

Tracking unaccounted greenhouse gas emissions due to the war in Ukraine since 2022

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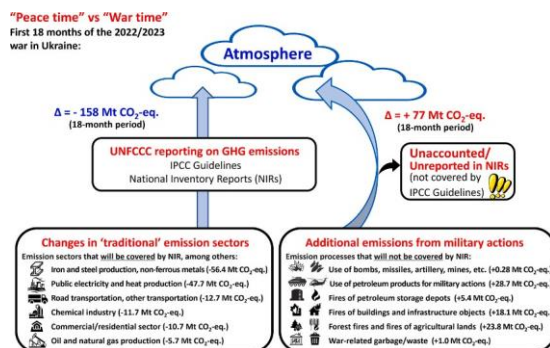
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HIGHLIGHTS

- During a war GHG emissions due to military actions can increase significantly.
- The GHG emissions impact of conflict extends well beyond the time and place of physical conflict.
- The IPCC guidelines do not explicitly consider wartime GHG emission reporting.
- War-related GHG emissions for the first 18 months of the war in Ukraine were 77 MtCO₂-eq.
- The relative uncertainty of war-related emissions in Ukraine is estimated to be 22 % (95 % CI).

GRAPHICAL ABSTRACT



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ABSTRACT

Accounting and reporting of greenhouse gas (GHG) emissions are mandatory for Parties under the Paris Agreement. Emissions reporting is important for understanding the global carbon cycle and for addressing global

climate change. However, in a period of open conflict or war, military emissions increase significantly and the accounting system is not currently designed to account adequately for this source. In this paper we analyze how, during the first 18 months of the 2022/2023 full-scale war in Ukraine, GHG national inventory reporting to the UNFCCC was affected. We estimated the decrease of emissions due to a reduction in traditional human activities. We identified major, war-related, emission processes from the territory of Ukraine not covered by current GHG inventory guidelines and that are not likely to be included in national inventory reports. If these emissions are included, they will likely be incorporated in a way that is not transparent with potentially high uncertainty. We analyze publicly available data and use expert judgment to estimate such emissions from (1) the use of bombs, missiles, barrel artillery, and mines; (2) the consumption of oil products for military operations; (3) fires at petroleum storage depots and refineries; (4) fires in buildings and infrastructure facilities; (5) fires on forest and agricultural lands; and (6) the decomposition of war-related garbage/waste. Our estimate of these war-related emissions of carbon dioxide, methane, and nitrous oxide for the first 18 months of the war in Ukraine is 77 MtCO₂-eq. with a relative uncertainty of +/−22 % (95 % confidence interval).

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