FACTSHEET

Cold Spot Risk Assessment
Winterisation 2023/24

August 2023
Ukraine

KEY MESSAGES

- Ukrainians face challenges ahead of the 2023/24 winter season due to a combination of factors, including damage to residential and non-residential infrastructure, internal displacement, elevated levels of humanitarian needs, and cumulative damage to energy, water, and heating infrastructure.
- Vulnerability to winter-related hazards is particularly high in **"cold spots"** - geographic areas where winter-related hazards compound with high levels of exposure, susceptibilities, and estimated lack of coping capacity.
- Cold spots for the 2023/24 winter season are largely located in the east of Ukraine, with the most vulnerable raions being **Bakhmutskyi, Kramatorskyi and Pokrovskyi** (Donestska oblast)**, Okhtyrskyi and Sumskyi** (Sumska oblast)**, and Kharkivskyi and Vinnytskyi raions** in Kharkivska and Vinnytska oblasts respectively.
- Coordination between winterisation actors, ongoing engagement with local representatives, and continuous needs assessment based on Ukraine's evolving situation are essential to ensure an effective winterisation response.

BACKGROUND & OBJECTIVES

The winter 2022/23 was characterised by a targeted campaign of strikes from the Russian Federation on Ukraine's electricity grid, power generation facilities, and heating and water infrastructures, resulting in prolonged outages and disruption to basic services throughout the country. According to UNDP, the average Ukrainian household experienced five cumulative weeks without power during the winter 2022/23.[1] An estimated $10 billion in damage to energy infrastructure, along with loss of government control under large power plants like the Zaporizhzhia Nuclear Power Plant (NPP), resulted in significant reduction in available power generation capacity in Ukraine compared to pre-war time.[2] Combined with high inflation rates in 2022 and 2023 and the presence of more than 5 million internally displaced persons (IDPs) throughout the country,[3] preparation for the 2023/24 winter season in Ukraine faces a number of challenges in the economic, institutional, social and logistical domains. To support the 2023/24 winterisation response, REACH conducted a Cold Spots Risk Assessment within government-controlled areas of Ukraine to identify raions most vulnerable to winter-related hazards. This assessment aims to improve the understanding of winter-related hazards, exposure, and vulnerabilities, as well as the potential for compounding impacts on conflict-affected people ahead of the winter season.

Image 1: Damaged residential building in Mykovaiv city. Source: Acted.

This factsheet presents the results of a geo-spatial analysis based on secondary data conducted by REACH in August 2023. These findings will be complemented by a comprehensive report in September 2023, with inclusion of primary data from key informant interviews in the seven most vulnerable raions to provide winterisation actors with insights on lessons learned from the previous winterisation response, and the challenges expected for this winter.

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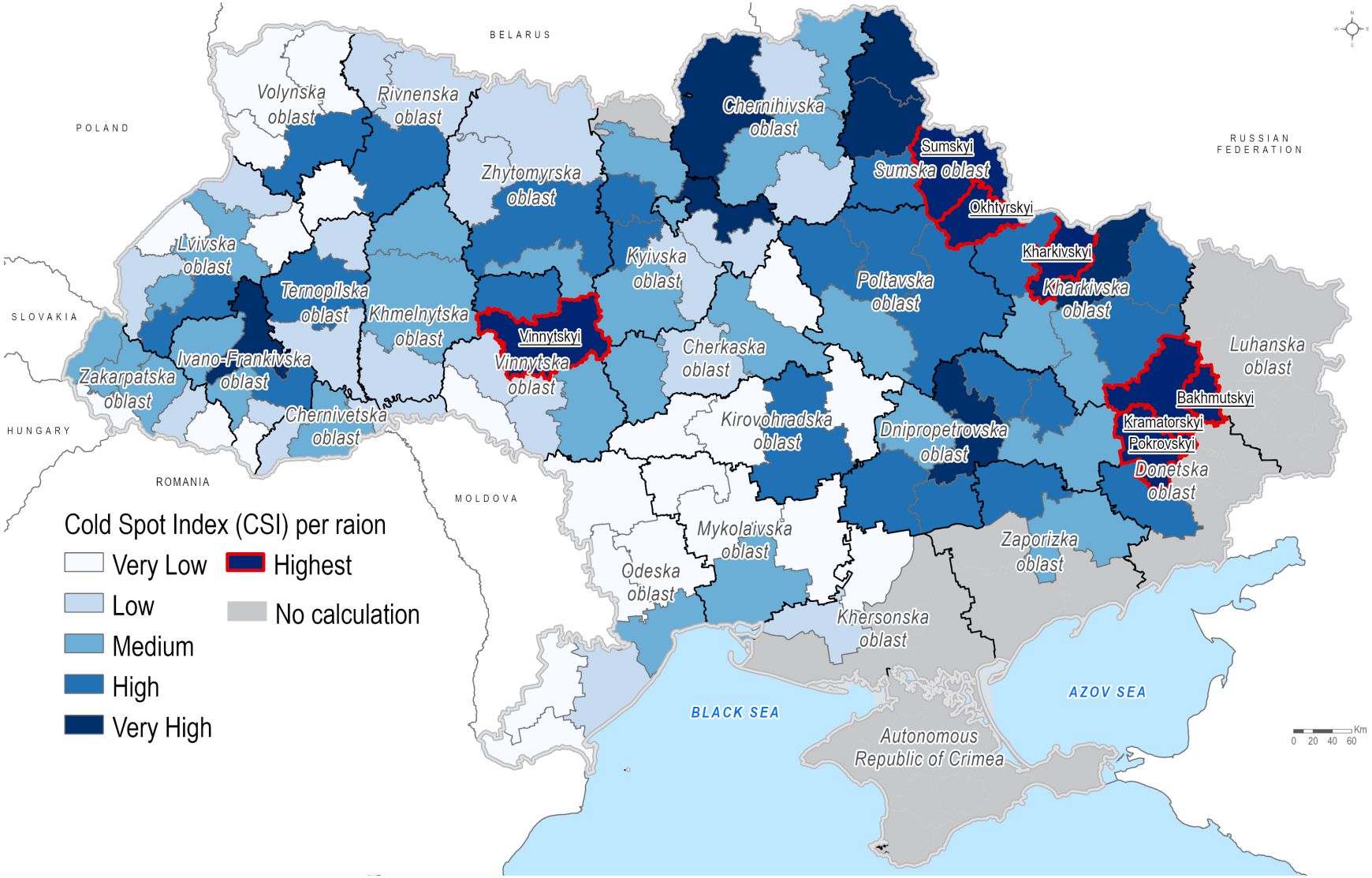
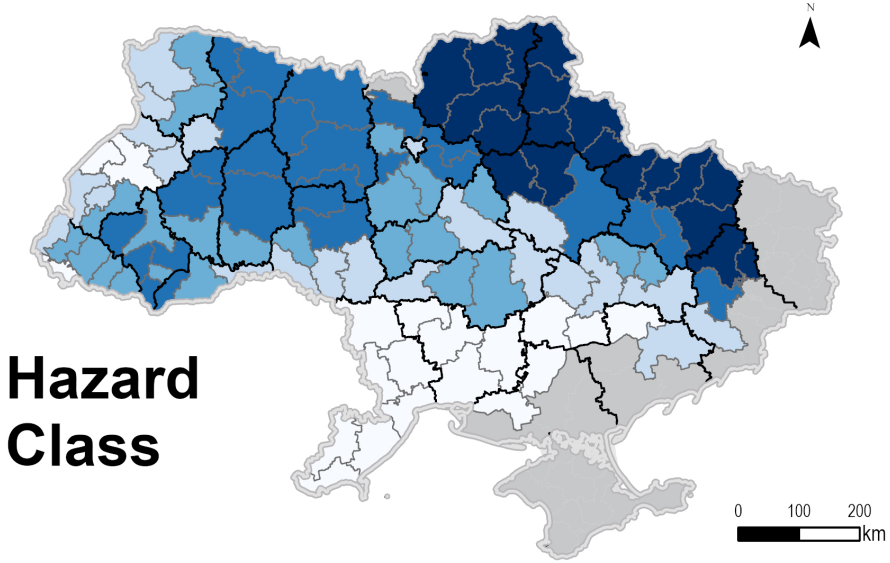
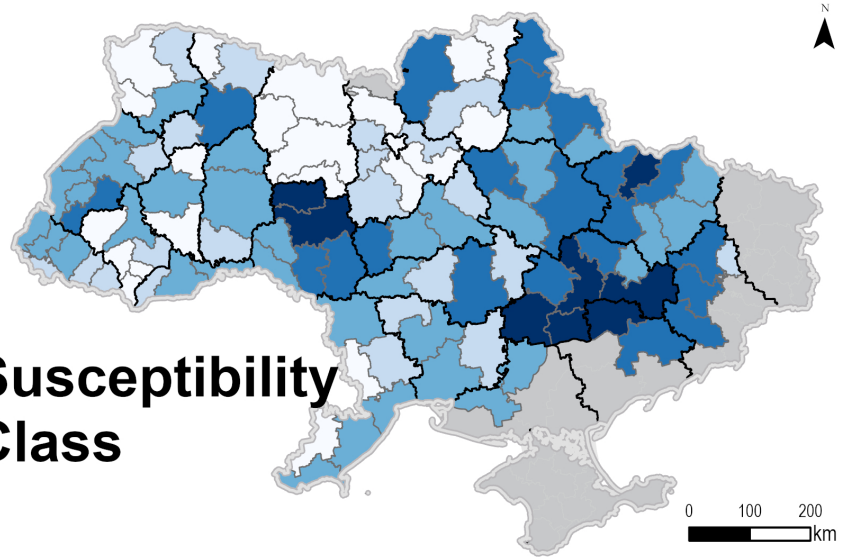
Cold Spot Index classes across Ukraine for winter season 2023/24

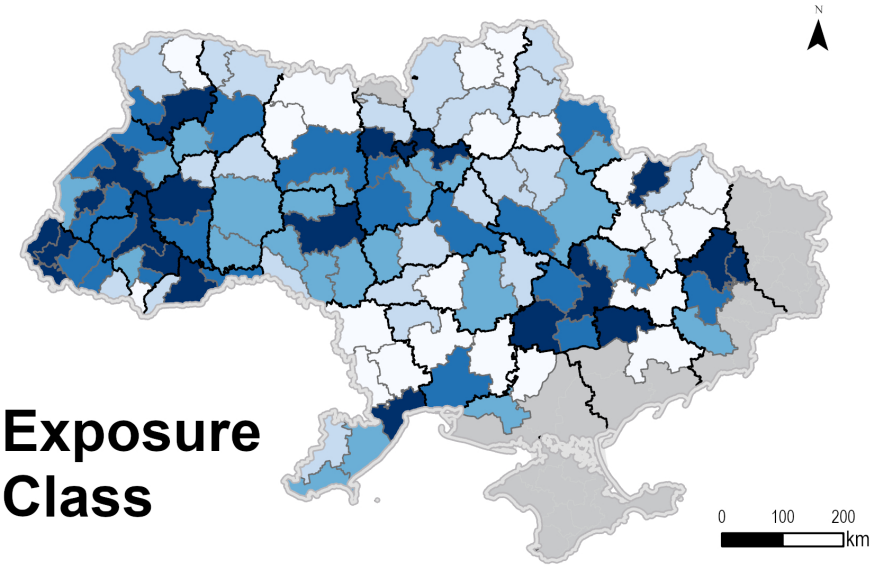
The map below illustrates the presence of 'Cold Spots' across Ukraine, showing where cold conditions compound with susceptibilities and lack of coping capacities, in an effort to identify where populations could be most impacted by winter conditions. The north-eastern part of Ukraine (Sumska, Kharkivska and Luhanska oblasts) featured the raions with the highest estimated levels of winter-related hazards. Larger cities and raions in the Western region are more exposed to winter-related hazards due to high population density and large numbers of IDPs.[4] Areas close to the front line or recently returned under the control of the GoU tended to have very high susceptibility and lack of coping capacity indicators. Two raions in Vinnytska oblast and one in Odeska oblast also showed a very high vulnerability indicator.

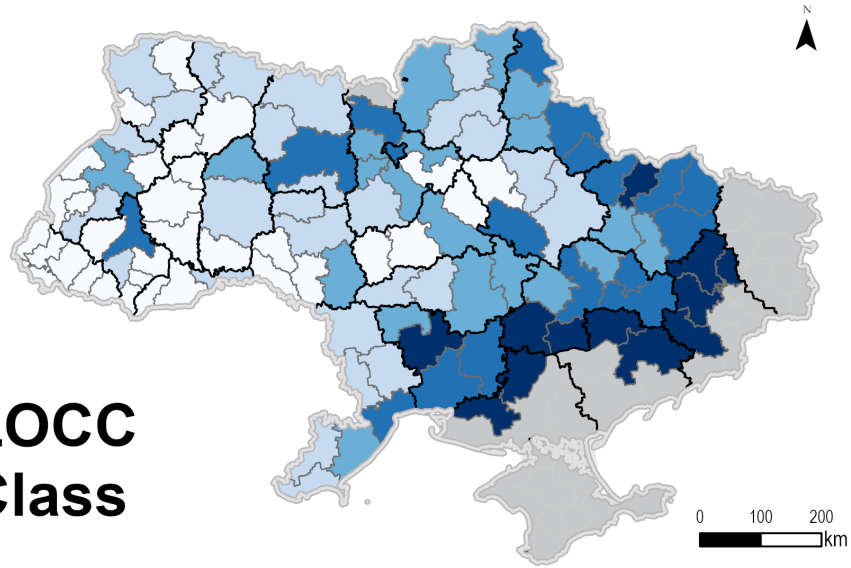


Ukraine's raion classification based on hazard, exposure, susceptibility and LOCC indicators









Classes: Very Low | Low | Medium | High | Very High | No calculation

METHODOLOGY OVERVIEW

A geo-spatial analysis based on aggregated data from various indicators was performed to identify 'Cold Spots' with the highest estimated compounding impacts of winter-related hazards and vulnerabilities on exposed people. It implied utilization of available datasets at raion level or disaggregation from oblast level and overlay them together as described below. The geographic scope of the analysis included 109 raions (administrative level 2) mostly under control of the Government of Ukraine (GoU) as of July 2023. Raions in Luhanska oblast and the Autonomous Republic of Crimea were excluded due to the lack of up-to-date data. Cold spots were identified on the basis of four groups of indicators: hazard, exposure, susceptibility, and lack of coping capacity (LOCC). Selected data sets for each group include:

Exposure: population density as of April 2023.[5]

Susceptibility: percentage of elderly population as of April 2023;[6] number of IDPs per raion as of June 2023;[7] consumer price index in June 2023 vs. June 2022;[8] availability of back up source of power in collective sites for IDPs.[9]

Hazard: number of frost days per year;[10] frequency of cold waves in winter season.[11]

LOCC: cumulative damage to critical infrastructure;[12] conflict incidents density;[13] change in electricity consumption.[14]

Selection criteria for data sets included their quality and suitability. Selected data sets for each indicator were aggregated at the raion level. Indicators' values were subsequently assigned into five classes, ranging from 'Very Low' to 'Very High'. Classes assigned to raions within each of the groups (hazard, exposure, susceptibility, and LOCC) were overlaid to calculate the raion's overall 'Cold Spot Index' (CSI) using the following formula:

CSI = **Hazard Class** * 0.35 + **Exposure Class** * 0.25 +Vulnerability ((**Susceptibilities Class** + **LOCC Class**) / 2) * 0.4

This formula defines Cold Spot risk as combination of hazard (weighted 35%), exposure (weighted 25%), and vulnerability (weighted 40% and understood as a combination of susceptibility and LOCC). CSI values were then classified in five classes (from 'Very Low' to 'Very High') to rank raions accordingly.

FINDINGS AND LIMITATIONS

The analysis resulted in the CSI ranking of Ukraine's raions for 2023 as well as revealed the changes in ranking against 2022 which are showed in Annex 1 and 2 respectively. The seven raions with highest CSI are Okhtyrskyi, Vinnytskyi, Pokrovskyi, Sumskyi, Bakhmutskyi, Kramatorskyi and Kharkivskyi. These areas may necessitate increased resources from relevant actors to plan the winterisation response ahead of the 2023/24 cold season.

While CSI can effectively support the allocation of resources and the prioritisation of areas for winterisation activities, results should be interpreted within the context of the rapidly-evolving situation in Ukraine. Coordination between winterisation actors and ongoing engagement with representatives of local authorities and communities during the winter season remains crucial to ensure that winterisation programming addresses the specific needs and challenges of war-impact populations across the whole of Ukraine during the winter season.

REFERENCES

[1] UNDP, Towards a Green Transition of the Energy Sector in Ukraine: Update on the Energy Damage Assessment, June 2023.
[2] ibid.
[3] OCHA, Ukraine Humanitarian Response 2023: Situation Report, 3 August 2023.
[4] IOM, Ukraine - Area Baseline Assessment (Raion level) - Round 26, July 2023.
[5] Leasure DR, Dooley CA, Contemporary sub-national population estimates for Ukraine by age and sex estimated using social media activity and geolocated conflict events.
[6] ibid.
[7] IOM, Ukraine - Area Baseline Assessment (Raion level) - Round 26, July 2023.
[8] State Statistics Service of Ukraine, Inflation calculator, August 2023.
[9] REACH, Collective Sites Monitoring Round 9, TBD.
[10] ECMWF / Copernicus Climate Change Service, ERA5 Daily Aggregates, July 2023.
[11] NASA, MODIS Land Surface Temperature and Emissivity, July 2023.
[12] Zoi Environment Network, Ecodozor, August 2023.
[13] ACLED, ACLED project database, August 2023.
[14] UNDP, Towards a Green Transition of the Energy Sector in Ukraine: Update on the Energy Damage Assessment, June 2023.

ABOUT REACH

REACH Initiative facilitates the development of information tools and products that enhance the capacity of aid actors to make evidence-based decisions in emergency, recovery and development contexts. The methodologies used by REACH include primary data collection and in-depth analysis, and all activities are conducted through inter-agency aid coordination mechanisms. REACH is a joint initiative of IMPACT Initiatives, ACTED and the United Nations Institute for Training and Research - Operational Satellite Applications Programme (UNITAR-UNOSAT).

ANNEX 1

CSI ranking of Ukraine's raions

Raion	Oblast	CSI class
Rozdilnianskyi	Odeska	Very Low
Berezivskyi	Odeska	Very Low
Bolhradskyi	Odeska	Very Low
Podilskyi	Odeska	Very Low
Bashtanskyi	Mykolaivska	Very Low
Kovelskyi	Volynska	Very Low
Pervomaiskyi	Mykolaivska	Very Low
Kamin-Kashyrskyi	Volynska	Very Low
Mohyliv-Podilskyi	Vinnytska	Very Low
Dubenskyi	Rivnenska	Very Low
Verkhovynskyi	Ivano-Frankivska	Very Low
Zolochivskyi	Lvivska	Very Low
Izmailskyi	Odeska	Very Low
Novoukrainskyi	Kirovohradska	Very Low
Volodymyr-Volynskyi	Volynska	Very Low
Rakhivskyi	Zakarpatska	Very Low
Yavorivskyi	Lvivska	Very Low
Zolotoniskyi	Cherkaska	Very Low
Berehivskyi	Zakarpatska	Very Low
Beryslavskyi	Khersonska	Very Low
Holovanivskyi	Kirovohradska	Very Low
Oleksandriiskyi	Kirovohradska	Very Low
Voznesenskyi	Mykolaivska	Very Low
Korostenskyi	Zhytomyrska	Low
Novohrad-Volynskyi	Zhytomyrska	Low
Sambirskyi	Lvivska	Low
Bilhorod-Dnistrovskyi	Odeska	Low
Kremenetskyi	Ternopilska	Low
Zvenyhorodskyi	Cherkaska	Low
Kamianets-Podilskyi	Khmelnytska	Low
Chortkivskyi	Ternopilska	Low
Kosivskyi	Ivano-Frankivska	Low
Tulchynskyi	Vinnytska	Low
Varaskyi	Rivnenska	Low
Vyzhnytskyi	Chernivetska	Low
Boryspilskyi	Kyivska	Low
Koriukivskyi	Chernihivska	Low
Obukhivskyi	Kyivska	Low
Prylutskyi	Chernihivska	Low
Zhmerynskyi	Vinnytska	Low
Tiachivskyi	Zakarpatska	Low
Chervonohradskyi	Lvivska	Low
Dnistrovskyi	Chernivetska	Low
Khersonskyi	Khersonska	Low
Sarnenskyi	Rivnenska	Low
Berdychivskyi	Zhytomyrska	Medium
Drohobytskyi	Lvivska	Medium
Mykolaivskyi	Mykolaivska	Medium
Nadvirnianskyi	Ivano-Frankivska	Medium
Polohivskyi	Zaporizka	Medium
Synelnykivskyi	Dnipropetrovska	Medium
Uzhhorodskyi	Zakarpatska	Medium
Kaluskyi	Ivano-Frankivska	Medium
Lvivskyi	Lvivska	Medium
Novhorod-Siverskyi	Chernihivska	Medium
Umanskyi	Cherkaska	Medium
Bilotserkivskyi	Kyivska	Medium
Haisynskyi	Vinnytska	Medium
Khustskyi	Zakarpatska	Medium
Lozivskyi	Kharkivska	Medium
Cherkaskyi	Cherkaska	Medium
Vyshhorodskyi	Kyivska	Medium
Kyivska	Kyivska	Medium
Odeskyi	Odeska	Medium
Krasnohradskyi	Kharkivska	Medium
Nizhynskyi	Chernihivska	Medium
Cnernivetskyi	Chernivetska	Medium
Kamianskyi	Dnipropetrovska	Medium
Kremenchutskyi	Poltavska	Medium
Mukachivskyi	Zakarpatska	Medium
Shepetivskyi	Khmelnytska	Medium
Khmelnytskyi	Khmelnytska	Medium
Kropyvnytskyi	Kirovohradska	High
Novomoskovskyi	Dnipropetrovska	High
Romenskyi	Sumska	High
Kolomyiskyi	Ivano-Frankivska	High
Lubenskyi	Poltavska	High
Myrhorodskyi	Poltavska	High
Stryiskyi	Lvivska	High
Volnovaskyi	Donetska	High
Buchanskyi	Kyivska	High
Lutskyi	Volynska	High
Nikopolskyi	Dnipropetrovska	High
Poltavskyi	Poltavska	High
Fastivskyi	Kyivska	High
Iziumskyi	Kharkivska	High
Kupianskyi	Kharkivska	High
Rivnenskyi	Rivnenska	High
Zhytomyrskyi	Zhytomyrska	High
Pavlohradskyi	Dnipropetrovska	High
Ternopilskyi	Ternopilska	High
Khmilnytskyi	Vinnytska	High
Bohodukhivskyi	Kharkivska	High
Kryvorizkyi	Dnipropetrovska	High
Zaporizkyi	Zaporizka	High
Brovarskyi	Kyivska	Very High
Chernihivskyi	Chernihivska	Very High
Konotopskyi	Sumska	Very High
Ivano-Frankivskyi	Ivano-Frankivska	Very High
Dniprovskyi	Dnipropetrovska	Very High
Chuhuivskyi	Kharkivska	Very High
Shostkynskyi	Sumska	Very High
Okhtyrskyi	Sumska	Highest
Vinnytskyi	Vinnytska	Highest
Pokrovskyi	Donetska	Highest
Sumskyi	Sumska	Highest
Bakhmutskyi	Donetska	Highest
Kramatorskyi	Donetska	Highest
Kharkivskyi	Kharkivska	Highest

ANNEX 2

The below map shows changes in CSI ranking of raions between the winter 2022/23 and winter 2023/24. Damage to energy infrastructure in the West of Ukraine during the 2022/23 winter and increased shelling of Kherson City and the surrounding region following the Government of Ukraine regaining control over this area contributed to high increase in CSI values for these areas. Only eight raions, scattered across different regions of Ukraine, show a moderate decrease in CSI ranking as compared from last winter.