REPORT

MILITARY AND CONFLICT-RELATED EMISSIONS: KYOTO TO GLASGOW AND BEYOND

Axel Michaelowa, Tobias Koch, Daniel Charro, and Carlos Gameros with contributions by Deborah Burton and Ho-Chih Lin

Freiburg, Germany, June, 2022

Perspectives Climate Research
Hugstetter Str. 7
79106 Freiburg, Germany
info@perspectives.cc
www.perspectives.cc

perspectives climate group

TIPPING POINT NORTH SOUTH

Perspectives Climate Group

Perspectives Climate Group gGmbH provides independent, high-quality and innovative advice to its public and private clients enabling them to pursue rapid decarbonisation and climate resilient development at all levels in line with the objectives of the Paris Agreement, in particular limiting global warming to 1.5C. In its research and advisory work, Perspectives draws upon the latest available science and develops ambitious, transparent, and fair solutions. Perspectives fosters trusted relationships with its partners, based on participatory and pragmatic decision-making processes. Internally, we value diversity and create opportunities for the personal as well as the professional growth of our team.

Authors

This study was led by Axel Michaelowa, Tobias Koch, Daniel Charro, and Carlos Gameros with contributions by Deborah Burton and Ho-Chih Lin.

Acknowledgements

Perspectives Climate Group has been commissioned by Tipping Point North South to produce this report.

Special thanks to
Dr. Stuart Parkinson, Scientists for Global Responsibility
Doug Weir, Conflict and Environment Observatory
Linsey Cottrell, Conflict and Environment Observatory

Funders
Tipping Point North South is grateful to Greenpeace Educational Trust and Marmot Charitable Trust for providing the funding for this report

Photography

Cover photo by karenfoleyphotography from iStock

Design and layout

Beatrice King

Perspectives Climate Group
Hugstetter Str. 7
79106 Freiburg, Germany
info@perspectives.cc
www.perspectives.cc

Disclaimer

Audiences

Greenhouse gas emissions from the military and armed conflicts and their treatment under the UNFCCC process is still a new topic. This report will be fed into the UNFCCC negotiation process.

In addition to relevant UN offices, we also wish to bring the report and its companion advocacy briefing to the attention of policy-makers, journalists and thought leaders; development, environment, peace, human rights NGOs and faith groups.

Executive Summary

Greenhouse gas emissions of military in peacetime and wars are notoriously overlooked but highly relevant, especially as the world becomes ever more conflict-prone. The UN Framework Convention on Climate Change (UNFCCC) did not until now request or publish robust data for direct emissions from military activities and conflicts as well as indirect emissions from the military 'value chain' and reconstruction after conflicts. This is mostly due to the exemption of reporting on military emissions for countries under the Paris Agreement, which is a backtracking from the stricter rules of the Kyoto Protocol.

Direct annual emissions of the military in large countries like the US and the UK reach over 1% of national emissions. The lion's share of these direct emissions is due to operation of combat aircraft. Residential emissions from military bases and emissions of naval operations are also significant. For arms-exporting or high military spending countries, such as USA and UK, their indirect military emissions from the 'value chain' can reach volumes similar to their direct annual emissions.

Emissions from the destruction of natural or man-made carbon stocks during wars can reach hundreds of million t CO2, as was the case with forest destruction in Vietnam and the burning of oil wells in Kuwait. Burning down a large city can emit up to 10 million t CO2.

Indirect emissions due to the need to reconstruct cities and infrastructures after the end of a war can easily exceed 100 million t CO2 if a conflict has led to destruction on a country-wide scale.

Further the indirect emissions caused in 3rd parties not directly involved in a conflict can even surpass the military emissions due to reorientation of energy systems, market forces or policies. A large conflict like the war in Ukraine is likely to be relevant in the short term, as the transition from domestically available fossil fuels will be slowed down. In the medium term, the use of distributed renewables is likely to be accelerated, but large-scale international collaboration to develop large scale renewable sources in remote locations can suffer.

Under the Paris Agreement, rules for reporting of military and conflict-related emissions need to be developed. Both independent reporting of operational emissions of military in peacetime as well as large-scale war-related emissions is to be taken up with high priority. Military emissions should play a relevant role in the Global Stocktake due to be finalized by COP28 in 2023. The IPCC should address the issue both in the context of national inventory guidelines and the 7th Assessment Report cycle, ideally in form of a Special Report.

Collaboration of researchers and civil society organisations, and engagement with committed governments can make use of windows of opportunities created by unprecedented crises.

The vision should be that aggressors should be made liable for war- and occupation related emissions through peace settlements or at least on the UNFCCC level.

Table of Contents

Abbreviations

CDM	Clean Development Mechanism
GHG	Greenhouse Gas
ITMO	Internationally transferred mitigation outcome
IPCC	International Panel on Climate Change
KP	Kyoto Protocol
LNG	Liquid Natural Gas
NDC	Nationally Determined Contribution
NIR	National Inventory Report
PA	Paris Agreement
TPNS	Tipping Point North South
UNEP	United Nations Environmental Programme
UNFCCC	United Nations Framework Convention on Climate Change

1. Introduction

Since the preindustrial period, greenhouse gas (GHG) emissions generated by human activities have led to a global temperature increase of approximately 1.1 ^{0}C. Despite thirty years of international climate policy and an increasing number of climate change mitigation policies, global GHG emissions increased annually by 2.2% in the period of 2000-2009 (IPCC 2014) and 1.3% in 2010-2019 (IPCC 2022). In 2019, total annual anthropogenic GHG emission reached 59 billion tCO_2e (IPCC 2022) and under the scenario of the nationally determined contributions (NDCs) for GHG mitigation under the Paris Agreement (PA), a further emissions increase until 2030 is expected (UNEP 2021). UNEP (2021) estimates the emissions gap between the sum of NDCs and an emissions pathway compatible with the 1.5°C temperature target of the PA to reach about two thirds of global emissions!

An important sector is usually overlooked on all levels of climate policy: the military. While Michaelowa and Koch (2001) addressed this gap more than two decades ago in a systematic research article, policymakers have turned a blind eye to this question until the present day. GHG emissions from military activities and wars are usually not included in total national GHG inventories. Only a few academic researchers (e.g. Crawford 2019a-b, Belcher et al, 2019, Parkinson 2020, Weir et al. 2021) and non-governmental organisations (Lorincz 2014, Burton and Lin 2020, Conflict and Environment Observatory 2021a-d, Fakih 2021) have raised the issue.

Generally, increasingly sophisticated military vehicles and weapons systems generate a tendency to increase fuel consumption and related emissions. However, as fuel delivery to a war zone becomes an increasing challenge and requires massive logistical investments, they are a burden on military operations and reduce their effectiveness considerably. Wars in Iraq, Afghanistan and Ukraine show that fuel consumption and supply are deciding factors for outcome of military campaigns. According to Samaras (2019), the US operation in Afghanistan in 2012 consumed 8 million l of fuel every day (i.e. generating about 20,000 t CO_2 per day), which had to be delivered through Pakistan causing extremely high costs. Logistics chains for fuel are highly vulnerable, as shown by the serious problems of the Russian invasion force in Ukraine in 2022 (Berkowitz and Galocha 2022), and have changed little since World War II. An army needing less fuel for the same level of combat strength will become more efficient and versatile. So principally military strategists should have an interest to reduce GHG intensity of military operations. Samaras et al. (2019) summarise efforts to make the logistic chains more efficient. Decentralised power supply and electrification of systems could increase the robustness of the systems (NATO 2018).

Given the increased military activities globally, the question of military GHG emissions receives additional urgency, especially when the control and potential denial of access to energy resources is involved. Especially the effect of conflicts on 3rd parties' GHG emission trajectories will produce significant changes- negative and positive alike. The Russian invasion of Ukraine in February 2022 has shone a stark spotlight on the topic, and we therefore will address it in depth, hoping that its current salience leads to a political treatment of the issue in international climate negotiations.

"Burning oil, gas and coal is causing warming and impacts we need to adapt to. And Russia sells these resources and uses the money to buy weapons. Other countries are dependent upon these fossil fuels, they don't make themselves free of them. This is a fossil fuel war. It's clear we cannot continue to live this way, it will destroy our civilization."

Svitlana Krakovska, Union of Concerned Scientists (2022)

Fossil energy does not only fuel the conflicts of the 21st century, access to and domination of energy resources is one the main drivers for conflict itself.

1.1. Military operations: an unknown but significant GHG emissions source

There is no global quantitative estimate of military GHG emissions, just a patchwork of partial estimates that are not fully consistent due to differences in definition and data coverage. Crawford (2019a) estimates cumulated emissions of the US military at 1.3 billion t CO_2 for the war-intensive period 2001-2018, with war-related activities in Iraq, Afghanistan, Pakistan, and Syria responsible for 440 million t CO_2. This is an average of 70 million t CO_2 per year, i.e. approximately 1.1% of US national emissions.

For the period from 1975, Crawford (2019a) calculates a total of 3.7 billion t, an even higher annual average of 86 million t CO_2. Over time emissions have decreased, as shown in Figure 3 in chapter 2 below. US GHG emissions from overseas deployments are subject to great changes depending on the intensity of conflicts the US is involved in.

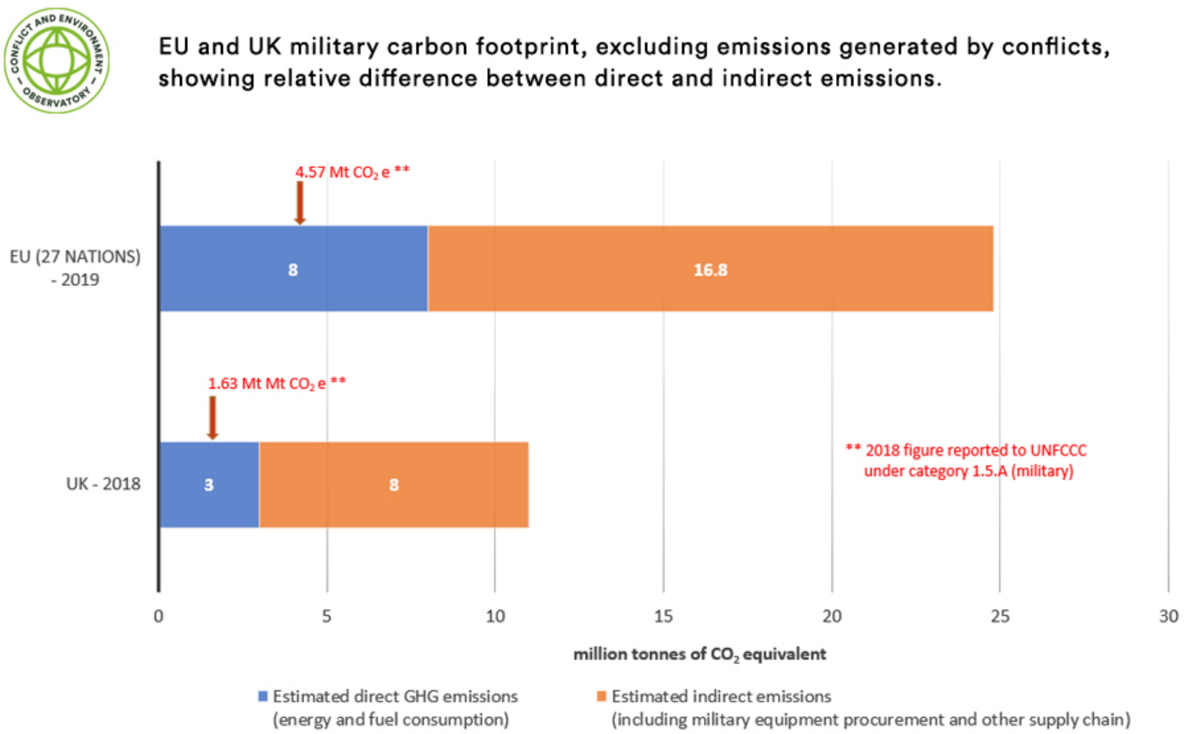
Estimates for the UK (Scientists for Global Responsibility 2020) calculate annual emissions of the UK military (i.e. including its supply chain) at 11 million t CO_2, about 3% of national emissions, an order of magnitude larger than provided by the annual reports of the UK Ministry of Defence.

In Norway military GHG emissions have been estimated at a level similar to the US - 1.1% of the national total in 2017 (Sparrevik and Utstøl 2020), with 0.37 million t CO_2 from operation of land, air and sea vehicles, 0.27 million t CO_2 from ancillary services, and 0.17 million t from buildings operations.

1.2. The reporting gap in international climate policy

Under the Kyoto Protocol (KP) agreed in 1997 industrialised countries annually have to provide a national inventory report (NIR). Decision 18/CP.8 in 2002 (UNFCCC 2003) specified the details of the NIR, and stipulates that domestic military emissions are to be included in national inventories. However, bunker fuels for international transport were exempted. While the official reason was not to burden world trade, implicitly large countries with a "maritime empire" (US, France, UK) as well as those operating military globally benefitted from this provision. This interpretation is confirmed by a statement of US climate negotiator Stuart Eizenstat at a Senate committee hearing in 1998: "We took special pains, working with the Defense Department and with our uniformed military, both before and in Kyoto, to fully protect the unique position of the United States as the world's only superpower with global military responsibilities. We achieved everything they outlined as necessary to protect military operations and our national security. At Kyoto, the parties, for example, took a decision to exempt key overseas military activities from any emissions targets, including exemptions for bunker fuels used in international aviation and maritime transport and from emissions resulting from multilateral operations" (United States 1998, p. 46). Data reported under these provisions suffer from a narrow interpretation of military emissions in the national inventory guidelines issued by the IPCC (2006), focusing on fuel for aviation, water-borne navigation, vehicles, and other machinery. This leads to aberrations like the EU reporting total military direct GHG emissions of 4.52 million t CO_2 for 2018, while the Conflict and Environment Observatory (2021a) estimates real emissions including indirect ones from the supply chain) five times higher, at 24.8 million t.

Figure 1. Direct and indirect emissions of EU and UK military



Source: Conflict and Environment Observatory (2021d)

One of the main problems regarding reporting of military GHG emissions is that even under the KP, only parts of the military 'value chain' were addressed. In addition to the exemption for international bunker fuels, GHG emissions from energy consumption of bases abroad and the manufacture of equipment used by the military are not covered (The Military Emissions Gap n.d.; Now This News 2021), nor are emissions from the destruction of infrastructures like burning of cities. Obviously, some of these emissions show up in national inventories, but are not directly linked to the military.

While the PA agreement in 2015 has significantly sharpened national reporting requirements under the "Enhanced Transparency Framework", the decision to allow countries to protect confidential business and military information essentially perpetuates the opaqueness regarding military emissions.

Another important topic linked to military action and conflict is how to report emissions from an occupied territory. While Michaelowa and Koch (2001) provided a detailed systematics for such reporting, the international climate policy regime has not taken up any of this, despite repeated attempts by Ukraine to raise it in the context of the occupation of Crimea since 2014 (see e.g. Ukraine 2019).

2. Greenhouse gas emissions related to military activities

As mentioned in the introduction, we strive to systematize emissions at all steps of the military 'value chain'. Emissions related to military action can be divided into the following types: 1) Direct emissions from operations of military forces (emissions from use of weapons and ammunition in training and conflict, fuel consumption for transport, heating and cooling of buildings, and emissions of non-fossil fuel related GHGs); 2) Direct emissions related to destruction of carbon reservoirs due to armed conflicts (with such reservoirs being either of fossil or biogenic nature); 3) Indirect emissions from the life cycle of production of weapons, vehicles and other equipment, including the use of electricity; 4) Emissions related to reconstruction after armed conflicts (which can entail human infrastructure or further damage to biological carbon stores), 5) Emissions related to restructuring of energy systems due to strategic considerations triggered by conflict (Sparrevik and Utstøl 2020; Bowcott 2021).

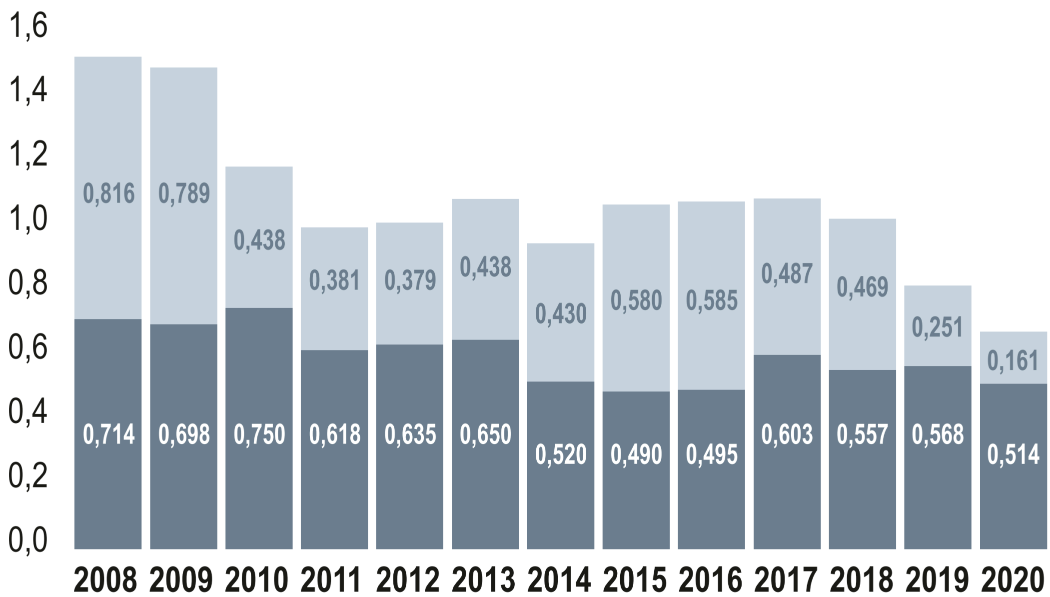
We start with the direct emissions categories and then expand our assessment to cover indirect emissions of elements of the value chain.

2.1. Direct emissions from home and overseas bases

The domestic and around 800 overseas (Vine 2019) military compounds and bases of the US feature nearly 275,000 buildings and are responsible for 40% of the total direct GHG emissions of the US military, about 30 million t CO_2 (Crawford 2019a). This is comparable to a country like Denmark. The US military spent USD 20 billion on air conditioning alone during the Iraq and Afghanistan wars (NPR 2011). According to Parkinson (2020), the proportion of estates' contribution (including both domestic and overseas military bases and civilian buildings) to direct emissions by the UK military are similar (also around 40%) to those of the US.

The German armed forces provide a detailed report on energy consumption and GHG emissions of the buildings operated on their bases. They operate 20 million m^2 of heated building space, the annual consumption is about 2.7 TWh for heating and about 1 TWh power. Only 0.4% were generated from renewable sources on site.

Figure 2. Estimated GHG emissions of German Armed Forces buildings 2008 – 2020



Source: Deutsche Bundeswehr (2021)
Note: Dark blue: thermal energy, light blue electricity

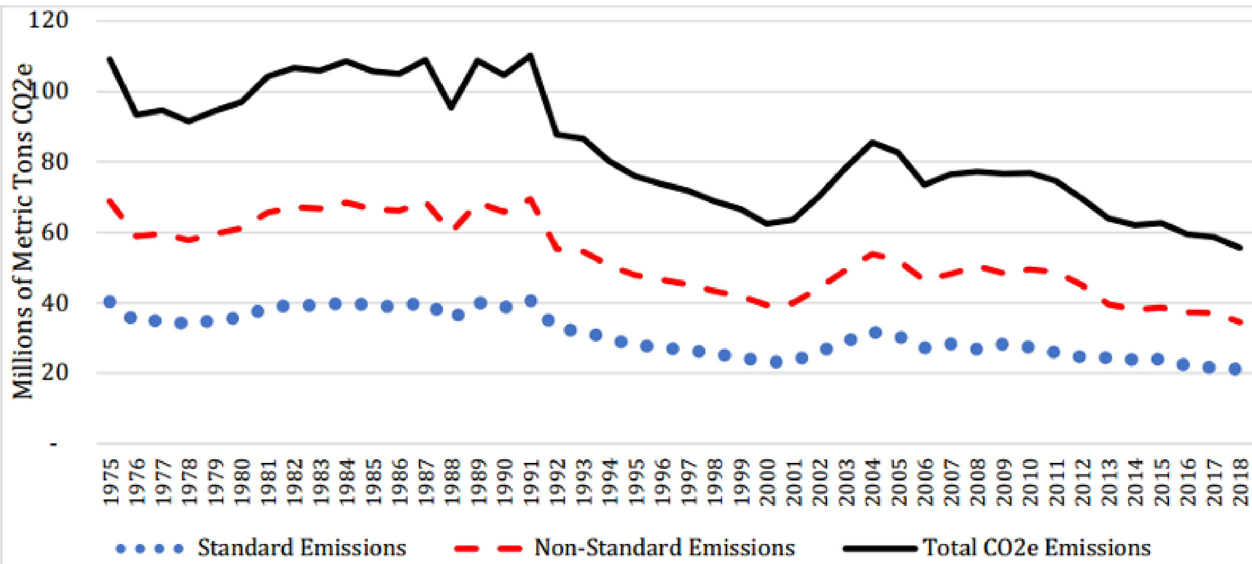
Most of the emissions reductions of the German army bases can be explained by reduction of manpower and related number of buildings, as well as fuel switch to natural gas. Only 12% of heat was derived from alternative sources, whereby combined heat and power with natural gas again are responsible for about 40%. This leaves only about 8% of required thermal energy from renewable decentralized sources.

2.2. Direct emissions from military operations

Operations include moving and sustaining military forces and their weapons during training and combat. As stated above, transport fuel makes up the lion's share of operation-related GHG emissions. Combat airplanes have a massive emissions intensity, with the commonly used B-2 emitting 1 t CO_2 per 45 km of flight distance (Crawford 2019b) with the F-35 being slightly more efficient at 1 t CO_2 per 80 km (Crawford 2019a). The emissions intensity of long-distance air-based missions is further increased by the need to fly tankers that can refuel combat airplanes in flight during the mission. A mission in 2017, where 2 B-2 bombers and 15 refueling tankers travelled to bomb ISIS targets in Libya generated 1000 t CO_2, 30 times as much as if the B-2 planes would have been on the mission alone (Crawford 2019b). Belcher et al. (2019) report 18.4 million t CO_2 emissions from jet fuel use in the US military in 2017, covering 78% of total transport fuel-related emissions. The next largest transport fuel user was the navy with 15% of emissions - a destroyer emits at least 9 t CO_2 per hour (Engber 2012), while land-based transport was only responsible for 8% of emissions, with the widely used High Mobility Multipurpose Wheeled Vehicle (USA ASC n.d.) having a fuel efficiency of 25-50 l/100km. Crawford's (2019a) estimates of US operational emissions are comparable. European Defense Agency (2019) fuel use numbers for European militaries in 2017, converted into GHG emissions by us show similar shares as in the US, with aviation fuel generating 3.6 million t CO_2, the navy 1.1 million t and land transport 0.7 million t, with the shares reaching 69%, 21% and 10%, respectively, see also Fort and Straub (2019).

US military GHG emissions tend to be significantly higher when at war or preparing for war, as shown in Fig. 1 below. During the Reagan years (1980s) they increased, then dropped at the end of the Cold War, and rose slightly again in the Gulf War (1991). After the September 11th attacks in 2001 and the subsequent US overseas wars, emissions increased significantly again. It should be noted that the long-term trend of US military emissions is clearly decreasing.

Figure 3. Estimated GHG emissions of the US military 1975 – 2018



Source: Crawford (2019a), p. 16.
Note: Non-standard emissions: War-related emissions

2.3. Direct emissions from the destruction of carbon reservoirs during war

Wars can destroy various forms of carbon reservoirs, natural and human-created ones. Deliberate burning of enemy infrastructure has been a feature of wars since the earliest times. The emissions related to such events can be very high and occur over very short time periods.

0.5 million hectares of tropical forest and mangroves in southern Vietnam were destroyed by the chemical "Agent Orange" by the US (Westing 1971). Assuming a carbon content of 600 t CO_2 per ha of mature mangrove forest in Southern Vietnam (McNally et al. 2010, p. 20), this event would have generated about 300 million t CO_2. Another relevant example is the increased deforestation and biodiversity loss in Congo due to the conflict in the eastern part of the country, particularly where the conflict resulted in the internal displacement of people, thus increasing the pressure on surrounding forests (Brown 2017).

The biggest direct attacks on fossil fuel deposits happened during the Gulf War in 1991, when Iraq set fire to 751 oil wells in Kuwait, which could only be extinguished over a period of several months. The fires initially emitted 1.8 million t CO_2 every day (Hobbs and Radke 1992), and about 320 million t CO_2 in total, taking the estimate of 1 billion barrels burned in total (Wikipedia 2022a), with an emissions factor of 317 kg CO_2/barrel (Bliss 2008).

The best researched case of a complete city being burned during a war is the Hamburg bombing of 1943. Toon et al. (2007, p. 1991–1992) collected the various estimates of burnable material, mostly wood, for the Hamburg case, differing by a factor of four between 0.12 and 0.47 million t/km^2. About 20 km^2 of the city burned (Stilgenbauer and Mc Bride 2010), i.e. 2.4–9.4 million t of material. Applying the estimate of Jacobson (2009, p. 158) for the carbon content of the combustible material in a city at 40-60% (wood being 50%), the CO_2 emissions of the burning of Hamburg would have reached 3.5 to 21 million t CO_2. Expanding this estimate to the entire area of German cities bombed in World War II, estimated at 205 km^2 (Murray and Millett 2000), yields total emissions of 36–215 million t CO_2.

Building on the work of Toon et al. (2007), Jacobson (2009) estimates that burning 50 large cities in the context of a nuclear war would generate 90-690 million t CO_2., i.e. 1.8–14 million t per city. These are lower than in the case of Hamburg due to the lower share of wood in buildings in modern cities. We would like to note that the tendency to shift towards wooden building for climate change purposes will again increase the emissions potential due to city burning.

2.4. Indirect emissions related to production of vehicles, weapons, and equipment

Indirect military GHG emissions accrue from the production of weapons and military equipment. Conflict and Environment Observatory (2021d) calculates such emissions for some of the largest US and European defence enterprises, with Raytheon responsible for 12.7 million t CO_2 and Boeing for 2.5 million t. Parkinson (2020) estimates direct emissions from Britain´s arms industry at 1.8 million t CO_2 per year for combined domestic use and export and the total indirect emissions in 2017–2018 at 1.7 million t CO_2. In total, the British military industry emitted 3.5 million t CO_2 per year for the production of weapons and military equipment. Extrapolating this upwards to a global level as per the share of the UK in global weapons exports, which reached 3.3% according to Marksteiner and Wezeman (2021), suggests an overall global annual indirect emissions level of weapons production of about 50 million t CO_2.

2.5. Indirect emissions related to reconstruction after armed conflicts

Reconstruction of buildings and infrastructure after war-related destruction requires an intense use of material resources such as steel and cement, which result in the generation of CO_2 emissions. One tonne of cement generates 0.5–0.9 t CO_2 (Fayomi et al. 2019), one tonne of steel on average 1.9 t CO_2 (Hoffmann et al. 2020).

Hu et al. (2010) estimate the material stock of all residential buildings in the Chinese capital Beijing in 2005 at 559 million tonnes. Assuming that the share of steel in the total material mass reaches 3%, i.e. 17 million t, reconstructing a city like Beijing from scratch would generate 300–520 million t CO_2 emissions.

The Syrian war has generated over 20 million t rubble through destruction of close to 50,000 buildings in Aleppo and Homs (Overton and Dathan 2019). Assuming the same ratio cement-steel as for the Beijing example, reconstructing these buildings would generate 11–19 million t CO_2 emissions.

2.6. Indirect emissions of conflicts related to restructuring of energy systems

Indirect effects of conflicts on emissions have been highlighted by the Russian invasion of Ukraine, which sent fossil fuel energy prices to record levels, and let to attempts by Western Europe to wean itself off Russian fossil fuel exports. The reactions of governments and private actors mostly increase emissions in the short run but may serve to accelerate already intended long term emission reductions.

Emission reductions immediately accrue through price induced falls in energy consumption. Longer term effects can arise due to different channels. Belgium is extending the life of two nuclear power plants for another decade (Edwardes-Evans 2022) and investing 1.1 billion € in renewable energies, to secure supply amid record high energy prices (Pronina 2022). Germany is accelerating the expansion of solar and wind energy, aiming to generate almost all of the country's electricity from renewable sources by 2035 (Delfs and Dezem 2022) instead of 2045. Green hydrogen is becoming more attractive than blue hydrogen from fossil fuel sources due to rising costs of the latter (Radowitz 2022).

Emissions increase if countries refocus on domestic fossil fuel resources. For a reduction of its dependency from the import of Russian gas, Germany could provide sufficient electricity without any imports of natural gas from Russia by an increase of power generation from coal, even when taking into account closing its remaining nuclear power stations as planned in December 2022 (DIW Berlin 2022).

Likewise, Ottmar Edenhofer, the director of the Potsdam Institute for Climate Impact Research (PIK) said "In the short term, […] in the electricity sector, we will have to rely more on coal instead of gas in the short term" (Amelang 2020). The international coal phase-out that had significantly accelerated in the last years, and especially in the context of COP26 in Glasgow, risks being stalled or reversed in a number of countries. Furthermore, emissions increase if costly investments in new fossil fuel infrastructure will be undertaken, like the announcement by German Chancellor Olaf Scholz that Germany has decided to accelerate the construction of two liquified natural gas (LNG) terminals to reduce the country's dependence on Russian gas imports (Elliott 2022).

Increased oil prices make fracking—a process in which water, chemicals and sand are injected under pressure into shale deposits to release oil and gas—more economic and also a way to reduce dependence on external oil supplies (Davis 2022), however, fracking is an emitter of large amounts of methane. For example, shale gas wells can have methane leakage rates of up to 7.9%, which would make that natural gas worse for the climate than coal (Pleifle n.d.).

In order to find alternatives to fossil fuel imports from conflict countries, importing nations are likely to be forced into long-term uptake contracts (Al-Monitor 2022), as currently pushed by Qatar for additional LNG exports to Germany. The exporters argue these long-term contracts are necessary to justify large investment on the producer side. However, this will lock-in both exporting and importing countries for long-term periods into production and consumption of fossil fuels (FOCUS Online 2022).

"It is time we tackle our vulnerabilities and rapidly become more independent in our energy choices. Let's dash into renewable energy at lightning speed. Renewables are a cheap, clean, and potentially endless source of energy and instead of funding the fossil fuel industry elsewhere, they create jobs here. Putin's war in Ukraine demonstrates the urgency of accelerating our clean energy transition."

Executive Vice-President for the European Green Deal, Frans Timmermans (European Commission 2022)

Outside Europe, many consumers in poorer countries will not be able to afford higher prices for "cleaner" cooking and heating fuels and therefore are likely to resort to usage of non-renewable biomass. This will be exacerbated by the massive increase in food prices due to the loss of grain and other agricultural exports from Ukraine, requiring redirection of scarce income towards food purchases. The recently observed record deforestation in Brazil (New Scientist 2022) could be a first indication of the impacts of food price increases.

In terms of increased emissions in the long term, there are repercussions due to lack of trust. As a result, cross-border collaborations, which are very important for emissions reduction, become less attractive. For example, construction of international electricity grids that allow accommodation of a higher share of intermittent renewable energy or the development of low-carbon energy carriers value chains like green hydrogen will also be made more difficult or impossible in the case of wars involving major countries. A clear example for such effects even in the context of peaceful Western Europe occurred when the French energy regulator rejected the application to build a 1.4 GW electricity interconnector between Great Britain and France, developed by the private company, GridLink Interconnector Ltd, due to the uncertainty since Brexit (Morison and Starn 2022). Similarly, Morison (2022) mentions that the UK has rejected a "politically controversial" 2 GW power cable to France proposed by Aquind Ltd, and the UK Secretary of State for the Economy, Kwasi Kwarteng, refusing to grant a development consent order despite the examining authority's recommendation that the project be approved. In the long term, lack of trust could be the largest risk of proliferation of conflicts for international climate policy.

2.7. Impact of embargos on fossil fuel production and emissions

A hitherto not considered impact is the effect of embargoes on the behaviour of the embargoed country that no longer can exports fossil fuel. The EU targets to end oil imports from Russia within 2022. Estimates are that Russia could be forced to reduce its production by 2–4 million barrels per day (Oxford Institute for Energy Studies 2022). Lack of sufficient alternative export routes can lead to a partial stop of oil production in Russia. Given the special climatic conditions of permafrost and low winter temperatures, the stop of oil flow and subsequent freezing of wells and transport infrastructure could create considerable damage to Russian oil infrastructure. Reconstruction can take multiple years or might be not economically feasible due to lack of capital or international technical know-how. This could lead to a permanent reduction of the capability of Russia to produce oil of 4–5 million barrel per day (Zeihan 2022), If no other major oil producer is capable to provide reserve capacity to cover the reduced production of Russia, a medium- or long-term reduction of world oil production can be expected, leading to permanently higher prices of fossil fuels and therefore widening the price gap to cheaper renewable energy forms. A similar effect would happen if Russian exports would be successfully curtailed by sanctions.

Therefore, Russia as natural gas exporter with fields and transport network in permafrost climate will first try to use the natural gas and oil domestically, replacing coal. This will lower emissions. But if Russia is unable to implement this fully due to infrastructural limitations, it might even resort to flaring the gas or oil that cannot be exported in order to avoid damage to the production capacities.

Higher prices for fossil fuels could also trigger new exploration and build-up of new production capabilities that could further lock in investments in a carbon intensive energy supply. Qatar announced it will greatly expand its capacities faster than previously announced to supply additional LNG for Germany (Brueggman 2022)).

However, OPEC and specifically Saudi Arabia possess considerable reserve capacities that are held on standby due to economic or political reasons. Saudi Arabia might increase output to avoid the accelerated adaption of renewables (Haykel 2022). The IEA assumes that outside Russia the global oil output will rise by 3.1 million barrels per day from May to December (IEA 2022). The possibility that the increase in oil prices might be only short-term could prevent private capital from provision of new financing for the oil industry (Forbes 2022).

To overcome this reluctance, the US government is urging oil companies to increase production—a reversal of its previous policy to pause lease sales for oil companies in order to meet GHG reduction commitments (Bloomberg Middle East Edition 2022).

3. Principles for accounting for military emissions in peace and war and related liabilities

As discussed in section 1.2 above, reporting military emissions by most countries is patchy. Below we discuss the current state of (or the lack of) reporting responsibilities during peacetime and times of war (Barry et al. 2022; Conflict and Environment Observatory 2022b)

The recommendations below are inspired by Michaelowa and Koch (2001), taking into account the Paris Agreement provisions, and could offer up the principles for the creation of a framework for reporting military emissions in peace and war. The governance of these accounting provisions should be under the UNFCCC.

3.1. Emissions coverage by national inventories in peacetime

3.1.1. Emissions in own territory

As discussed above, national inventories need to ensure that the different types of military emissions are duly reported. The IPCC National Inventory Guidelines should be revised to ensure that not only a narrow definition of such emissions prevails.

3.1.2. Emissions in foreign territory in peacetime

Emissions from military bases abroad formally have to be included in the inventory of the country hosting those bases. Already Michaelowa and Koch (2001) stressed that Pacific island states have had difficulties obtaining emission data for the bases located on their territories. This means that there is a high probability that these emissions are not being reported, despite probably exceeding the host state´s total emissions. In cases where a foreign country operates a base in a host country, we suggest to differentiate the allocation of emissions as follows:

1. When bases of the foreign country are established for military deployment to enforce UN resolutions, then their emissions are exempt (see discussion in section 4.2.1 below).
2. In any other situation than the previous, both countries must negotiate which country will account for the emissions. In the case that there is no agreement, the foreign country must be held responsible for the emissions.

3.2. Emissions coverage by national inventories during armed conflicts

Emissions generated by armed conflict are difficult to measure and should be reported in different ways depending on the character of the conflict. For example, as explained by Michaelowa and Koch (2001) under the Decision 2/CP.3 (para. 5) of the UNFCCC (1997), the emissions that result from "multilateral operations pursuant to the charter of the United Nations" are exempt from inclusion in the total national inventories. Therefore, the emissions in armed conflicts can be differentiated into those operations with UN approval and operations without UN approval, as discussed below.

3.2.1. Armed conflicts with the approval of the United Nations

The types of conflicts under this case include:

1. A state takes part in an international peacekeeping
2. Military action in pursuit of UN Charter but without formal approval of the UN
3. A state acts in self-defence with approval of the UN

It is a fundamental principle of international law that states are prohibited from using force except in self-defence or unless its use is formally authorised by Security Council under Chapter VII of the UN Charter or a resolution of the UN General Assembly (Wood 2013). Therefore, it is essential for the allocation of GHG emissions under the UNFCCC to resort to a strict application of UN decisions regarding the legal status of military actions. This applies also for the legal status of emissions when the UN mandate or approval is not valid any more or states extend military action beyond the scope licensed by UN mandates or decisions.

Case 1 should only be triggered by a formal UN declaration, by the Security Council or the General Assembly, as mentioned above, in order to prevent unilateral declarations by countries that their operations are carried out in pursuit of the U.N. Charter. Countries providing soldiers or logistical support to UN Peacekeeping should always be exempted from accounting of national emissions in order not to create a disincentive for such activities. Countries like Fiji, Rwanda or Pakistan cannot afford to cover GHG emissions cost for their overseas UN peacekeepers. The UN Department of Peacekeeping Operations should buy emissions credits and cancel them to cover these emissions.

However, emissions from above case need to be accounted by the UNFCCC Secretariat to increase the accuracy of the global GHG inventory, in the context of the Global Stocktake. Therefore a "conflict account" for UN approved military activities is still a necessity.

Case 2: There are unfortunately several recent examples:

The Security Council never authorised the use of force to justify the U.S. led coalition invasion of Iraq in 2003 and the self-defence justification did not apply. The resulting GHG emission of many million t CO_2 in this war was never accounted for by the U.S. and its allies. During the occupation of Crimea, Russia claimed to pursue the UN charter, arguing "The Russian Federation clearly states that the declaration of independence of the Autonomous Republic of Crimea and Crimea's integration into the Russian Federation ensures implementation of one of the fundamental U.N. principles—the principle of equal rights and self-determination by peoples," (Russia statement n.d.). As there was no corresponding resolution by any UN-organization, and the UN General Assembly in 2020 requesting Russia to withdraw from Crimea (UN General Assembly 2020), UNFCCC should not follow the Russian argumentation.

Case 3: in the current Russian invasion of Ukraine, Russia (2022) has invoked Article 51 of the UN Charter providing for Russia to act "in the exercise of self-defense". This attempt is not valid given the resolution of the UN General Assembly (2022) that stated that Ukraine was under aggression by Russia.

3.2.2. Armed conflicts without the approval of the United Nations

We consider several principal types of such conflict (examples include only post 1995 conflicts plus theoretical types of conflicts that did not appear since 1995):

1. Country A and Country B are in conflict due to territorial disputes, like India and Pakistan over Kashmir since 1947, Armenia and Azerbaijan since 1994 and 2021
2. Country A invades in Country B, like U.S. in Iraq 2003, or Russia in Ukraine 2014 and 2022 and in Georgia 2008. This category would also include all kinds of "punitive or preventive operations", "preventive wars" without clear UN mandate or unilateral declared reference to Article 51 of the UN Charter.
3. Country A continuously occupies territory of country B, like Israel parts of Lebanon, and Syria and Palestine, or Russia parts of Ukraine, Moldova and Georgia
4. Country A takes military action against a non-UNFCCC member or territory not previously included in national reporting, in theory this could apply only to a very limited number of territories including overseas territories of European countries and the US, Taiwan, Western Sahara, and Kosovo.
5. Country A supports the secession of a part of country B and provides military support to secessionists against country B or permanent bases in the secessionist territory without the approval of country B, like Luhansk, Donetsk, Abkhazia, Transnistria.
6. Civil war in Country A with intervention from country B with approval of Country A, like the Saudi intervention in

Yemen (where the legitimacy of the Yemeni leadership however has been doubtful).

7. Countries divide into new UN approved states after internal civil wars, like Sudan did in 2011. Conflict-related emissions will need to be divided among the new (and eventually old) state.
8. Multi-faceted conflicts with components of all the above categories.
9. International relations can be even more complicated than the above-mentioned cases and examples. An extremely negative example would constitute the ongoing war in Syria that involves varying coalitions of non-state actors and foreign interventions with and without the approval of the Syrian government and therefore a definitive allocation of GHG emissions caused by the conflict is very difficult. A similar situation arose in the Second Congo War 1998 – 2002, the worst conflict in the 21st century before 2022. Nine African countries and around twenty-five armed groups became involved in the war, causing between 2.6 and 5.4 million deaths (Wikipedia 2022b). This kind of conflict deserves therefore close attention as they were by far the largest conflicts of the 21st century in regard to loss of human life and infrastructure.

Conflicts generally arise because of lack of agreement, so understandably, this probably is the hardest area to reach an agreement on by all parties in the international community. Nevertheless, resolving other aspects of military emissions accounting should not be held up by lack of agreement over this issue – which could easily take many decades.

The GHG emissions from a conflict can realistically only be allocated after the conflict is over, following the following proposed considerations:

a. Fuel use for military purposes: the emissions generated from the use of fuel for operation on the respective territories must be included in the national inventories of each conflict party separately. A peace settlement between the parties involved might allocate the emissions differently from the actual accrual. Ideally, a country identified as aggressor would have to account for all the emissions of fuel use on the territory of the other country under a newly defined category "emissions in foreign territory".

b. Damages caused by military conflict: the emissions generated by the destruction and burning of carbon reservoirs are to be accounted to the aggressor country as part of its emissions in foreign territory. The most striking examples would be the intentional destruction of oil wells in Kuwait by Iraqi forces in 1991 or usage of Agent Orange in Vietnam by the USA causing deforestation.

c. Higher emissions due to destruction of low carbon power producers and replacement with high intensity generators should be accounted by the aggressor. An example is the case of Lebanon, where the Israeli attack of 2006 destroyed several thermal power stations and transmission lines. After this event, the population of Lebanon started relying on and growing a dependency on low-efficiency decentralised diesel generators for energy production (Julian et al. 2020). In future the potential destruction or disconnection of large renewable power plants could provide for substantial increases of post-conflict power generation carbon intensities.

d. Emissions generated during an occupation period: for permanently occupied or annexed territories the occupying party is likely to have a political interest to fully report on the emissions from annexed territory in order to bolster its claim (see also Conflict and Environmental Observatory (2021c)[1]. In case that such emissions are not covered by a peace settlement and that the countries involved in the conflict do not assume obligations from occupied territory, then:

- A U.N. settlement could allocate the shares of the emissions during the occupation after the de facto end of the armed conflict. A country occupying a territory should generally have to account for the emissions in the occupied territory. Such emissions need to include emissions from destruction of carbon sinks and military-related emissions on the occupied territory during the conflict and occupation.

[1] A case in point is an Israeli Clean Development Mechanism (CDM) wind power project on the Golan heights, registered as project no. 815 by the UNFCCC in 2007.

- Country B can formally reject the emissions from the occupied territory during the occupation period and the emissions are transferred to country A (occupier). On UNFCCC level, it should be clarified, that such a step is not equal to a formal acceptance of the occupation or loss of territory, but as a useful move to safeguard correct reporting of global GHG emissions also in cases such as when formal peace negotiations have not sufficiently covered this topic.

- Country B can still account for the sinks on its occupied or involuntary transferred territory during the occupation period, even if certifiers had no access or no data is available, until a formal settlement with country A is reached. Proven loss of sink capacity has to be addressed in peace negotiations for eventual reparation payments.

- In case country A takes permanent possession of the sinks created previously by country B, it must also inherit all connected obligations, e.g. operational expenditures, interest payments and contractual obligations (Grotius 1625). Any change of ownership must be also reported to the UNFCCC, in ideal case with the consent of country B.

- In the context of defining baselines for international carbon markets under Article 6 of the PA, it needs to be ensured that emission reductions that follow an eventual conflict-related collapse of economy and/or loss of population cannot generate Internationally Transferred Mitigation Outcomes (ITMOs). This means that the baseline always needs to be defined in terms of emissions intensity, not in terms of the absolute emissions level of an installation running below capacity.

- Changes of GHG emissions in non-combatant 3rd countries are difficult to assess. In case of direct dependencies for strategic energy supplies, it could be argued that also 3rd parties can claim reparation payments for emission increases. Landlocked countries without alternative low-GHG energy sources may exceed their NDCs and therefore have to buy costly ITMOs to remain in compliance.

- General damage to the economy of non-combatant 3rd countries is unlikely to be accounted in the framework of UNFCCC, but could lead to substantial GHG reductions outside the conflict zone.

The case of Russia's occupation of Crimea and parts of Eastern Ukraine since 2014 has already had repercussions in the UNFCCC process, where both nations sent their arguments to the UNFCCC Secretariat (see Ukraine statement 2019, Russia statement n.d.). Ukraine pushes for UNFCCC not to publish Russia's inventories as long as they contain information related to Crimea, claiming its occupation is "illegal" and "temporary", while Russia defends its occupation by citing that Crimea and Sevastopol voted to join Russia in a 2014 referendum (Russia statement n.d.). A pre-Paris UNFCCC working group evaluates both proposals to provide a proper accounting of global emissions and sinks, but negotiators from Russia and Ukraine have delayed this process since 2017 and prevented agreement on conclusions (Chemnick 2022). The Ukrainian NDC includes GHG emissions and targets for its uncontrolled and occupied territories, but it is difficult to get verifiable information on GHG emissions in those territories, which complicates the compilation of the annual National GHG Inventory. UNFCCC (2021) emphasizes that after the restoration of Ukraine's control over the occupied and uncontrolled territories, the Ukrainian NDC should be adjusted based on updated and verified data, but these should remain in the Ukrainian budget.

It is surprising that Azerbaijan, Georgia and Moldova have not officially raised this issue regarding their comparable cases, while addressing it in their national communications. Azerbaijan states that "20% of the country's territory was occupied by Armenia. No inventory work was conducted on these lands" (Azerbaijan 2021). Georgia states that "The occupation of Abkhazia and Tskhinvali by the Russian Federation is

hampering the improvement of the environmental situation on the ground, as the Georgian government is deprived of the ability to exercise its jurisdiction over the occupied territories. Also, the Russian Federation, as an effective control force on the ground, prevents the entry of international mechanisms in the regions of Abkhazia and Tskhinvali."

(Georgia 2021). Moldova (2018) is the only country of those with occupied territories that uses data from the Ministry of Economy of the secessionist Transnistria for their inventory since 1993.

4. The military, conflicts, related emissions and the future

When the Michaelowa and Koch (2001) paper was published, they general notion was that the topic of military and conflict-related emissions is irrelevant. Unfortunately, two decades later the Ukraine war and other active conflicts around the world grimly point to its salience. In this section we discuss impacts that go beyond those assessed in the preceding sections.

4.1. Emissions decreases through conflicts come at a high price

Loss of economic activity due to a war can cause large reduction in emissions. Probably the most extreme case was the civil war in Cambodia in the 1970s where the Khmer Rouge depopulated cities and fossil fuel use essentially vanished, at the price of over a million lives. On a global level, the first oil crisis essentially triggered by the Israeli-Arab conflict and the concomitant energy price shock led to a loss of economic activity and related emissions worldwide. The potential interruption of natural gas supplies from Russia to Europe in the framework of the conflict in Ukraine could lead to even greater loss of economic activity.

4.2. Potential long-term emission reduction outcomes of conflicts

In world history, the military and especially acute conflicts have often been an engine of technical development including aircraft, wireless, radar, computers, fuel cells and photovoltaics. Usually, such technologies have spread into the commercial civilian application soon after their emergence. When low GHG technologies have the potential to generate strategic advantages, the military will without doubt be interested in the promotion of them including synthetic aviation fuel, renewable power and energy efficiency for military bases that allows downsizing of vulnerable logistic chains, or fielding entirely novel systems such as solar propelled drones serving as permanent surveillance and communication platforms.

Energy systems are vulnerable to becoming targets in conflict, especially those based on fossil fuels as direct military targets relevant for the supply of fighting units or to disrupt the economy of the opponent. In the worst case, a disruption of energy supply can threaten the survival of the civilian population and be used on purpose.

In contrast, decentralized renewable energy has a very low risk of becoming a target for conflicts due to strategic reasons, since the effect of an attack would be low (Burke and Stephens 2018, Edwards 2018). The elimination of service personnel required for fuel transportation and power systems operation for military applications is one of the greatest advantages of novel power generation technologies, drastically reducing the "target size" of the troops

Given the immense logistic cost for shipping fuel in conflict zones resulting in up to USD 20 per kWh (Ravagni et al. 2012), the military has therefore a great economic and strategic incentive to promote renewable and efficient energy systems.

Recent cost reduction especially for PV make the destruction of renewable power generators uneconomic, as the weapon systems necessary to destroy decentralized PV power, would certainly cost a multiple of the replacement value or the PV systems. Decentralized renewables allow also a more rapid recovery from a conflict while a centralized grid requires resuscitating the entire network to power essential services (Rafalowicz 2016). The ongoing conflict in Ukraine has shown especially the European countries that strategic dependence from fossil fuel producing or transmission countries can have direct security implications. Providing a nation with renewable energy resources or reducing dependency on energy imports by increased energy efficiency has therefore strategic and financial advantages that were previously overlooked.

4.3. Strengthening the Paris Agreement system to deal with conflicts

In the short term, the consensus principle of the Paris Agreement needs to be interpreted creatively to prevent aggressors blocking UNFCCC negotiations as Russia did in the June negotiations of 2013. This could be done as in the cases of various UNFCCC COPs where opposition of up to five countries was just ignored by the COP presidency.

The international process should also consider how to deal with overseas territories of nations that are not included in the regular reporting and are mainly dedicated for military usages such as the Indian Ocean archipelago of Diego Garcia or artificial islands in the South China Sea. Their emissions should be allocated to the countries leading the military use of the territory in question or fully reported by the country voluntarily hosting the military presence of their nation.

In the context of the first Global Stocktake estimates of emissions from UN peacekeeping missions should be undertaken. Ideally, the UN would acquire emissions credits (ITMOs) through international carbon markets under Article 6 to cover these emissions.

Short term reporting of high intensity emissions during conflicts should be embarked upon on the international level, as countries involved in the conflict will not be likely to devote resources to that. A department of the UNFCCC Secretariat should engage in remote sensing of high intensity destruction of carbon reservoirs like fossil fuel deposits, cities and forest fires. These should then be reported in a separate "conflict account" in the transparency regime. The necessary technology is similar to that used for assessment of CO_2 emissions from natural disasters like the peat and forest fires in Indonesia in 1998 or large-scale methane leaks. The liability for this additional amount of the estimated or measured emissions should generally be addressed in peace settlements. In the ideal case the party established as the aggressor party should face an addition to its emission balance for the current NDC target.

The Ukraine government encourages it population to report all war related damages online to a designated website https://damaged.in.ua/, therefore a near real-time assessment of loss of carbon storage and sinks could be envisaged for the very near future. Also for eventual peace settlements between the conflict parties in Ukraine the damage to the environment will be taken into consideration (Al Jazeera 2022), creating a precedent for assessment and juridical treatment of all kind of damage to the environment in future conflicts.

The Conference and meeting of the Parties to the PA (CMA) could decide that countries whose territory has been (partially) occupied can apply a conservative emissions default for occupied territories derived from the last inventory before occupation. Material emissions increases that have occurred in the occupied territory need to be dealt with. The internationally acknowledged owner of the territory will likely continue to report on the emissions from its complete territory, like is done by Moldova, but hardly will have access to real data. Therefore, this situation can lead to double accounting of emissions from occupied territories especially if the occupier has a political interest to include the emissions within its own reporting.

A tier 1 solution would consist in using default values from previous reporting, especially if conflict parties obfuscate data in order to strengthen their claims. In case the occupying party includes the emissions of the contested territory in its reporting, the default data provided by the internationally recognised government should be deducted for the purpose of global stock take. A tier 2 solution would require a minimum of cooperation of both parties by creating a clear division of reported data regarding the disputed territory. In the context of the Global Stocktake due at COP28 it would be a conservative approach to utilise the higher of the two values without referring to any national claims.

In case of complete occupation of countries by UN-member states or not internationally acknowledged actors (like the Taliban government in Afghanistan), the exile government has an interest to continue the reporting, however it will have problems to acquire any correct data. Using default data over a longer period will lead to large deviations from real emissions. It would be necessary for the UNFCCC to decide on a generic rule for a time period after which the emission data of the occupier will be utilized for the global stocktake, with an explicit statement that this does not constitute any acknowledgement of the occupiers claim to a territory.

Non internationally acknowledged separatist territories could be invited to voluntarily report their emissions. Such territories could be granted a temporary observer status to the PA. In case the occupied territory joins the UN as an independent state, it will start reporting under the enhanced transparency framework.

The example from the current conflict in Ukraine below illustrates how the reporting could play out in the future.

Example for the case of Russia and Ukraine

Ukraine will want to report on its entire territory including Crimea and Donbass. Russia will want to report on its territory including Crimea. The secessionist territories Donezk and Lugansk may want to become temporary observers of the UNFCCC and report independently.

We now move to sum up the results from our assessment of military and conflict-related emissions and how to deal with them under the international climate policy regime.

5. Conclusion

This report demonstrates the many ways in which the global military and its associated activities significantly contribute to climate change. It also shows that we are far from having a clear and complete picture of the direct and indirect effects of modern armed conflicts on GHG emissions.

So far, no serious attempts to categorize GHG emissions from the military in peacetime and war and armed conflicts have been undertaken under the UNFCCC. With our report, we want to launch a serious engagement of the UNFCCC with this issue. We call on parties to come up with full reporting of military emissions on their territory and overseas. We call on the UNFCCC Secretariat to monitor emissions of active conflicts and report on those in a timely manner. We call on foundations and philanthropic actors to provide the necessary budget for such a monitoring. A solution to overcome the barrier of confidentiality regarding the reporting of fuel consumption for military purposes is necessary.

Building on all this, we see no harm in looking even further ahead. The conclusion of the IPCC Sixth Assessment Report (AR6) Cycle provides us with an opportunity to look ahead to the AR7 cycle and the placing of climate change and global military emissions in peace and war on its agenda in the hope and belief that this will stimulate further scientific reports and peer-reviewed publications, in anticipation of an eventual publication of an IPCC Special Report on this subject in the AR8 cycle by 2030.

6. Recommendations

We differentiate our recommendations according to their urgency.

For the next 12 months, we propose that civil society organisations lobby a government of a country with high international reputation and no military interests, e.g. Costa Rica, to make a formal submission to the UNFCCC for the Subsidiary Body of Scientific and Technical Advice to elaborate rules for reporting of military and conflict-related emissions under the Paris Agreement in the context of the enhanced transparency framework. The submission should call for national inventory guidelines to ensure that all the different types of military emissions are duly reported, including emissions from extraterritorial bases, and international bunker fuel consumption from military aviation and shipping. A standardised set of rules for conflict-related emissions should be made applicable, including destruction of human and biological carbon reservoirs. The UNFCCC Secretariat should be tasked and be provided the budget to undertake remote sensing of such destruction and report the results in a separate 'conflict account'. Conservative default parameters should be applied if data are unavailable. In the submission, the UNFCCC Secretariat should be requested to develop a technical paper discussing principles for accounting military emissions in peace and war, and issue a call for Party and observer submissions. A window of opportunity is provided by the UN International Law Commission - Protection of the environment in relation to armed conflicts (PERAC) set to conclude its deliberations in autumn of 2022 (Conflict and Environment Observatory (2022a).

A group of relevant research and observer organisations should make a submission on military emissions during the Global Stocktake process. Through side events at subsidiary body and COP sessions, the attention of the climate policy community should be drawn to the relevance of this issue for the Global Stocktake, which is due to be finalised by COP28 in 2023.

At the same time, civil society organisations should lobby their governments to voluntarily report in their next national inventory or Biennial Update Report military peacetime emissions according to the generic IPCC good practice guidance for national emissions sources from energy and other relevant sectors as if the military was a 'normal' emitter.

A group of observer organisations accredited with the IPCC should request the IPCC to put a Special Report on climate change and global military in peace and war on the agenda of the 7th Assessment Report cycle. Given that the IPCC is rather reluctant to agree on new special reports, civil society organisations need to lobby with their governments to support such a proposal. If a critical mass of about 30 governments from all continents underwrites the proposal, IPCC would not be able to silently 'bury' the proposal.

In the medium term of 3–5 years, we call researchers active in the field to develop a joint research programme "Military emissions in peace and war" aiming at providing specific input into the IPCC 7th Assessment Report, even if there is no Special Report agreed during this cycle. In the past, coordinated engagement with the IPCC process, e.g. through submitting papers to peer-reviewed journals early enough, serving as lead authors and strategically submitting comments at all stages of the process has been able to mobilise important topics. The programme should be kickstarted with an international academic conference that brings together all key researchers and develops proposals for "Special Issues" with relevant academic journals. As the programme progresses, it could develop the basis for UNFCCC agreeing to cover a new topic "Carbon Neutral Defence and Conflicts", following the same route as the approach laid out for the short term. The aim should be to ensure that the responsibility for emissions from conflicts is eventually allocated to the country causing the conflict under the UNFCCC regime.

Outside of the UNFCCC process, civil society should call for war and occupation-related emissions liabilities to be acknowledged in international law and therefore become part of peace settlement negotiations. The salience of this call could be increased by linking this issue to the research programme outlined above.

Some of our recommendations may look beyond our collective reach due to the glacially slow pace of progress in climate politics and international diplomacy, fraught as it is with a fatal mix of political 'short-termism' and corporate vested interests. However, desperate times call for radical change, and we have seen in the latest COVID-19 and Ukrainian crises that radical change is possible if windows of opportunity are used without hesitation, and by forming alliances that in 'normal' times would seem impossible. It is the ambition of the authors and the organisations supporting this report to build support for these recommendations to help achieve this call. We only have this one chance but it is an ever-narrowing window of opportunity. We cannot afford to miss it.

Epilogue

In the process of us writing this report and looking at our article written 20 years ago (Michaelowa and Koch 2001), the initial notion of assessing military activities in a way as potential 'engines of progress' for novel renewable technologies was shattered by the Iraq War followed by the horror of yet another large-scale ground war, this time in Europe, with serious and still unfathomable global implications. As the latest IPCC Assessment Report shows, all our attention should be directed towards achieving the 1.5° target. If we fail in this endeavour, the repercussions will be more deadly than all conflicts we have witnessed in the last decades.

References

Al Jazeera (2022): Can Ukraine hold Russia accountable for environmental crimes? https://www.aljazeera.com/features/2022/5/16/can-ukraine-hold-russia-accountable-for-environmental-crimes (accessed May 16, 2022)

Al-Monitor (2022): Germany to fast-track gas terminal as part of Qatar deal, March 20,2022 https://www.al-monitor.com/originals/2022/03/germany-fast-track-gas-terminals-part-qatar-deal (accessed May 7, 2022)

Amelang, Sören (2022): Russian energy import ban is possible if Germany uses more coal – PIK director, General-Anzeiger, March 09, 2022, Clean Energy wire, https://www.cleanenergywire.org/news/russian-energy-import-ban-possible-if-germany-uses-more-coal-pik-director

Azerbaijan (2021): Fourth national communication to the UNFCCC, Baku

Barry, Ben; Fetzek, Shiloh; Emmet; Caroline (2022): Green defence, the defence and military implications of climate change for Europe, IISS, https://www.iiss.org/blogs/research-paper/2022/02/green-defence (accessed March 03, 2022)

Belcher, Oliver; Bigger, Patrick; Neimark, Ben; Kennelly, Cara (2019): Hidden carbon costs of the "everywhere war": Logistics, geopolitical ecology, and the carbon boot-print of the US military, in: Transactions of the Institute of British Geographers, 45, p. 65-80.

Berkowitz, Bonnie; Galocha, Artur (2022): Why Russia´s military is bogged down by logistics in Ukraine, The Washington Post, https://www.washingtonpost.com/world/2022/03/30/russia-military-logistics-supply-chain/ (accessed March 30, 2022)

Bliss, Jim (2008): Carbon dioxide emissions per barrel of crude, http://numero57.net/2008/03/20/carbon-dioxide-emissions-per-barrel-of-crude/ (accessed April 30, 2022)

Bloomberg Middle East Edition (2022): Biden Fights Bid to Boost Oil Drilling, Climate Goal at Risk, https://www.bloomberg.com/news/articles/2022-05-10/biden-fights-states-bid-to-boost-oil-leasing-on-public-lands (accessed May 10, 2022)

Bowcott, Harry (2021): Decarbonizing defense, imperative and opportunity, McKinsey, July 01, 2021, https://www.mckinsey.com/industries/aerospace-and-defense/our-insights/decarbonizing-defense-imperative-and-opportunity (accessed March 2, 2022)

Brueggman, Mathias (2022) Katars Vizepremier: „Als kleines Land können wir uns Feindschaften zwischen großen Machtblöcken nicht leisten", Handelsblatt, https://www.handelsblatt.com/politik/international/scheich-mohammed-bin-abdulrahman-al-thani-katars-vizepremier-als-kleines-land-koennen-wir-uns-feindschaften-zwischen-grossen-machtbloecken-nicht-leisten/28358170.html (accessed 20 May, 2020)

Burke, Matthew; Stephens, Jennie (2018): Political power and renewable energy futures: A critical review, in: Energy Research & Social Science, 35, p. 78-93

Burton, Deborah; Lin, Ho-Chih (2020): Indefensible, the true cost of the global military to our climate and human security, the case for deep cuts to global military spending and emissions, TNPS, https://thefivepercentcampaign.files.wordpress.com/2020/12/indefensible-the-true-cost-of-the-global-military-to-our-climate-and-human-security.pdf (accessed February 23, 2022)

Chemnick, Jean (2022): Russia used U.N. climate process to bolster claim to Crimea, March 4, 2022, E&E news, https://www.eenews.net/articles/russia-used-u-n-climate-process-to-bolster-claim-to-crimea/, (accessed March 16, 2022).

Climate Home News (2014): Russia-Ukraine crisis seeps into UN climate talks, Former allies banned from cooperating as Ukraine prepares to align with EU's climate stance, June 12, 2014, https://www.climatechangenews.com/2014/06/12/russia-ukraine-crisis-seeps-into-un-climate-talks/ (accessed March 18, 2022)

Conflict and Environment Observatory (2021a): The military emissions gap, what militaries aren't reporting to the UNFCCC, https://ceobs.org/the-military-emissions-gap-what-militaries-arent-reporting-to-the-unfccc/#:~:text=The%20standard%20and%20scope%20of,to%20the%20UNFCCC%20is%20unacceptable.&text=Under%20the%20United%20Nations%20Framework,inventory%20of%20their%20greenhouse%20emissions accessed February 24, 2022)

Conflict and Environment Observatory (2021b): The EU military sector´s carbon footprint, https://ceobs.org/the-eu-military-sectors-carbon-footprint/ (accessed February 24, 2022)

Conflict and Environmental Observatory (2021c): How does war contribute to climate change?, June 14, 2021, https://ceobs.org/how-does-war-contribute-to-climate-change/ (accessed March 17, 2022).

Conflict and Environment Observatory (2021d): The military's contribution to climate change, https://ceobs.org/the-militarys-contribution-to-climate-change (accessed May 15, 2022)

Conflict and Environment Observatory (2022a): Ukraine invasion, rapid overview of environmental issues, https://ceobs.org/ukraine-invasion-rapid-overview-of-environmental-issues/ (accessed March 3, 2022)

Conflict and Environment Observatory (2022b): State positions on the draft principles on the Protection of the environment in relation to armed conflicts after first reading, https://ceobs.org/state-positions-on-the-ilcs-draft-perac-principles-after-first-reading/ accessed May 21, 2022)

Crawford, Neta (2019a): Costs of war, Pentagon Fuel Use, Climate Change, and the Costs of War, Brown University, Rhode Island.

Crawford, Neta (2019b): The Defense Department is worried about climate change and also a huge carbon emitter, The Conversation, https://theconversation.com/the-defense-department-is-worried-about-climate-change-and-also-a-huge-carbon-emitter-118017 (accessed March 18, 2022)

Davis, Diana (2022): The Frack is Back and Other Impacts of the Russia-Ukraine War, March 3, 2022, Oil & gas IQ, https://www.oilandgasiq.com/oil-gas/articles/the-frack-is-back-and-other-impacts-of-the-russia-ukraine-conflict (accessed April 1, 2022)

Delfs, Arne; Dezem, Vanessa (2022): Germany Brings Forward Goal of 100% Renewable Power to 2035, Bloomberg Green, February 28, 2022, Blomberg, https://www.bloomberg.com/news/articles/2022-02-28/germany-brings-forward-goal-of-100-renewable-energy-to2035#:~:text=Germany%20plans%20to%20rapidly%20accelerate,by%2015%20years%20to%202035 (accessed April 1, 2022).

Deutsche Bundeswehr (2021): Energiebericht 2020 Bundeswehr, Bundesamt fuer Infrastruktur, Umweltschutz und Dienstleistungen der Bundeswehr, https://www.klimareporter.de/images/dokumente/2022/03/BAIUDBw_2021_Energiebericht_2020.pdf (accessed May 12, 2022)

DIW Berlin (2022): Stromversorgung auch ohne russische Energielieferungen und trotz Atomausstieg sicher, DIW Nr. 84-20.4.2022

Edwards, Isabel (2018): The role of decentralized renewable energy in peacebuilding. Quaker United Nations Office, Geneva.

Edwardes-Evans, Henry (2022): Belgian decision on nuclear lifetime extensions imminent: report, March 17, 2022, S&P Global Commodity Insights, https://www.spglobal.com/commodityinsights/en/market-insights/latest-news/electric-power/031722-belgian-decision-on-nuclear-lifetime-extensions-imminent-report#:~:text=Belgium%E2%80%99s%20coalition%20government%20is%20to,to%20public%20service%20broadcaster%20RTBF (accessed April 1, 2022)

Elliott, Stuart (2022): Germany to push ahead with two LNG terminals to reduce Russian gas dependence: Scholz, Europe energy price crisis, War in Ukraine, February 27, 2022, S&P Global Commodity Insights, https://www.spglobal.com/commodity-insights/en/market-insights/latest-news/lng/022722-germany-to-push-ahead-with-two-lng-terminals-to-reduce-russian-gas-dependence-scholz (accessed April 1, 2022)

Engber, Daniel (2012): FYI: What kind of gas mileage can you get from a naval warship? A hulking Arleigh Burke–class destroyer might typically burn a minimum of about 24 barrels (1,000 gallons) of fuel per hour, October 17, 2012, Popular Science, https://www.popsci.com/technology/article/2012-09/fyi-what-kind-gas-mileage-can-you-get-naval-warship/#:~:text=Stocktrek,A%20hulking%20Arleigh%20Burke%E2%80%93class%20destroyer%20might%20typically%20burn%20a,effect%20on%20a%20ship%E2%80%99s%20efficiency (accessed March 1, 2022).

EPA (2020): Sources of greenhouse gas emissions, https://www.epa.gov/ghgemissions/sources-greenhouse-gas-emissions#:~:text=In%202019%2C%20direct%20industrial%20greenhouse,the%20Transportation%20and%20Electricity%20sectors (accessed March 15, 2022)

European Commission (2022): REPowerEU Press release, https://ec.europa.eu/commission/presscorner/detail/en/ip_22_1511 (accessed March 8, 2022)

European Defense Agency (2019): Defense energy data 2016 and 2017, https://eda.europa.eu/docs/default-source/eda-factsheets/2019-06-07-factsheet-energy-defence (accessed March 2, 2020)

Forbes (2022): 9000 Permits, Windfall Profits, Keystone XL and Russian Oil, https://www.forbes.com/sites/edhirs/2022/03/15/9000-permits-windfall-profits-tax-keystone-xl-and-russian-oil/?sh=3c408f335a8d (accessed March 15, 2022)

Fakih, Lama (2021): COP26 States Should Agree to Cut Military Emissions, Human Rights Watch, November 3, 2021, https://www.hrw.org/news/2021/11/03/cop26-states-should-agree-cut-military-emissions, (accessed March 4, 2022).

Fayomi, G.; Mini, S; Fayomi, O; Ayoola, A (2019): Perspectives on environmental CO_2 emission and energy factor in cement industry, in: IOP Conf. Series: Earth and Environmental Science, 331, 012035

FOCUS Online (2022): Habecks Gas-Deal mit Katar droht zu platzen, https://www.focus.de/finanzen/news/schwierige-verhandlungen-deutschland-und-katar-streiten-ueber-details-bei-fluessiggas-lieferungen-platzt-der-deal_id_96906647.html (accessed May 5, 2022)

Fort, Jessica; Straub, Philipp. (2019): The “carbon boot-print”: The United States and European military’s impact on climate change, IPB Information Paper, Military and Environment, Berlin.

Georgia (2021): 4th National Communication, Tbilisi

Grotius Hugo (1625): De jure belli ac pacis, Buon, Paris

Hobbs, Peter; Radke, Lawrence (1992): Airborne Studies of the Smoke from the Kuwait Oil Fires, in: Science, 256, p. 987-991.

Hoffmann, Christian; Van Hoey, Michel; Zeumer, Benedikt (2020): Decarbonization challenge for steel, https://www.mckinsey.com/industries/metals-and-mining/our-insights/decarbonization-challenge-for-steel (accessed March 30, 2022)

Hu Mingming; van der Voet, Ester; Huppes, Gjalt (2010): Dynamic Material Flow Analysis for Strategic Construction and Demolition Waste Management in Beijing, in: Journal of Industrial Ecology, 14, p. 440-456

IPCC (2022): Climate Change 2022, Mitigation of climate change, Working group III contribution to the 6th assessment report of the intergovernmental panel on climate change, Cambridge University Press, Cambridge

IPCC (2019): Global warming of 1.5°C. IPCC special report on the impacts of global warming of 1.5°C above pre-industrial levels and related global greenhouse gas emission pathways, in the context of strengthening the global response to the threat of climate change, Cambridge University Press, Cambridge

IPCC (2014): Climate Change 2014, Mitigation of climate change, Working group III contribution to the 5th assessment report of the intergovernmental panel on climate change, Cambridge University Press, Cambridge

IPCC (2006): Guidelines for national greenhouse gas inventories, general guidance reporting, https://www.ipcc-nggip.iges.or.jp/public/2006gl/vol1.html (accessed February 24, 2022)

Jacobson, Mark (2009): Review of solutions to global warming, air pollution, and energy security, in: Energy & Environmental Science, 2, p. 148-173

Julian, Maya; Bassil, Nathalie; Dellagi, Sofiene (2020): Lebanon´s electricity from fuel to solar energy production, in: Energy Reports, 6, p. 420-429

Kennard, Matt; Curtis, Mark (2020): Exclusive: UK military and arms companies produce more carbon emissions than 60 individual countries, Declassified UK, May 19, 2020, https://declassifieduk.org/exclusive-uk-military-and-arms-companies-produce-more-carbon-emissions-than-60-individual-countries/ (accessed March 2, 2022).

Lorincz, Tamara (2014): Demilitarization for Deep Decarbonization: Reducing Militarism and Military Expenditures to Invest in the UN Green Climate Fund and to Create Low-Carbon Economies and Resilient Communities, IPB, https://www.ipb.org/wp-content/uploads/2017/03/Green_Booklet_working_paper_17.09.2014.pdf (accessed April 1, 2022)

Marksteiner. Alexandra; Wezeman, Pieter (2021): The financial value of states' arms exports, in: Stockholm International Peace Research Institute (ed.): SIPRI Yearbook 2021, Oxford University Press, Oxford

McNally, Richard; McEwin, Angus; Hollan, Tim (2010): The Potential for Mangrove Carbon Projects in Viet Nam, SNV, Hanoi

Michaelowa, Axel; Koch, Tobias (2001): Military emissions, armed conflicts, border changes and the Kyoto Protocol, in: Climatic Change, 50, p. 383-394

Moldova (2018): Fourth national communication to the UNFCCC, Chisinau

Morison, Rachel (2022): UK rejects Aquind's proposed electricity link to France, January 20, 2022, Boomberg, https://www.bloomberg.com/news/articles/2022-01-20/u-k-denies-approval-for-aquind-s-electricity-link-to-france (accessed April 1, 2022).

Morison, Rachel; Starn, Jesper (2022): France Rejects Power Cable to U.K. Due to Brexit Uncertainty (1), International Trade, January 28, 2022, Bloomberg Law, https://news.bloomberglaw.com/international-trade/france-rejects-power-link-to-u-k-due-to-brexit-uncertainty (accessed April 1, 2022).

Murray, Williamson; Millet, Allan (2020): A War To Be Won, Fighting the Second World War, Harvard University Press, Cambridge.

NASA (2012) Landsat Top Ten-Kuwait Oil Fires, https://www.nasa.gov/mission_pages/landsat/news/40th-top10-kuwait.html (accessed May 19, 2022)

NATO (2018): Overview of dismounted soldier systems, https://apps.dtic.mil/sti/pdfs/AD1064371.pdf (accessed March 30, 2022)

New Scientist (2022): Amazon deforestation in April was the worst in modern records

https://www.newscientist.com/article/2319326-amazon-deforestation-in-april-was-the-worst-in-modern-records/ (accessed May 10, 2022)

Now This News (2021): How the military industrial complex affects the climate crisis, presentation held by Erik Edstrom, October 18, 2021, https://nowthisnews.com/videos/earth/how-the-military-industrial-complex-affects-the-climate-crisis (accessed February 24, 2022)

NPR (2011): Among the costs of war, billions a year in AC, https://www.npr.org/2011/06/25/137414737/among-the-costs-of-war-20b-in-air-conditioning?t=1648804691388 (accessed March 29, 2022)

Overton, Iain; Dathan, Jennifer (2019): Syria in 2020: the deadly legacy of explosive violence and its impact on infrastructure and health, https://reliefweb.int/report/syrian-arab-republic/syria-2020-deadly-legacy-explosive-violence-and-its-impact (accessed March 17, 2022)

Oxford Institute for Energy Studies (2022) Russia's Invasion of Ukraine: New Oil Order? https://www.oxfordenergy.org/wpcms/wp-content/uploads/2022/05/Russias-Invasion-of-Ukraine-New-Oil-Order.pdf (accessed May 19, 2022)

Parkinson, Stuart (2020): The Environmental Impacts of the UK Military Sector, Scientists for Global Responsibility (SGR), Lancaster https://www.sgr.org.uk/publications/environmental-impacts-uk-military-sector (accessed May 19, 2022).

Pronina, Lyubov (2022): Belgium to Extend Life of Nuclear Reactors By Another Decade, Bloomberg Green, March 19, 2022, Bloomberg, https://www.bloomberg.com/news/articles/2022-03-19/belgium-to-extend-life-of-nuclear-reactors-for-another-decade#:~:text=Belgium%E2%80%99s%20government%20will%20work%20to,amid%20record%20high%20energy%20prices (accessed April 1, 2022)

Pleifle, Jason (n.d.): Fracking, The Center for Biological Diversity, https://www.biologicaldiversity.org/campaigns/fracking/#:~:text=Fracking%20releases%20large%20amounts%20of,our%20climate%20in%20another%20way (accessed April 1, 2022)

Radowitz, Bernd (2022): Russia's war pushes blue and grey hydrogen costs way above those of green H_2: Rystad, Cost of fossil-based H_2 surged by over 70% since Ukraine invasion began, turbocharging the green H_2 sector, analyst say, March 22, 2022, Recharge, https://www.rechargenews.com/energy-transition/russias-war-pushes-blue-and-grey-hydrogen-costs-way-above-those-of-green-h2-rystad/2-1-1189003 (accessed April 1, 2022).

Rafalowicz, Joe (2016): Building Better: Why Decentralized Energy Increases Resilience, Finance, November 02, 2016, Power for all, https://www.powerforall.org/insights/finance/building-better-why-decentralized-energy-increases-resilience (accessed April 1, 2022).

Ravagni Alberto, Koch Tobias, Al-Yousef Yusef (2012) Solid Oxide Fuel Cells (SOFC) and ZEBRA batteries as the most efficient solution to provide maintenance-free, ambient temperature indifferent, supply of power, heating, cooling and water for unmanned, hot, arid outposts and control installations. International Conference on Border Security in Riyadh January 8, 2012

Russia (2022): Letter dated 24 February 2022 from the Permanent Representative of the Russian Federation to the United Nations addressed to the Secretary-General, S/2022/154, UN Security Council, https://documents-dds-ny.un.org/doc/UNDOC/GEN/N22/268/16/PDF/N2226816.pdf?OpenElement (accessed March 26, 2022)

Russia statement (n.d.): Statement by the Russian Federation regarding to the National inventory report of anthropogenic emissions by sources and removals by sinks of greenhouse gases for the period 1990-2015 submitted by Ukraine, https://unfccc.int/sites/default/files/resource/RF_statement%20on_Ukraine_NIR%201990-2015_Eng.pdf (accessed March 16, 2022).

Samaras, Constantine; Nuttall, William; Bazilian, Morgan (2019): Energy and the military, convergence of security, economic, and environmental decision-making, Elsevier, https://reader.elsevier.com/reader/sd/pii/S2211467X19301026?token=38E8C63AD0583AAF8095F8D81941EB4CB6EF80359B68D3CAAE121AEDF6EF3CDFEE0B205C5F2E7879EEB89B27402EA3CA&originRegion=eu-west-1&originCreation=20220318100042 (accessed March 18, 2022)

Sparrevik, Magnus; Utstøl, Simon (2020): Assessing life cycle greenhouse gas emissions in the Norwegian defence sector for climate change mitigation, in: Journal of Cleaner Production, 248, 119196

Stilgenbauer, Judith; McBride, Joe (2010): Reconstruction of Urban Forests in Hamburg and Dresden after World War II, in: Landscape Journal, 29, 2, p. 144-160.

The Military Emissions Gap (n.d.): Problem, https://militaryemissions.org/ (accessed February 23, 2022)

Toon, Owen; Turco, Richard; Robock, Alan; Bardeen, Charles; Oman, Luke; Stenchikov, Georgiy (2007): Atmospheric Effects and Societal Consequences of Regional Scale Nuclear Conflicts and Acts of Individual Nuclear Terrorism, in: Atmospheric Chemistry and Physics, 7, p. 1973–2002

Ukraine (2019): Statement of Ukraine with respect to SBI 50 agenda items 3(b)-3(c), https://www4.unfccc.int/sites/SubmissionsStaging/Documents/201906181215---Statement_Ukraine_SBs50.pdf (accessed March 16, 2022).

UNEP (2021): Emissions Gap Report 2021, the heat is on, a world of climate promises not yet delivered, UNEP, Nairobi

UNFCCC (2021): Updated Nationally Determined Contribution of Ukraine to the Paris Agreement, UNFCCC, July 31, 2021, https://www4.unfccc.int/sites/ndcstaging/PublishedDocuments/Ukraine%20First/Ukraine%20NDC_July%2031.pdf (accessed March 18, 2022).

UNFCCC (2003): Report of the conference of the parties on its eighth session, held at New Delhi from October 23 to 1 November 2002, https://unfccc.int/resource/docs/cop8/07a02.pdf (accessed March 28, 2020)

UNFCCC (1997): Methodological issues related to the Kyoto Protocol. Decision 2/CP.3, Kyoto

UN General Assembly (2022): Aggression against Ukraine, Document A/ES-11/L.1, New York

UN General Assembly (2020): Problem of the militarization of the Autonomous Republic of Crimea and the city of Sevastopol, Ukraine, as well as parts of the Black Sea and the Sea of Azov, Document A/75/L.38/Rev.1, New York

Union of Concerned Scientists (2022): War in Ukraine and the Climate Crisis are connected, https://blog.ucsusa.org/rachel-cleetus/war-in-ukraine-and-climate-crisis-are-connected-our-future-depends-on-solutions-that-address-both/ (accessed March 30, 2022)

United States (1998) Implications of The Kyoto Protocol on Climate Change Hearing, Committee on Foreign Relations United States Senate, One Hundred Fifth Congress, Second Session, February 11, 1998, http://www.gpo.gov/fdsys/pkg/CHRG-105shrg46812/pdf/CHRG-105shrg46812.pdf (accessed May 1, 2014)

USA ASC (n.d.): High Mobility multipurpose wheeled vehicle, https://asc.army.mil/web/portfolio-item/cs-css-high-mobility-multipurpose-wheeled-vehicle-hmmwv/#:~:text=The%20High%20Mobility%20Multipurpose%20Wheeled,droppable%20family%20of%20tactical%20vehicles (accessed February 25, 2022).

Vine, David (2019): Lists of U.S. Military Bases Abroad, 1776-2019, American University Library, https://dra.american.edu/islandora/object/auislandora%3A81234 (accessed March 17, 2022)

Weir, Doug; Neimark, Benjamin; Belcher, Oliver (2021): How the world´s militaries hide their huge carbon emissions. The Conversation. https://theconversation.com/how-the-worlds-militaries-hide-their-huge-carbon-emissions-171466 (accessed March 21, 2022)

Westing, Arthur (1971): Ecological Effects of Military Defoliation on the Forests of South Vietnam, in: Bioscience 21, 17, p. 893-898.

Wikipedia (2022a): Kuwaiti oil fires, https://en.wikipedia.org/wiki/Kuwaiti_oil_fires (accessed April 30, 2022)

Wikipedia (2022b): Second Congo War, https://en.wikipedia.org/wiki/Second_Congo_War (accessed April 30, 2022)

Wood, Peter (2013): International law and the use of force – What happens in practice?, in: Indian Journal of International Law, 53, p. 345-367

Zeihan, Peter (2022) 'Russia-Ukraine war, Oil Crisis & India's Position', Explains Peter Zeihan, India Economic Conclave, https://www.youtube.com/watch?v=QD5GqMainjY&t=84s (accessed April 22, 2022)

CONTACT

Perspectives Climate Group GmbhH Freiburg
Hugstetter Strasse 7 | 79106
Freiburg | Germany
Phone: +49 761 590 33 823

Perspectives Climate Group GmbH Hamburg
Rübekamp 33 | 25421
Hamburg | Germany
Phone: +49 176 211 75 635

info@perspectives.cc
www.perspectives.cc

Tipping Point North South
61 Linkfield Road | Isleworth
Middx TW7 6QP | United Kingdom

info@tippingpointnorthsouth.org
www.tippingpointnorthsouth.org

perspectives climate group

TIPPING POINT NORTH SOUTH