The global surge in military spending and military carbon emissions

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Scientists for Global Responsibility

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

Presentation given at Peace Pledge Union conference and AGM, London (via video link), 16 May 2026
(All references listed at the end)

About Scientists for Global Responsibility

- UK research/ advocacy organisation
- Membership includes hundreds of scientists & engineers
- Concerns include:
  - climate change; militarism in science & technology; military greenhouse gas emissions; nuclear weapons
- Numerous reports, articles etc

For more details, see: https://www.sgr.org.uk/

The military spending surge

Growing military spending

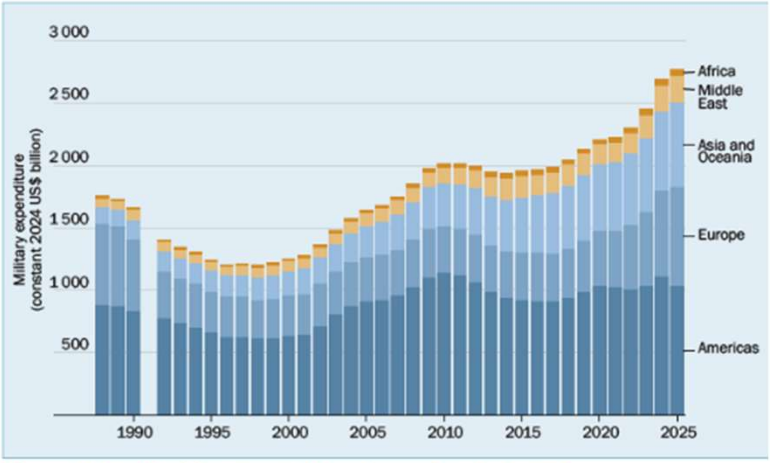


Figure 1. World military expenditure, by region, 1988–2025

SIPRI (2026)

- 2025: $2.9 trillion
- UN projections for 2035:
  - Low: $4.4 tr
  - High: $6.6 tr

- Historical data from: SIPRI (2026)
- UN projections for 2035 (UN, 2025):
  - Low estimate extrapolated from trend of past 5y
  - High estimate assumes 5% of global GDP spent on military activities

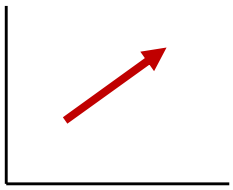
NATO military spending

- NATO nations currently responsible for **55%** of global military spending
- Spending increases (2018-2025)
  - All member nations: +34%
  - Europe & Canada: **+74%**
- Spending targets given as fraction of national economy
  - % of Gross Domestic Product (GDP)
  - Earlier target: 2% for military only
  - Target for 2035: 5% (3.5% on military; 1.5% on 'security-related measures')
- Spending increase for Europe and Canada (2018-2035):
  - **+130%** for military only

- NATO nations currently responsible for 55% of global military spending (SIPRI, 2026)
- Spending increases (2018-2025) – inflation-adjusted figures calculated from Table 2 of: NATO (2025a)
- Details on NATO spending targets: NATO (2025b) - 'security-related measures' include arms industry subsidies
- Spending increase for Europe and Canada (2018-2035) – extrapolated from figures in Table 3 of: NATO (2025a)

UK military spending

- Latest figures (2024-25): £60.2bn
  - 27% rise in 7y
- Planned rise (2028-29): £67.7bn
  - 12% rise in 4y
- Related to NATO targets
  - 2024: 2.3% GDP military spending
  - 2027: 2.6% GDP military spending
  - 2027: 4.1% GDP military and security spending
  - 2035: 5.0% GDP military and security spending
- Military spending is already above Cold War peak



- All figures from: House of Commons Library (2025)
- Spending figures (£) are inflation-adjusted: from p6&13
- Annual UK spending rises much less than most European nations as UK spending was already at high levels
- Spending figures (%GDP): from p13-16
  - 2027 figures will also include 0.1% GDP on intelligence
  - 2027 figures will include 1.5% on “homeland security and national resilience, like protecting our cyber-security and our energy networks” – much of this spending is already taking place
- Military spending has already risen above Cold War peak (p17)

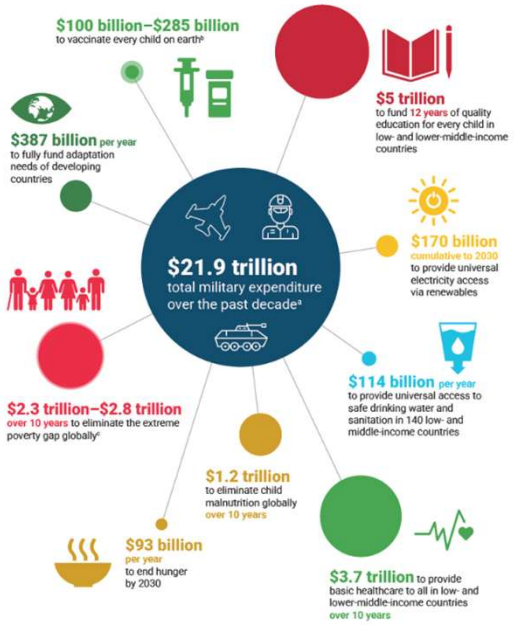
Where is the money coming from?

- Cuts to foreign aid budgets, welfare budgets, and climate budgets
- Tax rises
- Increased government borrowing
- Relabelling existing budgets
- UK as an example:
  - 2020: UK aid spending at 0.7% Gross National Income (GNI)
  - 2021: Cut to 0.5% GNI
  - 2027: Cut to 0.3% GNI
  - Equivalent to total cut of **£13bn+** per year
  - Aid cuts redirected to military spending

- Gross National Income (GNI) is another measure for the size of national economy – not that different to GDP
- For details of UK aid reductions, see: House of Commons Library (2026)
  - 2021 cut made by PM Johnson
  - 2027 cut made by PM Starmer
  - In both cases, the funding raised from the cut was used to increase military spending
  - Total reduction of £13bn/y from 2027 onwards – calculated from data on p20
  - Total rise in annual military spending over same period: £19bn/y (see previous slide)

Military spending displacing spending to tackle poverty, climate change etc

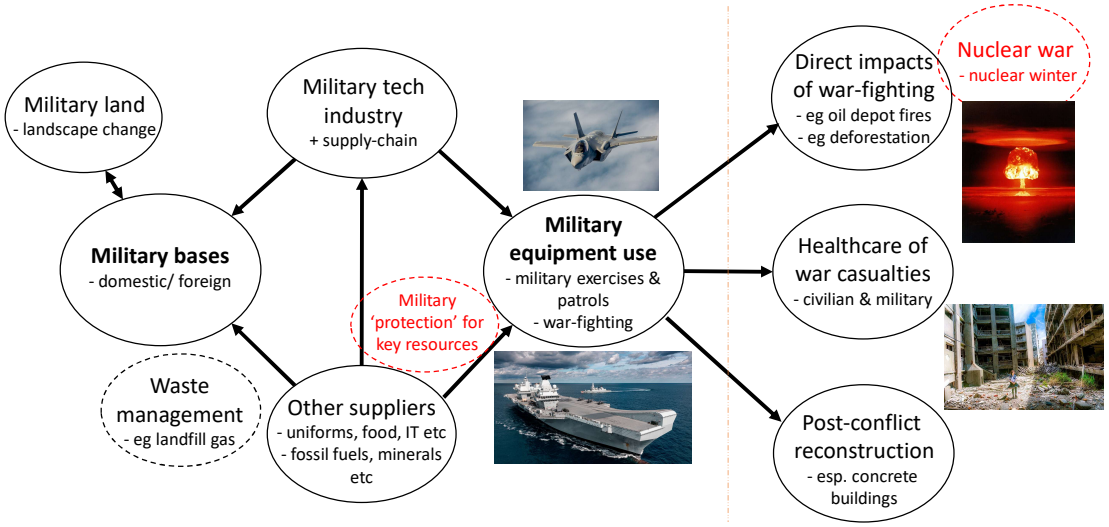
Figure 11: The world's total military expenditure over the past decade



- Diagram from UN (2025: 30)
- $2 trillion needed annually to meet energy and climate Sustainable Development Goals (UN, 2025: 29)

Military carbon emissions: How big are they?

Military carbon bootprint: key components



- 'Core' carbon emissions highlighted in bold
- 'Carbon footprint' covers (black) items to the left of dotted line – and is comparable with impacts seen in civilian sectors
- 'Carbon bootprint' is broader and also includes the items to the right of dotted line
- Data quality is poor
- For more analysis, see (e.g.) SGR (2020).

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

Key terminology

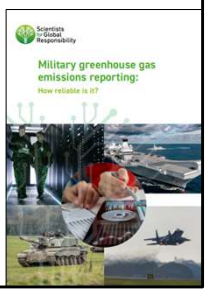
- **Core** carbon emissions (organisational/ operational)
  - Direct fuel use of military vehicles
  - Direct fuel use of military bases, eg heating
  - Electricity use of military activities
- Carbon **footprint**
  - Core emissions plus supply chains, logistics etc
- Carbon **bootprint**
  - Carbon footprint plus impacts of war-fighting
- *'Carbon emissions' and 'GHG emissions' widely used interchangeably*

- GHG – greenhouse gas
- Core carbon emissions known as 'scope 1 & 2' emissions
- Supply chain includes military tech manufacture, component manufacture, raw material extraction, and all military supplies – known as 'scope 3'
- Impacts of war-fighting includes urban fires, damage of ecosystems, healthcare of survivors, refugee movement, post-conflict reconstruction – known as 'scope 3+'

[Image: Clker-Free-Vector-Images]

Data on military GHGs is very poor

- National reporting of *direct* military GHGs is riddled within exemptions and inconsistencies
- National reporting of *indirect* military GHGs is almost non-existent
- Militaries thought to report less than 10% of their military carbon footprints – and no GHG data on war-related impacts
- IPCC has *never* published any data on military GHG emissions
- Lack of data is used to falsely argue that military and war emissions are very small

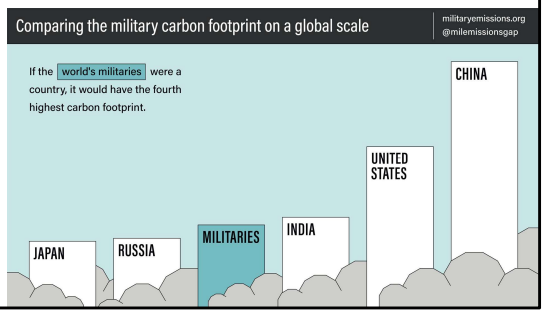


- IPCC – Intergovernmental Panel on Climate Change; UN advisory body
- Militaries typically report less than 10% of their military carbon footprints (SGR, 2025a)

Global estimate: military carbon footprint

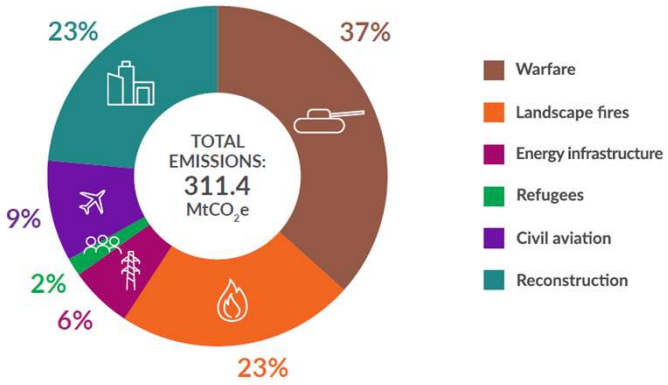
- Global total (best estimate): **2,750 million tCO2e/ 5.5%**
- **Larger than Russia's** total carbon footprint
- Extrapolated from US/UK/EU data, using proxy data
- Uncertainty range
  - 3.3% to 7.0% of global GHG emissions
- Incomplete estimate (no war impacts)

SGR/CEOBS (2022)



- Data from 2019 (i.e. before COVID-19 pandemic and Russian invasion of Ukraine)
- Proxy data includes: number of military personnel; ratio of stationary to mobile emissions
- Supply chain multiplier (over 5 times) derived from UK data; data from Norwegian military has since confirmed figure of over 5 times
- Main source: SGR/CEOBS (2022)

Russia-Ukraine War: GHG emissions



Due to 48 months of war; De Klerk et al (2026)

- Emissions from reconstruction occur after war has ended

Links between military spending and carbon emissions

Aim of additional funding	Effect on core emissions	Effect on wider emissions
Extra fuel for increased military activity	High	Low
Increased numbers of personnel	Medium	Medium
Increased wages for personnel	Low	Low
Increased stockpiles of ammunition	Low	High
Increased numbers and capability of military craft	Mixed	High

Based on SGR (2025b)

- Table summarised from information in SGR (2025b)
- Increases in emissions hard to monitor due to data quality problems (as discussed earlier)

SGR review: findings

- For *increase* in military spending of $100bn, carbon emissions rise by 32 million tonnes (range: 4-59 Mt)
- For *decrease* in military spending of $100bn, carbon emissions fall by 43 Mt (range: 26-59 Mt)
- NATO
  - 2019-2024: +64 Mt (equivalent to Bahrain)
  - 2024-2035: +132 Mt (equivalent to Chile)
- *Additional findings*
- UN projections for 2035
  - Low projection: +540 Mt (equivalent to Pakistan)
  - High projection: +1,250 Mt (equivalent to Brazil)

- SGR review of 11 research studies by academics and NGOs: SGR (2025b)
- NATO projection for 2035 based on all NATO nations reaching 3.5% GDP spending on military (currently only USA, Poland, Estonia close to this level)
- Additional findings based on SGR (2025b) and UN (2025) – see earlier slide
- Pakistan is 18th highest emitting nation in world, while Brazil is 6th highest (European Commission et al, 2025)

Reducing military emissions

Key options

- Military preference: Lower carbon weapons systems
- Alternatives
  - Reducing ‘peacetime’ military activities
  - Reducing armed conflict
  - ‘Common Security’ approaches
  - Arms control & disarmament treaties
  - Reducing military spending

- For data on reductions in emissions due to reduction of war, see earlier example of Ukraine
- The rest of the talk will focus on the other alternatives, which can also help reduce armed conflict

[Image credit: Arek Socha via Pixabay]

Lower carbon military technologies

- Only approach considered within military climate strategies
- 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”
- Main technologies
  - Fuel efficiency improvements in mobile tech
  - Use of biofuels/ synthetic fuels especially in military planes
  - More drones/ robotic/ AI tech
  - More nuclear power in warships/ at bases
  - Solar panels, insulation, heat pumps etc at bases
- Also: carbon offsets; forest projects on military land

- Quotes and info from (e.g.) MOD (2021)
- Title of US DoD report shows the main motivation for energy saving measures - from: Lorincz (2015)

Will these technologies reduce emissions?

Option	Key obstacles	Timescale	Chance of success by 2040s
Fuel efficiency	Rebound	Ongoing	Limited
Biofuels	Sustainable resource already used; land use/ technical limits	Near term	Very limited/ negative
More drones, AI etc	High failure rate; data centre expansion; rebound; human rights impacts	Near/ medium term	Limited/ negative
Synthetic fuels	Immature tech; low conversion efficiency; high costs	Medium term	Limited/ negative
Nuclear power	High radiation risks in battle-space; nuclear proliferation risks; high costs	Medium term	Limited/ negative
Carbon offsets	Major loopholes	Ongoing	Negative
Forestry on military land	Vulnerable to climate impacts	Ongoing	Reversible
Solar/ insulation/ heat pumps at bases	Adaptation to military conditions	Near-term	Significant

- Military tech overlaps with 'hard to abate' civilian sectors: aviation; shipping; heavy-duty road freight; iron & steel; synthetic chemicals
- Any improvements will not reduce environmental impacts of weapons use
- SGR research in this area is ongoing

Common security, disarmament & reductions in military spending

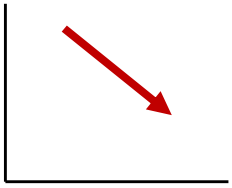
- Common security approaches
  - Mutual respect for security considerations of all nations/ groups
  - 'Win-win approach' based on diplomacy, negotiation, mediation etc
  - Bodies include: UN; ICJ; ICC; OSCE
- Arms control & disarmament treaties
- Non-offensive defence strategies
- These improve conditions for reductions in:
  - Numbers/ capability of offensive weapons systems (long-range = high carbon)
  - Military spending (related to GHG emissions)

- In addition to the United Nations, common security bodies include:
  - ICJ – International Court of Justice – for violations of international law by nations;
  - ICC – International Criminal Court – for violations of international law by individuals;
  - OSCE – Organisation for Security and Co-operation in Europe – ran common security initiatives after Cold War
- Non-offensive defence strategies focus on defending national territory while avoid deploying weapons systems that threaten the territory of other nations
- For more discussion, see: Unfold Zero (2022)

[Image: UN flag; credit: UN]

Will these reduce emissions?

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



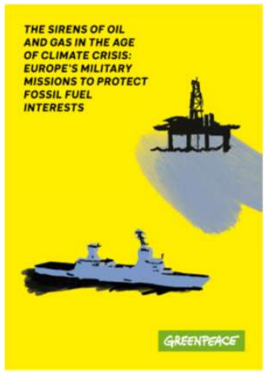
- Calculations based on US data from Crawford (2019) and UK data from Parkinson (2023) – both of which are analyses of government data

Related issues

Unspoken strategy: Militaries helping to preserve global inequalities

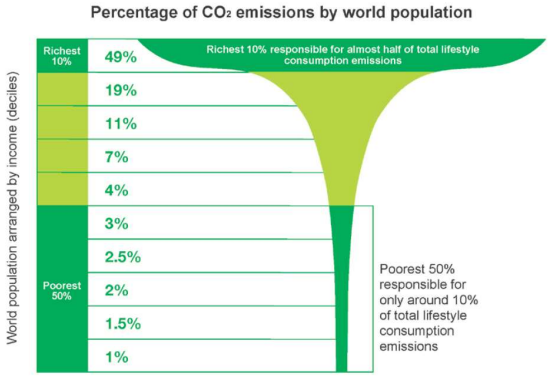
Militaries used to secure (e.g.):

- 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

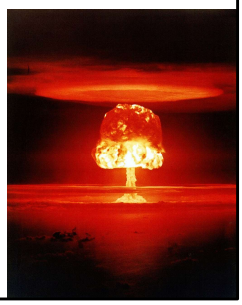


Source: Oxfam

- Analysis of EU military missions from Greenpeace (2021) – and 2026 Iran war also demonstrates the problem
- 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.

Threat from nuclear winter

- Nuclear war can cause catastrophic climate cooling, known as 'nuclear winter'
- Updated academic research shows impacts to be high, even from 'regional' nuclear war
  - Large areas of 'severe fire zone', injecting 5m tonnes of soot into stratosphere
  - Sudden major drop in surface temperatures lasting over 7y
  - Severe frosts/ drought lead to much shorter growing season/ reduction in crop yields for years
  - **Global famine affecting about 2,000,000,000 people**
  - (In addition to 10-21 million direct deaths from explosions)
- Impacts from global nuclear war far worse

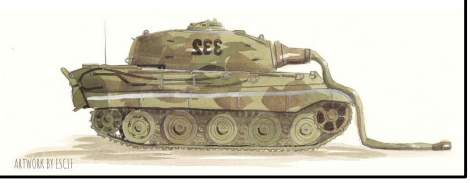


- Key findings from Toon et al (2007); Robock et al (2007) – other studies give comparable results
- Global famine affecting 2 billion – IPPNW (2013).

Image credit: Gerd Altmann

The importance of peacebuilding

- Reduces war
- Reduces military spending
- Reduces military carbon emissions
- Reduces non-military carbon emissions
- Reduces poverty and inequality
- Reduces nuclear threats



- From anti-war protests to front-line work in war zones

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

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