Climate, war and nuclear weapons

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These slides will be made available at: https://www.sgr.org.uk/

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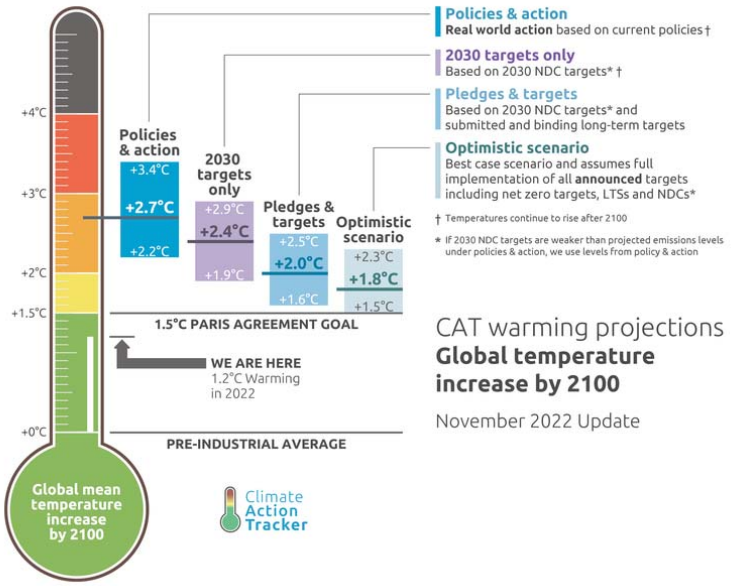
(All references listed at the end)

How do militaries and war fuel climate change?

[image credit: DoD]

Climate change

- Where are we heading?



Source: Climate Action Tracker (2022)

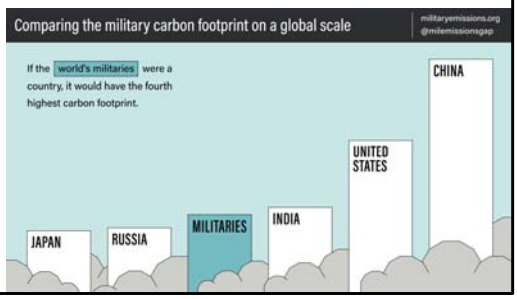
What is the military's role in carbon emissions?

- Difficult to estimate due to reporting exemptions etc:
  - Exclusions from national reporting & targets
    - e.g. military aviation & shipping in international areas
  - Concealment under civilian categories, e.g. military bases
  - Key suppliers counted as industrial, e.g. arms industry
  - Impacts of war
    - counted under other categories, e.g. fugitive emissions, land-use change, healthcare, construction (post-war)
    - or not counted at all…
- Virtually no mention of military/ war emissions in UN climate reports
- US govt led efforts to conceal these emissions

- For example, IPCC assessment reports have included virtually no mention of military/ war-related emissions – and have made no estimates of these emissions. Indeed, the whole areas has been avoided by climate scientists.
- In 1997, at negotiations on Kyoto Protocol, exemptions were agreed from national targets of all military emissions classified as 'international' – following lobbying by US govt - this was agreed by all govts (Lorincz, 2015)

How large are military/ war carbon emissions?

- Ukraine War emissions
  - Military fuel & war impacts: 50 MtCO2e in 7 months
  - Post-conflict reconstruction: 50 MtCO2e
- US military emissions
  - Armed forces: 55 MtCO2e
- Global military emissions
  - Armed forces: 500 MtCO2e
  - Carbon footprint: 2,750 MtCO2e (5.5% world)
  - Bigger than Russia's carbon footprint
  - Incomplete estimate (no war impacts)
- High uncertainty in estimates



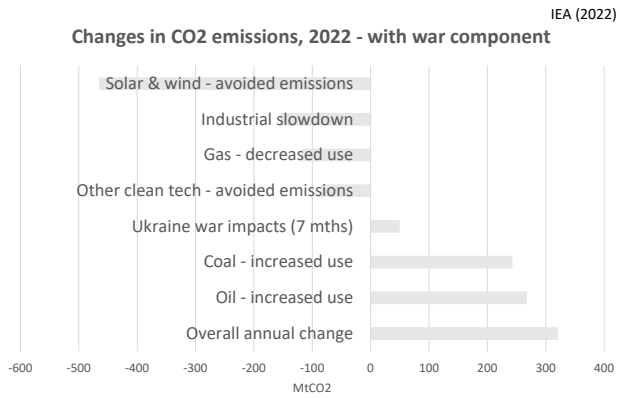
- MtCO2e – million tonnes of carbon dioxide equivalent – standard measure for carbon emissions (also known as greenhouse gas emissions)
- All figures rounded to nearest 5 MtCO2e
- Ukraine War emissions – from: Climate Focus (2022); largest sources: fires: 24 MtCO2e; gas pipeline leaks: 15 MtCO2e; military fuel: 9 MtCO2e
- US emissions – from: Crawford (2019)
- Global emissions – from: SGR (2022)

[image credit: CEOBS/ SGR]

War in Ukraine: wider impacts on carbon emissions (1)

- Major increase in oil & gas prices
- Rising carbon emissions due to:
  - Switch to higher carbon fossil fuels, esp. coal, liquified natural gas (LNG)
- Falling carbon emissions due to:
  - Reduction in energy demand
  - Switch to solar, wind etc

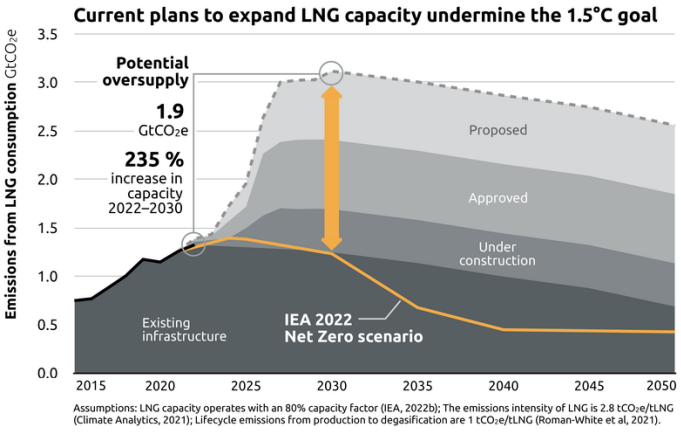
IEA (2022)



Sources: IEA (2022); Climate Focus (2022)

War in Ukraine: wider impacts on carbon emissions (2)

- Investment in high-carbon energy supply
  - New coal, oil & gas
    - e.g. new North Sea oil (Rosebank etc), new Cumbria coal mine
  - LNG supply-chains
- Military expansion
  - Major budget increases in NATO, Russia, China etc
  - Associated emissions rise



- Graph from: Climate Action Tracker (2022)
- Examples of UK fossil fuel expansion – BBC (2022)
- Examples of recent increases in military spending/ expansion – ENAAT (2022)

Climate disruption ↔ Nuclear war

[Image credit: Gerd Altmann]

Risks of nuclear war are increasing

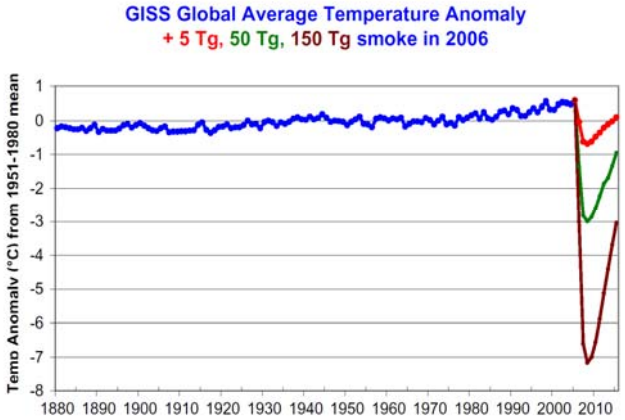
- Nuclear war by miscalculation?
  - Recent deterioration of relations between nuclear-armed nations
    - especially due to war in Ukraine
  - Climate change causes political instability
    - Pakistan and India particularly vulnerable
  - Historical evidence shows world has been lucky
    - average of 1 'near miss' every 3 years
  - Cyber attacks increase risk of launch in a crisis
- Nuclear winter
  - Recent climatic research shows higher vulnerability to catastrophic global ***cooling*** from smoke from any nuclear conflict

- Total number of nuclear weapons worldwide: approx. 12,700 (FAS, 2022)
- For further analysis of the nuclear threat due to Ukraine war, see: Rogers (2023)
- Average of 1 'near miss' every 3 years from 1962 to 2002 (Lewis et al, 2014)
- For examples of cyber security threats to nuclear weapons systems, see: Datoo (2017); SGR (2018)
- For a summary of recent research on nuclear winter, see: Parkinson (2022)

Nuclear winter: the key steps

[Image credit: Alicja via Pixabay]

Nuclear war: global temperature scenarios



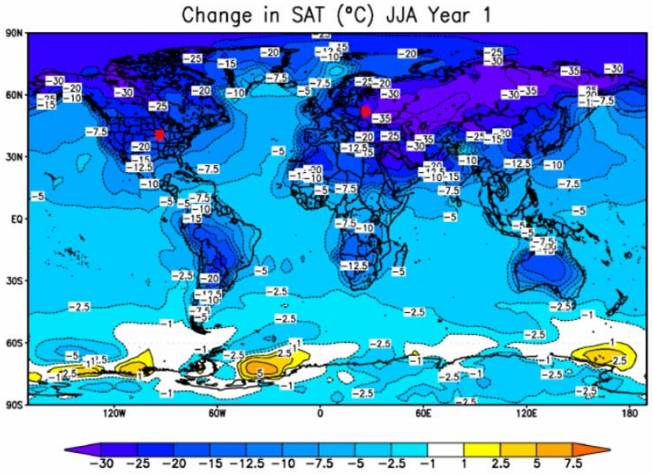
Robock et al (2007)

Scenario 1 (Red) – 'regional' nuclear war, e.g. India-Pakistan, **UK arsenal**
Scenario 2 (Green) – 'global-low' nuclear war, e.g. all current 'active' US-Russian weapons
Scenario 3 (Brown) – 'global-high' nuclear war, e.g. mid-2000s weapons level

- 3 nuclear war scenarios and the resultant 'global cooling'
    1. 5 million tonnes (Mt) of black carbon (soot) injected into stratosphere
    2. 50 Mt of black carbon
    3. 150 Mt of black carbon
- From research led by Prof Alan Robock, Rutgers University, USA, published in 2007
- Blue line is measured global temperature change 1880-2006 (relative to 1951-1980 average level)
- For UK nuclear scenarios, see: SGR (2015).

Nuclear winter scenarios

- ‘Global-high’ USA-Russia war scenario

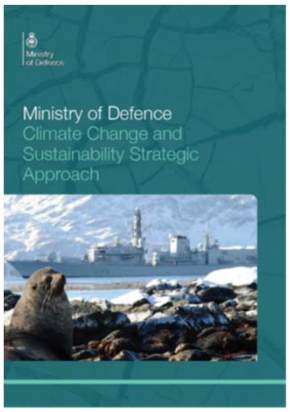


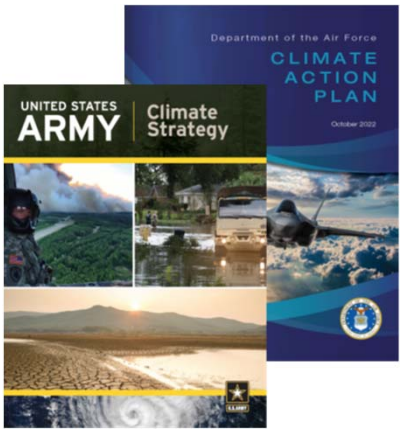
Robock et al (2007)

- Graph: Surface air temperature changes (degrees Celsius) for the ‘150 Tg case’ – i.e. a major nuclear war between USA and Russia using arsenals available in mid-2000s leading to emissions of 150 million tonnes of black carbon into the upper atmosphere, mainly in the form of smoke – averaged for June, July, and August of the year of smoke injection and the next year. Effects are largest over land, but there is substantial cooling over oceans, too. The warming over Antarctica in Year 0 is for a small area, is part of normal winter interannual variability, and is not significant. Also shown as red bursts are two example locations for nuclear weapon explosions.
- ‘Global-low’ war scenario – reductions in temperature are about half the magnitude, but follow a similar geographical distribution

‘Greening’ the military?

New military plans on climate





- Over last two years, UK, US and NATO have published military climate plans – but limited action promised on reducing carbon emissions

- Sources: MOD (2021); NATO (2021); US Army (2022); USAF (2022)

Military approaches to tackling climate change

- UK Ministry of Defence climate document
  - Aim: “seek to use the green transition to add to [military] capabilities”
  - Aim: “fight and win in ever more hostile and unforgiving physical environments”
- Reducing carbon emissions
  - Major focus on controversial tech
  - Use of biofuels/ synthetic fuels especially in military planes
  - More drones/ robotic/ cyber tech
  - More nuclear power in warships/ at bases
  - Use of offsetting – e.g. more trees on military land
- No consideration of alternative approaches to improving security
- No mention of climatic threat from nuclear weapons

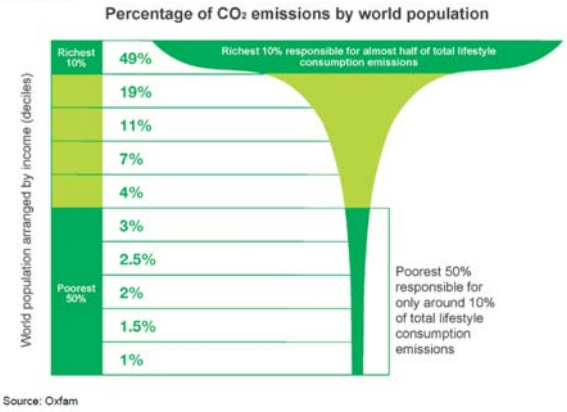
- Quotes and info from (e.g.) MOD (2021)
- Title of US DoD report shows the main motivation for energy saving measures - from: Lorincz (2015)
- Problems with proposals include:
  - Fuelling arms races and risk of war
  - Radioactive waste (nuclear tech)
  - Competition with land for food (biofuels)
  - Unreliability of carbon offsets
  - Use of speculative & energy-hungry tech that may not delivery emission reductions (synthetic fuels)

Unspoken strategy:
Militaries helping to preserve global inequalities

Militaries used to secure (e.g.):
- access to limited oil resources
- ability of wealthy to overconsume

"Almost two thirds of EU military missions are linked to fossil fuels"

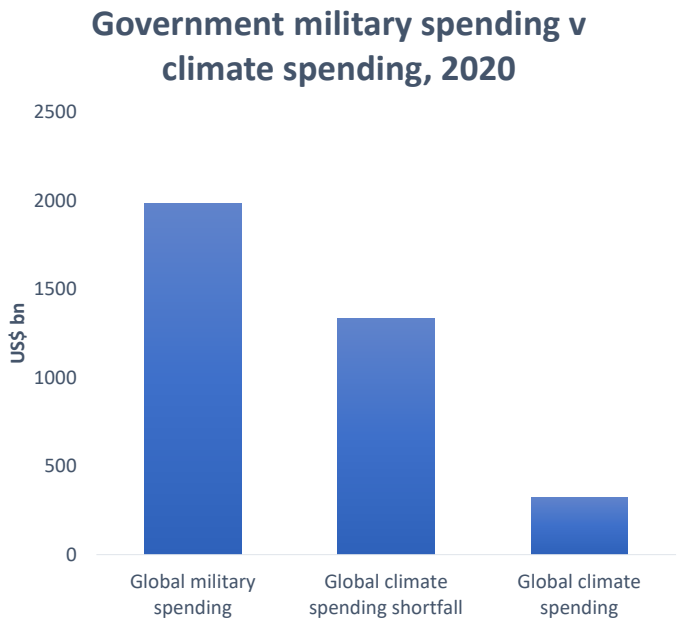
Figure 1: Global income deciles and associated lifestyle consumption emissions



Source: Oxfam

- Analysis of EU military missions from Greenpeace (2021)
- Carbon emissions inequality
  - 'Champagne glass' graph from: Oxfam (2015)
  - This research has just been updated - Oxfam (2021). Their projections, based on existing international policies, show this inequality will persist to at least 2030 – with richest 1% share increasing to 16% of carbon emission by then.

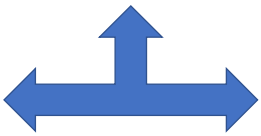
- Huge climate spending shortfall between current levels and those needed to hit 1.5C target



SIPRI (2021); CDP (2022)

- Data from: SIPRI (2021); Climate Policy Initiative (2021)
- Global climate shortfall on track to grow from $1,400 bn in early 2020s to $1,900 bn by 2030

Changing course



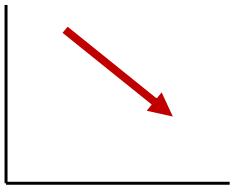
The missing strategy: Demilitarisation for decarbonisation

- More focus on diplomacy and arms control/ disarmament treaties
- Redirect large fraction of military spending to 'just transition'
  - Including conversion of arms to low carbon industries
- Rapid phase out of nuclear weapons
- Shift focus from 'national security' to 'human security'
- Human security (UN definition)
  - Freedom from fear: including protection from violence and environment crises
  - Freedom from want: including provision of decent food, healthcare & housing
  - Freedom from indignity: including from human rights abuses

- High potential for shift in skilled workers from military tech industries to renewable energy, energy storage, and energy efficiency industries – see (e.g.) SGR (2020); Rethinking Security (2021)
- Rapid phase out of nuclear weapons would be via 2017 UN Treaty on the Prohibition of Nuclear Weapons

How did past demilitarisation affect carbon emissions?

- Historical data shows potential of carbon emission reductions due to demilitarisation
- After end of Cold War (1991-2000)
  - US armed forces emissions fell by 44%
  - UK air force & navy emissions fell by 32%
  - Reductions in Soviet Union/ Eastern Europe probably much larger



- Calculations based on data from Crawford (2019) and BEIS (2021)

Campaign goals for military and climate

Peace and environmental campaigners should work together for:

1. Robust, transparent reporting on all military carbon emissions
2. All military activities covered by zero carbon targets compatible with Paris target of 1.5C
3. Demilitarisation/ shift to human security priorities should be key element of zero carbon plans
4. Nuclear weapons abolition

- SGR's suggestions

[image credit: Escif - https://www.facebook.com/Escif-116160785113488/]

References (p1)

BBC News (2022). UK defies climate warnings with new oil and gas licences. https://www.bbc.co.uk/news/science-environment-63163824

BEIS (2022). https://www.gov.uk/government/collections/uk-territorial-greenhouse-gas-emissions-national-statistics

Climate Action Tracker (2022). https://climateactiontracker.org/publications/massive-gas-expansion-risks-overtaking-positive-climate-policies/

Climate Focus (2022). https://climatefocus.com/publications/climate-damage-caused-by-russias-war-in-ukraine/

Climate Policy Initiative (2021). Global Landscape of Climate Finance 2021. https://www.climatepolicyinitiative.org/publication/global-landscape-of-climate-finance-2021/

Crawford N (2019). Pentagon Fuel Use, Climate Change, and the Costs of War. Brown University. https://watson.brown.edu/costsofwar/papers/ClimateChangeandCostofWar

Datoo A (2017). Could Trident be hacked? SGR website. http://www.sgr.org.uk/resources/could-trident-be-hacked

ENAAT (2022). News from the Brussels Bubble, 2/9/22. https://enaat.org/wp-content/uploads/2018/03/ENAAT-NBB-2022-3_02.09.2022.pdf

FAS (2022). https://fas.org/issues/nuclear-weapons/status-world-nuclear-forces/

Greenpeace (2021). The sirens of oil and gas in the age of climate crisis: Europe's military missions to protect fossil fuel interests. https://www.greenpeace.de/publikationen/Military%20missions%20protect%20fossile%20fuels%202.pdf

IEA (2022). https://www.iea.org/reports/co2-emissions-in-2022

Lewis P et al (2014). Too Close for Comfort: Cases of new nuclear use and options for policy. Chatham House. http://www.chathamhouse.org/publications/papers/view/199200

Lorincz T (2015). Demilitarization for Deep Decarbonization. Presentation. https://www.sgr.org.uk/events/messages-paris-conference-forgotten-dimensions-climate-change

MOD (2021). Climate Change and Sustainability Strategic Approach. March. https://www.gov.uk/government/publications/ministry-of-defence-climate-change-and-sustainability-strategic-approach

NATO (2021). Climate Change and Security Action Plan. June. https://www.nato.int/cps/en/natohq/official_texts_185174.htm?selectedLocale=en

References (p2)

Oxfam (2015). Extreme Carbon Inequality. https://policy-practice.oxfam.org/resources/extreme-carbon-inequality-why-the-paris-climate-deal-must-put-the-poorest-lowes-582545/

Oxfam (2021). Carbon inequality in 2030: Per capita consumption emissions and the 1.5^{o}C goal. November. https://www.oxfam.org/en/research/carbon-inequality-2030

Parkinson S (2022). The threat from nuclear winter. Presentation. https://www.sgr.org.uk/resources/threat-nuclear-winter

Rethinking Security (2021). Human Security and the Integrated Review. https://rethinkingsecurityorguk.files.wordpress.com/2021/04/human-security-and-the-integrated-review-april-2021.pdf

Robock A, Oman L, Stenchikov G (2007). Nuclear winter revisited with a modern climate model and current nuclear arsenals: still catastrophic consequences. Journal of Geophysical Research: Atmospheres, 112:D13; DOI:10.1029/2006JD008235

Rogers P (2023). https://declassifieduk.org/negotiation-or-nuclear-war-the-choice-in-ukraine/

SGR (2015). UK nuclear weapons: a catastrophe in the making? Report. http://www.sgr.org.uk/resources/uk-nuclear-weapons-catastrophe-making

SGR (2018). Artificial intelligence: how little has to go wrong? Report. http://www.sgr.org.uk/publications/artificial-intelligence-how-little-has-go-wrong

SGR (2020). The environmental impacts of the UK military sector. Report. https://www.sgr.org.uk/publications/environmental-impacts-uk-military-sector

SGR/ CEOBS (2021). Under the Radar: the carbon footprint of Europe's military sectors. Report. https://www.sgr.org.uk/publications/under-radar-carbon-footprint-europe-s-military-sectors

SGR (2022). https://www.sgr.org.uk/publications/estimating-military-s-global-greenhouse-gas-emissions

SIPRI (2021). Trends in World Military Expenditure, 2020. https://www.sipri.org/publications/2021/sipri-fact-sheets/trends-world-military-expenditure-2020

US Army (2022). Climate Strategy. https://www.army.mil/article/253754/u_s_army_releases_its_climate_strategy

USAF (2022). Climate Action Plan. https://www.safie.hq.af.mil/Programs/Climate/