

The Carbon Footprint of the Military

Dr Stuart Parkinson

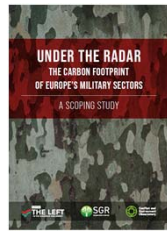


These slides will be made available at: <https://www.sgr.org.uk/>

Presentation given at webinar organised by Merseyside Campaign for Nuclear Disarmament, on 3rd June, 2021

A word about sources...

- SGR reports



- Other academic/ NGO reports



- Military/ arms industry reports



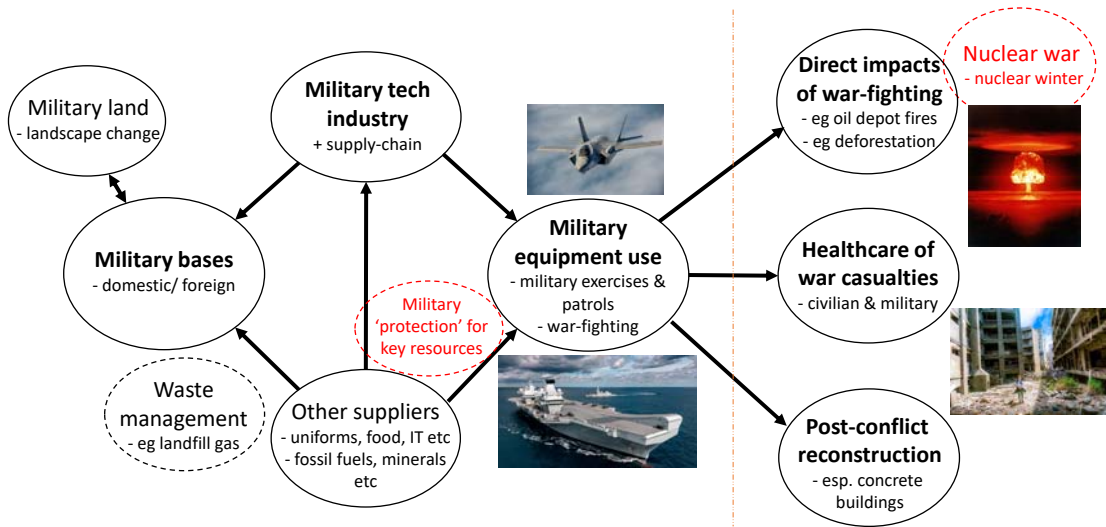
Reports shown: SGR (2020); SGR/ CEOBS (2021); Crawford (2019); TPNS (2020); BAE Systems (2018); MOD (2020)

How big is the
military carbon footprint?



[Image: Clker-Free-Vector-Images]

Military carbon footprint: key components

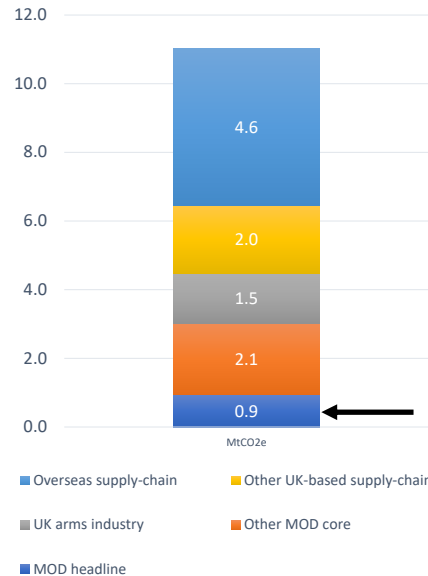


- Carbon footprint covers (black) items to the left of dotted line – and is comparable with civilian sectors
- Carbon ‘bootprint’ is broader and also includes the items to the right of dotted line
- For more analysis, see (e.g.) SGR (2020).

[image credits: MOD; Gerd Altmann; Free Photos]

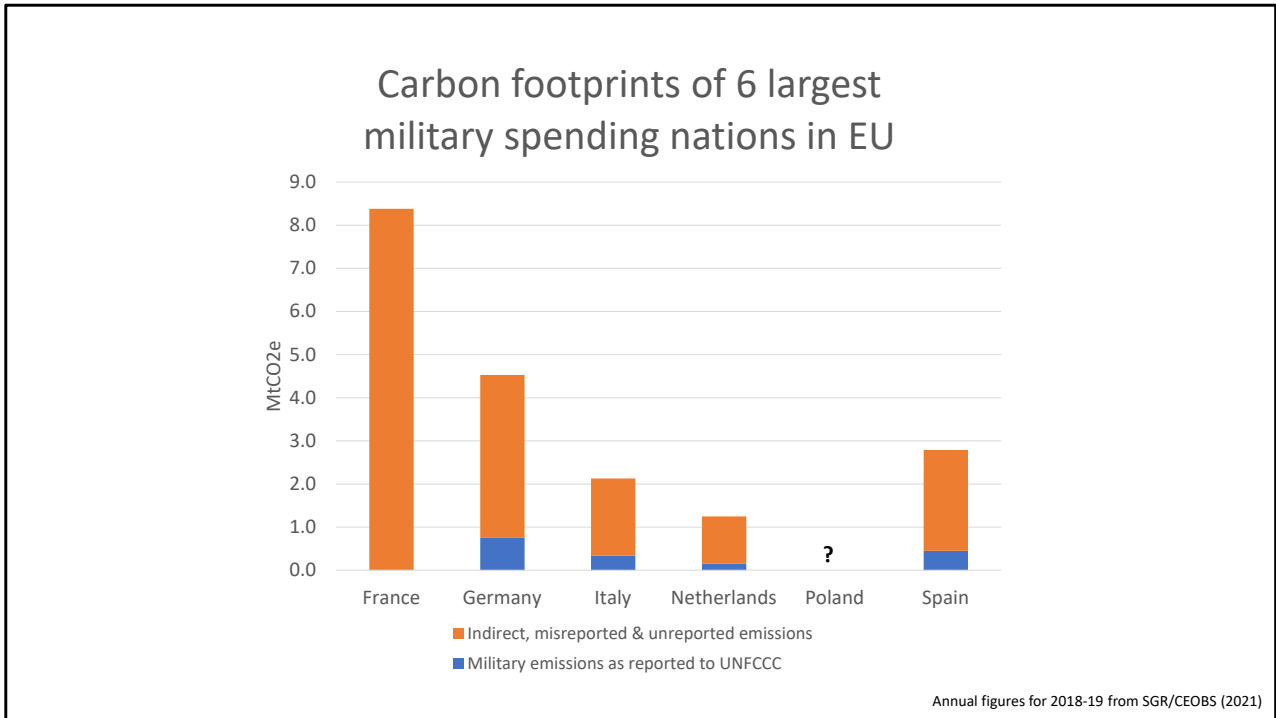
UK military carbon footprint

- Total: 11 million tonnes
 - carbon dioxide equivalent
- MOD 'headline figure' is 0.9 million tonnes
 - Only includes (most) military bases
- MOD total is 3 million tonnes
 - Also includes: air-force, navy, army operations
- UK arms industry: 1.5 million tonnes
- NB Does **not** include impacts of war-fighting
- Total is equivalent to **6 million cars**



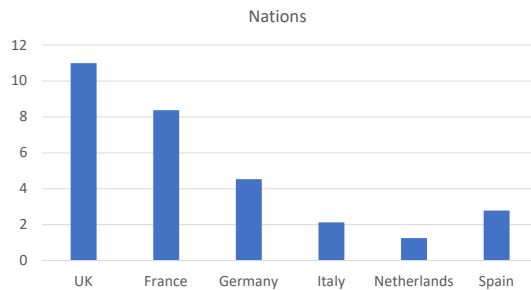
Annual figures for 2017-18 from SGR (2020)

- Arrow indicates Ministry of Defence (MOD) 'headline figure' – less than 1/3 of total for MOD and less than 1/10 of total footprint
- Total UK military carbon footprint is approx. equivalent to direct carbon emissions of 6 million average cars
- Figures do not include additional atmospheric heating effects due to high altitude flying ('uplift factor') – which could add a further 10%
- No figures for total 'bootprint' – could be significantly higher
- Data from: SGR (2020)



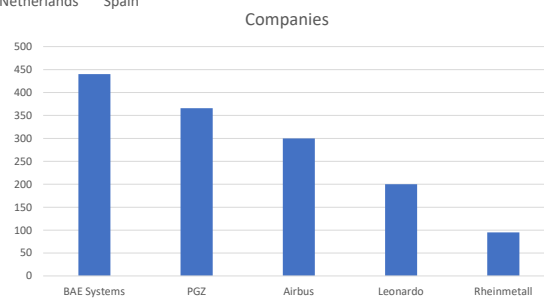
- Data from SGR/ CEOBS (2021) – United Nations Framework Convention on Climate Change (UNFCCC) figures from 2018; total estimates based on 2019 data
- Some reasons for national differences:
 - Level of military spending – France and Germany especially high
 - Numbers of high-consumption vehicles, especially planes & ships – France especially high
 - Size of military technology industries – France especially high
 - Level of overseas military operations – France especially high

Comparing UK and EU military carbon footprints



- UK footprint 30% higher than France
- BAE Systems emissions 20% higher than PGZ

- UK military carbon footprint per head of population 3 times that of Germany

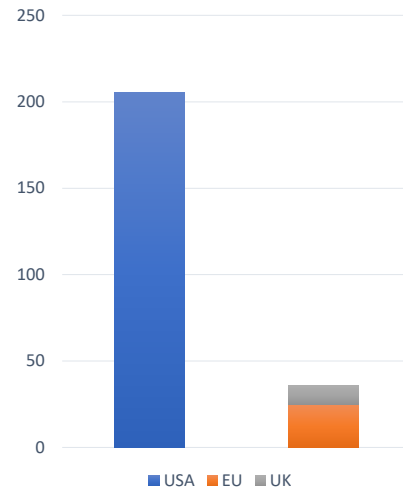


Annual figures: 2017-18 from SGR (2020); 2018-19 from SGR/CEOBS (2021)

- UK military carbon footprint per head of population 25% higher than France – other three nations broadly similar to Germany
- Companies: PGZ based in Poland; Airbus - mainly France; Leonardo - Italy; Rheinmetall - Germany

Comparing US/ European military carbon footprints

- US total: 205 million tonnes
 - New estimate!
- DOD is 56 million tonnes
 - i.e. armed forces
- Official figures minimal
- US footprint
 - nearly 6 times EU+UK
- **Global military carbon footprint**
 - Several % of all carbon emissions
 - Equivalent to large European nation



Sources: Brown University (2019); SGR (2020); SGR/CEOBS (2021)

- US military carbon footprint estimated based on US figure for Dept of Defense (DOD) emissions (56Mt) and scaled up assuming the ratio is the same as for UK military situation (3.7)
- Estimate for global military carbon footprint – based on USA/EU/UK data, bearing in mind that the rest of the world's militaries are likely to be more carbon intensive (e.g. in China, Russia, India, Saudi Arabia, Japan)
- Data sources: USA: Brown University (2019); UK: SGR (2020); EU: SGR/CEOBS (2021)
- Carbon footprint data for nations: Wikipedia (2021)

Why are military carbon data so poor?

- Minimal reporting requirements under 1992 Climate Convention
- US govt insisted on exemptions for military in 1997 Kyoto Protocol
 - No emissions targets
- Voluntary targets under 2015 Paris Agreement
 - No significant update to reporting requirements

So

- All these estimates are conservative
- UK military data is among the best...

See (e.g.) SGR (2020)

Climate disruption ↔ Nuclear war



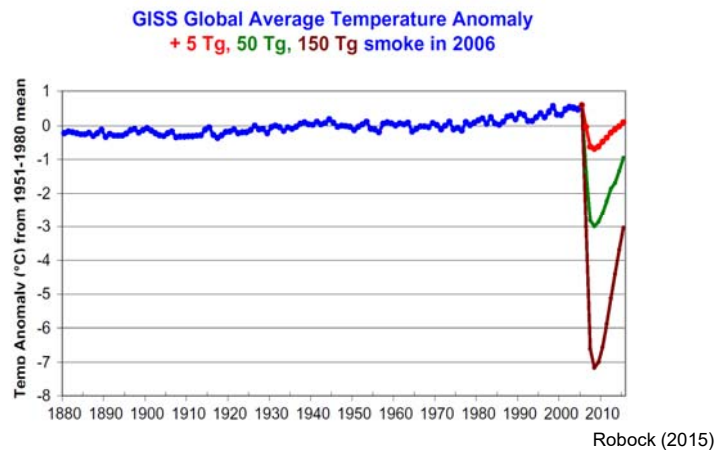
[Image credit: Gerd Altmann]

Risks of nuclear war are increasing

- Nuclear war by accident?
 - Historical evidence shows world has been lucky: average of 1 'near miss' every 3 years
 - Cyber attacks increase risk of launch in a crisis
 - Climate change causes political instability
 - Pakistan and India particularly vulnerable
- Nuclear winter
 - Recent climatic research shows higher vulnerability to global **cooling** from smoke from any nuclear conflict
 - Smoke comes from intense fires caused by nuclear explosions, and is injected into upper atmosphere

- Average of 1 'near miss' every 3 years from 1962 to 2002 (Lewis et al, 2014)
- For a summary of recent research on nuclear winter, see: SGR (2015)
- For examples of cyber security threats to nuclear weapons systems, see: Dato (2017); SGR (2018)

'Boot-print' of nuclear war

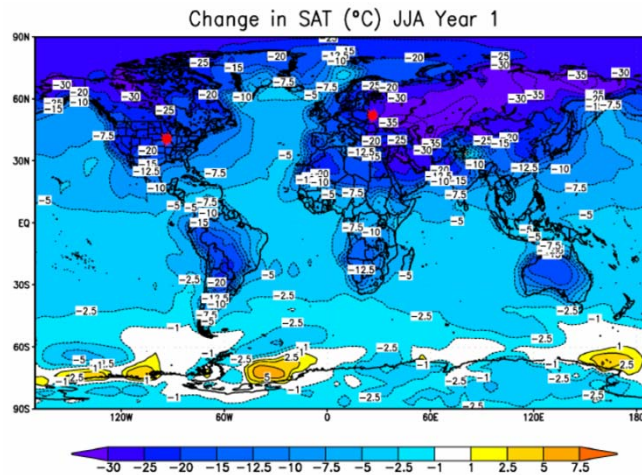


- Scenario 1 (Red) – 'small' nuclear war, e.g. India-Pakistan, UK arsenal
- Scenario 2 (Green) – 'medium' nuclear war, e.g. all US-Russian high-alert nuclear weapons
- Scenario 3 (Brown) – 'large' nuclear war, all deployed weapons

- From research led by Prof Alan Robock, Rutgers University, USA, published in 2007, with further work published in 2015
- Blue line is measured global temperature change 1880-2006 (relative to 1951-1980 average level)
- 3 nuclear war scenarios and the resultant 'global cooling'
- UK nuclear scenarios – SGR (2015)

Nuclear winter scenarios

- USA-Russia scenario:



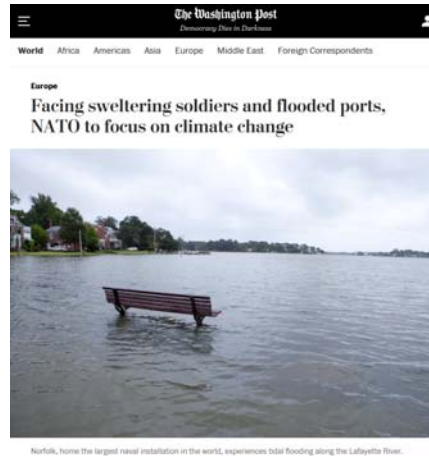
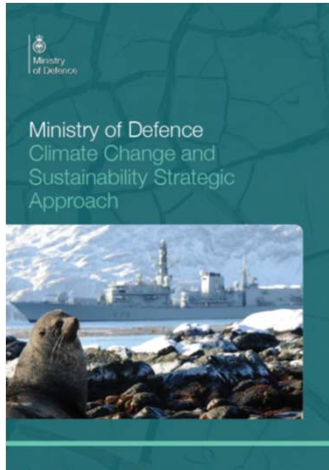
- Graph: Surface air temperature changes (degrees Celsius) for the '150 Tg case' – i.e. a major nuclear war between USA and Russia leading to emissions of 150 million tonnes of black carbon into the upper atmosphere, mainly in the form of smoke – averaged for June, July, and August of the year of smoke 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.

Reducing the military carbon footprint



[Image: Clker-Free-Vector-Images]

New military climate strategies



MOD (2021); Washington Post (2021)

Military approaches to tackling climate change

- Adaptation to climate change
 - “to fight and win in ever more hostile and unforgiving physical environments”
 - Reducing carbon emissions
 - Improving energy efficiency of existing tech
 - Mainly: military planes/ships/vehicles; military bases
 - Greater use of renewable energy
 - e.g. biofuels in planes, solar panels at bases
 - Technology shifts
 - e.g. more drones, nuclear-powered vessels, synthetic fuels
 - Offsetting
 - e.g. planting trees on military land, buying credits
 - “Defence will seek to use the green transition to add to capabilities”
- Most proposals problematic



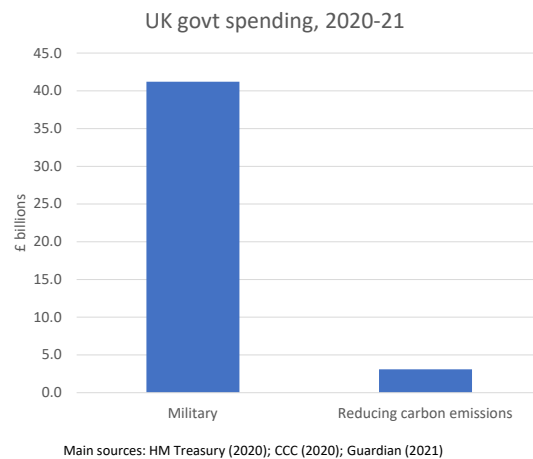
- Quotes and info from (e.g.) MOD (2021)
- Title of US DoD report shows the main motivation for energy saving measures - from: Lorincz (2015)
- Problems with proposals include:
 - Fuelling arms races and risk of war
 - Radioactive waste (nuclear tech)
 - Competition with land for food (biofuels)
 - Irreversibility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

Recent/ current trends in USA/UK

- Large falls in military carbon emissions over previous decade
Due to:
 - Major reductions in overseas military operations (esp. USA)
 - Spending cuts (esp. UK)
 - Military base closures (esp. UK)
 - Reductions in carbon emissions of civilian electricity grids – used by bases
 - Energy efficiency improvements/ tech shifts by military
 - Little publicly available data
- Military spending increases now fuelling emission rises
 - 24% increase in UK MOD emissions from 2017 to 2019 as some spending cuts reversed

Sources: USA: Brown University (2019); UK: NAO (2020); MOD (2020)

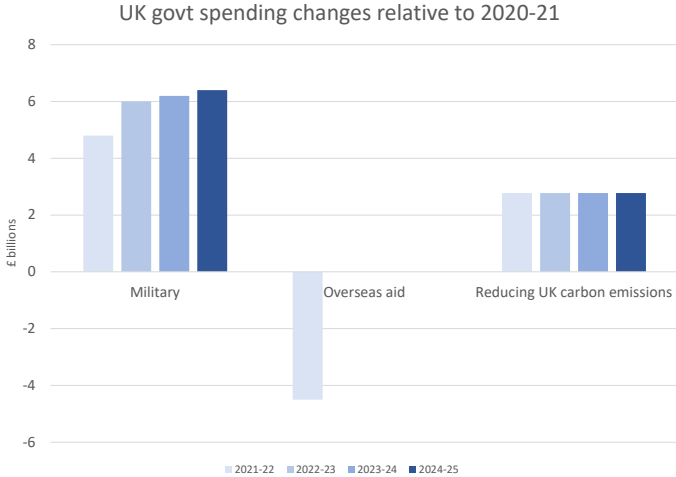
Comparing military and climate spending



- Military total does not include Trident contingency fund, military pensions etc
- Climate total covers UK action only, and is estimated as no official govt figures for annual climate spending

Data from HM Treasury, Climate Change Committee and The Guardian - details of calculations and sources can be found in: Parkinson (2021)

Changes in UK govt spending plans



Data from HM Treasury, Dept of Energy, Industry and Skills - details of calculations and sources can be found in: Parkinson (2021)
Additional data on overseas aid from: Centre for Global Development (2021)

Demilitarisation for decarbonisation

- Serious efforts to cut military carbon emissions require:
 - More focus on diplomacy and arms control/ disarmament treaties
 - Reductions in size/ spending on military
 - Abolition 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, and housing
 - Freedom from indignity
 - including from human rights abuses

See (e.g.) SGR (2020), Rethinking Security (2021)

Campaigning

- Goals
 1. Robust, transparent reporting on all military carbon emissions
 2. All military activities covered by zero carbon targets
 3. Demilitarisation a key element of zero carbon plans
 4. Nuclear weapons abolition
- Audiences
 - Governments; climate science bodies; militaries; climate campaigners; public
- Campaign groups include:
 - Scientists for Global Responsibility; Conflict and Environment Observatory; Movement for the Abolition of War; Veterans for Peace; XR Peace; Tipping Point North South
 - Sign-on statements:
 - <https://ceobs.org/governments-must-commit-to-military-emissions-cuts-at-cop26/>
 - <https://veteransforpeace.salsalabs.org/climatekerry/index.html>

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