

CLIMATE CROSSFIRE

How NATO's 2% military spending targets
contribute to climate breakdown



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‘I propose to bring an end to war, to defend life from the climate crisis, which is the mother of all crises.’

*– President of Colombia, Gustavo Francisco Petro Urrego,
in speech to the UN, September 2023*

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ABBREVIATIONS AND ACRONYMS

ASAP	EU Act in Support of Ammunition Production
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CEOBS	The Conflict and Environment Observatory
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CO ₂	Carbon dioxide
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CSO	Civil society organisation
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CSTO	Collective Security Treaty Organization
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EU	European Union
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GDP	Gross Domestic Product
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GHG	Greenhouse gas
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IMF	International Monetary Fund
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IPCC	Intergovernmental Panel on Climate Change
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NATO	North Atlantic Treaty Organization
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NGO	Non-government organisation
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SGR	Scientists for Global Responsibility
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tCO ₂ e	Metric tonne of carbon dioxide equivalent
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UN	United Nations
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UNEP	United Nations Environment Programme
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US	United States of America
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UK	United Kingdom
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\$	US dollar
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FOREWORD

We live in a time when climate hazards face off with vulnerabilities propelled by the expansionist socioeconomic system. This order is built on the relics of colonial extractivism operating behind military shields. Diversion of financial resources from building human resilience into military adventures is a key factor driving the multiple crises of political instability, indebtedness, climate breakdown, food insecurity, poverty, and human misery.

Real action on climate mitigation and adaptation is skirted around in multilateral negotiations where polluters promote false solutions to avoid responsibility and accountability. The rich, industrialized and polluting nations – whose actions have eaten up the planet's carbon budget – continue to wriggle and dither when it comes to climate finance.

It is a vacuous claim for rich nations, most of whom are members of NATO, to plead economic constraints as the reason for not meeting their climate finance obligations. It is clearly false when we see how much they commit to warfare. Global military expenditure tops \$2 trillion and the bulk of it is by the richest nations. Compare that to the unfulfilled promise of climate finance of \$100 billion per year and the climate hypocrisy of the rich and powerful nations is plain to see.

The more dire the situation gets, the more the rich nations seem to double down, producing weapons of destruction rather than making financial resources available for climate adaptation and mitigation. Their inability to meet their financial pledges is a signal of either xenophobic nationalism or represents a colonial mentality of taking from the periphery or sacrifice zones and never giving back.

This unwillingness to provide financial support to poor, vulnerable nations is made worse by the way that the richest nations continue to feed and expand vulnerability through fueling warfare in the most climate-impacted nations. NATO's destruction of Libya in order to overthrow the government of Muammar Gaddafi in 2011 is one such example. Could it be that Libya would have fared better than it did in the devastating flood of Derna in September 2023 if the nation had not been wrecked by NATO's assault and the conflict that has followed? What are the implications of the wars and conflicts in the Middle East for climate resilience? And how about the Russia-Ukraine war?

The true environmental impact of war is impossible to quantify because it affects a staggering array of sectors and every aspect of human well being. Wars kill people, extinguish biodiversity, and destroy the infrastructure that could otherwise provide safeguards in the face of extreme weather events. Warfare is an act of climate denial. And it is insulting that the military, which is one of the most polluting sectors, is not required to report its greenhouse emissions in nations' climate targets.

This report reminds us of the wastefulness of warfare and thus urges nations to pursue true security through investment in civilian sectors that build resilience. The military must not be allowed to continue as climate outlaws.

– **Nnimmo Bassey**

Nigerian environmental activist, author and poet. Director of Health of Mother Earth Foundation, former chair of Friends of the Earth International, and winner of the Right Livelihood Award

EXECUTIVE SUMMARY

Climate mitigation and adaptation efforts are chronically underfunded by billions of dollars, deepening the climate crisis and its impacts on citizens around the world. This has made climate finance one of the most contentious issues at annual United Nations climate summits as the richest countries that bear the most responsibility for climate breakdown have failed to keep even their limited promises of finance for those facing its harshest consequences. At the same time, the richest and most carbon-polluting nations are also increasing military expenditure. Global military spending has reached a record high of \$2.24 trillion, more than half of this spent by NATO's 31 member states, and budgets are projected to increase massively in the next few years.

This briefing examines the impact of one of the key drivers of increased global military spending¹ – NATO's target for all its member states to spend a minimum of 2% of their Gross Domestic Product (GDP) on the military, and the related target of at least 20% of expenditure on equipment. It looks at the history of the target, how it drives military spending, its impacts on greenhouse gas (GHG) emissions, its likely overall financial and ecological impacts in the coming decade, and the arms industry that will profit from it.

NATO's target has quickly become a benchmark for military spending, yet as this briefing shows, the goal has no clear methodological basis. Set in 2006 before the Russia's initial invasion of Ukraine in 2014, it is now defended as necessary to counter the Russian threat. Clearly Russia has a recent history of military interventions, particularly in neighbouring countries such as Ukraine and Georgia.² Yet even before achieving the 2% goal, in 2021, the 31 member states of NATO spent more than 16 times as much as Russia and its allies in the Collective Security Treaty Organization (CSTO, which includes Armenia, Belarus, Kazakhstan, Kyrgyzstan, Russia, and Tajikistan). Nevertheless, the target has received widespread momentum, and the NATO Secretary General now presents it as the minimum required for military spending for NATO and its allies.

The contrast between NATO's target with that of the Intergovernmental Panel on Climate Change (IPCC) – which proposed that all nations cut GHG emissions by 43% by 2030 in order to keep global average temperature increases below 1.5°C – could not be starker. The IPCC target is based on the best available climate science and yet is largely ignored, with none of NATO's members (or CSTO's members for that matter) committing to achieve 43% real cuts by 2030. Indeed, by adopting NATO's 2% target, they are making the IPCC target even harder to achieve as the planned increase of military budgets will significantly increase military GHG emissions and divert funding from climate action.

NATO and the arms industry frequently talk about 'greening' the military but have all but failed to reduce emissions in any of their operations. Increased military expenditure will therefore always increase GHG emissions.

Based on detailed calculations, our research estimates that:

- The total military carbon footprint of NATO rose from 196 million metric tonnes of CO₂ equivalent (tCO₂e) in 2021 to 226 million tCO₂e in 2023 – 30 million tonnes more in two years, equivalent to putting more than 8 million extra cars on the road.

- NATO's average yearly military carbon footprint of 205 million tCO₂e is higher than the total annual GHG emissions of many individual countries. If NATO's militaries were a single country, it would rank as the world's 40th largest carbon polluter.
- If all NATO members meet the target of 2% GDP spending, between 2021 and 2028 their total collective military carbon footprint would be 2 billion tCO₂e, greater than the annual GHG emissions of Russia, a major petroleum-producing country.
- NATO's military spending increased from \$1.16 trillion to \$1.26 trillion between 2021 and 2023, and the number of states meeting the 2% target almost doubled from six to 11 countries. If all 31 member states were to meet the 2% minimum GDP target, it would lead to an estimated total expenditure of \$11.8 trillion between 2021 and 2028.
- NATO's military expenditure of \$1.26 trillion in 2023 would pay the most-polluting nations' unfulfilled promise of climate finance of \$100 billion a year for 12 years.
- If every NATO member were to meet the commitment to 2% of GDP on military spending, by 2028, NATO would spend an estimated additional \$2.57 trillion, enough to pay for what the United Nations Environment Programme (UNEP) has estimated are the climate adaptation costs for low- and middle-income countries for seven years.
- For European NATO members, the €1 trillion extra spending needed to achieve the 2% of GDP target for military expenditure is equivalent to the €1 trillion needed for the EU Green Deal.

The principal beneficiary of NATO's targets is the arms industry, which has seen its revenue, profits and share prices surge. The industry is lobbying to ensure that these profit streams become permanent, by demanding long-term structural commitments to arms production and by limiting environmental commitments. The lobbying has paid off, as seen in the 2023 EU Act in Support of Ammunition Production (ASAP), NATO's Defence Production Action Plan (2023), and the Biden administration's support for arms production. It will also boost arms exports to countries outside NATO, as the war economy looks for further outlets after the war in Ukraine is over. Analysis of NATO members' arms exports shows that these are currently being sent to 39 of the 40 most climate-vulnerable countries; 17 of which are already in armed conflict, 22 have an authoritarian regime, 26 score low in human development indicators, and nine of which are subject to UN or EU arms embargoes. These exports fuel conflict and repression at a dangerous moment of climate breakdown.

Most importantly, the NATO targets – with all the attendant environmental consequences – are igniting a new arms race just as the climate crisis worsens. This will lead to increased emissions and absorb financial resources from already grossly inadequate climate finance. It is a political distraction that diverts attention from the biggest security crisis humanity has ever faced: climate breakdown. Ultimately, no sector can claim 'exceptionalism' from radical climate action, including the military and the arms industry. Common security and even life on Earth depends on only one target – urgent climate action undertaken by all.

INTRODUCTION

In 2023, the costs of climate inaction have become starker than ever. Temperature records have been broken in one country after another, catastrophic fires have swept across Canada, Chile, Greece, Algeria, and Spain, there have been unprecedented floods in China, India, Greece, and Japan, and sea temperatures have reached levels that shocked climate scientists.

In the words of the UN Secretary-General, António Guterres, ‘the era of global warming has ended’ and ‘the era of global boiling has arrived’.³ It has never been clearer that the richest nations should have made the climate crisis their biggest priority and set the goals and made the necessary investment to transition from fossil fuels and support countries facing the harshest impacts of climate breakdown. If ever there was a security threat, the climate crisis is the starkest that has faced humanity.

Yet, as this briefing shows, the most powerful nations have responded by investing in measures that will worsen the climate crisis by fuelling an arms race that will increase greenhouse gas (GHG) emissions, divert money from climate action, and expand arms exports to countries most affected by the climate crisis. Our world’s climate has been caught in the crossfire of war – which will have hugely negative impacts on the lives of millions of vulnerable people worldwide.

MILITARY SPENDING AND ITS IMPACT ON CLIMATE

Global military spending has been rising since the late 1990s, particularly since 2014 and reached a record \$2.24 trillion in 2022. Our research, *Climate Collateral – How military spending accelerates climate breakdown*, published in November 2022, showed that this growth in military spending:

- Increases GHG emissions, estimated to contribute to 5.5% of the world’s total annual GHG emissions;
- Diverts money from climate action, with the richest nations⁴ spending 30 times more on their armed forces than on providing climate finance for the world’s most vulnerable countries;
- Expands an already lucrative arms industry that exports arms to all 40 of the most climate-vulnerable countries, fuelling conflict and repression.

It also made clear that not even one country has adequate and transparent data or monitoring of environmental or climate impacts of its military and military industrial emissions.

In the few countries that have produced military climate strategies, reduction targets for GHG emissions are either ill-defined or do not apply to frontline military fuel use – they remain secondary to the goal of military dominance. Even among the countries with the most developed military sustainability strategies, there is no evidence that the military can ‘go green’. This is principally because there are not as yet adequate alternative fuels for the

transport and equipment used in military operations and exercises – which generally make up from 66% to 75% of the total energy consumption. Jet fuel alone accounts for up to 70% of the fuel used by most armed forces, followed by naval propulsion and, to a lesser extent, land-based vehicles. The alternative fuels are still unproven, prohibitively expensive, limited in availability and deeply unsustainable, requiring massive land-use change that would be socially and environmentally harmful.

NATO AND THE 2% TARGET

The North Atlantic Treaty Organization (NATO) is a political and military alliance created in 1949 at the dawn of the Cold War as a Western alliance to defend against the Soviet Union and its allied Warsaw Pact countries. Based on the principle of collective security, enshrined in article 5 of the Treaty, its member states agreed to defend each other in the event of an attack against any member country, on the principle that an attack on one is an attack on all. From the original 12 member states – Belgium, Canada, Denmark, France, Iceland, Italy, Luxembourg, the Netherlands, Norway, Portugal, the United Kingdom (UK), and the United States (US) – it now has 31 members, with Sweden expected to join in October 2023.

The original treaty did not stipulate a target for military spending for its member states, but during the Cold War, average expenditure exceeded 2% of each country’s Gross Domestic Product (GDP) (Table 1).

TABLE 1. NATO members’ average military expenditure as a percentage of GDP at the start of each decade between 1960 and 1990



Source: Sandler and George (2016)⁵

The US has frequently complained that NATO’s European members have failed to match its own exceptionally high military budgets (often more than 3% of GDP). Even in 1953, the Secretary of State John Foster Dulles threatened ‘an agonizing reappraisal’ of the US commitment to European security if the European members of NATO did not increase their spending.

With the fall of Berlin Wall and the collapse of the Soviet Union in 1991, military budgets were reduced everywhere – including the US – but especially Europe where they declined from an average of 3.1% of GDP (1985–1989) to 2.5% (1990–1994), 2% (1995–1999), 1.9% (2000–2004), 1.7% in 2009 and to 1.43% (1.40% including Canada) in 2015.

The end of the Cold War also opened debates about the purpose of NATO, with some political leaders arguing for its disbandment and others that Europe should set up its own security structures to replace or sit alongside NATO. Nevertheless, NATO soon assumed new roles, first to support ‘humanitarian’ interventions in the mid-1990s,⁶ and later as a response to the 11 September 2001 (9/11) attacks in the US and President Bush’s declaration of a Global War on Terror (GWOT) that year. These were used to justify NATO’s interventions in Bosnia (1992–1995),

Kosovo (1999), Afghanistan (2001–2021), Iraq (2004–2011), enforcing a no-fly zone in Libya (2011), and counter-piracy operations off the Horn of Africa (2009–2016).

Russia was not the primary target for these interventions. Indeed, according to Lord George Robertson, the Secretary General of NATO from 1999 to 2003, Vladimir Putin, who became Russia's president in 2000, requested to join NATO.⁷ Similarly, the EU, through its Partnership and Cooperation Agreement (PCA) signed with Russia, indicated that it supported 'full involvement of Russia in the development of a comprehensive European security architecture in which Russia has its due place'.⁸

There remains some debate about whether the US formally committed to not expand NATO membership to countries close to Russia.⁹ However declassified documents confirm that many of the leaders of NATO member states made various assurances that they would not threaten Russian security concerns.¹⁰ At the same time, NATO failed to create an alternative security architecture that might have defused tensions. This had already led in 1995 to President Boris Yeltsin protesting that NATO had not kept its word. On 10 May 1995, in a conversation at the Kremlin with President Bill Clinton, Yeltsin pointedly said: 'I see nothing but humiliation for Russia if you proceed Why do you want to do this? We need a new structure for Pan-European security, not old ones! But for me to agree to the borders of NATO expanding towards those of Russia – that would constitute a betrayal on my part of the Russian people'.¹¹ This sense of betrayal among the Russian elite fed into the narratives that went on to define Putin's foreign policy, some of which he has invoked among his spurious justifications for the illegal invasion of Ukraine and annexation of part of its sovereign territory.

Settling on 2%

NATO's new sense of purpose from the mid-1990s revived discussions on military spending. Military and security advocates within European and US defence ministries and related security think tanks argued that the war in Kosovo proved that Europe could not match its political ambitions with its existing military infrastructure. They noted that the bombing campaign was almost entirely carried out by US aircrews using US military infrastructure and intelligence.¹² Some of Europe's prominent military strategists argued for greater autonomy for European nations in military matters, which caused some tensions with the US Secretary of State Madeleine Albright, who famously said the US would not tolerate 'three D's': a *decoupling* of Europe's security from that of America's; a *duplication* of effort and capabilities; or *discrimination* against allies outside the EU.

Despite the tensions, European and US military advocates were united in pushing for greater military spending. In the run-up to the EU's Helsinki summit in 1999, François Heisbourg (a security analyst, former French government advisor and arms industry executive¹³) and others argued for a minimum of 2% of GDP for the military and at least 30–40% of the military budget for procurement and research and development (R&D).¹⁴ At the 2002 NATO summit in Prague, its member states made their first non-binding commitment to meet the 2% of GDP military spending threshold. This commitment was reiterated at a NATO summit in Riga in 2016. At the time, seven of the 20-plus nations had already met the target. It was not until 2014 at the NATO summit in Newport (Wales), however, that the target was officially adopted and given a timeline.

The Wales summit declaration states:

- ‘Allies currently meeting the NATO guideline to spend a minimum of 2% of their Gross Domestic Product (GDP) on defence will aim to continue to do so. Likewise, Allies spending more than 20% of their defence budgets on major equipment, including related Research & Development, will continue to do so.
- Allies whose current proportion of GDP spent on defence is below this level will:
 - halt any decline in military expenditure;
 - aim to increase military expenditure in real terms as GDP grows;
 - aim to move towards the 2% guideline within a decade with a view to meeting their NATO Capability Targets and filling NATO’s capability shortfalls.
- Allies who currently spend less than 20% of their annual defence spending on major new equipment, including related Research & Development, will aim, within a decade, to increase their annual investments to 20% or more of total military expenditures.’¹⁵

Why 2%?

There is no methodology or even a consensus on why 2% of GDP was adopted as a target. One view is that it was chosen because half of the NATO members between the early 1990s and early 2000s were already dedicating at least 2% of GDP on military expenditure.¹⁶ Another, not contradictory, view is that NATO chose the target as being achievable for aspiring members, given that their average expenditure was already roughly 1.7% of GDP.¹⁷ Military analysts point out that 2% of GDP does not necessarily measure warfighting capability as it allows for expenditure for peacekeeping and humanitarian operations and development aid as well as pensions, which can represent a substantial proportion of their budget (33% of Belgium’s military expenditure in 2016).¹⁸ Nor does it measure military capabilities – the armed forces’ readiness, deployability, and sustainability, as well as their willingness to use them.¹⁹

More importantly, there is no evidence that this threshold is needed to counter any perceived security threats. Figure 1 compares military expenditures (figures for NATO members are as reported by NATO whereas those for non-NATO countries are estimates made by the Stockholm International Peace Research Institute – SIPRI). Even before achieving the 2% target, in 2021 NATO overall spent more than 16 times as much as Russia and its allies in the Collective Security Treaty Organization (CSTO, which includes Armenia, Belarus, Kazakhstan, Kyrgyzstan, Russia, and Tajikistan)²⁰. It spent 13 times as much as CSTO in 2022, and more than three times as much as CSTO and China combined. Russia has increased its military expenditure since the full-scale invasion of Ukraine in 2022 to a projected \$102 billion in 2023,²¹ but this would still be less than a twelfth of NATO’s collective expenditure of \$1.26 trillion.

FIGURE 1. NATO’s military expenditure compared to Russia’s and China’s 2021–2022
(in current US dollars, billions)



Source: NATO https://www.nato.int/cps/en/natohq/news_216897.htm; SIPRI for China and Russia data <https://milex.sipri.org/>. Finland is not included in the NATO totals for years 2021 and 2022.

There is therefore little evidence that NATO needs to achieve a 2% GDP target to match Russia's and China's expenditure, along with that of CSTO. The targets also lock NATO into military spending regardless of changing national security needs, most of all the climate crisis, to which this offers few solutions.

Expanding beyond NATO members

Despite the lack of a clear rationale, the 2% target has now become a global benchmark for military spending. US National Security Advisor Robert O'Brien underlined this in October 2020, saying 'What's happened is a 2 per cent has become the gold standard, and countries, even non-NATO countries, want to hit it. I think we've really set a gold standard. We made 2 per cent the benchmark'.²²

The US administration has encouraged its NATO and non-NATO allies to adopt the target. Notably, amidst rising tension with China, it has urged Taiwan to meet the goal. Former US Defense Secretary Mark Esper, in a speech to the Atlantic Council in October 2020, said the US expected allies 'to be ready, capable and willing to deploy when trouble calls, and we expect them to stand shoulder to shoulder with the United States in confronting Chinese bad behavior and Russian aggression'. He continued 'To overcome the increasingly complex threats in the 21st century and defend our shared values, there can be no free riders to our common security'.²³

2% is just the beginning

For many military advocates within NATO, 2% is seen as not the ceiling but the minimum required. In 2018, former US President Donald Trump at the NATO summit in Brussels urged NATO members to spend 4% of their GDP on the military.²⁴ In February 2023, NATO Secretary General Stoltenberg argued that 'we should move from regarding the 2 per cent as a ceiling toward the 2 per cent of GDP as a floor and minimum'. He added that this should not be 'a long-term perspective' but rather 'an immediate commitment to spend 2 per cent as a minimum'.²⁵

CALCULATING THE FINANCIAL COST OF THE 2% TARGET

Despite the agreement in 2014, NATO member states were initially slow to fulfil their commitments to meet the minimum 2% of GDP, of which 20% should be on equipment. In 2021, only six of the 31 member states spent more than 2% of GDP on the military, namely Estonia, Greece, Latvia, Poland, the UK and the US.²⁶ The target became an obsession for Trump, who threatened on several occasions to withdraw from NATO if European nations didn't 'immediately' meet the 2% target.²⁷

The biggest boost for the target, however, was Russia's full-scale invasion of Ukraine in 2022, which prompted a surge in military spending commitments. At an extraordinary summit in Brussels in March 2022, NATO members agreed to 'accelerate our efforts to fulfil our commitment to the Defence Investment Pledge in its entirety' with a number of states providing new timelines for meeting the commitment. In 2023, more than a third of NATO's members have military expenditure exceeding 2% of GDP; and almost all now spend more than 20% of this on equipment. The only exception is Iceland, which has no standing army and hence no military expenditure.

Noticeably, governments have tended to increase military expenditure by increasing the proportion spent on equipment. No country whose military expenditure exceeds 2% of GDP spends less than 20% of this on equipment.



TABLE 2. NATO military expenditure – total as a percentage of GDP, and percentage on equipment 2021–2023 (in \$ million, based on constant 2015 prices and exchange rates)²⁸

Country	2021			2022			2023		
	Military expenditure	% of GDP	Equipment % share	Military expenditure	% of GDP	Equipment % share	Military expenditure	% of GDP	Equipment % share
Albania	170	1.24	15.1	173	1.21	17.1	259	1.76	29.0
Belgium	5,231	1.05	19.5	6,112	1.19	19.3	5,883	1.13	21.5
Bulgaria	901	1.52	11.1	992	1.62	26.5	1,147	1.84	35.1
Canada	21,545	1.27	13.7	21,308	1.22	11.5	24,515	1.38	24.4
Croatia	1,168	1.98	30.0	1,144	1.82	31.2	1,145	1.79	26.2
Czech Republic	2,932	1.39	20.5	2,895	1.34	24.5	3,263	1.50	25.5
Denmark	4,526	1.32	17.2	4,911	1.38	18.7	5,884	1.65	20.8
Estonia	581	2.02	23.2	614	2.16	21.8	766	2.73	31.6
Finland	3,583	1.40	19.9	4,401	1.68	33.5	6,413	2.45	50.8
France	49,189	1.91	27.8	49,608	1.88	28.6	50,616	1.90	29.1
Germany	51,754	1.46	16.7	53,945	1.49	19.9	56,641	1.57	25.4
Greece	7,431	3.70	37.2	8,226	3.86	42.3	6,551	3.01	36.0
Hungary	2,533	1.68	37.2	2,872	1.82	47.6	3,826	2.43	48.4
Iceland	0	0.00	0.0	0	0.00	0.0	0	0.00	0.0
Italy	29,276	1.57	23.2	29,174	1.51	22.7	28,560	1.46	23.0
Latvia	649	2.07	22.1	664	2.08	24.7	731	2.27	26.3
Lithuania	1,005	1.97	22.3	1,285	2.47	36.6	1,324	2.54	24.6
Luxembourg	326	0.47	39.6	435	0.62	39.1	508	0.72	50.3
Montenegro	71	1.55	20.5	68	1.41	22.9	94	1.87	26.8
Netherlands	11,693	1.38	23.8	14,447	1.63	23.7	15,134	1.70	27.0
North Macedonia	163	1.47	21.8	184	1.62	24.1	216	1.87	30.5
Norway	7,242	1.72	29.2	6,543	1.51	28.3	7,348	1.67	29.2
Poland	13,221	2.22	33.9	15,126	2.40	35.9	24,767	3.90	52.5
Portugal	3,289	1.53	16.5	3,253	1.42	18.0	3,482	1.48	22.0
Romania	4,121	1.86	21.6	4,012	1.72	25.5	5,860	2.44	35.2
Slovakia	1,755	1.74	32.3	1,855	1.81	36.5	2,107	2.03	24.3
Slovenia	644	1.24	14.6	687	1.25	22.4	752	1.35	23.5
Spain	12,880	1.04	22.5	13,915	1.07	26.1	16,761	1.26	28.6
Türkiye	18,170	1.61	29.3	16,195	1.36	28.4	16,235	1.31	25.4
United Kingdom	70,004	2.30	26.1	68,426	2.16	28.1	65,609	2.07	28.6
United States	713,804	3.48	28.9	722,799	3.45	27.2	743,259	3.49	29.3

²⁸ Finland is included in 2021 and 2022 to be consistent for comparison with 2023.

Cost of achieving 2%

2021 is a good reference year to explore how much the extra military spending would be in order to meet NATO’s targets, as it preceded Russia’s full-scale invasion of Ukraine (although it had already invaded and illegally annexed territory in 2014) and the subsequent rise in budgets. Between 2021 and 2023, NATO’s military expenditure increased from \$1.16 trillion to \$1.26 trillion.

If every NATO member currently spending less than 2% were to reach this minimum, overall military expenditure in 2021 would be \$90 billion higher than NATO reported. For some member states, this would mean an increase of more than 50%: Belgium by 90%, Canada by 57% and Spain by 92%.³⁰

We can also model this impact by using the International Monetary Fund (IMF)’s latest GDP forecast up to 2028. In a minimum 2% scenario, NATO members collectively would increase their total eight-year military expenditure to \$11.8 trillion, an additional \$2.57 trillion than if NATO members maintained their 2021 expenditure.

**TABLE 3. Estimate of NATO members' total military expenditure (\$mn)
based on minimum 2% GDP target 2021–2028**

Country	2021	2022	2023	2024	2025	2026	2027	2028
Albania	361	382	422	417	439	462	484	509
Belgium	11,900	11,600	12,500	12,900	13,200	13,500	13,900	14,200
Bulgaria	1,680	1,780	2,020	2,120	2,220	2,330	2,430	2,530
Canada	40,200	42,700	42,000	43,600	45,600	47,700	49,800	52,100
Croatia	1,370	1,410	1,560	1,660	1,740	1,820	1,900	1,980
Czech Republic	5,630	5,810	6,710	7,120	7,570	7,900	8,180	8,450
Denmark	7,990	7,860	8,210	8,400	8,750	9,120	9,510	9,920
Estonia	749	821	1,170	1,210	1,320	1,420	1,510	1,610
Finland	5,920	5,630	7,320	7,610	7,820	8,040	8,230	8,410
France	59,200	55,600	59,600	60,400	62,700	64,700	66,400	67,800
Germany	85,000	81,600	86,700	88,900	92,700	96,400	98,900	101,000
Greece	8,010	8,490	7,120	7,470	7,720	7,950	8,160	8,320
Hungary	3,640	3,600	5,040	4,930	5,150	5,340	5,490	5,600
Iceland	511	557	573	619	664	712	766	824
Italy	42,200	40,100	43,300	44,400	45,700	46,900	48,100	49,000
Latvia	824	857	1,030	1,140	1,200	1,270	1,340	1,400
Lithuania	1,330	1,740	1,990	2,160	2,320	2,450	2,550	2,630
Luxembourg	1,710	1,650	1,690	1,810	1,900	1,980	2,050	2,120
Montenegro	117	122	140	151	160	169	177	184
Netherlands	20,200	19,100	19,700	22,700	23,500	24,300	25,000	25,700
North Macedonia	278	273	314	332	353	374	395	415
Norway	9,810	11,600	10,600	11,300	11,400	11,500	11,600	11,800
Poland	15,100	16,600	29,100	31,200	33,700	35,900	37,900	39,100
Portugal	5,080	5,030	5,630	5,560	5,780	5,990	6,200	6,370
Romania	5,700	6,040	8,480	9,190	9,890	10,500	11,000	11,500
Slovakia	2,370	2,310	2,620	2,750	2,880	3,010	3,140	3,250
Slovenia	1,230	1,240	1,370	1,440	1,530	1,610	1,680	1,750
Spain	28,600	27,800	30,400	31,200	32,400	33,400	34,300	35,100
Türkiye	16,300	18,100	24,200	21,700	22,900	24,200	25,500	26,700
United Kingdom	71,900	66,700	65,800	69,800	73,900	78,400	83,000	87,700
United States	794,000	822,000	860,000	969,000	1,000,000	1,040,000	1,090,000	1,130,000
Total (excl. Canada and USA)	415,000	404,000	445,000	461,000	481,000	502,000	520,000	536,000
Total	1,250,000	1,270,000	1,350,000	1,470,000	1,530,000	1,590,000	1,660,000	1,720,000

Source: For 2021–2023 based on NATO reported figures; any member that spends less than 2% of GDP would have the corresponding proportions increased to 2%. For the 2024–2028 period, based on IMF projections; any members that spent more than 2% of GDP in 2023 would maintain the same proportions in the following years; for other members, their proportions would be increased to 2%. This calculation is based on current prices and exchange rates and IMF's GDP forecast.³¹ (See APPENDIX 2C for details.) Finland is included in 2021 and 2022 for ease of comparison.

NATO's 2023 military expenditure of \$1.26 trillion and the anticipated additional expenditure for meeting its targets could instead be spent on mitigating and adapting to climate change. The promised and unfulfilled commitment by the richest countries to provide additional climate finance of \$100 billion a year, for example, is less than 8% of what NATO spent on military in 2023. For European NATO members, the additional €1 trillion spending required to achieve the 2% target would be the same as the yet-to-be-funded amount of at least €1 trillion needed for the EU Green Deal, the EU's plan to reduce GHG emissions by 55% by 2030 from 1990 levels.³² Figure 2 details other ways NATO's military expenditure could be better used to increase climate security.

FIGURE 2.

NATO military spending could pay for much-needed climate finance

CURRENT SPENDING

ANNUAL MILITARY SPENDING

1 YEAR OF MILITARY SPENDING COULD PAY FOR...



NATO's annual expenditure in 2023

\$1.26 tn



Paris Agreement commitment of climate finance for low- and middle-income countries for

12 years

\$100 billion per year estimate



Required external climate finance for low- and middle-income countries for

1 year

\$1 trillion per year estimate

(IHLEG)³³



African countries' costs for climate adaptation and mitigation for

4 years

\$280 billion per year estimate

(IHLEG)³⁴



Climate adaptation costs for low- and middle-income countries for

3 years

\$340 billion per year estimate

(UNEP)³⁵

PROJECTED SPENDING

NATO's military spending 2021–2028 based on 2% GDP minimum

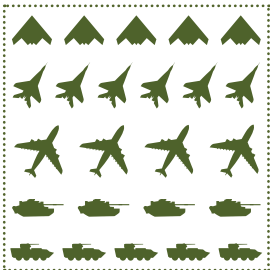
Total expenditure if the 2% target was met by every NATO member
\$11.8 trillion



Additional total expenditure needed to meet the 2% target
\$2.57 trillion

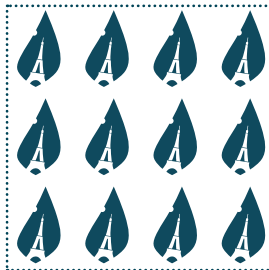
MILITARY SPENDING

8 YEARS OF MINIMUM 2% OF GDP NATO MILITARY SPENDING BY 2028 COULD PAY FOR...



Total expenditure if the 2% target was met by every NATO member

\$11.8 tn



Paris Agreement commitment of climate finance for low- and middle-income countries for

118 years

\$100 billion per year estimate

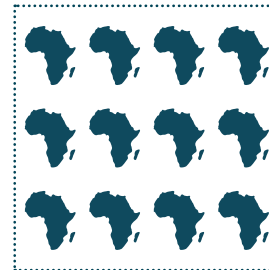


Required external climate finance for low- and middle-income countries for

11 years

\$1 trillion per year estimate

(IHLEG)

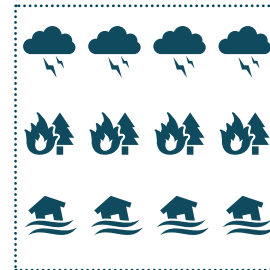


African countries' costs for climate adaptation and mitigation for

42 years

\$280 billion per year estimate

(IHLEG)



Climate adaptation costs for low- and middle-income countries for

34 years

\$340 billion per year estimate

(UNEP)

CALCULATING THE GHG EMISSIONS COST OF THE 2% TARGET

Globally, the armed forces are among the largest institutional GHG emitters. A report by Scientists for Global Responsibility (SGR) and The Conflict and Environment Observatory (CEOBS) estimated in 2022 that the world's armed forces are responsible for about 5.5% of total global GHG emissions. If the global military were a country, it would rank fourth, with emissions exceeding Russia's.³⁶

The 'carbon footprint' (excluding conflict-related) of the military can be divided into three categories: 'stationary', 'mobile', and 'supply-chain'. Stationary emissions are operational GHG emissions (scope 1 and 2)³⁷ for military bases (as well as Defence Department's civilian buildings and transport for civilian activities) whereas mobile emissions arise from mobile military activities (i.e. use of aircrafts, marine vessels and land vehicles, spacecraft). Supply-chain emissions (the upstream component of scope 3) include the GHG emissions of the arms industry and other companies which supply the military (such as accommodation and food for active personnel, and private security contractors).

The ratios between emissions from these three categories depend on the composition of the military. For Germany, which spends 17% of military expenditure on equipment, the ratio of mobile emissions to stationary is 0.7:1.³⁸ In comparison, the ratio for France, which spends 27% of military expenditure on equipment and has a much larger active air force, is 4.9:1. The supply-chain emissions are generally larger than the other two categories.

Currently, military emissions are both poorly reported and under-reported. An academic and civil society initiative – Military Emissions Gap – concludes that reports of military emissions to the United Nations Framework Convention on Climate Change (UNFCCC) are 'either wholly absent or incomplete, generally unclear, and highly inconsistent between countries'.³⁹ It has therefore fallen to researchers and modellers to estimate total emissions based on the more reliable datasets that are available. SGR and CEOBS developed their estimate of total military global emissions based on (stationary) emissions per head of military personnel (in active service in national armed forces) and combined that with assessments of mobile or operational emissions derived from military deployment and activities, and supply-chain impacts such as weapons production or transport.

To estimate the carbon footprint of the NATO members' militaries, our research builds on this methodology and proposes this military carbon footprint formula (see methodology and details in Appendix 1(A-B)):

Carbon footprint of military and the associated military technology industry = (military expenditure) x (proportion spent on equipment) x (spend–emission conversion factor) + (number of military personnel) x (average stationary emission per military head).

The first part (military expenditure x proportion spent on equipment x spend–emission conversion factor) accounts for both the mobile and the supply-chain emissions, and the

spend–emission conversion factor is 0.000534 (tCO₂e/\$). Not all aspects of military expenditure, for example pensions, are relevant to mobile or supply-chain emissions; what is most relevant is the proportion spent on equipment, such as fighter jets, tanks, and warships.

The second part (number of military personnel x average stationary emission per military head) accounts for the stationary emissions. Figures for the average stationary emission per military head are 12.9 (tCO₂e) for the US and 5 (tCO₂e) for every other NATO member state.

The spend–emission conversion factor is estimated by using the latest available comprehensive GHG emission reports by arms manufacturers, Thales and Airbus (where possible, only military-related business activities are considered; see Appendix 1A), while figures for the average stationary emission per military head are adopted from the recent military emission report by SGR and CEOBS.⁴⁰

TABLE 4. Estimated military carbon footprint of NATO members and the associated military technology industry 2021–2023

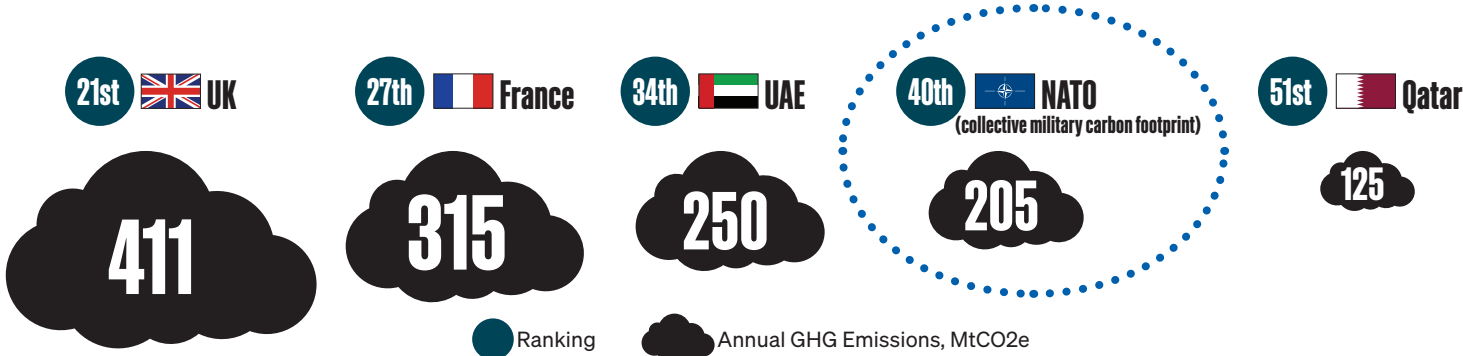
Country	2021	2022	2023
Albania	51	54	90
Belgium	763	822	923
Bulgaria	204	332	480
Canada	2,220	1,982	4,157
Croatia	290	290	271
Czech Republic	560	645	823
Denmark	569	628	840
Estonia	127	130	232
Finland	596	999	2,143
France	9,436	9,011	9,836
Germany	6,456	7,414	10,179
Greece	2,145	2,475	1,928
Hungary	707	940	1,414
Iceland	0	0	0
Italy	4,970	4,548	4,751
Latvia	130	150	183
Lithuania	232	426	351
Luxembourg	89	111	168
Montenegro	18	19	27
Netherlands	1,980	2,187	2,626
North Macedonia	54	59	80
Norway	1,427	1,432	1,488
Poland	3,334	3,794	8,774
Portugal	470	456	608
Romania	954	1,034	2,001
Slovakia	422	477	411
Slovenia	89	122	146
Spain	2,376	2,664	3,522
Türkiye	4,252	4,101	4,458
United Kingdom	10,821	10,771	10,824
United States	139,982	136,904	151,979
Total	195,724	194,976	225,714

Figures are in kilotonnes of CO₂ equivalent (KtCO₂e). Calculation of these estimates is based on data reported by NATO. See Appendices 1–2 for details. Finland is included in 2021 and 2022 for ease of comparison.

Table 4 shows the estimated military carbon footprints of NATO members for 2021–2023. It shows that the emissions have significantly increased since 2021, when there were 12 NATO member states whose military carbon footprint was larger than one million tCO₂e, namely Canada, France, Germany, Italy, Netherlands, Norway, Poland, Spain, Türkiye, the UK and the US. That rose to 15 in 2023. The total military carbon footprint of NATO was 196 million tCO₂e in 2021, with 70% contributed by the US alone, compared to 226 million tCO₂e in 2023 – 30 million tonnes more in just two years, equivalent to putting more than 8 million extra cars on the road in the same period.⁴¹

NATO’s average yearly military carbon footprint of 205 million tCO₂e is higher than the total annual GHG emissions of many countries. If NATO’s militaries were a single country, it would rank as the world’s 40th biggest carbon polluter, greater than that of Qatar, the largest global exporter of liquefied natural gas (LNG), and nearly as much as (80% of) the total annual GHG emissions of COP 28’s host, the oil-producing nation of United Arab Emirates.⁴²

FIGURE 3: NATO military emissions compared to total country emissions



Total annual GHG emissions of selected countries for 2020 (the latest year available). Source: Climatewatch

To see the impact on GHG emissions if all NATO members meet both targets, we have applied the formula to the military spending level estimated in the (minimum) 2% scenario earlier, in which every NATO member whose military expenditure was less than 2% of GDP and of which less than 20% was spent on major military equipment had these changed to 2% and 20% respectively (see Appendix 2B). As noted earlier, governments tend to increase military expenditures by increasing the proportion spent on major military equipment while keeping the number of military personnel more or less constant (see Appendix 2D), so we assume the number of military personnel is unchanged in the 2% scenario.

The total military carbon footprint of NATO was 196 million tCO₂e in 2021, which was much larger than 130 million tonnes of CO₂ (only) emissions of all civilian flights in and out of EU27+EFTA according to the European Union Aviation Safety Agency (EASA) in the same year.⁴³

In the 2% scenario, NATO collectively would have had a military carbon footprint of 209 million tCO₂e in 2021, an increase of 13-million tCO₂e (7%) compared to the estimated GHG emissions of 196 million tCO₂e in the actual scenario, based on military expenditures reported by NATO. The climate impact of the two NATO targets is therefore significant. It would produce a similar amount of GHG emissions as putting more than 7 million extra cars on the road in a single year.

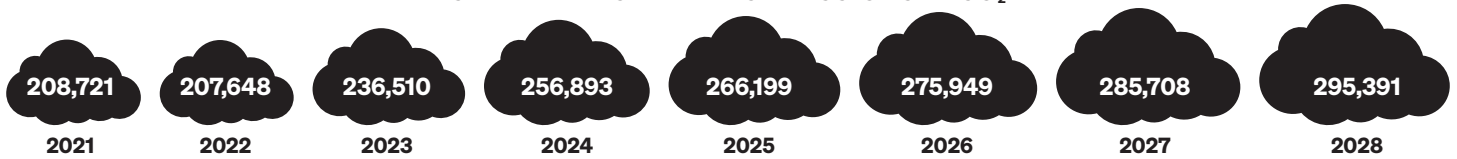
The US, whose expenditure is by far the most globally, has consistently spent more than 3% of GDP on the military and more than 20% of this on equipment, and hence has a huge military

carbon footprint of 140m tCO₂e, more than the emissions of all the other 30 NATO members combined. The carbon footprints of other top military spenders, such as France and UK – which already (nearly) achieved the two NATO targets in 2021 – were around 10 million tCO₂e. For Canada and Germany, which have not yet met the targets, it would mean that Canada could double its military emissions while Germany would dramatically increase military emissions to around 10 million tCO₂e.

Iceland, which had no military expenditure and hence no military emissions in 2021, would have a military carbon footprint of about 55,000 tCO₂e in the 2% scenario, equivalent to forcing an extra 30,333 cars onto the road in a single year in a country with a population of only 376,000.

TABLE 5A. Estimated GHG emissions of NATO members based on meeting NATO targets of 2% GDP and 20% on equipment (2021–2028)

ESTIMATED TOTAL NATO EMISSIONS KTCO₂E



Emissions by country	2021	2022	2023	2024	2025	2026	2027	2028
Albania	72	72	95	97	101	104	108	112
Belgium	1,384	1,357	1,542	1,584	1,623	1,663	1,702	1,736
Bulgaria	308	380	510	530	550	569	589	607
Canada	4,632	4,953	5,832	6,064	6,330	6,603	6,882	7,176
Croatia	293	313	297	308	320	332	343	353
Czech Republic	748	895	1,038	1,107	1,168	1,213	1,252	1,288
Denmark	936	921	988	1,020	1,059	1,100	1,143	1,188
Estonia	127	130	232	239	258	274	290	306
Finland	789	1,160	2,143	2,220	2,278	2,335	2,389	2,437
France	9,820	9,528	10,119	10,416	10,771	11,080	11,356	11,571
Germany	10,032	9,650	12,630	13,002	13,513	14,020	14,359	14,622
Greece	2,145	2,475	1,928	1,994	2,043	2,087	2,127	2,158
Hungary	821	963	1,414	1,388	1,444	1,492	1,531	1,561
Iceland	55	59	61	66	71	76	82	88
Italy	6,106	5,752	6,202	6,320	6,486	6,638	6,785	6,892
Latvia	130	150	183	198	207	217	226	235
Lithuania	234	426	351	374	394	411	425	435
Luxembourg	366	348	471	490	515	536	556	574
Montenegro	21	23	28	30	31	33	34	35
Netherlands	2,784	2,728	3,330	3,486	3,603	3,715	3,822	3,916
North Macedonia	63	66	82	86	89	93	96	99
Norway	1,640	1,864	1,841	1,873	1,896	1,901	1,928	1,957
Poland	3,334	3,794	8,774	9,368	10,066	10,678	11,237	11,582
Portugal	669	652	747	771	797	822	846	867
Romania	1,001	1,148	2,001	2,135	2,266	2,378	2,476	2,562
Slovakia	468	512	411	428	445	462	478	492
Slovenia	162	178	201	211	222	231	241	250
Spain	4,022	4,488	5,154	5,361	5,538	5,693	5,839	5,953
Türkiye	4,755	4,986	5,102	5,259	5,419	5,592	5,763	5,931
United Kingdom	10,821	10,771	10,824	11,433	12,059	12,751	13,454	14,180
United States	139,982	136,904	151,979	169,034	174,637	180,852	187,351	194,229
Total	208,721	207,648	236,510	256,893	266,199	275,949	285,708	295,391
8-year TOTAL, excl. Canada and USA								649,580
8-year TOTAL								2,033,020

For 2021–2023 (based on reported numbers), any member country that spends less than 20% of military expenditure on equipment would have this increased to 20%. For the period 2024–2028 (based on the IMF forecast), since every member (except Iceland) spent more than 20% of their military expenditure on equipment in 2023, the same proportions would be assumed; also, the number of military personnel in 2023 would remain constant (see Appendix 2D). This calculation is based on military expenditures modelled in Table 4.

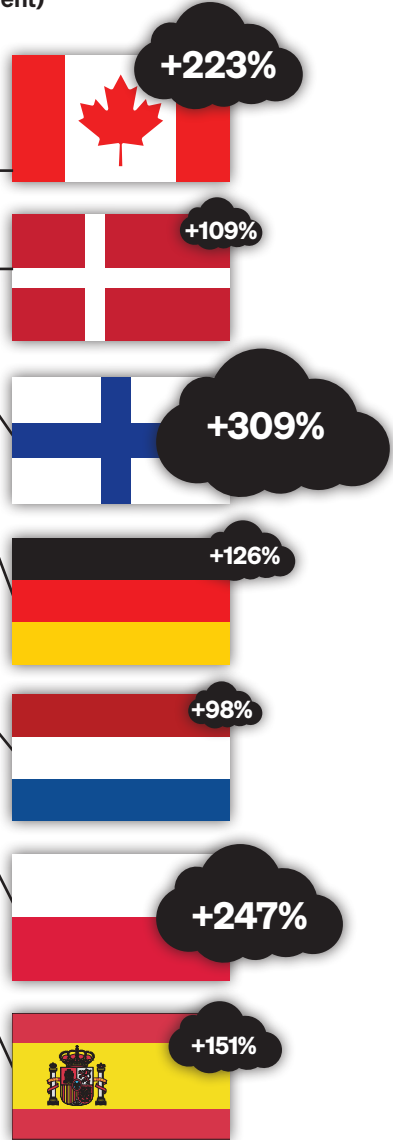
Extrapolating this over the period 2021–2028 would lead to a collective military carbon footprint of NATO of 2 billion tCO₂ equivalent, greater than the total GHG emissions of Russia, a major petroleum-producing state, in a single year or the total annual GHG emissions of Japan and Germany combined, currently the world’s third and fourth biggest economies respectively.⁴⁴ If Canada and the US are excluded, the European NATO members would collectively have a military carbon footprint of 650 million tCO₂e, greater than the total annual GHG emissions of Australia, Mexico or South Korea.

The actual collective military carbon footprint of NATO in 2021 is estimated to be 196 million tCO₂e and we use this figure as the annual baseline in this eight-year comparison. Meeting the NATO targets would lead to an additional 467 million tCO₂e of GHG emissions in total during these eight years, more than Vietnam’s GHG emissions in a single year, currently the world’s 18th largest emitter; these additional emissions are also more than either UK’s or France’s current annual GHG emissions.⁴⁵ The extra emissions required to achieve the 2% NATO target is equivalent to 474 million return flights between London and New York City over eight years – averaging 59 million flights a year.⁴⁶ In comparison, there were 38.9 million flights globally in 2019, the last year before global travel was severely restricted by the COVID-19 pandemic.⁴⁷

If only European NATO members are considered, the additional collective military carbon footprint would be 234 million tCO₂e – greater than the total CO₂ emissions of all flights departing from EU27+EFTA airports (147 million tonnes emitted by 4.6 million departure flights in 2019).⁴⁸

TABLE 5B. Comparison of estimated GHG emissions of NATO members in 2021 (based on NATO’s reported figures) and 2028 (based on meeting NATO targets of 2% GDP and 20% on equipment)

Country	2021	2028	Difference	% increase
Albania	51	112	61	120%
Belgium	763	1,736	973	128%
Bulgaria	204	607	403	198%
Canada	2,220	7,176	4,956	223%
Croatia	290	353	63	22%
Czech Republic	560	1,288	728	130%
Denmark	569	1,188	619	109%
Estonia	127	306	179	141%
Finland	596	2,437	1,841	309%
France	9,436	11,571	2,135	23%
Germany	6,456	14,622	8,166	126%
Greece	2,145	2,158	13	1%
Hungary	707	1,561	854	121%
Iceland	0	88	88	∞
Italy	4,970	6,892	1,922	39%
Latvia	130	235	105	81%
Lithuania	232	435	203	88%
Luxembourg	89	574	485	545%
Montenegro	18	35	17	94%
Netherlands	1,980	3,916	1,936	98%
North Macedonia	54	99	45	83%
Norway	1,427	1,957	530	37%
Poland	3,334	11,582	8,248	247%
Portugal	470	867	397	84%
Romania	954	2,562	1,608	169%
Slovakia	422	492	70	17%
Slovenia	89	250	161	181%
Spain	2,376	5,953	3,577	151%
Türkiye	4,252	5,931	1,679	39%
United Kingdom	10,821	14,180	3,359	31%
United States	139,982	194,229	54,247	39%
Total	195,724	295,391	99,667	51%



Comparison of military carbon footprints, in KtCO₂e, of NATO members in 2021 (in the actual scenario, where military expenditures were actual figures reported by NATO; Table 4) and 2028 (in the minimum 2% scenario, where every NATO member state spends at least 2% of GDP on military and 20% of which is spent on major military equipment; Table 5a)

The annual military carbon footprint would increase significantly if every NATO member were to meet both targets. It would see by 2028 (compared to 2021) an increase of total annual GHG emissions by more than 50%, from 196 million tCO₂e to 295 million tCO₂e. The impact on individual member states would be even more dramatic: Finland would quadruple its annual military carbon footprint, Poland's would more than triple, and Luxembourg's would increase by more than 500%. There are 21 member states that would increase their annual military carbon footprint by more than 50% if the two NATO targets were met in 2028, compared to 2021. Of these, 15 would more than double their annual military carbon footprint.

NATO ARMS INDUSTRY PROFITEERS

One of the key beneficiaries of the NATO targets has been the arms industry. As this briefing has detailed, meeting the two NATO targets has led to greater expenditure on military equipment than on other military expenditure, and is mainly what led to spending increases in Europe. Unsurprisingly, the European arms industry both lobbied for the targets and has continued to push for their fulfilment. In 2003 and 2004, three of the largest European arms companies (BAE Systems, Airbus (then called EADS) and Thales) came together and lobbied for more European government funding.⁴⁹ In 2015, the year after NATO's renewed pledge at its Wales Summit, the Aerospace and Defence Industries Association of Europe, the European biggest arms industry lobby group, called on European NATO members to make 'a firm commitment to fulfil the NATO target of spending 2% of their GDP on defence'.⁵⁰

Their lobbying has paid off. According to the European Defence Agency (EDA) in 2021, 'the procurement of new equipment has benefitted most strongly from the overall increase in defence investments' in recent years.⁵¹

Booming profits

The true extent of this in terms of increased revenue will only become visible in the coming years, as the cycles of military R&D and arms sales – from order to delivery – typically take a longer time, and many companies are focused on building production capacities, staff recruitment and supply-chain management, such as ensuring access to raw materials and components.⁵²

The order books are already filling up. Many governments and armed forces have published long shopping lists for new weapons, combined with plans to replenish munition stockpiles and replace other weapons.⁵³ EU arms companies have reported large increases in orders in 2022, with ammunition producer Rheinmetall standing out with a 259% growth for the first half of the year compared to the same period in 2021.⁵⁴ The value of US arms exports notifications grew by more than 25% from 2021 to 2022.⁵⁵

Stock prices of arms companies have also soared, far outperforming the average growth of major indexes, with investors relying on planned increases in (mainly western) military spending.⁵⁶ The arms industry sees a bright future ahead. 'Our backlog is expected to continue to grow, given the heightened and increasingly complex threat environment', according to Raytheon CEO Chris Calio.⁵⁷

Trying to consolidate a war economy



The arms industry is keen to ensure that these profit streams become permanent, and not dependent on Russia's war in Ukraine – and have been successful in lobbying for this.⁵⁸ The EU Act in Support of Ammunition Production (ASAP), adopted in July 2023, for example, stipulates that 'the measures taken at Union level should aim at reinforcing the competitiveness and resilience of the European Defence Technological and Industrial Base (EDTIB) in the field of ammunition and missiles, to allow its urgent adaptation to structural change'.⁵⁹ Similarly, the Biden administration has pushed for billions of investment in the structural expansion of arms-production capacities.⁶⁰ At its Vilnius summit in July 2023, NATO leaders adopted a Defence Production Action Plan, to support the arms industry and increase its capacities.⁶¹ This plan would reportedly include a separate 'defence industry investment pledge'.⁶² Such structural increases which would seek to create a permanent expansion in arms-production capacities are effectively creating 'war economies' in many NATO member countries.

They are also likely to fuel arms exports to non-NATO countries, as the war economy looks for new opportunities for when the war in Ukraine is finally over. As our report, *Climate Collateral*, revealed, the countries most responsible for climate change, both currently and historically, are already exporting the most weapons to countries worst affected by climate change, fuelling instability, war and repression around the world. Analysis of NATO members' arms exports (Table 6) shows that these are currently being sent to 39 of the 40 most climate-vulnerable countries; 17 of which are already in armed conflict, 22 have an authoritarian regime, 26 score low in human development indicators, and nine of which are subject to UN or EU arms embargoes.

TABLE 6. NATO member states' arms exports to 40 most vulnerable countries (ND-GAIN Index 2023)⁶³

Country	Armed conflict	Democracy Index	Human Development Index	Arms embargo	Most important NATO member states arms exporters (2013–2022)
Afghanistan	yes	authoritarian	low	yes	Bulgaria, Canada, US
Angola	no	authoritarian	medium	no	Bulgaria, France, Italy, Lithuania
Bangladesh	no	hybrid regime	medium	no	Italy, Türkiye, UK, US
Benin	no	hybrid regime	low	no	France
Burkina Faso	yes	authoritarian	low	no	Bulgaria, France, Spain, Türkiye
Burundi	no	authoritarian	low	no	France, US
Central African Republic	yes	authoritarian	low	yes	Germany, Portugal
Chad	yes	authoritarian	low	no	France, Italy, Portugal, US
Comoros	no	authoritarian	medium	no	UK
Congo	no	authoritarian	medium	no	Bulgaria
DR Congo	yes	authoritarian	low	yes	Bulgaria, US
Eritrea	no	authoritarian	low	no	Germany
Ethiopia	yes	authoritarian	low	no	Czech Republic, Hungary, US
Gambia	no	hybrid regime	low	no	Germany
Guinea	no	authoritarian	low	no	Romania
Guinea-Bissau	no	authoritarian	low	no	Portugal
Haiti	no	authoritarian	low	no	Germany
Kenya	yes	hybrid regime	medium	no	Czech Republic, Italy, Spain, US
Liberia	no	hybrid regime	low	no	Belgium, Germany, UK
Madagascar	no	hybrid regime	low	no	UK
Malawi	no	hybrid regime	low	no	Bulgaria, Canada
Mali	yes	authoritarian	low	no	France, Germany, Spain, US
Marshall Islands	no	n/a	medium	no	UK
Mauritania	no	hybrid regime	medium	no	France, Italy, Türkiye, US
Micronesia	no	n/a	medium	no	–
Mozambique	yes	authoritarian	low	no	France, Romania, UK
Myanmar	yes	authoritarian	medium	yes	France, Germany, Netherlands, UK
Niger	yes	authoritarian	low	no	France, Germany, Türkiye, US
Nigeria	yes	hybrid regime	low	no	Czech Republic, France, Netherlands, US
Pakistan	yes	hybrid regime	low	no	Italy, Netherlands, Türkiye, US ⁶⁴
Papua New Guinea	no	hybrid regime	medium	no	UK
Sierra Leone	no	hybrid regime	low	no	UK
Solomon Islands	no	n/a	medium	no	Germany
Somalia	yes	n/a	n/a	yes	Germany, Türkiye, UK
Sudan	yes	authoritarian	low	yes	Germany
Syria	yes	authoritarian	medium	yes	Germany
Tanzania	no	hybrid regime	low	no	France, Netherlands, UK
Uganda	no	hybrid regime	low	no	Bulgaria, Czech Republic, US
Yemen	yes	authoritarian	low	yes	Czech Republic, Spain, US
Zimbabwe	no	authoritarian	medium	yes	UK

Sources: Geneva Academy of International Humanitarian Law and Human Rights – Rule of Law in Armed Conflicts (RULAC) portal (<https://www.rulac.org/>); EIU – Democracy Index 2022 (<https://www.eiu.com/n/campaigns/democracy-index-2022/>); UNDP Human Development Index 2021/2022 (<https://hdr.undp.org/system/files/documents/global-report-document/hdr2021-22overviewn.pdf>); SIPRI arms embargoes database (<https://www.sipri.org/databases/embargoes>); SIPRI arms transfers database (<https://sipri.org/databases/armstransfers>); EEAS – arms exports database (<https://webgate.ec.europa.eu/eeasqap/sense/app/75fd8e6e-68ac-42dd-a078-f616633118bb/sheet/74299ecd-7a90-4b89-a509-92c9b96b86ba/state/analysis>)

 NATO arms importer
 NATO arms importer – country with armed conflict

These arms exports may be expanded as a result of NATO's planned structural increases in military production, with the arms industry benefiting from the climate instability to which it has itself contributed. Some in the arms industry are even openly welcoming these developments. Saab, Sweden's largest arms company, in the process of becoming NATO's newest member state, said in 2014: 'Climate change [...] may result in conflicts within already unstable regions or in areas where several different, international parts claim the natural resources. This will most likely lead to an increased market for civil and military security solutions'.⁶⁵

Arms industry greenwashing

Like the oil industry, the arms industry is happy to indulge in greenwashing when it is convenient to do so – such as touting low-carbon laser weapons, biodegradable explosives and lead-free bullets.⁶⁶ Claiming it can 'go green' though has no base in reality, however, as military equipment remains highly dependent on fossil fuels and significant switches to renewable energy are impossible for the foreseeable future, while munitions are notoriously damaging to the environment.⁶⁷ According to research by SGR, the arms industry 'in itself contributes considerably to the climate emergency', with arms companies and their supply chain being of a 'carbon intensive nature'. Not all arms companies report on GHG emissions, but it comes as no surprise that the largest among them in NATO countries – including Airbus, Leonardo and Thales in Europe – are also estimated to be the largest emitters.⁶⁸

Ultimately, like its counterpart in NATO's defence ministries, the arms industry is not willing to prioritise environmental concerns if these conflict with military objectives. In the words of Steven Gillard, defence sustainability lead at Boeing, the major US arms and aerospace company: 'Our number one priority is warfighter effectiveness, and we're not going to do anything to compromise that'.⁶⁹ In preparing for its shareholder meeting in April 2023, the board of US arms giant Lockheed Martin advised voting against a resolution calling on the company to disclose how it 'intends to reduce its full value chain greenhouse gas emissions in alignment with the Paris Agreement's 1.5°C degree goal requiring Net Zero emissions by 2050', calling the resolution 'premature and not in the best interest of our Company'.⁷⁰

Indeed, the evidence from the recent boom in military spending is that it is weakening climate and environmental standards. In a March 2023 meeting of the Expert group on Policies & Programmes relevant to EU Space, Defence and Aeronautics Industry, a permanent dialogue group between the European Commission and the industry, representatives of arms companies explicitly complained about 'the burden that environmentally and socially oriented measures are posing on the industry'.⁷¹

Looking at the EU's 2023 Act in Support of Ammunition Production (ASAP), this complaint fell on fallow ground. The regulation states that 'Member States should consider using defence-related exemptions under national and applicable Union law [...] if they deem that the use of such exemptions would facilitate the achievement of [the] objective' of the regulation, which 'could in particular apply to Union law concerning environmental, health and safety issues'. According to the EU such laws only 'produce regulatory barriers hampering the Union defence industry's potential to ramp up the production and deliveries of relevant defence products. It is a collective responsibility for the Union and its Member States to urgently look into any action they could take to mitigate possible obstacles'.⁷²

Such sentiments are shared in the US, where government plans to reduce the carbon emissions of the military industrial sector have been hampered by the strict condition that this should not be at the cost of operational effectiveness.⁷³ In the latest US military climate-action plans, it is made clear that the priority remains unchanged ‘in the face of climate risks’ to maintain ‘dominance’ over air, land, sea and space.⁷⁴ Vice-admiral Dennis McGinn, who sits on the Board of the Rocky Mountain Institute, a US think tank aiming for a zero-carbon future,⁷⁵ stated that the ‘war in Ukraine shows us the importance of having a strong military capability in the US and NATO that we should not sacrifice by decarbonising too rapidly’.⁷⁶

Despite its active lobbying against environmental regulations, the arms industry is keen to project itself as ‘sustainable’, twisting the meaning entirely in order to ease the path to private investments. EU companies envy their US counterparts in this respect.⁷⁷ According to Patrice Caine, CEO of Thales, the French arms company, ‘Investment funds in the United States have fully assimilated the fact that you can’t have sustainable development without stability’.⁷⁸ The lobby organisation Aerospace, Security and Defence Industries Association of Europe (ASD) put it even more bluntly: ‘There is no sustainability without security, no security without defence capabilities, and no defence capabilities without defence industries’.⁷⁹

While it is clearly absurd that the military-related industries should be considered as the essence of sustainability, the close relationship between the industry and policy-makers means this argument has been echoed in public policy. In its Strategic Compass (2022) the EU states that it should be ensured that ‘horizontal EU policies, such as initiatives on sustainable finance, remain consistent with the European Union efforts to facilitate the European defence industry’s sufficient access to public and private finance and investment’.⁸⁰

CONCLUSION:

The planet can't survive an arms race

This briefing has shown the damaging climate implications of NATO's spending targets. The bigger picture is that it is igniting a new arms race, which will intensify the already damaging impacts on the climate. NATO's increased expenditure and new weapons systems are already prompting the intended opponents – Russia and China in particular – to respond in kind. Russia increased its military expenditure to 4.06% of GDP in 2022. China's military spending in 2022 as a proportion of GDP remained roughly stable at 1.6%, although this is expected to rise in coming years.⁸¹ In both cases, this will lead again both to the diversion of resources from climate action and to increased GHG emissions.

NATO's arms race and its consequent climate collateral damage could also spread further. Other countries which are not NATO members, such as China's Southeast Asian neighbours, are also likely to increase spending in view of the increased tensions in the region and under pressure from countries such as the US. As most nations currently spend significantly less than 2% of GDP on the military, its status as a benchmark for military spending would lead to significant diversion of resources and increased military-related emissions.

Beyond the immediate impacts, countries' race to arm themselves is distracting political attention from the biggest security crisis the world has ever faced: climate breakdown. The IPCC has said that limiting warming to around 1.5°C requires global GHG emissions to be reduced by 43% by 2030. 'It's now or never, if we want to limit global warming to 1.5°C (2.7°F)', says Jim Skea, co-chair of IPCC Working Group III. 'Without immediate and deep emissions reductions across all sectors, it will be impossible.'

None of NATO's member states – nor Russia or China – have committed to reduce their military-related emissions as climate science requires.⁸² This is because the military dependence on fossil fuels means that emission cuts can be achieved only by reducing military spending. Some military personnel admit this. For example, Ben Barry, former director of the British Army Staff and currently Senior Fellow at the International Institute for Strategic Studies, concludes an assessment of the potential to green European military forces saying 'in general [it will] be challenging to maintain capability while reducing emissions – requiring the defence sector to grapple with uncomfortable trade-offs'.⁸³ NATO's targets deepen the climate crisis, yet its members give it the green light. Perversely, NATO is even applying for observer status at the IPCC on the grounds that it is knowledgeable about climate and is a humanitarian responder, even though it blatantly ignores the IPCC's recommendations.⁸⁴

Beyond NATO's greenwashing, an unprecedented cut in emissions in the next few years will happen only if every prominent political initiative, and especially global diplomatic efforts, prioritise one goal above all – working to radically and equitably transform the fossil-fuel economy into a renewable one. Escalating hostility not only diverts resources and increases emissions, but also diverts political attention and prioritisation of the climate crisis and creates an atmosphere of distrust that poisons any chance of necessary global breakthroughs for

climate action. This was already evident in August 2022, when China cancelled US–China bilateral talks on climate change after the US House Speaker Nancy Pelosi’s deliberately provocative trip to Taiwan. These have since restarted but progress has stalled in an atmosphere of continuing tension and distrust.

The lessons are clear. To tackle climate change will depend, among other things, on reducing global military spending, de-escalating tensions and advancing diplomacy, peace, and international collaboration. The end of the Cold War in 1991 allowed the world to reap a peace dividend. Preventing the next Cold War – or, more dangerously, a Hot War – will enable a climate dividend and the hope of a future for the millions of people who will bear the brunt of an unfolding climate crisis.



APPENDIX 1.

CALCULATING MILITARY CARBON FOOTPRINT

A. Spend–emission conversion factor

In an economy powered by fossil fuels, military expenditure is inevitably associated with GHG emissions. Arms contractors earn their revenues from military spending. We can therefore estimate GHG emissions from military spending and the associated revenue for arms contractors. Here, we determine the conversion factor.

Thales and Airbus, unlike most of their competitors, recently started to publish comprehensive Scope 1/2/3 GHG emission estimates, notably including emissions from ‘use of sold products and services’.⁸⁵ Since Airbus has a much bigger civilian aerospace business, the emission figures have been adjusted to reflect only the military-related business (Airbus Helicopters, and Airbus Defence and Space).

Unlike Airbus, Thales does not specify the proportion of its GHG emissions arising from sales of its military-related products so we are unable to adjust accordingly. Thales’ civilian products are mainly aerospace electronics, simulation and training, satellites, and digital security and ID; it is assumed that these have a much smaller carbon footprint than its military products (e.g. the Hawkei and the Bushmaster armoured military vehicles, the key supplier to Queen Elizabeth Class aircraft carriers, co-manufacturer of the Rafale and the Mirage 2000 fighter aircrafts) that consume much more fossil-fuel energy in both production and deployment. Arguably, the great majority of Thales’ GHG emissions arise from its military products, even though its civilian products account for slightly less than half of the overall revenue. It is therefore likely that the derived conversion factor will underestimate GHG emissions. Since for Thales, the emission figures cover both civilian and military products, we use overall revenues to give a conservative estimate of the conversion factor.

Thales	2020	2021	2022	Average
Revenue, €mn	15,400	16,200	17,600	
Total Scope 1/2/3 emissions, including ‘use of sold products and services’, KtCO ₂ e	9,533	9,538	9,746	
Conversion factor, tCO ₂ e/€	0.000619	0.000589	0.000554	0.000587

Airbus	2021	2022	Average
Revenue (military-related), €mn	16,695	18,307	
Total Scope 1/2/3 emissions, including ‘use of sold military products and services’, KtCO ₂ e	9,601	10,939	
Conversion factor, tCO ₂ e/€	0.000575	0.000598	0.000587

By coincidence, the average conversion factor is the same for both companies, namely 0.000587 tCO₂e/€. Using figures from the International Monetary Fund (IMF),⁸⁶ the average exchange rate from the euro to the US dollar for the 2021–2023 period is 0.91 €/\$, and hence the spend–emission conversion factor is 0.000534 tCO₂e per dollar.

Thales and Airbus are leading pan-European arms manufacturers, and hence representative of the European arms industry overall. The fact that the conversion factors for both companies

are similar suggests that they use an equivalent carbon accounting methodology and/or have comparable energy efficiency in production. Jet fuels account for most of the military fossil-fuel consumption, so in terms of estimating military-related GHG emissions, military aircraft suppliers are the most important. Therefore, the fact that we are limited by the lack of data to only two (albeit the most important European) companies, because other arms manufacturers (e.g. Lockheed Martin and BAE Systems) are much less transparent, becomes less of a problem. The spend–emission conversion factor is expected to work well for European countries and other European arms manufacturers.

European manufacturers are generally considered to be more energy-efficient than their North American counterparts so the conversion factor may work less well for Canada and the US, and is probably underestimating their GHG emissions.

B: The Military Carbon Footprint Formula

The impact of war is unpredictable so we simply propose a formula to estimate the military carbon footprint. This does not take into account the consequences of war such as environmental pollution, burning and destruction of forests/buildings/energy storage, post-conflict reconstruction, population movements of internally displaced persons (IDPs) and refugees and health care for victims.

Carbon footprint of the military, including the associated military technology industry = (military expenditure) x (proportion spent on equipment) x (spend–emission conversion factor) + (number of military personnel) x (average stationary emission per military head)

The military carbon footprint (excluding conflict-related) can be divided into three categories: ‘stationary’, ‘mobile’, and ‘supply-chain’. Stationary emissions are operational GHG emissions for military bases whereas mobile emissions arise from mobile military activities. Supply-chain emissions are the GHG emissions of the arms industry and other companies which supply the military (such as accommodation and food for active personnel, and private security contractors).

When Scope 3 (Cat 11) ‘use of sold products and services’ emissions were estimated by the arms manufacturers, ‘average fuel use’ of a military product was assumed without reference to the monetary cost of fuel consumption. This is consistent with our choice of ‘the proportion of expenditure spent on equipment’, which also excludes the monetary cost of fuel consumption; fuel cost is part of operations and maintenance expenditure. This enables the effective equivalence of the military’s mobile and supply-chain emissions and the GHG emissions by the military technology industry (Scope 1/2/3), which we explain later and is the fundamental basis of this formula.

Estimating GHG emissions accurately is necessarily complex given the lack of available data. It is further complicated when it seeks to make projections. This formula is, however, sufficiently simple to make it possible to forecast the military carbon footprint. It aims to give ‘good enough’ rather than accurate estimates to permit an analysis (say, of relative magnitudes and trends). It is a start and will be further refined if more robust data become publicly available.

‘Mobile’ and ‘supply-chain’ emissions

The equipment (aircraft, sea vessels and land vehicles) used in the mobile activities are made and provided by the military technology industry, and their operating emissions should be included in their Scope 3 (Cat 11) emission reporting. If an arms manufacturer makes comprehensive GHG emission accounting this should therefore include not only its own GHG emissions (i.e. supply-chain emission of the military carbon footprint) but also the mobile part of the military carbon footprint (i.e. Category 11 of Scope 3 emissions reporting: Use of sold products).

Simply put, the military’s mobile and supply-chain emissions and the military technology industry’s Scope 1/2/3 full emissions are two sides of the same coin. Rising military spending is the revenue of the military technology industry.

The spend–emission conversion factor, calculated from comprehensive emission reporting of arms manufacturers, such as Airbus and Thales, and their military-related revenues, thus enables the first part of the formula to estimate the mobile and supply-chain emissions of the military carbon footprint for a given military expenditure.

Stationary emissions

The second part of the formula estimates the stationary military emissions. To calculate this, we adopt the figures for ‘average stationary emissions (tCO₂e) per military head’ in the latest military emission report produced by SGR and CEOBS.⁸⁷

The figures are 12.9 for the US and 5.0 for all other NATO members. The US figure is much larger because of the number of the country’s military bases (including around 750 overseas⁸⁸) and military operations around the world.

Examples

SGR and CEOBS estimated the 2019 carbon footprint of military sectors for various European countries, which are used here for comparison.⁸⁹ To be consistent, their figures for ‘military expenditure’, ‘proportion spent on equipment’ and ‘number of military personnel’ are used for calculation.

France (2019)

Carbon footprint

$$\begin{aligned} &= (\text{€}44,300,000,000) * (0.27) * (0.000587) + (208000) * (5) \\ &= 7,021,107 + 1,040,000 \\ &= 8,061,107 \text{ tCO}_2\text{e} \end{aligned}$$

Germany (2019)

Carbon footprint

$$\begin{aligned} &= (\text{€}46,900,000,000) * (0.17) * (0.000587) + (186,900) * (5) \\ &= 4,680,151 + 934,500 \\ &= 5,614,651 \text{ tCO}_2\text{e} \end{aligned}$$

Italy (2019)

Carbon footprint

$$\begin{aligned} &= (\text{€}21,000,000,000) * (0.25) * (0.000587) + (175,500) * (5) \\ &= 3,081,750 + 877,500 \\ &= 3,959,250 \text{ tCO}_2\text{e} \end{aligned}$$

Netherlands (2019)

Carbon footprint

$$\begin{aligned} &= (\text{€}11,000,000,000) * (0.23) * (0.000587) + (40,000) * (5) \\ &= 1,485,110 + 877,500 \\ &= 1,685,110 \text{ tCO}_2\text{e} \end{aligned}$$

Spain (2019)

Carbon footprint

$$\begin{aligned} &= (\text{€}11,300,000,000) * (0.23) * (0.000587) + (122,500) * (5) \\ &= 1,525,613 + 612,500 \\ &= 2,138,113 \text{ tCO}_2\text{e} \end{aligned}$$

Table A. Summary

Country	Estimates by the formula MtCO ₂ e	Estimates by SGR and CEOBS MtCO ₂ e
France	8.06	8.38
Germany	5.61	4.53
Italy	3.96	2.13
Netherlands	1.69	1.25
Spain	2.14	2.79

This comparison shows that our military carbon footprint formula gives straightforward and indicative estimates. It is worth noting that SGR and CEOBS made clear that their estimates were conservative because of many issues related to data quality.

APPENDIX 2.

ADDITIONAL TABLES

A. Actual versus 2% GDP scenario for NATO military expenditure in 2021

Country	The actual scenario		The minimum 2% scenario		Difference \$mn	% increase
	% of GDP	Military expenditure \$mn	% of GDP	Military expenditure \$mn		
Albania	1.24	224	2	361	138	62
Belgium	1.05	6,245	2	11,895	5,651	90
Bulgaria	1.52	1,276	2	1,679	403	32
Canada	1.27	25,502	2	40,161	14,659	57
Croatia	1.98	1,361	2	1,375	13	1
Czech Republic	1.39	3,915	2	5,633	1,718	44
Denmark	1.32	5,274	2	7,991	2,717	52
Estonia	2.02	749	2.02	749	0	0
Finland	(1.40)	(4,145)	(2)	(5,921)	(1,776)	(43)
France	1.91	56,561	2	59,226	2,665	5
Germany	1.46	62,054	2	85,005	22,951	37
Greece	3.70	8,006	3.70	8,006	0	0
Hungary	1.68	3,061	2	3,644	583	19
Iceland	0.00	0	2	511	511	∞
Italy	1.57	33,157	2	42,238	9,082	27
Latvia	2.07	824	2.07	824	0	0
Lithuania	1.97	1,308	2	1,328	20	2
Luxembourg	0.47	403	2	1,715	1,312	325
Montenegro	1.55	91	2	117	26	29
Netherlands	1.38	13,953	2	20,222	6,269	45
North Macedonia	1.47	204	2	278	74	36
Norway	1.72	8,438	2	9,812	1,374	16
Poland	2.22	15,099	2.22	15,099	0	0
Portugal	1.53	3,886	2	5,080	1,194	31
Romania	1.86	5,298	2	5,697	399	8
Slovakia	1.74	2,066	2	2,375	308	15
Slovenia	1.24	763	2	1,231	468	61
Spain	1.04	14,849	2	28,556	13,707	92
Türkiye	1.61	13,137	2	16,319	3,183	24
United Kingdom	2.30	71,938	2.30	71,938	0	0
United States	3.48	793,990	3.48	793,990	0	0
Total		1,153,631		1,243,054	89,423	8

Comparison of military expenditures in two scenarios. The first is the actual military expenditures in 2021 as reported by NATO. The second is what military expenditures would be if every NATO member spends at least 2% of their GDP on defence. Numbers are based in current prices and exchange rates. Finland becomes a NATO member in 2023 so is not included in the 2021 totals.

B. Estimated GHG emissions (KtCO₂e) of NATO members and associated arms industry based on actual military spending in 2021 and minimum 2% GDP spending and 20% on equipment target

Country	Real scenario			2% scenario			Difference KtCO ₂ e	% increase
	% of GDP	% on equipment	Emissions KtCO ₂ e	% of GDP	% on equipment	Emissions KtCO ₂ e		
Albania	1.24	15.1	51	2	20	72	21	41
Belgium	1.05	19.5	763	2	20	1,384	621	81
Bulgaria	1.52	11.1	204	2	20	308	104	51
Canada	1.27	13.7	2,220	2	20	4,632	2,412	109
Croatia	1.98	30.0	290	2	30.0	293	3	1
Czech Republic	1.39	20.5	560	2	20.5	748	188	34
Denmark	1.32	17.2	569	2	20	936	367	64
Estonia	2.02	23.2	127	2.02	23.2	127	0	0
Finland	1.40	19.9	596	2	20	789	193	32
France	1.91	27.8	9,436	2	27.8	9,820	384	4
Germany	1.46	16.7	6,456	2	20	10,032	3,576	55
Greece	3.70	37.2	2,145	3.70	37.2	2,145	0	0
Hungary	1.68	37.2	707	2	37.2	821	114	16
Iceland	0.00	0	0	2	20	55	55	∞
Italy	1.57	23.2	4,970	2	23.2	6,106	1,136	23
Latvia	2.07	22.1	130	2.07	22.1	130	0	0
Lithuania	1.97	22.3	232	2	22.3	234	3	1
Luxembourg	0.47	39.6	89	2	39.6	366	276	309
Montenegro	1.55	20.5	18	2	20.5	21	3	16
Netherlands	1.38	23.8	1,980	2	23.8	2,784	804	41
North Macedonia	1.47	21.8	54	2	21.8	63	8	16
Norway	1.72	29.2	1,427	2	29.2	1,640	213	15
Poland	2.22	33.9	3,334	2.22	33.9	3,334	0	0
Portugal	1.53	16.5	470	2	20	669	200	43
Romania	1.86	21.6	954	2	21.6	1,001	48	5
Slovakia	1.74	32.3	422	2	32.3	468	46	11
Slovenia	1.24	14.6	89	2	20	162	73	82
Spain	1.04	22.5	2,376	2	22.5	4,022	1,647	69
Türkiye	1.61	29.3	4,252	2	29.3	4,755	503	12
United Kingdom	2.30	26.1	10,821	2.30	26.1	10,821	0	0
United States	3.48	28.9	139,982	3.48	28.9	139,982	0	0
Total			195,724			208,721	12,997	7

Comparison of military carbon footprint in two scenarios in 2021. The first is the GHG emissions estimated from actual military expenditure as reported by NATO. The second assumes that every NATO member spends at least 2% of their GDP on defence, 20% of which on major military equipment. Since 2021 is the reference year for comparison of GHG emissions with other years when Finland is a NATO member, Finland is included in 2021.

C. GDP

Country	2024	2025	2026	2027	2028
Albania	21	22	23	24	25
Belgium	643	659	677	694	709
Bulgaria	106	111	116	122	126
Canada	2,179	2,281	2,385	2,492	2,605
Croatia	83	87	91	95	99
Czech Republic	356	378	395	409	422
Denmark	420	438	456	475	496
Estonia	45	49	52	56	59
Finland	311	319	328	336	343
France	3,019	3,133	3,233	3,322	3,391
Germany	4,446	4,635	4,822	4,947	5,044
Greece	248	257	264	271	277
Hungary	203	212	220	226	231
Iceland	31	33	36	38	41
Italy	2,218	2,285	2,347	2,407	2,450
Latvia	50	53	56	59	62
Lithuania	85	91	96	100	103
Luxembourg	90	95	99	103	106
Montenegro	8	8	8	9	9
Netherlands	1,135	1,175	1,214	1,251	1,284
North Macedonia	17	18	19	20	21
Norway	564	572	573	582	591
Poland	800	864	920	971	1,003
Portugal	278	289	300	310	319
Romania	377	405	430	451	470
Slovakia	136	142	148	155	160
Slovenia	72	76	80	84	88
Spain	1,560	1,618	1,669	1,716	1,754
Türkiye	1,087	1,146	1,210	1,273	1,335
United Kingdom	3,375	3,574	3,793	4,016	4,245
United States	27,741	28,766	29,903	31,092	32,350
Total	51,703	53,793	55,964	58,106	60,219

Gross domestic product (GDP) forecast for 2024–2028 in US\$bn current prices.⁹⁰
 Values for the 2024–2028 are based on IMF forecasts.

D. Military personnel (IN THOUSANDS)

Country	2021	2022	2023
Albania	6.6	6.6	6.6
Belgium	22.7	22.5	22.4
Bulgaria	25.7	25.6	26.6
Canada	71.0	76.2	76.7
Croatia	14.4	15.2	15.2
Czech Republic	26.4	26.9	27.4
Denmark	16.9	17.2	17.5
Estonia	6.8	6.9	6.9
Finland	31.1	30.5	31.0
France	207.5	207.1	207.3
Germany	184.8	188.5	192.2
Greece	110.4	111.4	111.7
Hungary	19.8	21.4	22.3
Iceland	0.0	0.0	0.0
Italy	171.5	174.8	173.9
Latvia	6.6	7.5	7.6
Lithuania	15.2	17.2	17.8
Luxembourg	0.8	0.9	0.9
Montenegro	1.6	1.6	1.7
Netherlands	40.8	41.6	42.2
North Macedonia	6.1	6.2	6.4
Norway	22.2	22.6	22.9
Poland	120.1	122.5	124.0
Portugal	25.3	22.5	23.6
Romania	68.6	65.1	81.3
Slovakia	13.1	13.8	14.3
Slovenia	6.0	5.9	6.0
Spain	118.7	118.2	117.6
Türkiye	439.1	446.9	461.5
United Kingdom	156.2	156.2	156.2
United States	1348.4	1346.4	1346.4
Total	3305	3325	3368

Number of military personnel in thousands.⁹¹

Finland is included in 2021 and 2022 totals for ease of comparison.

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Note that the 'total' figures in the NATO report include Finland only from 2023 onwards.



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