UK military carbon emissions: assessing the latest data

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Scientists for Global Responsibility

Download slides from: https://www.sgr.org.uk/

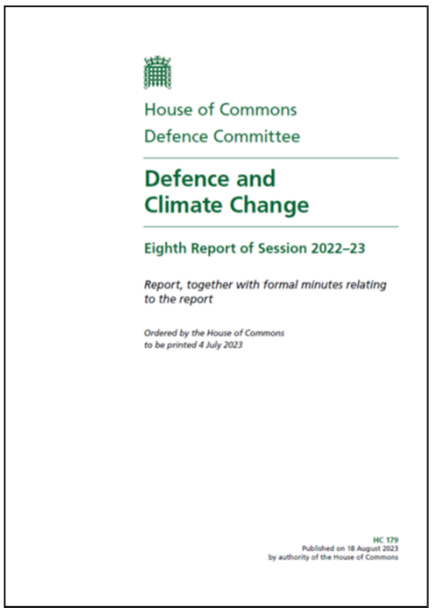
Presentation given at conference, *Military and conflict GHG emissions: from understanding to mitigation*, Oxford, 26th September, 2023
(All references listed in final slides)

About Scientists for Global Responsibility

- UK research/ advocacy organisation
- Membership includes hundreds of scientists and engineers
- Concerns include:
  - climate change; militarism in science & technology; military greenhouse gas emissions
- Publications on military GHGs
  - 3 reports on UK, EU & global military GHGs
  - 2 technical papers on UK military GHGs
  - Main partner: CEOBS

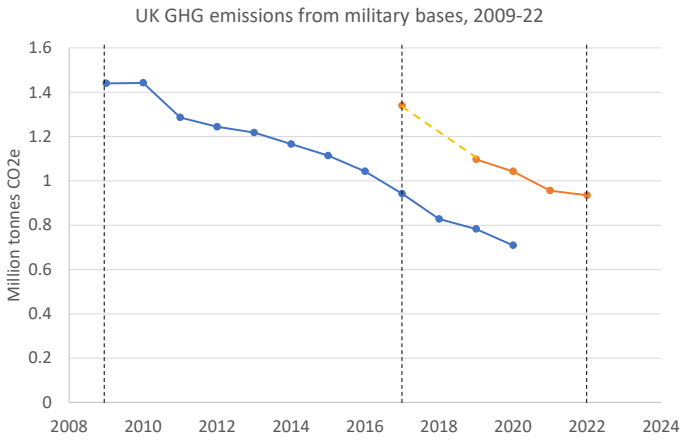
- Reports published in 2020, 2021, 2022; technical papers published in 2022, 2023 – all listed in references
- Articles/ presentations since 2007 – for a list of main outputs, see: https://www.sgr.org.uk/projects/climate-change-military-main-outputs
- Main collaborator: Conflict and Environment Observatory (CEOBS)

- Some SGR/CEOBS findings & recommendations – especially on GHG emissions from military bases – echoed in UK parliamentary report
- Published in August 2023



HCDC (2023)

UK military GHG emissions: estate/ stationary

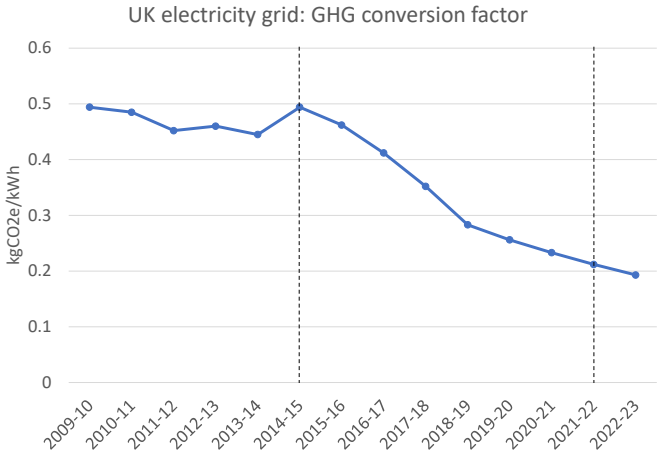


- Data collection practices revised in 2022
  - Shown in orange
  - >40% increase
- Percentage change (2009-17):
  - **35%**
- Percentage change (2017-22):
  - **30%**

Data: Ministry of Defence (2023a; 2023b)

- Both data sets include scopes 1 + 2 and business travel (scope 3) – business travel is few percent of total
- Revised (orange) data set explicitly includes data from UK overseas military bases – which appears to be absent from original (blue) – but this difference alone is not enough to explain the discrepancy
- Analysis of fall in military base emissions given in: SGR/CEOBS (2023)

Estate – key influence: national grid (civilian)

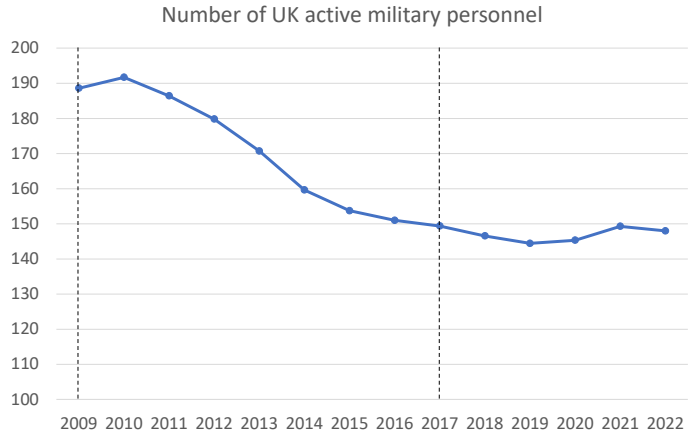


- Percentage change (2015-22):
  - **57%**
- Major decreases due to:
  - Reduction in coal use
  - Expansion of renewables

Data: DESNZ (2023a)

- Total electricity use at military bases is also a factor, although it mainly varies with personnel numbers – see next slide – electricity consumption per head has remained roughly constant over period

Estate – key influence: personnel numbers

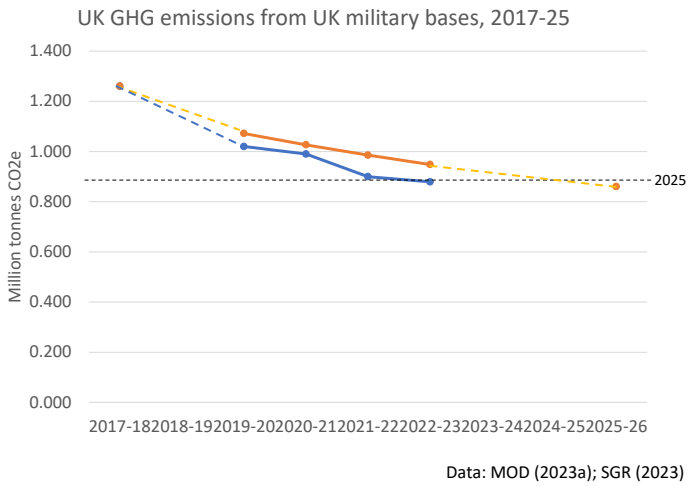


- Military cuts announced in 2010
- Percentage change (2009-17):
  - **21%**

MOD (2023c); DASA (2013)

- Cuts in military personnel were accompanied by sell-off of military buildings
- Figures are for number of 'UK Regulars' as at 1st April each year – do not include reserves or Gurkhas
- Figures for civilian personnel working for MOD fell by an even larger percentage during the period

Estate – 2025 target

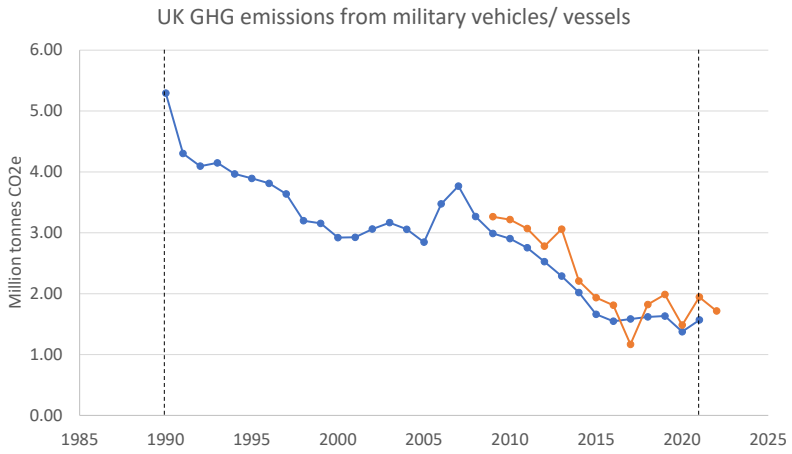


Data: MOD (2023a); SGR (2023)

- 2025 target level for emissions reductions set at 30% relative to 2017
- Target level reached in 2022 (blue)
- However, decarb. of elec. grid would have led to target being reached in 2025 (orange) – *without any other action*
- Parliament report: target **"insufficiently demanding"**

- MOD target is "insufficiently demanding" (HCDC, 2023; p26)
- MOD target is second least demanding of 20 govt bodies – which have an average target of 49% (HCDC, 2023; p25)

UK military GHG emissions: capability/ mobile



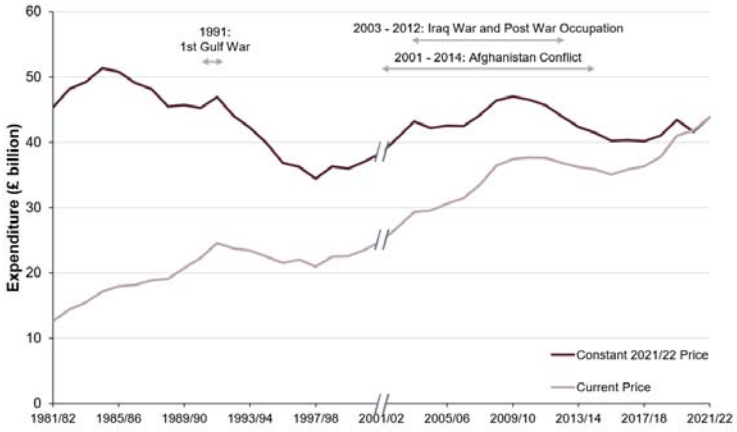
- Percentage change in GHGs from aircraft & ships (1990-2021):
  - **-70%**

Data: DESNZ (2023b); MOD (2023a; 2023b)

- COVID-19 pandemic led to temporary emissions drop in 2020

Capability – key influences: military spending/ activity

UK military spending, 1981/82 to 2021/22



Graph: MOD (2022)

- After end of Cold War, military spending fell significantly – but Global War on Terror, especially Afghanistan and Iraq wars, led to rises
- 2010 Defence and Security Review led to significant cuts in military spending/ equipment/ personnel (part of national 'austerity' policies following Global Financial Crisis)

Capability – key influence: major equipment

Vehicles/ vessels	Number (year)	Number (year)	Percentage change
Large warships	52 (1990)	20 (2022)	**-62%**
Main combat aircraft	389 (1990)	167 (2022)	**-57%**
Main battle tanks	521 (1997)	227 (2022)	**-56%**

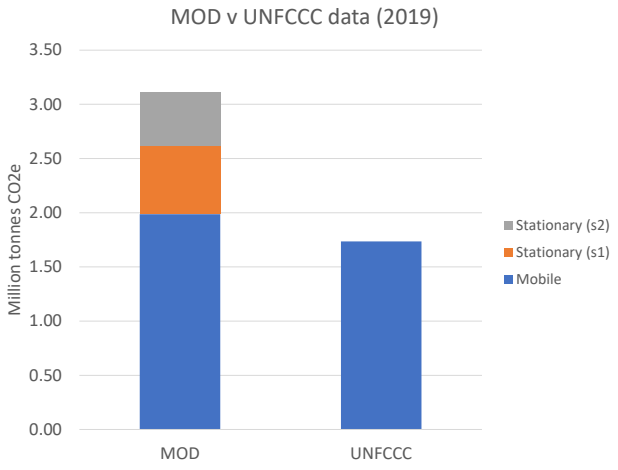
Data: IISS (2022); DASA (2008)

- Large warships includes: aircraft carriers; destroyers; frigates - breakdown:
  - 1990: 3 x aircraft carriers; 14 x destroyers; 35 x frigates
  - 2022: 2 x aircraft carriers (Queen Elizabeth); 6 x destroyers (Type-45); 12 x frigates (Type-23)
- Combat aircraft includes: fighters; ground attack planes; multi-role – breakdown*:
  - 1990: 265 x Tornado; 77 x Harrier; 47 x Jaguar
  - 2022: 144 x Typhoon; 23 x F-35 Lightning II
- Main battle tanks - breakdown:
  - 1997: 415 x Challenger; 98 x Chieftain; 8 x Centurion
  - 2022: 227 x Challenger
- Role of energy efficiency improvements in military tech is unclear

* Figures are for Royal Air Force only. 1990 figures also do not include all aircraft based overseas, due to reporting ambiguities. Hence, these figures are conservative estimates. More research is needed to uncover complete figures.

Images (credits): Queen Elizabeth aircraft carrier (MOD); Typhoon (MOD); Challenger 2 (MOD)

UK military GHGs – comparing official data



UNFCCC military categories:

- 56% of MOD scope 1+2
- 66% of MOD scope 1

Sources: MOD (2023a); UNFCCC (2021)

Key conclusions

- UK military 'stationary' emissions
  - Decline of around 65% over past 13y (but level much higher than originally thought)
  - Mainly due to:
    - decarbonisation of civilian electricity grid; decline in no. of military personnel/ base closures
  - 2025 targets are "insufficiently demanding"
- UK military 'mobile' emissions
  - Decline of around 70% over past 30y
  - Mainly due to:
    - decline in military activity; decline in nos. of energy intensive vehicles
  - Unlikely to fall further without major changes in tech/ strategy/ policy
- Little evidence that military energy efficiency/ climate measures contributed to historic falls
- UN data under-reports UK military emissions by at least 1/3
  - Need for greater transparency in reporting

Further thoughts

- GHG emissions from military bases have clear reduction pathways
  - Tech is widely available, e.g. insulation, LEDs, solar panels, heat pumps
  - Fuel/ cost savings
  - Recommend target of 90%+ reductions 2020-30
- GHG emissions from military equipment very difficult to reduce
  - International arms races/ military spending increases
  - Major technical obstacles to low carbon tech – early stage of development; high cost; environmental/ human rights side-effects; security issues
  - ➢ Need to explore changes to military/ security strategies – especially more emphasis on tackling roots of conflict

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