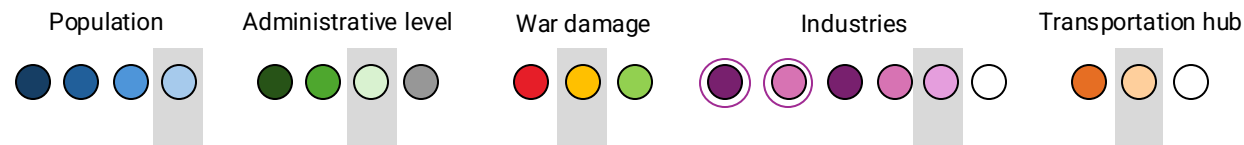


# Vinnytsia

|                            |                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |
|----------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Geographic location</b> | 49°13'55.9" N 28°28.123' E<br>Central Ukraine, Vinnytsia Oblast                                                                                                                                                                                                                                                                                                                                                                                                            |
| <b>Area size</b>           | 265.35 km <sup>2</sup>                                                                                                                                                                                                                                                                                                                                                                                                                                                     |
| <b>Population</b>          | 399,500                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |
| <b>City profile</b>        | Strategically located in central Ukraine, Vinnytsia serves as an important logistics hub with a well-developed transportation infrastructure. The municipality is considered one of the most progressive in Ukraine, consistently demonstrating leadership in implementing innovative solutions. It has been a role model for real urban transformation in Ukraine.                                                                                                        |
| <b>War impact</b>          | IDPs: 43,220 people<br>As of 16.07.2025, destroyed or damaged: Vinnytsia International Airport, PJSC "Volodarka", House of life "Yuvileinyi", House of officers (Vinnytsia), Business entities - 72, Multi-storey buildings - 54, Private houses - 31, Church – 1<br>Source: <a href="https://www.newsweek.com/russia-strikes-polish-factory-ukraine-vinnytsia-drones-2099691">https://www.newsweek.com/russia-strikes-polish-factory-ukraine-vinnytsia-drones-2099691</a> |

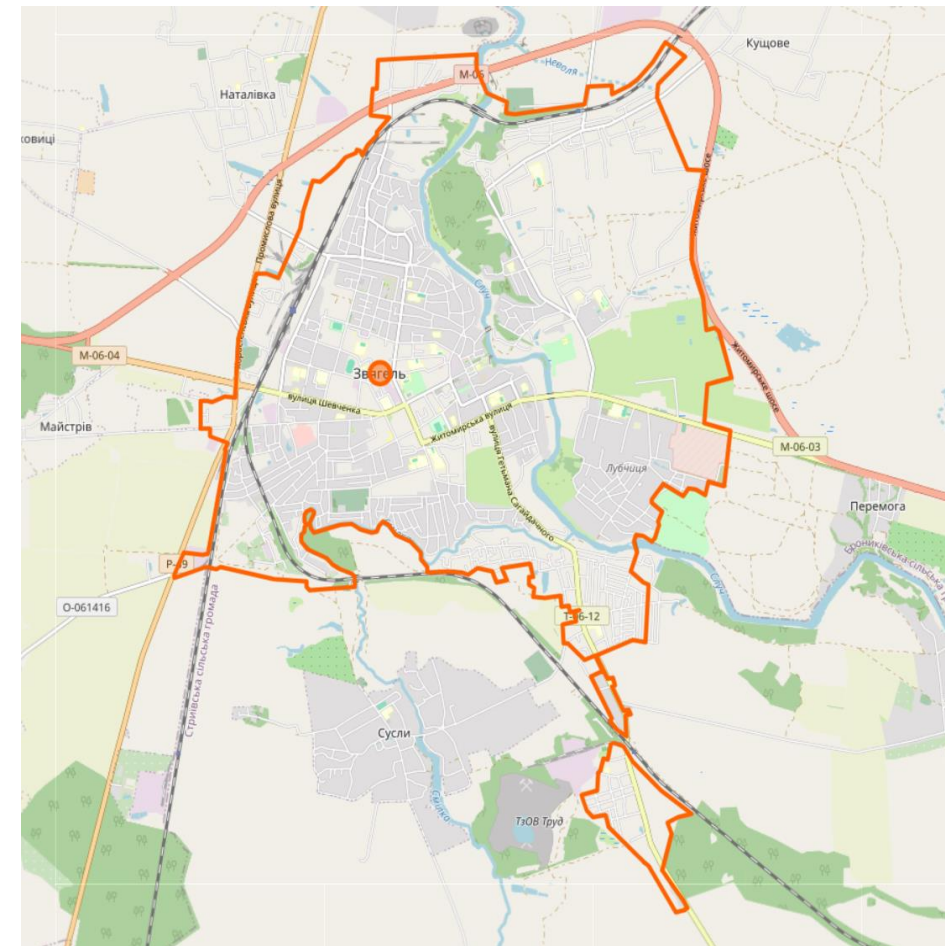


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# Zviahel

|                            |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |
|----------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Geographic location</b> | 50°35'38.8" N 27°36.99' E<br>North of Ukraine, Zhytomyr Oblast                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |
| <b>Area size</b>           | 254 km <sup>2</sup>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |
| <b>Population</b>          | 59,442                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |
| <b>City profile</b>        | Zviahel has a rich history and culture, as well as picturesque nature. It has a favourable geographical and economic location: 218 km west of Kyiv and 312 km east of Lviv, connected by the international highway. The leading industries are the food and chemical industries, mechanical engineering, light and woodworking industries.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |
| <b>War impact</b>          | <p>IDPs: 2,135 people (as of 01.01.2025)</p> <p>On 9 June 2023, four houses had been destroyed and another 30 had been damaged because of the strike. On 8 April 2024, a critical infrastructure facility was hit, most likely an oil and gas terminal, near Zviahel. Following the attack, the city authorities appealed to residents not to leave their homes due to possible air pollution. The energy infrastructure facilities was damaged causing emergency power outages (as of 07.11.2024).</p> <p>The 54th Separate Reconnaissance Battalion and 140th Separate Territorial Defence Battalion are based in the city of Zviahel.</p> <p>Source: <a href="https://english.nv.ua/nation/one-dead-three-injured-in-latest-russian-missile-attack-on-zviahel-in-zhytomyr-oblast-50330679.html">https://english.nv.ua/nation/one-dead-three-injured-in-latest-russian-missile-attack-on-zviahel-in-zhytomyr-oblast-50330679.html</a><br/> / <a href="https://ukranews.com/en/news/997302-russians-attack-infrastructure-facility-in-zviahel-zhytomyr-region-air-pollution-threat">https://ukranews.com/en/news/997302-russians-attack-infrastructure-facility-in-zviahel-zhytomyr-region-air-pollution-threat</a> / <a href="https://ukranews.com/en/news/1045906-emergency-power-outages-implemented-in-zhytomyr-region-due-to-russian-attack-on-energy">https://ukranews.com/en/news/1045906-emergency-power-outages-implemented-in-zhytomyr-region-due-to-russian-attack-on-energy</a></p> |



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# IDENTIFIED INFRASTRUCTURE, CONSTRUCTION AND COMMUNITY NEEDS



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# Identified infrastructure, construction and community needs



growth-related need

conflict-related need



| No. | Type | Identified need                                                                                                                                                                 | Comment                                                                                                                                                                                                                                                | Number of FMs related                                                                                  |
|-----|------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------|
| 1   |      | Increase electricity production from solar, wind, biogas and other Renewable Energy Sources (RES), alongside the modernisation of transmission and distribution infrastructure. | Military attacks targeted electricity infrastructure. Clean energy are pillars of resilient cities - reducing dependence on imports, protecting ecosystems, and ensuring long-term stability in the face of climate and geopolitical risks.            | 12/12                                                                                                  |
| 2   |      | Upgrade and decarbonize central heating networks, including the transition to electric and renewable heat sources and the gradual phase-out of coal and natural gas.            | Military attacks severely damaged heating infrastructure - upgrading to renewable and electric systems is essential for restoring service and ensuring long-term resilience.                                                                           | 10/12<br>Chemihiv, Chemivtsi, Dnipro, Kalush, Kharkiv, Konotop, Kyiv, Mykolaiv, Novovolynsk, Vinnytsia |
| 3   |      | Rebuild and modernize thermal power plants and boiler facilities to improve energy efficiency and reduce emissions.                                                             | As energy infrastructure remains a primary target of military attacks, rebuilding it with a focus on efficiency and resilience is essential to ensure uninterrupted utility services for the population.                                               | 10/12<br>Chemihiv, Chemivtsi, Dnipro, Kalush, Kharkiv, Konotop, Kyiv, Mykolaiv, Novovolynsk, Vinnytsia |
| 4   |      | Install cogeneration plants powered by landfill biogas and natural gas, especially in public institutions like hospitals, to enhance energy resilience and efficiency.          | Installing cogeneration units powered by landfill biogas and natural gas enhances energy efficiency and ensures reliable power supply during infrastructure disruptions.                                                                               | 6/12<br>Chemihiv, Chemivtsi, Kharkiv, Kyiv, Pervomaisk, Vinnytsia                                      |
| 5   |      | Renovate individual heating systems, install heat meters and pumps, and implement energy-efficient technologies in residential and public buildings.                            | Given the vulnerability of centralized systems to military attacks, upgrading individual heating systems and deploying energy-efficient technologies in buildings is essential to ensure reliable, decentralized heat supply and reduce energy demand. | 5/12<br>Kalush, Kharkiv, Konotop, Mykolaiv, Novovolynsk                                                |



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4Ukraine

# Identified infrastructure, construction and community needs



growth-related need

conflict-related need



| No. | Type | Identified need                                                                                                                              | Comment                                                                                                                                                                                                             | Number of FMs related                                                                   |
|-----|------|----------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------|
| 6   |      | Installation of solar collectors and heat pumps in both public and private buildings.                                                        | To counter risks from attacks on central systems, solar collectors and heat pumps offer resilient, low-emission heating for buildings.                                                                              | (5/12)<br>Kyiv, Konotop, Kharkiv, Vinnytsia, Kalush                                     |
| 7   |      | Replace traditional lighting with LED systems and install smart lighting controls in streets, parks, and public spaces to reduce energy use. | Reducing energy demand through efficient lighting is critical to ease pressure on damaged power infrastructure and enhance urban resilience during ongoing disruptions.                                             | (7/12)<br>Chemivtsi, Kalush, Konotop, Vinnytsia, Kyiv, Kharkiv, Novovolynsk,            |
| 8   |      | Install solar panels on rooftops, smart lighting at intersections and stops, and implement RES technologies across city infrastructure.      | Deploying renewable and smart technologies across city infrastructure reduces reliance on vulnerable grids, enhances energy autonomy, and strengthens urban resilience amid ongoing threats.                        | (8/12)<br>Kyiv, Kharkiv, Konotop, Vinnytsia, Kalush, Pervomaisk, Novovolynsk, Chemivtsi |
| 9   |      | Convert outdated boiler rooms to use biofuels, heat pumps, and hybrid systems for peak load management.                                      | Modernising outdated infrastructure with cleaner technologies is crucial to reduce dependency on centralized fuels, improve energy flexibility, and maintain heating reliability during infrastructure disruptions. | (7/12)<br>Chemivtsi, Kharkiv, Novovolynsk, Kalush, Konotop, Kyiv, Vinnytsia             |
| 10  |      | Deploy energy monitoring, metering, and control systems to optimize energy use across municipal and residential infrastructure.              | Enhancing energy oversight is essential to strengthen system resilience, reduce waste, and support the transition to climate neutrality.                                                                            | (6/12)<br>Kyiv, Kharkiv, Konotop, Kalush, Vinnytsia, Chemivtsi                          |



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# Identified infrastructure, construction and community needs

|                                                                                          |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |
|------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|  Energy | <b>Expert comments</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |
|                                                                                          | <b>General:</b> Reconstruction presents a key opportunity to shift toward resilient, renewable energy systems. Energy planning must balance short-term rebuilding needs with long-term modernization goals. Cities affected differently by conflict will have varying priorities - some focusing on rebuilding, others on upgrading. Ukraine should build on existing local practices (e.g., backup power systems) to ease the transition and reduce resistance to change.                                            |
|                                                                                          | <b>Policy and Governance:</b> Long-term national planning is essential to guide energy transition and infrastructure development. A clear stance on the EU's EPBD is needed to align with European standards is needed. Policies should support decentralization while managing the trade-offs with large-scale energy generation and transmission. An integrated systems approach to managing supply-demand is recommended over a node-based model for energy and transport resilience.                              |
|                                                                                          | <b>Infrastructure and Design:</b> Smaller, decentralized grids may offer greater resilience in conflict-prone areas. Integration of energy infrastructure with transport systems is critical - especially for fixed energy supply and EV charging. Reducing energy demand through efficient building design can ease pressure on energy systems. Infrastructure should be robust, diversified, and designed to accommodate future loads like data centres and EVs.                                                    |
|                                                                                          | <b>Energy and Sustainability:</b> RES must be central to reconstruction to avoid duplicating efforts later. Decentralized household-level infrastructure (e.g., PVs) requires incentives and support schemes. Clean tech development should consider Ukraine's potential role in the EU supply chain. Energy security is as important as decarbonization - resilience to future disruptions is key. Transitioning to decarbonized interurban transport networks will significantly increase electrical energy demand. |
|                                                                                          | <b>Finance and Implementation:</b> Financial support schemes and business incentives are needed to build local installation capacity, especially for SMEs. Private financing should be leveraged to support both centralized and decentralized energy solutions. Timelines and geographic differences must be considered in funding strategies - tailoring support to local contexts.                                                                                                                                 |

# Identified infrastructure, construction and community needs

|  Energy – Expert's comment | Identified need                                                                                                                                                               | Comment                                                                                                                                                                                                                                                                                                                                                                                    |
|---------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|                                                                                                               | <i>Increase electricity production from solar, wind, biogas and other RES, alongside the modernisation of transmission and distribution infrastructure.</i>                   | Reconstruction offers a chance to phase out coal and gas by promoting heat pumps and reimagining energy demand. Reducing consumption and diversifying energy sources are just as critical as supply - designing for lower demand from the start can build long-term resilience and independence.                                                                                           |
|                                                                                                               | <i>Upgrade and decarbonize central heating networks, including the transition to electric and renewable heat sources and the gradual phase-out of coal and natural gas.</i>   | Ukraine's existing district heating systems hold major potential for decarbonization, ideally transitioning to electric individual heating. Local Area Energy Plans and energy communities could support this shift by organizing renewable generation at the district level. However, success depends on strong coordination, utility cooperation, and effective local energy management. |
|                                                                                                               | <i>Rebuild and modernize thermal power plants and boiler facilities to improve energy efficiency and reduce emissions.</i>                                                    | Energy storage facilities are key for use of RES in thermal energy.                                                                                                                                                                                                                                                                                                                        |
|                                                                                                               | <i>Install cogeneration plants powered by landfill biogas and natural gas, especially in public institutions like hospitals, to enhance energy resilience and efficiency.</i> | A feasibility study should be carried out before making this investment to assess financial viability, supply, environmental impact, the most appropriate technology, thermal/electrical load matching, grid capacity, engine-generator compatibility and Emissions control systems.                                                                                                       |
|                                                                                                               | <i>Renovate individual heating systems, install heat meters and pumps, and implement energy-efficient technologies in residential and public buildings.</i>                   | Polish programmes for replacing heat sources in residential buildings can serve as a valuable model for Ukrainian cities, helping them shape their own path toward cleaner, more efficient heating systems during reconstruction.                                                                                                                                                          |



# Identified infrastructure, construction and community needs

|  Energy – Expert's comment | Identified need                                                                                                                              | Comment                                                                                                                                                                                                                                                                                                               |
|---------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|                                                                                                               | Installation of solar collectors and heat pumps in both public and private buildings.                                                        | The first step is to assess the building's suitability for installing solar collectors, including checking whether the roofs can be used and whether there is adequate sunlight.                                                                                                                                      |
|                                                                                                               | Replace traditional lighting with LED systems and install smart lighting controls in streets, parks, and public spaces to reduce energy use. | Upgrading and expanding street lighting is key to make sustainable travel routes more attractive and safer. This should be paired with smart monitoring and control systems - such as dimming and energy-saving technologies - to manage the increased demand efficiently.                                            |
|                                                                                                               | Install solar panels on rooftops, smart lighting at intersections and stops, and implement RES technologies across city infrastructure.      | The first step is to assess whether the building is suitable for installing solar panels, and whether there is adequate sunlight. Network capacity also needs to be checked. When installing new LEDs, consideration should be given to using appropriate control and remote control systems that are powered by RES. |
|                                                                                                               | Convert outdated boiler rooms to use biofuels, heat pumps, and hybrid systems for peak load management.                                      | The EU's push for cleantech manufacturing presents both an opportunity and a challenge for Ukraine - offering potential for integration into the supply chain, but also raising questions about long-term dependency versus domestic capability development.                                                          |
|                                                                                                               | Deploy energy monitoring, metering, and control systems to optimize energy use across municipal and residential infrastructure.              | Aerial scanning of district heating networks can identify heat losses and improve efficiency. However, deploying such technologies requires balancing readiness with the urgency of delivery - ensuring solutions are both effective and timely.                                                                      |

# Identified infrastructure, construction and community needs



growth-related need

conflict-related need



| No. | Type | Identified need                                                                                                                            | Comment                                                                                                                                                                                            | Number of FMs related                                                                             |
|-----|------|--------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------|
| 1   |      | Restoration and modernization of educational institutions to meet current standards and community needs.                                   | Military attacks have damaged parts of the educational infrastructure, preventing students from accessing safe and uninterrupted learning environments.                                            | (9/12)<br>Chernihiv, Dnipro, Kalush, Kharkiv, Konotop, Mykolaiv, Pervomaisk, Kalush, Vinnytsia    |
| 2   |      | Rehabilitation of healthcare, social protection, and administrative facilities to ensure essential public services.                        | Military attacks have damaged parts of the healthcare infrastructure, limiting access to essential medical services and compromising the safety of patients and staff.                             | (9/12)<br>Chernihiv, Dnipro, Kalush, Kharkiv, Konotop, Mykolaiv, Pervomaisk, Kalush, Vinnytsia    |
| 3   |      | Restoration of damaged cultural landmarks, historical monuments, and sites of architectural and landscape significance.                    | Cultural landmarks, historical monuments, and architecturally significant sites have suffered damage and now require restoration to preserve heritage and community identity.                      | (6/12)<br>Dnipro, Kharkiv, Konotop, Mykolaiv, Novovolynsk, Vinnytsia,                             |
| 4   |      | Installation of modular homes and construction of temporary housing for displaced residents and those affected by war-related destruction. | There is an urgent need to construct modular and temporary housing to quickly provide shelter for residents displaced by the destruction of residential buildings.                                 | (3/12)<br>Chernihiv, Kharkiv, Mykolaiv                                                            |
| 5   |      | Repair of damaged residential buildings, construction of new energy-efficient housing, and implementation of affordable housing programs.  | There is an urgent need to repair damaged buildings and construct new ones, as well as implement affordable housing programmes, to ensure long-term, sustainable shelter for affected communities. | (9/12)<br>Chernihiv, Kalush, Kharkiv, Konotop, Kyiv, Mykolaiv, Novovolynsk, Pervomaisk, Vinnytsia |



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# Identified infrastructure, construction and community needs



growth-related need

conflict-related need



| No. | Type | Identified need                                                                                                                                                                                             | Comment                                                                                                                                                                                                                                                                                             | Number of FMs related                                                  |
|-----|------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------|
| 6   |      | Comprehensive upgrades to public and private buildings (including multi-apartment buildings), including insulation, energy management systems, and replacement of outdated heating and ventilation systems. | Deep thermal modernization of buildings, combined with the integration of low-carbon heating systems, is essential for advancing the transition to a zero-carbon city.                                                                                                                              | (12/12)                                                                |
| 7   |      | Modernization and expansion of sports facilities, including inclusive design and support for physical education institutions.                                                                               | Military attacks have damaged numerous sports facilities, limiting access to recreational spaces and compromising the safety and well-being of local communities.                                                                                                                                   | (4/12)<br><i>Chemihiv, Kalush, Konotop Chernivtsi,</i>                 |
| 8   |      | Revitalization of abandoned buildings and old industrial zones for new community, cultural, or economic uses.                                                                                               | Revitalizing abandoned buildings and former industrial zones is essential to create new community, cultural, and economic spaces, especially where existing facilities have been lost due to military destruction.                                                                                  | (5/12)<br><i>Dnipro, Chernivtsi, Kharkiv, Kyiv, Vinnytsia</i>          |
| 9   |      | Expansion and diversification of hotel services, including guesthouses, conference facilities, wellness centres, and cultural tourism offerings.                                                            | Expanding and diversifying hotel services including guesthouses, conference venues, wellness centres, and cultural tourism facilities is key to restoring hospitality capacity and creating new spaces for community and economic activity, especially where existing infrastructure has been lost. | (2/12)<br><i>Chernivtsi, Vinnytsia</i>                                 |
| 10  |      | Improvement of courtyards in historic areas and construction of public shelters and civil protection facilities in line with safety standards.                                                              | Upgrading courtyards in historic districts and constructing public shelters and civil protection facilities in line with modern safety standards is essential to restore safe, functional public spaces where existing ones have been lost or compromised.                                          | (6/12)<br><i>Chernivtsi, Dnipro, Kharkiv, Kyiv, Konotop, Vinnytsia</i> |



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# Identified infrastructure, construction and community needs

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|---------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|  Buildings | <b>Expert comments</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |
|                                                                                             | <p><b>General:</b> Incorporate mental and physical health considerations into all reconstruction efforts, including sensory-friendly, biophilic, and universally accessible environments.</p> <p>Design homes that support care for both children and elders, with flexible layouts and “loose fit” construction to adapt to changing family needs. Engage communities in shaping their living environments, including preferences for intergenerational living, shared spaces, and cultural identity. Integrate safety features such as shelters and secure zones in public and residential buildings, drawing lessons from post-conflict regions. Explore “caring neighbourhoods” with communal care facilities, gardens, storage, and services to unlock latent capacity and foster social cohesion.</p>                                                                                                                                                                                                                                                                  |
|                                                                                             | <p><b>Policy and Governance:</b> Avoid rushed rebuilding by embedding spatial and urban planning principles from the outset to prevent long-term dysfunction.</p> <p>Explore legal guarantees to ensure every citizen has access to housing, especially in post-war Ukraine.</p> <p>Design funding distribution mechanisms that address energy poverty and prioritise vulnerable populations.</p> <p>Align city recovery plans with other organisations’ (e.g. World Bank, EU, UNDP) damage assessments (e.g. Guidance for PDNA in Conflict Situations) to ensure targeted, needs-based interventions.</p> <p>Set achievable building and energy standards that can evolve over time, balancing immediate needs with long-term goals.</p> <p>Ensure policies reflect post-war gender demographics and support inclusive, equitable rebuilding.</p>                                                                                                                                                                                                                           |
|                                                                                             | <p><b>Infrastructure and Design:</b> Rebuild urban areas to support walkability, access to services, and decentralised living (15-Minute Cities and Mixed-Use Districts).</p> <p>Use modern methods of construction (MMC) and a digital “kit of parts” to enable rapid, scalable, and standardised rebuilding.</p> <p>Design public infrastructure (schools, hospitals, libraries) to function as a network - sharing energy, services, and space.</p> <p>Incorporate smart HVAC, lighting, and digital systems; ensure designs are family-friendly, neurodiverse-friendly, and energy efficient.</p> <p>Build flexible, tech-enabled learning environments with VR/AI labs and remote learning capabilities.</p> <p>Respect historical architecture by retaining original elements where possible and adhering to conservation laws.</p> <p>Allow for staged construction (e.g., ground floor first, with future expansion) to match household resources and needs.</p> <p>Use modular homes for displaced persons with a plan for repurposing or upgrading them later.</p> |





# Identified infrastructure, construction and community needs

|                                                                                             |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |
|---------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|  Buildings | Expert comments                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |
|                                                                                             | <p><b>Energy and Sustainability:</b> Integrate energy, building, and human systems to optimise performance over the building lifecycle. Prioritise materials and methods that reduce embodied carbon, not just operational emissions. Align with communal heat networks and district energy systems; assess best-fit energy sources (e.g., biomass, nuclear, renewables). Reuse rubble and materials from damaged buildings; develop a rubble and noxious substances strategy early. Invest in smart energy infrastructure to support decentralised, resilient energy systems. Support local factories producing low-impact, high-quality materials under a common framework.</p>                                                                                                                                                           |
|                                                                                             | <p><b>Finance and Implementation:</b> Combine public, private, and philanthropic capital to stretch resources while staying within planetary boundaries. Stimulate local economies by supporting SMEs and contractors, especially in areas with limited capacity. Conduct national construction industry capacity assessments to ensure readiness for large-scale reconstruction. Use tools like the Swiss-backed building asset database to track, plan, and optimise rebuilding efforts. Train and upskill local labour to meet demand in construction, energy, and digital sectors. Leverage Ukraine's strengths in drones, cybersecurity, and digital innovation to support reconstruction and long-term growth. Prioritise infrastructure that supports long-term resilience - transport, energy, water, and digital connectivity.</p> |

# Identified infrastructure, construction and community needs

|  Buildings | Identified need                                                                                                                                   | Comment                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |
|---------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|                                                                                             | <i>Restoration and modernization of educational institutions to meet current standards and community needs.</i>                                   | Prioritise high-performance, energy-efficient building envelopes to boost resilience and durability in new construction. Retrofit existing buildings where it aligns with local energy strategies for greater impact. Design for climate resilience by integrating indoor-outdoor interactions and ensuring thermal comfort - especially for vulnerable and war-injured populations. Scale up safe, accessible school infrastructure using established frameworks like those developed with the World Bank „Safe Schools Program”. |
|                                                                                             | <i>Rehabilitation of healthcare, social protection, and administrative facilities to ensure essential public services.</i>                        | Align with local energy strategies to ensure resilient, low-carbon systems and avoid diesel reliance. Use passive design and renewables to maintain operations during outages. Design hospitals and rehab centres to be smart, inclusive, and supportive of physical and mental recovery.                                                                                                                                                                                                                                          |
|                                                                                             | <i>Restoration of damaged cultural landmarks, historical monuments, and sites of architectural and landscape significance.</i>                    | Rebuilding is a chance to “Build Back Better” by embedding resilience, energy autonomy, and low-carbon principles into every layer of design and delivery.                                                                                                                                                                                                                                                                                                                                                                         |
|                                                                                             | <i>Installation of modular homes and construction of temporary housing for displaced residents and those affected by war-related destruction.</i> | Temporary homes must be designed with long-term use in mind, as many may remain in place for decades. Speed should not compromise quality - there’s an opportunity to do better by using thermally efficient, demountable, and repurposable materials. Embedding circular design principles and standardised, interoperable modular components can set a national standard, enabling reuse, adaptability, and higher-quality outcomes for displaced populations.                                                                   |
|                                                                                             | <i>Repair of damaged residential buildings, construction of new energy-efficient housing, and implementation of affordable housing programs.</i>  | Reconstruction should follow circular principles - reusing materials and cutting carbon. Focus on resilient, low-carbon homes with good thermal comfort for vulnerable groups. Combine energy efficiency with risk reduction, modular design, and smart heating strategies. Larger, flexible homes may support orphaned children and shared care.                                                                                                                                                                                  |

# Identified infrastructure, construction and community needs

|  <b>Buildings</b> | Identified need                                                                                                                                   | Comment                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |
|----------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|                                                                                                    | <i>Restoration and modernization of educational institutions to meet current standards and community needs.</i>                                   | Prioritise high-performance, energy-efficient building envelopes to boost resilience and durability in new construction. Retrofit existing buildings where it aligns with local energy strategies for greater impact. Design for climate resilience by integrating indoor-outdoor interactions and ensuring thermal comfort - especially for vulnerable and war-injured populations. Scale up safe, accessible school infrastructure using established frameworks like those developed with the World Bank „Safe Schools Program”. |
|                                                                                                    | <i>Rehabilitation of healthcare, social protection, and administrative facilities to ensure essential public services.</i>                        | Align with local energy strategies to ensure resilient, low-carbon systems and avoid diesel reliance. Use passive design and renewables to maintain operations during outages. Design hospitals and rehab centres to be smart, inclusive, and supportive of physical and mental recovery.                                                                                                                                                                                                                                          |
|                                                                                                    | <i>Restoration of damaged cultural landmarks, historical monuments, and sites of architectural and landscape significance.</i>                    | Rebuilding is a chance to “Build Back Better” by embedding resilience, energy autonomy, and low-carbon principles into every layer of design and delivery.                                                                                                                                                                                                                                                                                                                                                                         |
|                                                                                                    | <i>Installation of modular homes and construction of temporary housing for displaced residents and those affected by war-related destruction.</i> | Temporary homes must be designed with long-term use in mind, as many may remain in place for decades. Speed should not compromise quality - there’s an opportunity to do better by using thermally efficient, demountable, and repurposable materials. Embedding circular design principles and standardised, interoperable modular components can set a national standard, enabling reuse, adaptability, and higher-quality outcomes for displaced populations.                                                                   |
|                                                                                                    | <i>Repair of damaged residential buildings, construction of new energy-efficient housing, and implementation of affordable housing programs.</i>  | Reconstruction should follow circular principles - reusing materials and cutting carbon. Focus on resilient, low-carbon homes with good thermal comfort for vulnerable groups. Combine energy efficiency with risk reduction, modular design, and smart heating strategies. Larger, flexible homes may support orphaned children and shared care.                                                                                                                                                                                  |

# Identified infrastructure, construction and community needs



growth-related need

conflict-related need

Water

| No. | Type                                                                                | Identified need                                                                                                                                    | Comment                                                                                                                                                                                                                                      | Number of FMs related                                                                           |
|-----|-------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------|
| 1   |    | Restoration of river ecosystems and improvement of coastal and waterfront areas to enhance biodiversity, flood resilience, and public access.      | Restoring water systems help repair war-related ecological damage, strengthen natural flood defences, and support climate and biodiversity goals.                                                                                            | (9/12)<br>Chernihiv, Chernivtsi, Dnipro, Vinnytsia, Kharkiv, Konotop, Kyiv, Pervomaisk, Zviahel |
| 2   |    | Comprehensive upgrade of water supply and sewage networks, including main pipelines, pumping stations, and control systems.                        | Restoring war-damaged water infrastructure helps ensure continuous access to safe drinking water, maintain public health, and reestablish reliable service delivery.                                                                         | (8/12)<br>Vinnytsia, Kalush, Konotop, Chernivtsi, Pervomaisk, Mykolaiv, Dnipro, Chernihiv       |
| 3   |    | Construction and modernization of wastewater treatment plants to improve water quality and environmental protection.                               | Improving water quality is essential to safeguard ecosystems, protect biodiversity, and ensure the long-term sustainability of natural water resources.                                                                                      | (7/12)<br>Vinnytsia, Kalush, Konotop, Chernivtsi, Pervomaisk, Dnipro, Mykolaiv                  |
| 4   |   | Development of modern storm sewer infrastructure and systems equipped with debris-capturing devices to prevent urban flooding and water pollution. | Preventing urban flooding and water pollution helps protect natural waterways, maintain ecological balance, and strengthen cities' climate resilience.                                                                                       | (8/12)<br>Chernihiv, Dnipro, Vinnytsia, Kharkiv, Kyiv, Konotop, Pervomaisk, Vinnytsia           |
| 5   |  | Construction of protective systems to eliminate and prevent land flooding, especially in vulnerable urban and suburban areas.                      | Military damage to drainage systems and the deliberate targeting of dams have significantly increased flood risks, underscoring the need to safeguard vulnerable areas to prevent displacement, infrastructure loss, and environmental harm. | (8/12)<br>Chernihiv, Chernivtsi, Kharkiv, Vinnytsia, Konotop, Kalush, Kyiv, Mykolaiv,           |



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# Identified infrastructure, construction and community needs



growth-related need

conflict-related need

| No. | Type | Identified need                                                                                                                                                                           | Comment                                                                                                                                                                              | Number of FMs related                                                                          |
|-----|------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------|
| 6   |      | Construction and upgrade of water intake facilities and implementation of optimized water supply schemes supported by hydraulic modelling.                                                | Securing clean water for cities requires resilient intake systems and efficient distribution, especially under conflict and climate stress.                                          | (5/12)<br>Dnipro, Kalush, Kharkiv, Mykolaiv, Vinnytsia                                         |
| 7   |      | Installation of water metering devices and digital monitoring systems to improve efficiency, detect leaks, and manage consumption.                                                        | Accurate water monitoring improves efficiency, reduces losses, and strengthens urban water security under growing stress.                                                            | (5/12)<br>Kharkiv, Kyiv, Kalush, Novovolynsk, Vinnytsia                                        |
| 8   |      | Replacement of outdated engineering networks and restoration of thermal insulation in heating and hot water pipelines.                                                                    | Enhancing the efficiency and reliability of urban heating systems reduces energy losses, lowers operational costs, and ensures stable service delivery.                              | (9/12)<br>Chernivtsi, Dnipro, Kyiv, Kharkiv, Konotop, Kalush, Vinnytsia, Mykolaiv, Novovolynsk |
| 9   |      | Deployment of decentralized water purification systems to ensure safe and accessible drinking water across urban areas.                                                                   | Maintaining access to safe drinking water during conflict is critical for public health, making water quality protection and decentralized treatment essential for urban resilience. | (8/12)<br>Chernihiv, Chernivtsi, Dnipro, Vinnytsia, Kalush, Kyiv, Konotop, Pervomaik           |
| 10  |      | Installation of solar power stations at wastewater treatment sites and implementation of rainwater harvesting systems to support energy-efficient and climate-resilient water management. | Ensuring energy-efficient water management during conflict supports uninterrupted treatment operations and protects water quality under unstable conditions.                         | (7/12)<br>Chernihiv, Konotop, Kalush, Kharkiv, Chernivtsi, Pervomaik, Vinnytsia                |

Water



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# Identified infrastructure, construction and community needs

| <br>Water | Expert comments                                                                                                                                                                                                                                                                                                                                                                                                                                                               |
|--------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|                                                                                            | <b>General:</b> Reconstruction and resilience should be the overarching framework for energy and water planning. Nature-based solutions (NbS) offer co-benefits - mitigation through energy with added dividends in water management and flood prevention. Cities must assess what actions are within their reach versus what requires broader partnerships or significant effort.                                                                                            |
|                                                                                            | <b>Policy and Governance:</b> Integrated catchment-based water planning is key but often extends beyond city jurisdictions, requiring multi-level governance. Rivers, often national assets in Ukraine, play a key role in hydroelectric power and must be considered in national energy and water strategies. A complexity vs. benefit approach can help prioritize actions - distinguishing between simple, high-impact measures and more complex, resource-intensive ones. |
|                                                                                            | <b>Infrastructure and Design:</b> Water infrastructure should support not only utility functions but also recreation and wellbeing, enhancing green and nature engagement. Economy of scale differs between water and energy systems - water often benefits from centralized infrastructure, while energy may lean toward decentralization.                                                                                                                                   |
|                                                                                            | <b>Energy and Sustainability:</b> Energy mitigation strategies should be designed to deliver water-related co-benefits, such as flood control and resource efficiency. NbS and decentralized energy systems can enhance resilience and sustainability when integrated thoughtfully.                                                                                                                                                                                           |
|                                                                                            | <b>Finance and Implementation:</b> Cities need to identify what they can implement independently and where partnerships or external support are necessary. Strategic planning should consider the effort required versus the expected benefits to ensure efficient use of resources.                                                                                                                                                                                          |

# Identified infrastructure, construction and community needs

|  Water | Identified need                                                                                                                                    | Comment                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |
|-----------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|                                                                                         | Restoration of river ecosystems and improvement of coastal and waterfront areas to enhance biodiversity, flood resilience, and public access.      | Ukraine's major rivers, like the Dnipro, are long-established hydro power corridors with dams, making structural changes difficult and likely unnecessary. Instead, upgrades such as improved fish passes could enhance ecological value. Cities can link waterfront access to active travel networks and use reconstruction as a chance to plan new green and protected areas. However, since rivers fall under national water authorities and nature systems follow catchment boundaries, city-level influence is limited and requires cross-jurisdictional coordination. |
|                                                                                         | Comprehensive upgrade of water supply and sewage networks, including main pipelines, pumping stations, and control systems.                        | Where feasible, integrate blue-green infrastructure solutions to enhance climate resilience, manage water, and support biodiversity within urban development and reconstruction efforts.                                                                                                                                                                                                                                                                                                                                                                                    |
|                                                                                         | Construction and modernization of wastewater treatment plants (WWTPs) to improve water quality and environmental protection.                       | A nationwide programme for developing WWTPs is essential to improve sanitation, protect water resources, and support sustainable urban and rural development across Ukraine.                                                                                                                                                                                                                                                                                                                                                                                                |
|                                                                                         | Development of modern storm sewer infrastructure and systems equipped with debris-capturing devices to prevent urban flooding and water pollution. | Integrate NbS for stormwater management using the sponge city approach, which supports water attenuation, light treatment, and urban resilience through natural systems.                                                                                                                                                                                                                                                                                                                                                                                                    |
|                                                                                         | Construction of protective systems to eliminate and prevent land flooding, especially in vulnerable urban and suburban areas.                      | Where location allows, adopt natural approaches to flood management by planning for controlled water retention and flooding. Rainwater networks should be modelled to assess infrastructure needs, while long-term strategies can include creating new green spaces that enhance flood protection - aligned with the sponge city concept.                                                                                                                                                                                                                                   |

# Identified infrastructure, construction and community needs

| <br>Water | Identified need                                                                                                                                                                           | Comment                                                                                                                                                                                                                                                                                                                                                                                                                            |
|--------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|                                                                                            | Construction and upgrade of water intake facilities and implementation of optimized water supply schemes supported by hydraulic modelling.                                                | Water intake should be selected and appropriate control methods - surface water (sediment control and seasonal flow analysis) or groundwater (hydrogeological surveys and aquifer studies) - should be matched. Care should be taken to provide storage tanks. Use of sand filters, UV, chlorination. Leak detection systems (e.g. acoustic sensors, smart meters) should be introduced to reduce losses and ensure water quality. |
|                                                                                            | Installation of water metering devices and digital monitoring systems to improve efficiency, detect leaks, and manage consumption.                                                        | It should be paired with building, road, and infrastructure interventions to maximize resilience, manage runoff effectively, and support integrated urban water management.                                                                                                                                                                                                                                                        |
|                                                                                            | Replacement of outdated engineering networks and restoration of thermal insulation in heating and hot water pipelines.                                                                    | The priority should be to restore the damaged infrastructure of the engineering networks. Thermal imaging could be used to identify inefficient networks. Smart controls should also be installed to minimise heat loss and swiftly detect potential leaks.                                                                                                                                                                        |
|                                                                                            | Deployment of decentralized water purification systems to ensure safe and accessible drinking water across urban areas.                                                                   | While a national wastewater treatment programme is essential, decentralised solutions should be carefully considered. Water Treatment Plants (WTP) need to serve broader communities efficiently, so local adaptations must fit within national policy frameworks - overly decentralised systems may be less effective and harder to manage at scale.                                                                              |
|                                                                                            | Installation of solar power stations at wastewater treatment sites and implementation of rainwater harvesting systems to support energy-efficient and climate-resilient water management. | Wastewater treatment plants can play a key role in achieving net-zero goals by integrating technologies like waste heat recovery, biogas production, and solar PV. These solutions enhance energy efficiency and sustainability within the treatment process.                                                                                                                                                                      |

# Identified infrastructure, construction and community needs



growth-related need

conflict-related need

Mobility and transport

| No. | Type | Identified need                                                                                                                                           | Comment                                                                                                                                                                                                    | Number of FMs related                                                                                               |
|-----|------|-----------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------|
| 1   |      | Investment in the construction, reconstruction, and major repairs of public roads and emergency bridges to enhance connectivity and logistics efficiency. | Some key roads and strategic bridges were damaged during the conflict, while much of the remaining infrastructure shows signs of wear and needs structural repairs.                                        | (11/12)<br>Chernihiv, Kalush, Kharkiv, Konotop, Kyiv, Mykolaiv, Pervomaisk, Vinnytsia, Zviahel, Novovolynsk, Dnipro |
| 2   |      | Development and renewal of environmentally friendly public transport systems, including e-buses, trolleybuses, trams, and supporting infrastructure.      | Cities aim to become zero-emission, and public transport plays a key role in that vision. To achieve this, they need to modernize and decarbonize their vehicle fleets.                                    | (12/12)                                                                                                             |
| 3   |      | Comprehensive construction/reconstruction of tram tracks, crossings, and switches using modern technologies to improve reliability and efficiency.        | In cities with tram infrastructure, significant upgrades are needed to improve traction efficiency and power supply systems. Some of this infrastructure has also been damaged by military activity.       | (4/12)<br>Kharkiv, Konotop, Kyiv, Vinnytsia                                                                         |
| 4   |      | Installation of GPS, emergency alert systems, and real-time information tools in public transport vehicles and at stops.                                  | To strengthen safety and resilience amid ongoing conflict, cities are equipping public transport vehicles and stops with GPS tracking, emergency alert systems, and real-time passenger information tools. | (7/12)<br>Chernihiv, Kharkiv, Novovolynsk, Kyiv, Dnipro, Konotop, Mykolaiv                                          |
| 5   |      | Redesign and construction of bus stops to meet safety, accessibility, and inclusion standards for all users.                                              | Bus stops are being redesigned and rebuilt to meet modern standards, accessibility, inclusivity and safety - crucial for protecting all users.                                                             | (6/12)<br>Kalush, Kharkiv, Mykolaiv, Chernihiv, Novovolynsk, Kyiv                                                   |



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# Identified infrastructure, construction and community needs



growth-related need

conflict-related need

Mobility and transport

| No. | Type | Identified need                                                                                                                                      | Comment                                                                                                                                                                                                                  | Number of FMs related                                                                                                  |
|-----|------|------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------|
| 6   |      | Implementation of optimized traffic schemes, pedestrian safety lighting, and acoustic warning systems for improved urban mobility and accessibility. | Expanding the public transport fleet, cycle paths, and pedestrian walkways also requires the development of supporting infrastructure to ensure the integrated and efficient functioning of the entire transport system. | (12/12)                                                                                                                |
| 7   |      | Construction and modernization of transport hubs to facilitate seamless transfers between public, shared, and micromobility modes.                   | Strategic transport hubs have sustained damage due to targeted military strikes and now require reconstruction or expansion to accommodate evolving movement patterns.                                                   | (6/12)<br>Dnipro, Kharkiv, Kyiv, Konotop, Novovolynsk Vinnytsia,                                                       |
| 8   |      | Deployment of EV charging stations and support for electric and micromobility transport to reduce emissions and modernize urban fleets.              | Achieving a zero-emission future also depends on shifts in public behaviour, supported by strategic investment in accessible charging infrastructure to enable the transition of the private transport sector.           | (7/12)<br>Kharkiv, Kyiv, Chernihiv, Chernivtsi, Dnipro, Kalush, Novovolynsk                                            |
| 9   |      | Creation of multi-level and organized parking facilities, along with improved parking management systems in high-density areas                       | Multi-level parking and better management systems are needed in dense areas to restore functionality where infrastructure has been disrupted by conflict.                                                                | (9/12)<br>Chernivtsi, Dnipro, Kalush, Konotop, Kyiv, Kharkiv, Vinnytsia, Novovolynsk, Pervomaïsk                       |
| 10  |      | Expansion of bicycle lanes, pedestrian zones, and barrier-free sidewalks to promote safe, inclusive, and sustainable mobility.                       | Cities are building new cycling routes, widening sidewalks, and removing physical barriers to create safer, more inclusive streets for everyday use.                                                                     | (11/12)<br>Kharkiv, Vinnytsia, Chernivtsi, Kyiv, Kalush, Chernihiv, Dnipro, Mykolaiv, Pervomaïsk, Konotop, Novovolynsk |



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# Identified infrastructure, construction and community needs

|                                                                                                              |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |
|--------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <br>Mobility and transport | <b>Expert comments</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |
|                                                                                                              | <b>General:</b> Without proactive planning, cities may default to car and internal combustion engine-based recovery, especially post-crisis. Post-damage recovery presents a unique chance to implement high-quality, replicable transport solutions. A cohesive, place-based transport policy is essential to avoid fragmented development and ensure sustainable outcomes.                                                                                                                                                                                                                                                                               |
|                                                                                                              | <b>Policy and Governance:</b> Strong influence through parking policy and standards to discourage car dependency and promote alternative modes. Current planning is siloed; integration is needed to align transport with urban development (e.g., Science Neighbourhood master plan). Connectivity between cities requires national-level coordination and policy alignment. Success depends on strong strategies supported by local governments. Communication of policy goals and benefits is crucial alongside specific actions. Focus on providing attractive alternatives rather than imposing restrictions, considering the socio-economic context. |
|                                                                                                              | <b>Infrastructure and Design:</b> Opportunity to redesign streets with integrated green/blue infrastructure and climate resilience in mind. Existing highways are growth-oriented; without intervention, they will reinforce car-centric development. Enhance access to public transport by making active travel modes more attractive and convenient.                                                                                                                                                                                                                                                                                                     |
|                                                                                                              | <b>Public Transport:</b> Build on the traditionally strong public transport system. Existing systems require updates to meet current accessibility and service expectations. Improve walking and cycling links to public transport to boost usage.                                                                                                                                                                                                                                                                                                                                                                                                         |
|                                                                                                              | <b>Energy and Sustainability:</b> Transport planning must consider energy resilience, especially in light of recent supply disruptions. Infrastructure should be designed to withstand climate impacts and support environmental goals.                                                                                                                                                                                                                                                                                                                                                                                                                    |
|                                                                                                              | <b>Finance and Implementation:</b> Leverage national development finance institutions and public-private partnerships for multi-level impact and implementation capacity.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |

# Identified infrastructure, construction and community needs

|  Mobility and transport | Identified need                                                                                                                                                  | Comment                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |
|-----------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|                                                                                                           | <i>Investment in the construction, reconstruction, and major repairs of public roads and emergency bridges to enhance connectivity and logistics efficiency.</i> | To ensure a resilient and forward-looking recovery, the transport and construction sectors should adopt a leapfrogging approach - prioritizing innovative, sustainable solutions over simply replacing damaged infrastructure with outdated models. This includes leveraging multi-annual funding frameworks and establishing a long-term pipeline of repair and reconstruction projects to build industry capacity and stability. Additionally, embracing circular economy principles - such as urban mining and the reclamation of aggregates from rubble - can reduce environmental impact, lower costs, and support local material supply chains. |
|                                                                                                           | <i>Development and renewal of environmentally friendly public transport systems, including e-buses, trolleybuses, trams, and supporting infrastructure.</i>      | Trams and trolleybuses are less resilient in conflict due to infrastructure vulnerability. Modernizing fleets and facilities is key, especially as energy disruptions have forced retrofits to fossil fuels - highlighting the need for strong transport-energy integration.                                                                                                                                                                                                                                                                                                                                                                          |
|                                                                                                           | <i>Comprehensive construction/reconstruction of tram tracks, crossings, and switches using modern technologies to improve reliability and efficiency.</i>        | Integration with public space planning activities for shared-surface interventions (trams, cars and pedestrians).                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |
|                                                                                                           | <i>Installation of GPS, emergency alert systems, and real-time information tools in public transport vehicles and at stops.</i>                                  | This would need to be operationalised through public transport operators and other control centres.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |
|                                                                                                           | <i>Redesign and construction of bus stops to meet safety, accessibility, and inclusion standards for all users.</i>                                              | Enhancing the pedestrian realm around bus stops is vital for accessibility and placemaking. With many returnees potentially facing mobility challenges, inclusive design, amenities, and well-landscaped transport hubs are more important than ever.                                                                                                                                                                                                                                                                                                                                                                                                 |

# Identified infrastructure, construction and community needs

|  Mobility and transport | Identified need                                                                                                                                             | Comment                                                                                                                                                                                                                                                                                                                                                                                      |
|-----------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|                                                                                                           | <i>Implementation of optimized traffic schemes, pedestrian safety lighting, and acoustic warning systems for improved urban mobility and accessibility.</i> | Transport recovery should balance traffic system upgrades with active travel improvements like lighting and safety. Cross-department coordination is key to avoid car-centric outcomes. Policies must support integration with green spaces and adopt trauma-informed, accessible design for IDPs, veterans, and conflict-affected individuals.                                              |
|                                                                                                           | <i>Construction and modernization of transport hubs to facilitate seamless transfers between public, shared, and micromobility modes.</i>                   | Transport hubs enhance intermodality, especially in cities like Kharkiv. However, success depends on improving pedestrian connections and avoiding over scaled solutions in bus-only cities. The focus should be on high-quality, multimodal hubs that enhance service rather than just expanding coverage.                                                                                  |
|                                                                                                           | <i>Deployment of EV charging stations and support for electric and micromobility transport to reduce emissions and modernize urban fleets.</i>              | An efficient transport network requires strategic development of EV charging infrastructure, supported by financial incentives. Integrating charging solutions with existing assets like light poles and aligning with energy networks for load balancing is essential for sustainable implementation.                                                                                       |
|                                                                                                           | <i>Creation of multi-level and organized parking facilities, along with improved parking management systems in high-density areas</i>                       | There's a strong opportunity to integrate Sustainable Drainage System (SuDS) solutions - like water retention, storage, and tree planting - into street redesign. Parking management policies can play a key role in preventing car-centric recovery by reallocating road space for green/blue infrastructure and creating climate-resilient, multifunctional streets.                       |
|                                                                                                           | <i>Expansion of bicycle lanes, pedestrian zones, and barrier-free sidewalks to promote safe, inclusive, and sustainable mobility.</i>                       | It requires integrating nature and landscaping into walking and cycling routes, connecting green spaces. Behavioural change and demand management are key, alongside supportive measures like bike purchase schemes. While cycling exists mainly for leisure, there's a strong opportunity to shift perceptions by highlighting the everyday benefits of commuting - cost, ease, and safety. |

# Identified infrastructure, construction and community needs



growth-related need

conflict-related need

| No. | Type | Identified need                                                                                                                                                      | Comment                                                                                                                                                                        | Number of FMs related                                                                                               |
|-----|------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------|
| 1   |      | Development of specialized systems for managing debris and waste resulting from destruction caused by military activities.                                           | Managing debris from conflict-related destruction reduces environmental and health risks, facilitates safe reconstruction, and ensures proper handling of hazardous materials. | (7/12)<br>Chernihiv, Kharkiv, Konotop, Vinnytsia, Zviahel, Dnipro, Mykolaiv                                         |
| 2   |      | Purchase and installation of equipment and machinery for the collection, transportation, sorting, pressing, recovery, recycling and disposal of various waste types. | Investing in modern waste management equipment supports cities in reducing emissions, conserving resources, and progressing toward climate neutrality.                         | (11/12)<br>Chernivtsi, Dnipro, Kharkiv, Kalush, Kyiv, Konotop, Mykolaiv, Novovolynsk, Pervomaik, Vinnytsia, Zviahel |
| 3   |      | Procurement of containers and deployment of city-wide infrastructure for the separate collection of solid household waste.                                           | To effectively implement a waste separation system, appropriate infrastructure for citizens must be provided.                                                                  | (11/12)<br>Chernivtsi, Dnipro, Kharkiv, Kalush, Kyiv, Konotop, Mykolaiv, Novovolynsk, Pervomaik, Vinnytsia, Zviahel |
| 4   |      | Development of Mechanical Biological Treatment (MBT) facilities for the efficient treatment and reduction of solid household waste volumes.                          | Efficient waste treatment reduces landfill volumes, minimizes environmental impact, and supports cleaner, more sustainable urban development.                                  | (6/12)<br>Dnipro, Kharkiv, Kyiv, Vinnytsia, Zviahel, Konotop                                                        |

Waste and the circular economy



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# Identified infrastructure, construction and community needs



growth-related need



conflict-related need

| No. | Type | Identified need                                                                                                                                                    | Comment                                                                                                                                                                                                  | Number of FMs related                                                                                                |
|-----|------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------|
| 6   |      | Establishment of accessible waste collection centres to support community-level waste management.                                                                  | Providing accessible waste collection points improves waste segregation, increases collection efficiency, and reduces illegal dumping at the community level.                                            | (11/12)<br>Chernivtsi, Dnipro, Kharkiv, Kalush, Kyiv, Konotop, Mykolaiv, Novovolynsk, Pervomaisk, Vinnytsia, Zviahel |
| 7   |      | Restoration and reclamation of polluted land in former industrial zones to enable safe redevelopment and environmental recovery.                                   | Reclaiming polluted industrial land eliminates environmental hazards, enables safe redevelopment, and restores land for productive use.                                                                  | (5/12)<br>Chernivtsi, Kharkiv, Dnipro, Kyiv, Vinnytsia                                                               |
| 8   |      | Creation of composting areas and organic waste processing lines to reduce biodegradable waste in landfills.                                                        | Processing organic waste at the source reduces landfill volumes, lowers methane emissions, and supports more efficient local waste management.                                                           | (5/12)<br>Novovolynsk, Vinnytsia, Kalush, Konotop, Kyiv,                                                             |
| 9   |      | Recultivation and environmental restoration of existing landfills to mitigate pollution and reclaim land for future use.                                           | Environmental restoration of legacy landfills mitigates long-term pollution risks, improves land use efficiency, and contributes to ecological recovery.                                                 | (11/12)<br>Chernihiv, Kharkiv, Konotop, Vinnytsia, Kalush, Kyiv, Mykolaiv, Novovolynsk, Dnipro, Zviahel, Pervomaisk, |
| 10  |      | Establishment of integrated recycling centres with sorting lines and public education components to divert from landfills and promote sustainable waste practices. | Combining sorting infrastructure with public education reduces reliance on landfilling, improves material recovery rates, enhances waste separation at source, supports transition toward a circularity. | (6/12)<br>Kharkiv, Vinnytsia, Kyiv, Konotop, Zviahel, Kalush, Pervomaisk                                             |



# Identified infrastructure, construction and community needs

|                                                                                                                      |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |
|----------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <br>Waste and the circular economy | <b>Expert comments</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |
|                                                                                                                      | <b>General:</b> Promote a circular economy by reusing building materials, conducting material flow analysis, and encouraging urban mining.<br>Run public awareness campaigns to shift behaviour toward recycling and reuse.<br>Ukraine has a unique opportunity to lead in circular economy practices during its post-war reconstruction.                                                                                                                                                      |
|                                                                                                                      | <b>Policy and Governance:</b> Establish a legal framework with clear targets for waste reduction, recycling, and circularity.<br>Enforce circular economy principles in construction and reconstruction.<br>Collaborate with NGOs and communities to support local waste initiatives.<br>Material flow analysis (MFA) is recommended to guide policy and infrastructure planning at national, regional, and city levels.                                                                       |
|                                                                                                                      | <b>Infrastructure and Design:</b> Investment in shared waste management facilities is needed, especially in under-resourced cities.<br>Develop temporary and permanent waste facilities, including SRF plants for cement kilns.<br>Install infrastructure for hazardous waste treatment and energy-from-waste systems, ensuring incineration is a last resort.<br>Reuse of building materials should be regulated and promoted, potentially setting a precedent for broader European adoption. |
|                                                                                                                      | <b>Energy and Sustainability:</b> Use waste-to-energy solutions for district heating and agriculture, while avoiding long-term lock-ins.<br>Promote reuse of concrete debris and other materials to reduce environmental impact.                                                                                                                                                                                                                                                               |
|                                                                                                                      | <b>Finance and Implementation:</b> Encourage public-private partnerships and international financing (e.g., IFIs) for waste collection and infrastructure.<br>Build technical capacity for municipal and private operators.<br>Use material flow data to guide investment and system redesign at national, regional, and city levels.                                                                                                                                                          |

# Identified infrastructure, construction and community needs

|  Waste and the circular economy | Identified need                                                                                                                                                             | Comment                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |
|-------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|                                                                                                                   | <i>Development of specialized systems for managing debris and waste resulting from destruction caused by military activities.</i>                                           | Effective construction and demolition waste management is essential for promoting material circularity, including the recycling of plastics and fibres-especially from drone wire impacts. Reusing rubble in new building construction supports sustainable rebuilding efforts and reduces the demand for virgin materials.                                                                                                                                                                             |
|                                                                                                                   | <i>Purchase and installation of equipment and machinery for the collection, transportation, sorting, pressing, recovery, recycling and disposal of various waste types.</i> | Public awareness campaigns should be closely tied to the legal framework to encourage responsible waste practices, while smart solutions like route optimization and real-time monitoring of container fill levels can improve efficiency and support data-driven decision-making.                                                                                                                                                                                                                      |
|                                                                                                                   | <i>Procurement of containers and deployment of city-wide infrastructure for the separate collection of solid household waste.</i>                                           | It is also important to install containers in public spaces, including underground containers, to ensure accessible and efficient waste disposal while maintaining urban aesthetics and hygiene.                                                                                                                                                                                                                                                                                                        |
|                                                                                                                   | <i>Development of Mechanical Biological Treatment (MBT) facilities for the efficient treatment and reduction of solid household waste volumes.</i>                          | The first step should be to ensure selective waste collection. Investment in MBT should be preceded by a feasibility study considering the choice of technology, supply, and waste composition. The possibility of producing biogas or RDF, which can be used for energy production at other facilities, should also be considered.                                                                                                                                                                     |
|                                                                                                                   | <i>Establishment of accessible waste collection centres to support community-level waste management.</i>                                                                    | Improving access to fleet-based infrastructure and establishing a pipeline for vehicle procurement is key to serving communities effectively, especially through household-level waste collection. Beyond collection centres, there should be a strong focus on reuse, rebuy, and repair-supported by investment in repair skills training and enterprise development. Insights from Ukraine's current efforts and the Irish EPA's Repair Economy study can guide scalable, community-driven solutions. |

# Identified infrastructure, construction and community needs

|  Waste and the circular economy | Identified need                                                                                                                          | Comment                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |
|-------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|                                                                                                                   | Restoration and reclamation of polluted land in former industrial zones to enable safe redevelopment and environmental recovery.         | Promoting and transforming industrial areas for circular economy planning involves aligning production processes to support one another through smart logistics and urban planning. This transformation must be closely linked with remediation companies, while establishing and regulating waste and remediation enterprises is essential to drive innovation and ensure environmental compliance across the sector.                                                                |
|                                                                                                                   | Creation of composting areas and organic waste processing lines to reduce biodegradable waste in landfills.                              | The key priority is to establish proper infrastructure for collecting agricultural and organic waste, alongside building community capacity. Aligning agricultural redevelopment with biofuel production and energy generation from food waste can create sustainable energy solutions while supporting rural economies.                                                                                                                                                              |
|                                                                                                                   | Recultivation and environmental restoration of existing landfills to mitigate pollution and reclaim land for future use.                 | Remediating landfills into green spaces like parks can enhance urban environments while balancing the need for future waste capacity. WtE offers a viable end-stage treatment for non-recyclable waste, especially when integrated with national energy strategies, such as district heating and agri-industrial systems. However, care must be taken to avoid long-term lock-in to waste generation.                                                                                 |
|                                                                                                                   | Establishment of integrated recycling centres with sorting lines and public education components to promote sustainable waste practices. | Supporting and encouraging citizens - especially teens through smart apps can foster long-term engagement with sustainability. These tools can make waste sorting, recycling, and circular practices more accessible and interactive, helping to build habits and awareness from a young age. Waste to Energy (WtE) facilities can be a complementary option, especially for non-recyclable waste, as it helps recover energy while minimizing the volume of waste sent to landfills. |

# Identified infrastructure, construction and community needs



growth-related need  
conflict-related need

## Green Infrastructure & Nature Based Solutions

| No. | Type | Identified need                                                                                                                                         | Comment                                                                                                                                                                                          | Number of FMs related                                                                           |
|-----|------|---------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------|
| 1   |      | Development of special-purpose green areas, including parks, squares, and recreational zones in populated areas.                                        | Creating accessible green spaces improves urban liveability, supports mental and physical well-being, and enhances environmental quality in densely populated areas.                             | (6/12)<br>Chernihiv, Konotop, Kyiv, Vinnytsia, Kharkiv, Dnipro                                  |
| 2   |      | Creation of interconnected green and water-based corridors, integrating rivers, lakes, wetlands, and greenways for biodiversity and climate adaptation. | Linking natural landscapes through green and blue corridors enhances biodiversity, supports ecosystem connectivity, and strengthens urban adaptation to climate impacts.                         | (9/12)<br>Chernihiv, Chernivtsi, Dnipro, Vinnytsia, Kharkiv, Konotop, Kyiv, Pervomaïsk, Zviahel |
| 3   |      | Large-scale planting of trees and shrubs in public spaces, streets, and parks to improve air quality, reduce heat, and enhance urban aesthetics.        | Widespread tree and shrub planting helps restore vegetation lost to conflict-related fires, improves air quality, mitigates urban heat, and contributes to ecological recovery in public spaces. | (8/12)<br>Chernihiv, Chernivtsi, Konotop, Kalush, Kyiv, Vinnytsia, Novovolynsk, Pervomaïsk      |
| 4   |      | Establishment and restoration of eco-parks and natural recreational areas using native vegetation and sustainable landscaping.                          | Restoring and establishing parks with native vegetation supports biodiversity, enhances ecological stability, and provides accessible natural spaces for urban populations.                      | (8/12)<br>Chernihiv, Chernivtsi, Konotop, Kalush, Kyiv, Vinnytsia, Novovolynsk, Pervomaïsk      |
| 5   |      | Implementation of green roofs, permeable pavements, and rain gardens in densely built-up areas to manage stormwater and reduce urban heat.              | Integrating green infrastructure into built-up areas improves stormwater absorption, reduces surface temperatures, and enhances environmental performance in cities.                             | (3/12)<br>Kyiv, Vinnytsia, Konotop                                                              |



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# Identified infrastructure, construction and community needs



growth-related need  
conflict-related need

| No. | Type | Identified need                                                                                                                                              | Comment                                                                                                                                                                                                                        | Number of FMs related                                                                           |
|-----|------|--------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------|
| 6   |      | Transformation of underused or abandoned industrial areas into public green spaces and community parks.                                                      | Converting abandoned industrial sites into green public areas reclaims degraded land, reduces urban blight, and provides much-needed recreational space in densely populated neighbourhoods.                                   | (5/12)<br>Chernivtsi, Kharkiv, Dnipro, Kyiv, Vinnytsia                                          |
| 7   |      | Protection and rehabilitation of natural wetlands and riverbanks to support biodiversity and water quality.                                                  | Military actions and fires have severely degraded wetlands and riverbanks, making their protection and rehabilitation critical for restoring biodiversity, improving water quality, and strengthening natural flood defences.  | (9/12)<br>Chernihiv, Chernivtsi, Dnipro, Vinnytsia, Kharkiv, Konotop, Kyiv, Pervomaisk, Zviahel |
| 8   |      | Installation of air quality sensors and digital platforms for real-time alerts and public access to environmental data.                                      | Real-time air quality monitoring enhances public awareness, supports timely health protection measures, and strengthens environmental oversight in areas affected by pollution and conflict-related fires.                     | (4/12)<br>Vinnytsia, Kharkiv, Chernivtsi, Dnipro                                                |
| 9   |      | Prevention and reduction of soil contamination from hazardous waste and chemicals through targeted remediation and land management.                          | Military operations and the spread of hazardous materials have increased the risk of soil contamination, making targeted remediation essential to prevent long-term environmental damage and protect land for safe future use. | (7/12)<br>Kyiv, Vinnytsia, Chernivtsi, Dnipro, Kalush, Novovolynsk, Dnipro                      |
| 10  |      | Integration of green infrastructure into urban planning using smart technologies for energy analysis, environmental monitoring, and sustainable development. | Smart integration of green infrastructure improves environmental control, reduces energy use, and supports recovery in damaged urban areas.                                                                                    | (6/12)<br>Dnipro, Kyiv, Vinnytsia, Kharkiv, Konotop, Chernivtsi                                 |



# Identified infrastructure, construction and community needs

|                                                                                                                                         |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |
|-----------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <br>Green Infrastructure & Nature<br>Based Solutions | <b>Expert comments</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |
|                                                                                                                                         | <b>General:</b> Recognize nature's essential services - cooling, water attenuation, pollution removal, and mental health support. Ecologists must be involved in species selection and ecological planning from the outset. Design natural spaces for healing, especially for neurodiverse individuals, displaced people, children, and former soldiers. Integrate play into NBS to support child development and community well-being. Establish nature education centres and school-based farming to foster environmental stewardship.                                                                                                                                                                                                                                                                                                       |
|                                                                                                                                         | <b>Policy and Governance:</b> Enforce NBS in infrastructure and urban planning through robust legal mechanisms. Ensure governance structures and capacity building to support implementation. Include gender-responsive approaches in the design and implementation of NBS. Include diverse stakeholders - especially beyond military in decisions about nature use for protection and restoration. Apply the World Bank-supported toolkit to embed gender perspectives in NBS planning and delivery.                                                                                                                                                                                                                                                                                                                                          |
|                                                                                                                                         | <b>Infrastructure and Design:</b> Integrate tactical urbanism and interventionist approaches to restore nature while enabling long-term planning. Design inclusive green spaces for healing, play, and food production (e.g., city farms, school gardens). Monitor and protect natural heritage sites with tools like soil and water pollution sensors. Develop detailed plans with specific species and interventions to ensure climate resilience. Use natural features (e.g., wetlands) as barriers; fast-growing species can offer temporary cover and evolve over time. Address physical and chemical contamination from war debris and munitions to restore ecological function. Consider the impact of drones and residual fibre-linked systems on forestry and natural areas—develop protocols for clearing and restoring these zones. |
|                                                                                                                                         | <b>Finance and Implementation:</b> Secure dedicated funding for nature, often deprioritized in reconstruction. Explore funding opportunities for NBS with military and protective value. Use gender and community-focused toolkits to guide inclusive and effective NBS deployment. Leverage existing toolkits (e.g., Gender-responsive NBS toolkit for the World Bank) to guide implementation.                                                                                                                                                                                                                                                                                                                                                                                                                                               |

# Identified infrastructure, construction and community needs

|  <b>Green Infrastructure &amp; Nature Based Solutions</b> | Identified need                                                                                                                                                | Comment                                                                                                                                                                                                                                                                                                      |
|----------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|                                                                                                                                              | <i>Development of special-purpose green areas, including parks, squares, and recreational zones in populated areas.</i>                                        | Support community-led initiatives to rebuild and adapt green spaces, ensuring they meet the needs of veterans, displaced people, and war-impacted communities. Prioritize healing spaces through trauma-informed design to foster recovery, inclusion, and long-term ownership.                              |
|                                                                                                                                              | <i>Creation of interconnected green and water-based corridors, integrating rivers, lakes, wetlands, and greenways for biodiversity and climate adaptation.</i> | Integrate nature systems and green corridors into regional planning to support recreation, biodiversity, and land protection. Focus urban rebuilding in compact, accessible formats like the 15-minute city model, ensuring services and green spaces are within easy reach of all residents.                |
|                                                                                                                                              | <i>Large-scale planting of trees and shrubs in public spaces, streets, and parks to improve air quality, reduce heat, and enhance urban aesthetics.</i>        | Implement phased tree planting in damaged zones - start with fast-growing species for quick greening and stabilization, with a planned transition to diverse, long-term species for ecological and community benefits.                                                                                       |
|                                                                                                                                              | <i>Establishment and restoration of eco-parks and natural recreational areas using native vegetation and sustainable landscaping.</i>                          | Develop a connected network of green and blue spaces across cities to enhance biodiversity, recreation, and climate resilience. Support local rewilding by protecting selected areas from development and allowing nature to regenerate.                                                                     |
|                                                                                                                                              | <i>Implementation of green roofs, permeable pavements, and rain gardens in densely built-up areas to manage stormwater and reduce urban heat.</i>              | Leverage the rebuilding process to introduce new guidelines and standards for green infrastructure, such as green roofs and permeable pavements. Provide technical, financial, and knowledge-based training to build understanding and highlight the long-term benefits and cost savings of these solutions. |

# Identified infrastructure, construction and community needs

|  Green Infrastructure & Nature Based Solutions | Identified need                                                                                                                                                     | Comment                                                                                                                                                                                                                                                                                                                                                                                                                                                           |
|-----------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|                                                                                                                                   | <i>Transformation of underused or abandoned industrial areas into public green spaces and community parks.</i>                                                      | Establish Technology Parks as hubs for new communities, businesses, and scientific collaboration. These spaces can drive innovation, support economic recovery, and foster connections between research, entrepreneurship, and local development.                                                                                                                                                                                                                 |
|                                                                                                                                   | <i>Protection and rehabilitation of natural wetlands and riverbanks to support biodiversity and water quality.</i>                                                  | Use nature as a protective buffer (e.g., wetlands) in collaboration with the military and all stakeholders, ensuring ecological areas are not excluded from protection. This approach can help secure funding for nature in times of limited resources. Address war-related damage including drone debris, contamination, and landmines to restore forests and open areas for ecological, health, and community use, especially in vulnerable agricultural zones. |
|                                                                                                                                   | <i>Installation of air quality sensors and digital platforms for real-time alerts and public access to environmental data.</i>                                      | Link nature-based protection to broader security systems, working with universities to train personnel on their use and ensure long-term operation. Engage citizens in site selection and awareness efforts to build public support and ensure effective, locally grounded implementation.                                                                                                                                                                        |
|                                                                                                                                   | <i>Prevention and reduction of soil contamination from hazardous waste and chemicals through targeted remediation and land management.</i>                          | Use phytoremediation - plant-based techniques to support safe demining and soil restoration in contaminated areas. This approach can help rehabilitate land affected by war, making it usable again for agriculture, nature, and community development.                                                                                                                                                                                                           |
|                                                                                                                                   | <i>Integration of green infrastructure into urban planning using smart technologies for energy analysis, environmental monitoring, and sustainable development.</i> | Incorporate green and blue infrastructure not only in public spaces but also in the design of buildings, especially hospitals and schools. Use GIS and parametric urban design tools for fast, informed decision-making. Leverage the reconstruction momentum to establish new rules and standards that embed nature-based solutions (NBS) into all levels of planning and redevelopment.                                                                         |

# Identified infrastructure, construction and community needs

|                                                                                              |                                                                                                                                                                                                                                                                                                                                                                           |
|----------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <br>Digital | Expert comments                                                                                                                                                                                                                                                                                                                                                           |
|                                                                                              | <b>General:</b> Use digital tools to improve access to healthcare, education, training, and public services. Ensure digital inclusion, especially for elderly users through capacity building and literacy programs. Promote community-led digital access to reduce long-distance travel and support local development.                                                   |
|                                                                                              | <b>Policy and Governance:</b> Develop a tiered digital re-establishment strategy focused on social benefit and phased delivery. Create regulations for AI and data centre development, especially post-war. Ensure cybersecurity across all digital systems and infrastructure. Explore pooled procurement across cities for cost-effective digital solutions.            |
|                                                                                              | <b>Infrastructure and Design:</b> Invest in 5G infrastructure, dynamic traffic management, and inter-city travel planning apps. Use GIS and parametric tools for fast, informed urban planning. Build UPS and energy-independent systems for key connectivity nodes and data centres. Consider satellite-based internet for remote and quick deployment.                  |
|                                                                                              | <b>Public Transport:</b> Use real-time apps and 5G to connect buses, trains, and traffic systems. Enable transport planning with GIS tools, support inclusive access, and coordinate across cities for efficient, low-emission mobility.                                                                                                                                  |
|                                                                                              | <b>Energy and Sustainability:</b> Monitor energy performance in buildings using real-time digital tools. Support net-zero goals through smart energy generation, distribution, and load matching. Ensure energy resilience for data centres and critical infrastructure, with backup systems.                                                                             |
|                                                                                              | <b>Finance and Implementation:</b> Use digitalisation to track energy savings, especially in industrial zones. Implement digital patient records and citizen data backups. Encourage community-beneficial data centre development (DC gigaframework). Link digital systems to security infrastructure, with university partnerships for training and long-term operation. |

# Identified infrastructure, construction and community needs

|  <b>Digital</b> | Identified need                                                                                                                                                  | Comment                                                                                                                                                                                                                                                                                                                                                                               |
|--------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|                                                                                                  | <i>Introduction of free open Wi-Fi zones in public institutions and state buildings to ensure universal internet access for citizens.</i>                        | Expand Wi-Fi coverage in public spaces (parks, squares, transport hubs, institutional buildings, and street lighting) to support IoT solutions like smart bins and bike rentals. Integrate EV charging, and smart water, traffic, and waste management into urban planning. Build technical capacity for municipal and private operators and ensure cybersecurity across all systems. |
|                                                                                                  | <i>Development of adaptive traffic light control systems, onboard computers for public transport, and transport modelling tools for infrastructure planning.</i> | Develop risk strategies and training using digital tools, ensuring technology is integrated with people and processes. Build capacity for municipal and private staff, redesign workflows, and strengthen supply chains for deployment and operation. Prioritise public transport in planning and risk mitigation efforts.                                                            |
|                                                                                                  | <i>Ensuring mobile coverage along international transport corridors and equipping internet towers with alternative energy sources for uninterrupted service.</i> | Collaborate with infrastructure owners and operators to prioritise Wi-Fi and digital coverage along public transport corridors, hubs, and metro systems. This ensures reliable access to smart mobility services and supports broader digital inclusion in high-use transit areas.                                                                                                    |
|                                                                                                  | <i>Upgrade of emergency alert systems and maintenance of radiation safety barriers to enhance public protection and crisis response.</i>                         | Integrate SMS, mobile apps, sirens, radio, TV, and loudspeakers for real-time, location-based alerts. Install loudspeakers in public spaces and establish mobile or fixed decontamination stations to support emergency response teams.                                                                                                                                               |
|                                                                                                  | <i>Use of Big Data and GIS technologies for spatial planning, infrastructure optimization, and service delivery improvement.</i>                                 | Install IoT sensors for real-time monitoring of traffic, air quality, noise, energy use, and water levels. Use drones and satellite imaging to map and track land use changes. Store and manage all data through centralised, cloud-based platforms for efficient analysis and decision-making.                                                                                       |



# Conclusion

The SUN4Ukraine Needs Assessment has delivered a comprehensive, evidence-based evaluation of the challenges and opportunities facing Ukraine's 12 Flagship Municipalities (FMs) as they strive for climate-neutral recovery. By systematically reviewing local policies, engaging international experts, and synthesising priorities across seven strategic sectors, the assessment has identified both urgent reconstruction needs and long-term pathways for sustainable development.

Cities such as Kyiv, Kharkiv, and Dnipro have experienced widespread destruction of residential, industrial, and public infrastructure, requiring large-scale reconstruction and modernisation. Smaller municipalities like Novovolynsk and Zviahel are focusing on integrating displaced populations, restoring essential services, and leveraging digital and green solutions for local development.

Additional key findings and sector insights include:

- **Energy:** All municipalities face urgent needs to rebuild and modernise energy infrastructure, with a strong emphasis on decentralisation, renewable energy (solar, wind, biogas), and resilience to conflict-related risks. Upgrading heating systems, deploying cogeneration units, and integrating smart energy management are critical.
- **Buildings:** There is an acute need to restore and retrofit educational, healthcare, and residential buildings, many of which have suffered significant war damage. Deep thermal modernisation, energy-efficient technologies, and affordable housing programmes are essential to support vulnerable populations and ensure sustainable, resilient communities.
- **Water:** Restoring water supply, sewage, and wastewater treatment infrastructure is a priority, especially in cities with extensive damage to pumping stations and pipelines. Nature-based solutions, such as river

ecosystem restoration and flood protection, are recommended to enhance biodiversity and climate resilience.

- **Mobility and Transport:** The conflict has severely impacted roads, bridges, and public transport systems. Municipalities are prioritising the reconstruction of key transport links, the decarbonisation of public fleets (e-buses, trams), and the expansion of cycling and pedestrian infrastructure to promote safe, inclusive, and sustainable mobility.
- **Waste and Circular Economy:** Effective management of debris and waste from destruction is critical. Cities are investing in modern waste collection, recycling, and composting facilities, as well as the reclamation of polluted land and the development of circular economy practices to reduce landfill use and environmental impact.
- **Green Infrastructure & Nature-Based Solutions:** The creation and restoration of parks, green corridors, and eco-parks are central to improving urban liveability, supporting mental and physical well-being, and enhancing environmental quality. Large-scale tree planting, soil remediation, and the integration of green infrastructure into urban planning are key strategies.
- **Digital:** Expanding digital infrastructure—including free public Wi-Fi, adaptive traffic management, and smart monitoring systems—supports both immediate recovery and long-term urban innovation. Ensuring digital inclusion, especially for vulnerable groups, is a cross-cutting priority.

Building on these identified needs, Ukraine's municipalities can lay the foundations for a green recovery that meets both immediate needs and long-term ambitions.



# Thank you

Let's keep in touch!



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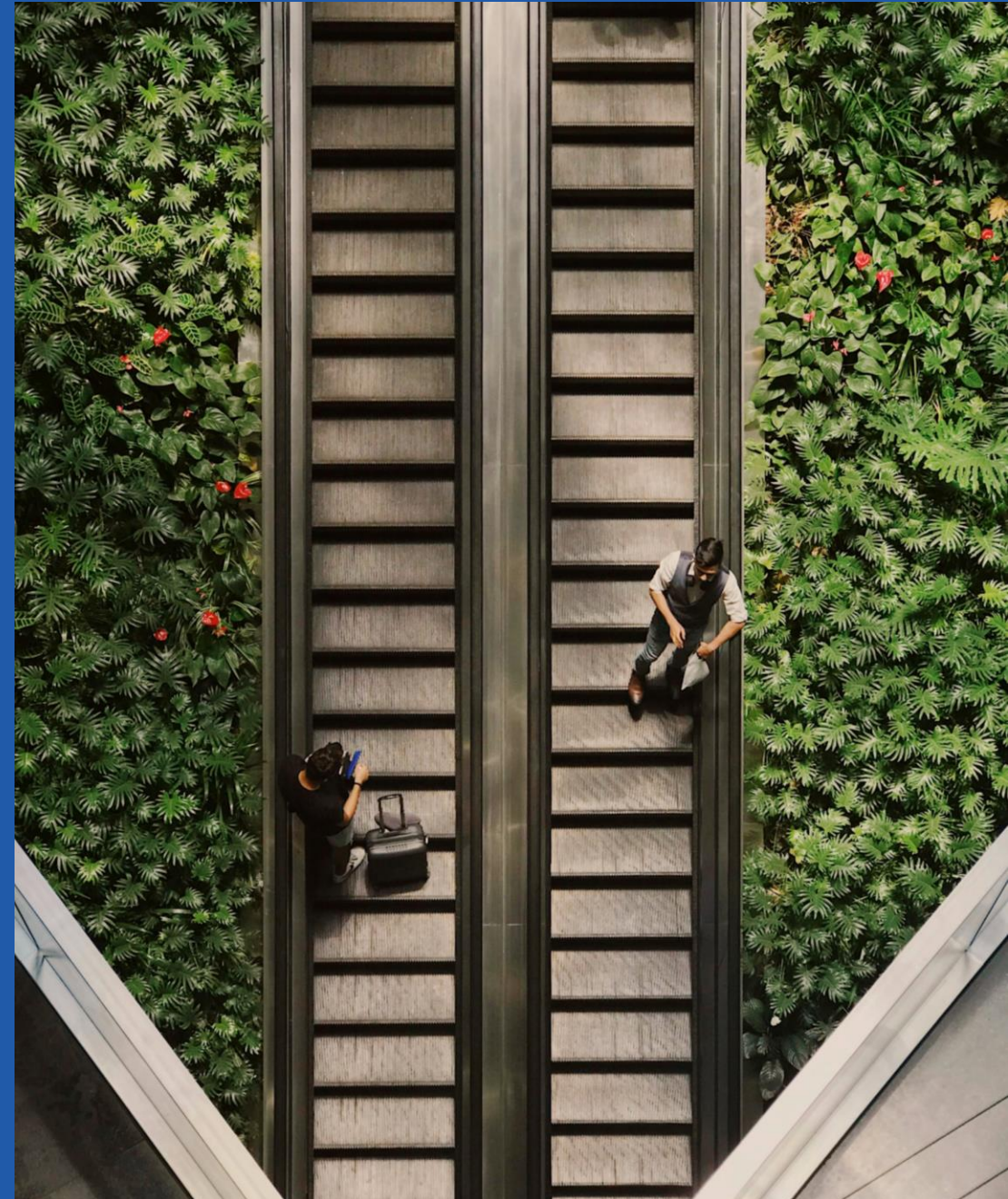
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