Armed 'Green' Disaster Capitalism

How the 'Climate Conflict' Narrative Sustains War and Socioecological Catastrophe

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08 Jun 2026

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Abstract

Despite consistent debunking, climate conflict narratives remain dominant in Euro-American great power discourse and practice. This article reveals the role of these narratives in justifying capitalist climate strategies and technologies, and their application to the military. We argue that the branding of armed forces as 'green' and central to the 'fight' against climate change is an expression of 'disaster capitalism': now armed and greened to advance geopolitical and industry objectives amid climate breakdown. The article demonstrates the supply-web impact and hydrocarbon entanglement of 'renewable energy', and how such false solutions and extractive technologies are integrated into NATO and EU militaries to 'decarbonise' their operations. We identify five discursive and material practices by which armed green disaster capitalism—the continuation of war by 'green' means—is solidifying in ways that only worsen socioecological catastrophes. The article concludes with a discussion of community-based and inter/national policy approaches that would begin a process of real conflict prevention and climate change mitigation.

Introduction

Crafting political legitimacy and making (self)destructive processes politically feasible is central to sustaining any structure of political, cultural and economic conquest (Ince and Barrera de la Torre 2024, Wolfe 2006). Lahiri-Dutt (2006, 14) reminds us that 'simplistic and generalising' policy narratives produce 'widespread and uncritical acceptance' that refuse to challenge, let alone undermine, capitalism. One such simplistic narrative is that of 'climate conflict'. The climate conflict story, reaffirmed by various inadequate research methodologies (Moe and Müller 2024, Selby et al. 2022, 2024, Telford 2023), seeks to acquire uncritical acceptance 'to undermine possible alternative explanations' of both climate collapse and conflict (Lahiri-Dutt 2006, 14). The result is limiting people's imaginations, while simultaneously preventing the accurate identification of harms—the sources of conflict and socioecological degradation—that consequently leads to inadequate individual, collective and public policy solutions. In this article, we argue that climate conflict discourse, and the broader environmental security framework on which it builds, represents a manipulative myth to distract from imperial warfare and resource control driven by statist capitalism.

Climate conflict narratives, we assert, are further enabled by a series of ideas emerging from the 1973 oil and economic crisis (Bonneuil and Fressoz 2016). By the late-1970 and 1980s, ideas of 'energy transition', 'sustainable development' and 'renewable energy' emerged to ignore the problem of industrial development (see Dunlap 2021, Fressoz 2024, 2025). As then US President George H.W. Bush Senior exclaimed at the 1992 UNEP Earth Summit: '[Economic] Growth is the engine of change, and the friend of the environment'.[1] At present, the ideas around a 'green' energy transition and climate conflict are coalescing to inform and drive 'military greening' projects (Bigger and Neimark 2017, Dunlap and Fairhead 2014, N. Edwards 2026a, Lamain et al. 2026, Verweijen and Marijnen 2018). These projects craft 'strategic sustainability' agendas that demand the expansion and repurposing of NATO and EU military power to govern 'climate chaos', and the 'greening' of military operations to maintain superiority in a net-zero world (N. Edwards 2023, 2026b, NETZMIL 2025). Notably, the spectacle of 'sustainable war' goes beyond the green militari-

[1] Khanna, P. S. *The Fairytales of Growth* (2020), minute 12:14.

sation identified in the context of militarised natural conservation practices (Büscher and Fletcher 2018), and extends to surface-level attempts at greenwashing military activities. In contrast to the second Trump administration's purge of all 'climate crap' from US military activity, many NATO and EU militaries still take climate change seriously (N. Edwards 2026b, 21–22), and it is precisely this military intervention into climate governance and the deployment of lower-carbon technologies to boost military power that is shaping present-day conceptual understandings of and practical possibilities for climate action in dangerous ways. This development has significant consequences for socioecological justice in theory and in practice.

Rather than represent a necessary reckoning with the military's contribution to climate breakdown, we argue that branding armed forces—Army, Navy, Airforce, special forces and police departments—as 'green' and central to the 'fight' against climate change is an expression of 'disaster capitalism' (Klein 2008), now 'armed' and 'greened'. Even with political shifts in the US towards climate denialism (Deberdt, Malone, and Smith 2025), NATO and EU militaries continue to employ socioecological disasters to advance geopolitical and industry objectives. Armed green disaster capitalism demonstrates the continuation of war by 'green' means; an endeavour that requires deflecting blame from the role of statism and capitalism (wedded to militarism and extractivism) in driving planetary destruction. This continuation of capitalism and military enterprise depends on ignoring or actively silencing the scientists objecting to these narratives as false. Climate conflict narratives, as Dunlap and Fairhead (2014, 955) affirm, are in effect creating a self-fulfiling prophecy of planetary socioecological catastrophe.

The article proceeds by first reviewing the literature that has debunked climate conflict claims, followed by a discussion of empirical case studies that together reveal climate conflict narratives as a driver of, and central device within, armed green disaster capitalism. We remind readers that the 'renewable energy versus fossil fuel dichotomy' does not exist (Dunlap 2018, 2021, Fressoz 2024, Harlan and Baka 2024, Lennon 2021), and demonstrate how wind, solar and electric vehicle technologies are advancing capitalism, militarism and, by extension, planetary catastrophe. After revealing the material, ideological and institutional issues presented by the roll-out of lower-carbon technologies under current political-economic structures, we review the ways that NATO and EU militaries are (hoping to) 'green' and 'decarbonise' their operations by mobilising a range of technoscientific schemes to sustain war in a warming world and refashion the military's purpose under the umbrella of fighting climate change. Drawing these processes together, we identify five discursive and material practices by which a climate-military-greening complex is solidifying in ways that only worsen socioecological catastrophes. The article concludes with a discussion of numerous community-based, international and national policy approaches that would begin a process of real conflict prevention and climate change mitigation.

Compost the Climate Conflict Myth to (De)Grow Real Solutions

The 'climate conflict' framing is painfully inaccurate and works to maintain and advance imperial, (neo)colonial and statist governance. As recounted by Selby, Daoust, and Hoffmann (2022, 3), the climate conflict narrative asserts that:

Climate change will exacerbate resource pressures and scarcities and in turn feed increased resource competition, economic and social vulnerability, migration and displacement, and civil and political conflict at multiple sites and scales – all aided and abetted by existing patterns of poverty and fragility (see also Benjaminsen 2023, Dalby 2020, Daoust and Selby 2023, Selby and Hoffmann 2014, Selby et al. 2024, Vogler 2023a, 2023b).

Said simply, this climate conflict position, which forms part of a broader environmental security framework (Moe and Müller 2024), contends that the more extreme weather, heat waves, ecosystem strain and desertification, the more conflict, war and migration will occur (Burke et al. 2009, Busby 2018, Missirian and Schlenker 2017, Schwartz and Randall 2003, G. Sullivan et al. 2007, von Uexkull and Buhaug 2021). 'While environment-related insecurities, vulnerabilities and conflicts are unfortunately all too real', we argue with Selby, Daoust, and Hoffmann (2022, 10), that negative socioecological/climatic impacts 'are much more determined by political and economic forces and power relations—by processes of state-building, war-making and development—than by environmentally defined resource scarcities, and that this is unlikely to change anytime soon' (see also Benjaminsen 2024, Benjaminsen et al. 2012, Cunha 2024a, 2024b, Telford 2023). The 'correlation between conflict and climate change', Dalby (2020, 120) summarises, 'are at best suggestive, at worst they simply misconstrue interconnections'.

Selby, Daoust, and Hoffmann (2022, 4–9) outline how climate conflict claims have different and ambiguous meanings; are built on unsubstantiated assumptions; and are guided by ideological and economic objectives, while creating new and intensifying existing socioecological impacts (see also Daoust and Selby 2023, Dunlap, Verweijen, and Tornel 2024, Hunsberger et al. 2017, Mirumachi, Sawas, and Workman 2020, Selby 2014, Telford 2023). The evidence in favour of climate conflict is contradictory and weak and, we argue, instead demonstrates a causal relationship between climate change, scarcity, insecurity/conflict and political-economic objectives. Indeed, as Verhoeven (2014) shows, the naturalisation of insecurity as a climate/environmental issue that manifests in present-day 'climate war' narratives is directly linked with European colonial imaginaries of colonised peoples and their environments. As B. Hartmann (2014) contends, the association of African populations and ecosystems with disorder, danger and violence was mobilised to justify colonial control and strong-armed interventions.

Going to great length to discuss existing studies, Selby, Daoust, and Hoffmann (2022, 14) demonstrate a radical 'climate reductionism', which Gelderloos (2022, 38) defines as 'the tendency of bureaucrats to reduce complex systems—like the interconnected ecosystems of planet Earth—to simple problems that can be measured by tracking a handful of quantifiable factors'. Quantitative, and generally reductive, approaches are indeed the prime advocates of climate conflict discourses. Despite the fact, as Selby, Daoust, and Hoffmann (2022, 14) rightfully point out, that 'many of the historical correlations identified within [this quantitative research programme] are highly questionable, shaped as much by unreliable and frequently contradictory datasets, and by arbitrary or untenable modelling and data boundary assumptions, as by anything else' (see also Moe and Müller 2024, Selby 2014). We will revisit two examples from their work to further animate this concern.

Delving into two studies attempting to prove the climate conflict narrative, Selby, Daoust, and Hoffmann (2022, 15) show how one study uses a limited number of historical conflicts that 'were sparked by foreign interventions which could not have been caused by local temperature anomalies'. Drawing on temperatures, weather or the climate, Selby, Daoust, and Hoffmann (2022) show, was completely misplaced. The second study claims to show a correlation between the increase in asylum applications to the EU and rising temperatures in origin countries between 2000–2014, including war-torn nations such as Syria, Afghanistan and Iraq (see Missirian and Schlenker 2017). Again, rather than foreground the increase in asylum migration as a result of foreign military interventions and regional armed violence, the authors attempt to prove that the countries with highest temperature rises also produced the highest number of asylum applications. However, Selby, Daoust, and Hoffmann (2022, 15) show that the study conclusion is disproportionately affected by a small number of states, most notably Iraq: a country which, by 2013, had endured a decade of massive bombardment, military occupation, mass incarcerations, war crimes and human rights abuses on a large-scale, with more than half a million Iraqis having 'died violently' (Dyer 2006). Iraqis still report birth defects and cancers as a result of the US military's widespread use of depleted uranium during the 2003 invasion and burn pits throughout the proceeding decade (R. Edwards 2013, Rubaii 2020). While we hope these are extreme examples of research negligence, the fact remains that 'global climate change is a social-political as much as an environmental phenomenon' (Selby, Daoust, and Hoffmann 2022, 16).

Climate conflict narratives, moreover (Daoust and Selby 2023), are political constructs that produce serious social, political, ecological and policy consequences. Scholarly accounts—and the policy agendas that follow—that blame environmental conditions and climatic changes for violent conflicts (e.g. 'insurgencies, genocide, guerilla attacks, gang warfare and global terrorism' [Homer-Dixon 1994, 39]) are scarred by a potent mix of ecological determinism and the climate reductionism mentioned above (Selby, Daoust, and Hoffmann 2022, 13–14). Telford (2023, 1) identifies these 'compulsive' 'climatic determinisms' within the US National Security Council debates. In naturalising the root sources of violence (and of socioecological change) these narratives remove entire social, political and economic histories, and justify what Ojeda, Sasser, and Lunstrum (2020) have identified as coercive, masculinist strategies for intervention into climate change and the environment (see also B. Hartmann 2010, 2014, Plumwood 1993, Shiva 2012). Inspired by feminist research, Dunlap (2022, 154) calls this phenomenon 'climate masculinities' to capture the obsession with 'grand scales, reductionary data, rooted in approaches of scientific domination of the planet, which marginalise or ignore other scientific approaches' (e.g. ontologies and epistemologies). Some of the most effective and dangerous political work that climate conflict (and environmental security) narratives do then is to *de*politicise the root sources behind ecological change and social conflict. Such narratives therefore become rhetorical (and consequently ontological and methodological) strategies for deflecting blame, escaping accountability and presenting sources of insecurity and socioecological harm as solutions. In Orwellian style, climate conflict and related narratives actively perpetuate military industries, land control, conflict and war.

Erasing the underlying and long-term social, political/economic and power relations within conflicts is misleading, and even disastrously faulty if the objective is ecological restoration, social and geopolitical harmony. Environmental conflicts, or environment-related violence, is not a question of 'biophysical scarcity' like Homer-Dixon and the Malthusian tradition contend. Instead, ecological distribution conflicts, or ecological destruction conflicts (EDCs), offer a more accurate theoretical framework and descriptor (Dunlap, Verweijen, and Tornel 2024, 445). Scheidel et al. (2018, 587) conceptualise EDCs as 'social conflicts arising over the unequal distribution of environmental benefits, such as access to natural resources, fertile land, or ecosystem services [sic], as well as over unequal and unsustainable allocations of environmental burdens, such as pollution or waste'.

Rather than thinking of environmental conflicts as caused by a 'natural' lack of resources or (certain) humans' proclivity towards competition and violence—ideas which are integral to the fears mobilised as part of climate conflict discourses—struggles over land are often better understood as the result of social, bodily and ecological harm created by extractive development, resource accumulation and warfare (Dunlap and Brock 2022, Robbins 2012, Scheidel et al. 2018, Scheidel et al. 2020, Verweijen and Marijnen 2018). Political ecologists and critical security theorists remind us of how the categories of 'nature' and 'security'—with attendant notions of 'resources', 'scarcity', 'insecurity', 'conflict', etcetera—'are not fixed but rather politically, economically and socially constructed' (Huff and Orengo 2020, Ojeda, Sasser, and Lunstrum 2020). With climate-related disasters and armed conflicts on the rise globally, these must be recognised as originating not from ecological change but from state formation, colonialism and political economy.

Further, just as climate change is not *anthropo*genic but rather *socio*genic (Malm and Hornborg 2014, 66)—caused by specific social structures rather than the behaviour of the whole human species—it is safe to say there is no such thing as a natural disaster: landslides, wildfires and floods are social disasters (Dalby 2020, Firth 2022). The social causes and consequences of extreme environmental events become obvious when we think of where people build settlements, tourist resorts, and, as Davis (1999) points out, large homes within the fire corridor of Malibu Canyon, California; or the type of building materials that are used in earthquake areas (Dunlap 2021, Contreras, Gerardo, and Marina Flores Cruz 2025); or when considering the effects of living in societies designed around consumerism and never-ending growth and extractivism. Discussing the Fukushima nuclear reactor, Dalby (2020, 119) writes:

The meltdowns added to the difficulties in dealing with the consequences of the natural disaster of the earthquake, accentuated by the construction of towns and infrastructure in areas known to be vulnerable to tsunamis. They had occurred before but warnings from earlier generations about the dangers of coastal life were ignored. Coastal facilities were constructed literally in harm's way in environments that are very insecure in multiple senses.

The building of nuclear power plants directly on, or near, fault lines on the California coastline is another example of building to produce disaster (e.g. The Humboldt Bay, San Onofre and Diablo Canyon nuclear power plants). The hubris emanating from scientists, governments and developers in their (dis)regard for ecosystems, bioregions, and seasonal cycles—not to forget the marginalising and killing of the traditional knowledge-holders of the land (e.g. various Indigenous nations)—remains *a modernist catastrophe, not a climate catastrophe.* Authorities who ignore the political, social and myriad of knowledge (e.g. onto-epistemological) regimes that operate in a territory, lay the foundations for conflict, environmental discord and so-called natural disaster. Recognising these complex territorial regimes requires forms of sensitivity and respect which better distribute state power or taxes and hinder corporate profitability in material terms. Instead of correcting cultural, political and ecological wrongdoing, however, we are witnessing the redefinition of militaries as 'climate warriors' who steadily close in on various 'enemies' while striving to meet a manufactured 'carbon neutrality'. Klein (2017, 2008) and others (Loewenstein 2017) have with irrefutable detail accounted for the insidious mechanisms by which powerful actors 'profit from disaster', 'cashing in on chaos' in a global system predicated upon social, economic and ecological shocks. As green industrial strategies and the military-tech-industrial complex are increasingly joined at the hip, 'disaster capitalism' is taking on a new form: armed and green.

Catastrophic Intensification: Lower-Carbon and (Imperial) Military Technologies

Considering how the climate conflict narrative, and the environmental security frame more broadly (Moe and Müller 2024), serves as a politico/epistemic fabrication, we turn to unpacking the technologies that are developed and promoted as part of the ostensible greening and decarbonisation of the military. Ideas of ecological modernism, extending to leftist proposals (Roos and Hornborg 2024, 2025), identify institutional and capitalist constraints to developing (relatively) harmonious socioecological energy systems (Schwartzman 2025a, 2025b). While theoretical possibilities exist to retrofit the existing with de/post-growth policies and lower-carbon energy systems (Dunlap and Tornel 2026, Kallis et al. 2025), we seek here to further illuminate the extractive and political-economic challenges that ecomodernist proposals often overlook concerning lower-carbon technologies' material flows, and how said technologies are increasingly reinforcing military operations and interests. Not only are armed approaches to climate action deceptive, but the foundation of such military climate claims—rooted in (green) capitalist energy transition and climate change mitigation projects—are inadequate and faulty. In this section, we explore how lower-carbon infrastructures reproduce the harm they are supposed to mitigate, followed by how military sectors are adapting lower-carbon technologies to make invasion, occupation and extractivism politically acceptable amid socioecological catastrophe.

Lower-Carbon Technologies as Vehicles for Ecocide

The idea that fossil fuels are separate, and opposing, so-called renewable energy is profoundly misleading in practice. This dichotomy is reinforced by company public relations and simplistic environmental rhetoric, and remains embedded in ideas of 'fossil capitalism' (Malm 2016, 376–88), which represent Marxist (eco)modernist perspectives that uncritically celebrate lower-carbon technologies, centralised planning models and colonial megaprojects like Plan Desertec (Dunlap and Sovacool 2026a). While competition between energy companies exists, this should not overshadow the material, operational and financial interdependency of wind, solar, hydrological and other lower-carbon technologies on the hydrocarbon, timber, chemical and related extractive sectors (Dunlap 2018, 2021, 2023, Fressoz 2024, Harlan and Baka 2024, Lennon 2021, Vezzoni 2023). The material dependency of lower-carbon infrastructures is hidden in plain sight: Every stage of wind, solar, electric vehicles, digital technologies and energy infrastructure is completely, or more than partially, dependent on hydrocarbons (e.g. oil, gasoline, various coal, natural gas and thermal power plants, etc. [Dunlap and Sovacool 2025]). Whether regarding the machines and facilities that manufacture mining equipment; the mines themselves; heavy chemical production; the process of separating ores; smelting metals; brokering the metal to suppliers; manufacturing; transporting; and then decommissioning lower-carbon energy generation infrastructures: hydrocarbon resources are front and centre.

We advocate for lower-carbon technologies (such as wind, solar, hydroelectric, biomass, tidal wave) and, even if not properly explored, see a theoretical possibility for developing real energy transition and renewable energy systems (Dunlap 2021). However, mainstream academic discourse—Marxist (eco)modernism among them (Roos and Hornborg 2024, 2025)—has failed to recognise: (1) the energy and material intensity of lower-carbon technologies; (2) capital accumulation imperatives that require constant growth; (3) the failure of energy transition claims (despite the affordability of solar and wind energy); and (4), discussed below, how these claims and technologies are advancing militarism and warfare. Claims of energy transition and renewability have been proven false (Cezne and Otsuki 2025, Dunlap 2018, 2021, 2023, Fressoz 2024, Harlan and Baka 2024, Llavero-Pasquina et al. 2025, Vezzoni 2023), alongside revealing profound colonial foundations within notions of 'energy' and 'energy justice' (Daggett 2019, Lohmann 2024, Lohmann 2025, Tornel 2023). This indicates scientific, planning and political-institutional constraints that have not only hampered, delayed and prevented the reduction of hydrocarbons, but have generated ecological impacts and conflict by aggressively rolling out lower-carbon infrastructures across the world (Avila-Calero 2025, Mansilla-Quiñones, Melín Pehuén, and Curamil Millanao 2024, Menton et al. 2020, Sovacool BK 2021). The violent addition, and not transition (Dunlap, Novaković, and Sovacool 2025a), of lower-carbon infrastructures to hydrocarbon and nuclear-powered grids, creates serious concern and deserves critical consideration.

The energy and material demand of lower-carbon technologies remains ignored, and wrongly romanticised as 'renewable energy' juxtaposed to 'fossil fuels' (Dunlap 2021, Lennon 2021), which now serves the purposes of military expansionism and rebranding. During the operation phase, wind turbines require more oil than solar panels, but all require sustained maintenance vehicles and personnel as well as utility-scale plants operating on centralised and highly digitalised control rooms (Mulvaney 2019, Sovacool, Dunlap, and Novaković 2025), which of course have extensive material and energy lifecycles. The specific material and energy requirements will vary depending on the energy extraction technology, which extends to smelting facilities running partially on hydrological power (de Leeuw 2025), but overall fossil fuels play an under-accounted and under-acknowledged role within lower-carbon technologies. This, as with the climate conflict narrative, relates to quantitative methods that rely on ideologically skewed models, highly questionable and incomplete data; often restricted by national boundaries; excluding numerous related technologies (e.g. HVPLs, transformers, household appliances) and questionable data collection methods (Archer 2024, Dunlap 2023, Dunlap and Marin 2022, DuPuis and Mulvaney 2024, Marin, Dunlap, and Roels 2023). Lennon (2021, 6) calls this a 'means of reduction', which refers to 'a way of apprehending a good or service solely in terms of its reductive capacities, enabling us to implement strategies to quantitatively reduce a negative phenomenon'. Said differently, the means of reduction ignores complicated and negative issues related to, in this case, the production and maintenance of lower-carbon technologies.

Lower-carbon technologies are increasingly integrated in hydrocarbon and mineral extraction operations. While natural conservation and mining initiatives have been surprisingly integrated and overlapping over the years (Brock 2023, Büscher and Davidov 2013, Billon and 2021), hydrocarbon and mining companies are increasingly attempting to position themselves as 'green' and 'carbon neutral' by integrating so-called renewable energy and natural gas into their operations (Harlan and Baka 2024, Llavero-Pasquina et al. 2025, Vezzoni 2023). In the case of the Rio Tinto Kennecott mine and smelter (1 of 2 in the US) that produces copper, molybdenum, gold, silver and, since 2022, tellurium (useful for cadmium telluride photovoltaic solar panels [CadTel]), this means implementing various strategies to decarbonise the mine and to reach net-zero (Dunlap, Novaković, and Sovacool 2025b). This decarbonisation strategy includes: decommissioning a thermal power plant; drawing more on natural gas; liquifying sulphur dioxide in the smelter to sell to agricultural fertiliser companies; purchasing wind energy through the grid (coming from Wyoming); building their own solar energy extraction site; developing so-called 'renewable diesel' based on biofuels for large-haul trucks, alongside experiments with electrification and more (Dunlap, Novaković, and Sovacool 2025b). While the degree to which some of these efforts are integrated is minimal and in early phases, as with 'renewable diesel', this complex of mining, crushing, leaching, transporting, smelting and refining remains complex and profoundly energy intensive. Consider the machinery, energy and materials required *just* for the mining operations recounted by a mine tour guide and the ex-Kennecott environmental manager. Dunlap, Novaković, and Sovacool (2025b, 8–9) explain:

One excavator bucket holds 120 tons of rock and it takes 3 scoops to fill a haul truck, which are two-stories tall (24 ft/7.37 m).[2] Each haul truck has six 3.25 m (10 ft 8in) ties, each costing between $60–65,000USD and will last between 3–9 months. Tires, under particular rock and winter conditions, we are told, can only last one month. The haul trucks, Emily continues, hold 1,200 gallons (5,455 litres) of diesel, and they fuel up every 9 to 11 hours. 'And because this mine is open 24/7, 365 days a year', Emily reminds us, each of the approximately 80–90 haul trucks 'go through 24 hundred gallons of diesel every single day'.[3] Then only one-in-four haul trucks bring their rock load to the crusher. The identification of waste rock, Emily explains, is determined by geologists using GPS mapping of mineral deposits. The three trucks dump their waste rock in the large piles surrounding the mine (see figure 3). 'There is 7 billion tons of it', explains 'Joe' an ex-Kennecott environmental manager, and 'every time it rains or snows' there is a concern that the 'two-to-six percent sulphides in it' will turn to acid rock drainage (ARD).

Diesel, heavy machinery, mega-haul trucks, digital infrastructure, geologists and much more represent a sprawling energy and material-intensive supply-web of extraction, which is driven by profit motives and the surrounding urban development, luxury consumerism, and, potentially, electric vehicles (Archer and Calvão 2024). This level of extraction and production is not designed to create infrastructural systems ushering socio/ecological and energy transition, but to constantly expand urbanisation, market relations and, as we see in the next section, military vehicles, aircraft and equipment.

Another instance of hydrocarbon industry climate change mitigation, driven by inter/national incentives from Norway to Texas, is how hydrocarbon companies are integrating solar, wind and other lower-carbon energy extraction technologies into their operations. While Equinor, Norway's largest oil company, builds offshore wind turbines and organises natural gas to extract oil, Harlan and Baka (2024, 5) provide a slate of examples from the US:

A solar project at California's Belridge oil field, features a 26.5 MW solar array to power drill rigs, and an 850 MW-thermal of solar collectors for steam generation, which is pumped back into the earth for enhanced oil recovery (EOR). A 29 MW solar array also provides electricity for Chevron's Lost Hills facility located next door to Belridge. In Texas' Permian Basin, meanwhile, Exxon Mobil is buying 500 MW of wind and solar power produced at the nearby Sage Draw wind farm and Permian solar facility. Occidental Petroleum, another Permian producer, chose to both purchase nearby solar and build its own solar farm. Extractive firms are also making use of U.S. federal tax credits in the IRA for battery storage projects to purchase or construct hybrid renewables + storage systems to power their operations. Across the board, producers rationalise

[2] Emily explains: 'If you wanna know what it's like to drive one, climb on top of a two-story house and sit there for 12 hours'. Trucks used: Komatsu 930E.

[3] Mine tour, 27-10-2023.

these investments as a way to reduce their carbon footprint – even as they continue to drill for fossil fuels and release emissions.

The integration of lower-carbon technologies to justify hydrocarbon extraction is thus extensive. These might serve as contemporary examples as to why, as the material historian Fressoz (2024) demonstrates, the ideas of 'energy transition' and 'decarbonisation' have served to delay adequate action on climate change and laid the foundation for climate denialism (see also Fressoz 2025). The next section demonstrates how the integration of lower-carbon technologies is now also justifying military-industrial production and operations.

Mining companies, as mentioned above, have been doing this for longer and, despite running on hydrocarbons, position themselves as necessary for providing the materials for lower-carbon extraction technologies, which extends to integrating them into their operations. In the EU alone, solar and wind technologies will (under a 'high demand' scenario) increase the EU's demand for lithium, dysprosium, cobalt, neodymium and nickel by up to 600% in 2030 and up to 1500% in 2050 (Bolger et al. 2021). Batteries for electric vehicles, wind and solar technologies will drive the EU's demand for lithium up by 1800% and cobalt by 500% by 2030, and in 2050 demand will increase by almost 6000% for lithium and 1500% for cobalt (Bolger et al. 2021). These numbers, however, are conservative, are missing data and are not accounting for numerous related energy infrastructures and technologies (Dunlap 2023, Klinger, Armstrong, and Richaud 2024). While initially attempting to subvert the wind industry (Peter 2002), Germany's largest utility provider and coal mine operator, RWE, has been investing into wind energy through its subsidiary 'Innogy' and pulls power from wind turbines in the West Rhine Land (Brock and Dunlap 2018). This coincides, as Brock (2023) shows, with numerous environmental offset initiatives that are increasingly a matter of practice of established mining companies, but have numerous socioecological problems that promote displacement, disempowerment, degradation and forced dependence on capitalist political economy (see also Huff and Orengo 2020, Billon and 2021, S. Sullivan 2013). Examples of mining companies doing this are ample and extend to magazines, such as *Energy and Mines*, dedicated to decarbonising mining. Reviewing *Energy and Mines*, government subsidies and profit motives appear to drive this hybrid integration of lower-carbon technologies, which are also allowing mining in harder to reach rural and mountain areas.

The same goes for investment. The Vanguard Group Inc., BlackRock Inc., State Street Corp, Fidelity Management and Research Co. LLC among others invest widely across the wind, solar, gas, oil, nuclear and infrastructure sectors. Many of these have percentages in First Solar, while investing in numerous other companies and projects. While AmazonWatch (AW 2021) notes how 'BlackRock, Vanguard, and State Street invested $46 billion in Amazon oil companies tied to Indigenous rights violations and rainforest destruction', the State Street's *Sustainability Bond Report* (SS 2023, 3) proclaims:

State Street has allocated a portion of the net proceeds from its 2022 Sustainability Offering to contribute to advancing the transition to renewable energy through strategic investments in wind and solar projects. We have allocated approximately $83 million to three such projects, which collectively produce a total energy output of 217k MWh, annually.

With the rise of subsidies, abatements and other supportive measures to develop lower-carbon infrastructures, financial investments and multi-sector concentrations become ubiquitous through the top-ten investment groups. Notably, the same investment groups have equally significant financial stakes in global mining and arms production industries (Marshall 2023a, Marshall 2023b, Rogaly 2023, Schwarz 2025). Investing at once in mining, fossil fuels, lower-carbon technologies and weapon systems, this reveals the financialised nature of venture capital that sustain armed green disaster capitalism globally.

Extractive supply-web accounting, moreover, is incomplete, which extends to studies bounding to accommodate countries in the Global North (Dunlap 2023). The impacts of half the world's mining areas, it was recently found by Maus and Werner (2024), are undocumented—missing from any accounting. Lower-carbon technologies worsen these impacts given their mineral intensity. This is particularly concerning with regards to energy storage systems and electric vehicles batteries (Archer and Calvão 2024), which are generating serious water shortages and socioecological disruptions in the lithium triangle (Balcázar and Argento 2026, Hernandez and Newell 2022, Jerez, Garcés, and Torres 2021) and opening up new extraction sites related to lithium (Ayeh and Rutjes 2025, Djukanović 2026, A. Dunlap and Riquito 2023, Hanaček, Kröger, and Martinez-Alier 2024, Dustin, James, and Alida 2025); nickel (Andreucci et al. 2023, Hyldmo et al. 2025); zinc (Heikkinen 2024); and other minerals (Amoah et al. 2024, Brown, Zhou, and Sadan 2024, Deberdt, Malone, and Smith 2025). Reminding readers what is required for decarbonisation projects, The International Energy Agency (IEA 2022, 5) lays out: 'A typical electric car requires six times the mineral inputs of a conventional car, and an onshore wind plant requires nine times more mineral resources than a gas-fired power plant'. This, however, ignores the hydrocarbons used and various chemicals produced to acquire those minerals.[4] The demand scenarios projected are conservative and the numerous other digital and plastic components that comprise wind turbines, solar panels and electric vehicles are absent from these calculations (Dunlap 2023). In short, electric mobility comes at a high, but intentionally unknown and frequently underestimated, price. Additionally, Geological Survey of Finland (GTK) researcher, Michaux (2021, 1), has shown that global mineral reserves 'are not large enough to supply enough metals to build the renewable non-fossil fuels industrial system or satisfy long term demand in the current system'.

Solar, wind and other lower-carbon technologies have particular material requirements, but also socioecological impacts. Negative impacts depend on the geology, water table, flora, fauna, human populations and, most of all, the siting of lower-carbon projects, quantity of infrastructures on the site and mitigation measures employed by lower-carbon infrastructures. That said, when large quantities are deployed it makes disruptions increasingly severe. While solar has different extractive and manufacturing patterns to wind turbines (Dunlap and Sovacool 2025, Mulvaney 2024, Roos 2023, Stock and Ptak 2024, Sovacool and Stock 2024, Sovacool, Dunlap, and Novaković 2025), both risk significant negative impacts on soil, water tables, vegetation and animals, mostly related to clearing local vegetation—in deserts or forests—to widen or build roads; build above or below ground power lines; and foundations. While many think of deserts as empty wastelands ripe for solar power production, in fact, they are extremely biologically diverse and house important flora that sequester carbon (Dunlap, Novaković, and Sovacool 2025a). Wind turbines and solar panels, however, require a lot of land and despite claims of mixing them with agriculture, these positive proclamations are often overestimated (and in-development), with large quantities of wind turbine foundations creating extremes with drying and flooding as well as leaking oil into the ground (Dunlap 2019, 2021, Contreras and Gerardo 2023). The integration of agriculture (e.g. agrovoltaics) with solar panels presents environmental justice challenges (Hu

[4] This includes the lack of material accounting for hydrocarbon supply-chains and refineries. Importantly, however, hydrocarbons and conventional supply-chains are rarely positioned as environmental and climate solutions by national and international bodies.

2023, Tomasi et al. 2025), which extend to concerns with damaged panels related to extreme weather, birds crashing into panels and inadequate decommissioning.

The distance of wind turbines and solar panels from homes, and how much room they take up, also remains central. Building in close proximity to human settlements has been leading to increasing disturbances and illnesses (Dunlap 2019, Fjellheim 2023, Dunlap, Novaković, and Sovacool 2025a), the results of which are inconclusive, but can relate to negative relationships with projects, somatic conditions, negative impacts from audible and infrasound, electromagnetic currents and so on. The project distance, quantity and process by which wind, solar and other lower-carbon extraction projects arrive are rightfully met with caution from locals (Batel and Devine-Wright 2020, Batel and Rudolph 2021), which authorities and companies attempt to discredit as not-in-my-backyard (NIMBY) struggles. Likewise, Austrian and European Commission representatives have made it explicit, and collectively agree that: 'We know it [the green economy] is not going to work, but we cannot admit it'.[5]

In sum, lower-carbon technologies—developed in such a way as to meet the demands of the industrial-scale 'green transition', that is, a 'greener' version of an expanding racial capitalist global economy—rely on the continued extraction and use of hydrocarbons and chemicals, and reproduce the socioecological harms necessitated by industrial-scale mining, fossil fuel and other industrial production processes (Sovacool 2021, Temper et al. 2020). Lower-carbon infrastructures, theoretically on a large scale and practically on small scales can certainly facilitate, support and potentially create real renewability and progress towards energy transition. Yet, capitalist growth imperatives, state or otherwise, have to be challenged (Andreucci et al. 2025, Post et al. 2025, Riofrancos et al. 2023, Schwarz 2025, Tornel and Dunlap 2025). The claims of energy transition, renewability and the complications they entail are systematically overlooked, which allows the military to adopt these technologies based on an inadequate engagement with the harmful life cycles of lower-carbon alternatives (Ashbridge and Beard 2022, Barry, Fetzek, and Emmett 2022, Conger et al. 2024, Floyd 2025, NETZMIL 2025, Wardlaw 2023). The same way we witness extraction-companies appropriate lower-carbon technologies to justify their operations, armed forces have embarked on a similar journey—with dire consequences for how we envision and practice not only climate change mitigation but also conflict resolution and prevention.

The Spectacle of Sustainable War

Climate conflict stories are foundational to NATO and EU military greening policies, on Alliance, Union and individual Member State levels (see e.g. EC 2023, NATO 2024). 'The threats of our modern world, made worse by rising seas, extreme weather and creeping desertification, will almost certainly lead to more conflict' confirms the UK's Climate General, Richard Nugee, in the introduction to the Climate Change and Sustainability Strategic Approach (CCSSA 2021, 5). This policy document constitutes the British military sector's first comprehensive engagement with the implications of climate change for British national security. The strategy outlines how military equipment, installations and operations are to be adapted to extreme weather conditions, enhance biodiversity, reduce fuel consumption and lower carbon emissions (CCSSA 2021). As such, the strategy is representative of military greening efforts across NATO and EU military sectors, which build on the myths and false solutions propagated by ideas of 'energy transition', 'renew-

[5] Personal communication (PC) in a workshop exercise (in which one of the authors was a group scribe).

able energy' and 'ecological modernism' (Llavero-Pasquina et al. 2025). Rather than comprise an actual transition between energy sources, the idea of greener warfighting paradigms promises to expand current levels of energy use simply through diversifying the military's energy portfolio. By accumulating/adding energy over transitioning (Dunlap 2021, Fressoz 2024), the aim is for militaries to (largely) maintain their fossil fuel use while also increasing their demand for the industrial-scale production of nuclear, wind, solar, hydrogen and geothermal energy—all of which still depend on hydrocarbons, heavy chemicals, extreme mining and manufacturing.

While experimenting with lower-carbon solutions, NATO and EU militaries are locking in further with decades of fossil-fuel heavy weapon systems, as seen with the growing demand for and development of resource-intensive fighter jets like the US F-35, the multinational Eurofighter Typhoon, the French Rafale and the Swedish Gripen. Given the centrality of airpower to present-day warfighting paradigms, the military's decarbonisation dream is premised in large part on innovating alternative fuels by mixing conventional with bio and synthetic fuel sources to reduce emissions. At present, the F-35 is certified to run with up to 50% of 'sustainable aviation fuels' (Hoyle 2025). These alternative fuels involve hydrogenated vegetable oils, animal fat, household and woodland wastes, alcohols, sugars, biomass and algae, developed by energy suppliers such as Neste, AirBP and World Fuel Services Corporation.

While the use of algal liquid fuels, *re*use of cooking oil and household wastes, or the production of synthetic fuels hold some actual potential to reduce socioecological costs from aviation, shipping and automobiles, these sources are not enough to power current and next-generation weapon systems and operations. More importantly, the military's reliance on alternative fuels to solve some of the sector's greatest carbon problems—fighter jets and warships (Bigger and Neimark 2017)—directly boosts and worsens the sustainable fuel 'revolution's' practices of extractive agribusiness and patterns of green grabbing (Fairhead et. al. 2012, Ide and Kirsten 2016, Kröger 2022, 2024, Oliveira et al. 2020). Considering the realities of agroextractivism (Borras et al. 2010, Ide and Kirsten 2016, Oliveira et al. 2020, Kröger 2022), and its intersections with digital technologies (Stone 2022, Ruder 2025), we argue that the promotion of 'sustainable fuels' at the scale required for military platforms is another fiction akin to 'renewable diesel' and energies. The 'sustainable fuel' industry relies predominantly on a type of biofuel production that is causing large-scale deforestation, community dispossession and displacement, and the destruction of arable lands through mono-cropping, in particular palm oil, sugarcane, corn and Jatropha plantations (Borras et. al. 2010, Dunlap and Fairhead 2014, Hunsberger et al. 2017, Li and Pujo 2021, Kröger 2022). The energy-intensive nature of synthetic fuel production processes also make so-called 'e-fuels' a less efficient option—and far from carbon-neutral—especially given the amounts of fuel demanded by military platforms (Parkinson et al. 2024, 83). The omission of these impacts, like with lower-carbon infrastructures above, raises issues concerning data collection, study bounding, accounting, methodology and the models employed to identify and communicate military 'greening' solutions.

Besides alternative fuels, the decarbonisation of war is envisioned through the electrical, digital and autonomous transformation of military equipment, strategy and tactics (ASD 2025, British Army 2024, Cook 2025, van Schaik and Ramnath 2022). As advocates contend, so-called green military technologies will enable operational adaptation in the face of climate-related threats to military practice while also making the military 'an unexpected driver of climate action' (Goodman and Kertysova 2022). 'Emerging green technologies', according to British Lt. General Wardlaw (2023, 2), 'will allow us to make a reality tomorrow of what seems impossible today: greater agility, higher operational tempo and increased resilience will all underpin [Operational] Advantage'. A central way to produce 'green' military technologies is to electrify them. This includes 'electrical weapons, vehicles and situational awareness technologies' that 'will enable forces to operate swiftly, stealthily and at stand-off distances' (2020). Coupled with lower-carbon energy sources, these technologies include photovoltaic, hydrogen-fuel cell and lithium-ion battery solutions for powering systems and platforms such as drones, tanks and submarines. Another increasingly popular electrified armament are directed energy weapons (DEWs). Employing concentrated electromagnetic energy to destroy targets—such as lasers, microwaves or particle beams—DEWs are presented as excellent 'green' solutions for warfighting because of their supposed 'low-carbon footprint' and their dispensing with the need to manage explosives (QinetiQ 2021).[6] Powered by electricity, the destructive capabilities of DEWs are only limited by the electrical power-generating capacity of the platforms on which they are mounted, including hybrid tanks, ships, aircraft, and other mediums (e.g. QinetiQ 2020, 7). At an arms fair organised around the theme of 'Sustainable Security' (NEDS 2023), a sales representative from EOS Defense Systems boasted that since the laser beam cuts through targets with heat rather than blow them up with explosives, the DEW removes the toxic pollution otherwise resulting from explosions (such as the release of chemical compounds TNT, RDX and HMX).[7] In effect, however, the DEW is only 'low-carbon' in as far as the weapon can be powered by lower-carbon sources if these are made available in the field. And militaries are indeed experimenting with deployable solar, wind, hydrogen and 'small' modular nuclear reactor power systems. There is, however, little to no data available to the public—nor, potentially, to scientists without security clearance—concerning the complete resource and energy input and output of directed energy weapons' production and use.

While reducing direct emissions from fuel used during exercises or battle, electrification maintains or risks increasing the overall resource intensity of weapon systems and platforms, as seen with the mineral demand of electrified systems and the lower-carbon sources that power them discussed above. Electrification also supports a belief in technological salvation and (eco)modernism rather than a re-evaluation of the size and scope of military missions. To fully electrify operations is a near-to impossible technical endeavour, and most electrification solutions, such as applied to combat tanks, are necessarily hybrid. As such, battlefield electrification represents another technological solution (or tech-fix) promoted to 'secure the tactical advantage' while ostensibly 'help[ing] defence meet emissions targets' (2020). Adequate accounting for these technological applications is either missing from military climate policy plans or remains radically incomplete.

Electrified military technologies are also heavily digitalised, making digitalisation another central pillar within NATO and EU technoscientific visions of environmentally 'sustainable' war. The digitalisation of military operations consists of the widescale adoption of Robotics and Autonomous Systems, Artificial Intelligence and Machine Learning, mixed with an uptake of hybrid-power technologies and an information-based approach to warfare (British 2023, British 2024, Judson 2021, Wardlaw 2023). The idea, as professed in various policy outputs, is to develop swarms of unmanned weapon systems and platforms—partly powered by lower-carbon energy sources such as solar and green hydrogen—that operate alongside (genetically enhanced) human troops optimised by 'force multiplying' digital 'combat clouds' (Army Technology 2024, Burt 2023, 2024, Drones, n.d.). 'Combat clouds' refer to the integration of cloud-technology in mili-

[6] PC 30–11-2023.
[7] PC 30–11-2023.

tary tactics, strategy and consequent capabilities. By ensuring 'information superiority' cloud technologies offer 'a decentralised, cyber-resilient network spanning air, land, sea, space and cyber domains … linking forces in real time' (Airbus 2024). Besides decarbonisation, military industry is also experimenting with detoxifying (reducing hazardous pollution from) weapon systems, developing solutions like lead-free bullets, biodegradable shell casings, toxin-reduced rockets, explosives produced by genetically engineered microbes and less harmful alternatives to the forever chemical PFAS.[8]

A worrying consequence of the push for and perceived reality of 'sustainable war'—electrified, digitalised, 'less' toxic and powered by alternative fuels and lower-carbon energy—is the resulting equation of climate mitigation and adaptation projects with the military pursuit of 'operational advantages' (Nugee 2022, Wardlaw 2023). Cast in military-industrial terms, energy is being redefined as 'capacity', sustainability as 'strategy' and green technologies as 'capabilities'. In essence, we are therefore witnessing military logics conflate climate action and environmental care with NATO and EU aspirations of military dominance and of so-called 'ethical' forms of warfare, as well as of profiteering from weapons production and trade. As British-owned military and dual-use manufacturer Rolls Royce Defence' former President, T. Bell (2021) claims: 'Decarbonisation is a warfighting opportunity – for industry and its customers'. This understanding of decarbonisation is armed green disaster capitalism in operation. Further, by promoting decarbonisation as a simultaneous business and battlefield opportunity, NATO and EU military sectors effectively position venture capital, Big Tech and the arms industry front and centre in military climate adaptation and decarbonisation projects.

The privileging of this set of actors and their 'sustainable' military-industrial techno-fixes reveals a dangerous tendency among today's climate *and* security policymakers towards betting the planet on tech, while minimising—if not purposely concealing—all mentions of the socioecological impact originating from hegemonic 'decarbonisation' solutions. As a result, within the spectacle of sustainable war, the strategic desires, military-industrial objectives and technoscientific visions of 'Sustainable Autonomous War' are front and centre, drawing together the development of 'green' and high-technological forms of late modern warfare (N. Edwards 2026b). This paradigm is predicated upon the development of militarised environmental technologies that do nothing to address the underlying harms of industrial development, militarised or otherwise (Ajonye 2024). In effect, the uncritical 'decarbonisation' of military equipment and operations—based on limited or concealed accounting to promote expansionary (eco)modernist fantasies—multiplies both military power and socioecological catastrophe.

For example, the military's omission of the socioecological consequences of digitalisation—central to electrification—prevents adequate material and energy assessments. As ever-more capital, strategic and tactical importance is placed on autonomous weapons systems and cloud-communication—transforming the focus of the global arms trade/race as well as actual battlefield practice—we tend to forget to ask what biophysical realities underpin virtual worlds (see Chagnon 2026, Mejias and Couldry 2024). Similar to the under-accounted and under-acknowledged harms of electrification, the shifts towards computation and data-driven practice come at a high resource-input and pollution-output price. Digital technologies consume a rapacious amount of the same metals and minerals as electrification/lower-carbon and advanced military technologies (Selwyn 2020), increasing global demand for copper, aluminium, indium,

[8] PC 18–10-2024; 21–11-2024; 26–09-2023.

gallium and germanium and the socioenvironmental burden placed on communities affected by mineral extraction (IEA 2021, Sovacool, Upham, and Monyei 2022, Venditti 2023). As noted by Parikka (2013), 'our electronics are like mini-mines … there would be no media without geology'.

Estimates by the UN Conference on Trade and Development (UNCTAD 2024, v) suggest that the digital economy is responsible for 6–12% of global carbon emissions and that worldwide data centres consumed as much energy as France in 2022, reaching 460 terawatt hours (UNCTAD 2024, v). Since these estimates were made, the global digital economy and its energy demand have only grown: for instance, digital technologies presently account for between 8–10% of the EU's energy consumption, and 2–4% of its greenhouse gas emissions—'small percentages but big numbers' (EC 2025). Alex Vries-Gao (2025, 9) finds that 'the carbon footprint of AI systems alone could be between 32.6 and 79.7 million tons of CO2 emissions in 2025, while the water footprint could reach 312.5–764.6 billion [litres]'—roughly the same annual carbon footprint as New York City and equivalent to the water footprint of the total global annual consumption of bottled water. Notably, corporate sustainability reports rarely include indirect water consumption.

Another detrimental output from both electric and digital development is e-waste: every year millions of tonnes of electronic waste is produced globally, estimated at 62 million tonnes in 2022 (UNITAR 2024)—although around 82.6% of all e-waste globally is not properly documented, collected or recycled (WHO 2024). The management of these highly toxic electronic scraps maps onto global geographies of toxicity, exploitation and marginalisation. In the US, prison labour is employed to recycle e-waste at 35 cents to 2 dollars an hour, with hazardous effects for inmates (Conrad 2017, Dunlap and Sovacool 2026b). In order to maintain large US military budgets, as Dunlap and Sovacool (2026b) show, functioning and even new electronic equipment was mixed into extremely hazardous e-waste streams—from both military and civilian industries—for ill-equipped prisoners and guards to sort, re-sell and recycle. More often than prisons, the scraps are shipped by wealthy countries like the US to poorer countries across the Global South, with a devastating impact on human and ecosystemic health (GEN 2024). Containing over 1000 chemicals, studies show that e-waste accounts for 70% of the toxic heavy metals found in landfills, even when it only forms 2–5% of its solid volume (Ankit et al. 2021). This is felt particularly acutely in Agbogbloshie, Ghana, one of the world's largest e-waste scrapyards (Little 2021, Sovacool et al. 2021). And yet, this socioecological catastrophe is almost unheard of in public debate, let alone in relation to military digital expansionism and the decarbonisation of warfare ostensibly enabled by digitalisation.

Digital industrial strategies gain allure and unquestioning public support from the idea of 'cloud'-based internet storage space. Cloud rhetoric, however, erases the deep materiality and situatedness of digital culture and renders its geopolitical, social and environmental costs invisible (Vai and Taylor 2023). Data centre development represents a key locus of digital transformation fantasies and their socioecological realities. As data centres expand at pace, especially with the growing integration of AI across civilian and military sectors, their yearly global electricity demand is projected to more than double by 2030, reaching around 945 terawatt-hours—just above the current entire electricity consumption of Japan (IEA 2025). Growing scholarship on the data-energy nexus and environmental data justice demonstrate data centres' insatiable appetite for land, water, energy and raw materials (Bresnihan and Brodie 2023, 2021, Brodie 2024, Nost and Colven 2022, Lehmann and Wiertz 2025), which exposes the environmental embeddedness of computational technologies and the capital interests driving data centre expansion. With the digitalisation of warfare and law enforcement more generally—such as seen with the increasing use of surveillance technologies, often with AI-driven functions—data centre expansion and the underlying capital interests are further justified in the name of protecting national security.

In the US alone there are 5,426 data centres, the larger of which ‘can each “drink” … about 1.8 billion [gallons] annually, usage equivalent to a town of 10,000 to 50,000 people’, explains Yañez-Barnuevo (2025) from the Environmental and Energy Study Institute. As local inhabitants around ‘server farms’ in places like Arizona struggle through heat domes and historic droughts, the local desert data centre consumes seven million gallons of water daily (Monseratte 2022). Far from the desert, techno-environmental imaginaries of the ‘cool climates’ of Ireland and Nordic countries as naturally optimal locations for data centre development are producing similarly adverse effects for local populations (Brodie 2024, Murphy and Brodie 2026, Sovacool, Upham, and Monyei 2022). Moreover, many of the component parts essential for data centre operations have further detrimental impacts. By example, Ruberti (2023, 2) finds that each step of the semiconductor manufacturing process ‘involves high environmental impact related to the use of huge quantities of ultrapure water (UPW), energy, and hazardous substances and to pollutants emissions and waste generation’. Between 2001 and 2022, the production and sales of semiconductor units quadrupled (UNCTAD 2024, v). However, it is extremely challenging to estimate the life cycle environmental impacts of semiconductor manufacturing (Ruberti 2023). Additionally, like with mining decarbonisation schemes (Dunlap, Novaković, and Sovacool 2025b), downstream accounting for lower-carbon energy systems employed within manufacturing processes, such as of semiconductors, is lacking or non-existent.

Though still primarily related to civilian sectors, the socioecological footprints and inadequate accounting that mark digitalisation—including data centres, semiconductors, and other AI soft- and hardware—would reach untold proportions when integrated into the military-industrial-greening complex, where transparency and democratic safeguards are lacking even further. As the military becomes ‘an information-age-ready’ force plugged into ‘combat clouds’ (British 2023, 2024), these socioecological costs and elite attempts at hiding them will only worsen.

Degrowing Capital and Militarism, Growing Mutual Aid

Embedded within the climate conflict narrative, the extractivist-driven development of lower-carbon technologies and the greening of the military are numerous layers of profound concern. We identify these in terms of five discursive and material practices. *Firstly*, it begins with the omission of political, economic and historical factors (e.g. civilisation, imperialism, colonialism and militarism) in creating the conditions for climate change and conflict, as discussed in earlier sections. *Secondly*, it regards the manufacturing of ‘solutions’ in the form of ‘energy transition’, ‘sustainable development’ (e.g. (eco)modernism), ‘renewable energy’ and ‘decarbonisation’ that ignores the hydrocarbon, nuclear, mineral, chemical production and energy requirement embedded in lower-carbon energy, electric vehicles and digital systems. In the same way climate conflict discourses ignore imperialism, modernism and power relations, sustainable development discourses and technologies are employed to ignore the expansive extractive reality of capitalism. This is justified by quantitative data and models in selective ways that affirm an existing material, political and economic trajectory. *Thirdly*, environmental security and climate conflict discourses have collided—often to counter Indigenous, environmental and anti-militarist protest (Dunlap 2023)—to promote ideas of how and why to green the military. Under the present institutional arrangement, these ideas reinforce the former two myths while serving as an imagined force multiplier to justify, (re)brand and promote state, capital and military expansionism and adventurism (N. Edwards 2026b, N. Edwards 2023). Ideas of greening the military—integrating decarbonisation technologies into military practice—sustains and advances military power.

This, *fourthly*, leads to another largely neglected issue, which is that the green transition serves as a camouflage to advance extractivism for weapon systems and other military, security and police equipment production (Dunlap 2022, N. Edwards 2026a, Marin, Dunlap, and Roels 2023, Petitjean and Verheecke 2023, Selwyn 2020, 2022). *Fifthly*, bombs and military equipment compete with lower-carbon technologies over energy and material-use. Wolk et al. (2024), 1) show how missiles, MK-84 bombs and other Joint Direct Attack Munitions (JDAMs) have similar material composition to wind turbines, and between Russia's war in Ukraine and Israel's ethnic cleansing in Palestine (Albanese 2025, Molavi 2024, Pappe 2007, Short 2016), materials for wind turbines, electric vehicles and other lower-carbon technologies will be redirected to conducting war. Wolk et al. (2024, 1) explain, 'As of September 2024, over 500,000 JDAM kits have been produced (19,000 sold to IDF as of 8/2024), diverting ETM [Energy Transition Minerals] from renewable energy technology supply chains'. They estimate:

Aluminium: The equivalent amount of aluminium could produce 8,127 4.2 MW wind turbines, an energy generation capacity equivalent to 2.5 average nuclear reactors.

Lithium: The guidance section of each missile contains approximately 1.85 kg of Li/Si/Fes2 batteries, adding up to the equivalent amount needed to produce more than 70,000 average EV car batteries.

Neodymium-Iron-Boron Magnets: Each JDAM contains an estimated 0.34 kg of NdFeB Magnets, enough to produce 1,360 4.2 MW wind turbines (Wolk et al. 2024, 1).

While we would challenge the term 'renewable energy' as it provides a misleading framework—that prevents accurate assessments of industrial/financial/digital capitalism—conventional, indiscriminate and defensive warfare competes with lower-carbon infrastructures and expands socioecologically destructive extractivism. Military operations purposely kill people, spread toxins (M. Griffiths and Rubaii 2024, Rubaii and Griffiths 2025), destroy infrastructure (Graham 2011) and lifeways among them (Molavi 2024, Short 2016). Ironically, as Wolk et al. (2024) note, infrastructural destruction during military operations often includes solar panels, agricultural lands and other lower-carbon technologies (see also Jafarnia 2024). In sum and said simply, this extractivism, warfare, profiteering and deception must stop immediately if there is any possibility of mitigating socioecological catastrophe. The current political, economic and institutional constraints hamper, delay or outright prevent the appropriate, circular and remediating use of lower-carbon technologies and the significant reduction and phasing out of hydrocarbons.

Approaching Alternative Pathways

The climate-military-greening complex, summarised in the five points above, threatens the planet. How can we think about these socioecological challenges differently in order to remediate socioecological harm? This begins, in general terms, by putting people and the planet before accumulating power, economic growth and individual profit. To do so, we must completely rethink climate, security and conflict. Capitalist growth imperatives and military expansionism must face global limits or be abolished, meanwhile ideas of 'sustainability' and 'renewability' must be accurately restored. Selby, Daoust, and Hoffmann's (2022, 21) 'International political ecology' framework could assist in this process by rooting political decision-making in scientifically informed understanding of ecological conditions and in the quality of the climate. This means to produce policy responses that recognise—among other historical, structural and ideological factors—colonialism, borders, war-making, state formation and perceived governmental interests as among the 'primary causes of environmental degradation and environment-related vulnerabilities' and conflict (Selby, Daoust, and Hoffmann 2022, 22). Further, *geo*political ecology (Belcher et al. 2020, Bigger and Neimark 2017, Graddy-Lovelace and Ranganathan 2023, Neimark et al. 2023, Neimark, Steichen, and Bigger 2025) complements *international* political ecology by understanding militaries as 'ecological actors': shaping and being shaped by ecological conditions; always intervening in environmental relations in complex productive and destructive ways. International political ecology and geopolitical ecology prevent careless (neo)Malthusianism and racialised fears (e.g. of Black-Brown masses overpopulating and spreading conflict and disease in climate conflict 'hotspots') by acknowledging the history, valuation systems, power relations and political-economic realities that converge in socioecological disasters. If there is any political-scientific hope for international climate policy, it stems from International political ecology and geopolitical ecology attempting to hold militaries and states accountable.

The alternatives to armed green disaster capitalism are everywhere and always possible. While the military has a robust budget and logistical capacity with which to address climate insecurity, the development and expansion of the military is not the answer to climate change. In reality, mitigating climate change requires 'energy amputation' (Fressoz 2024, 13) or, more accurately, the implementation of degrowth and postgrowth/post-extractivism pathways to establish a real circular economy that allows the regeneration of ecosystems and the stabilisation of the climate (Burton 2023, Gudynas 2021, Hickel 2021, Schwartzman 2025b, Kallis et al. 2025). While this can happen in numerous ways, from a policy perspective the first step begins with real transparency. Transparency means enforcing the measuring and reporting of state, corporate and military material and energy use—which includes cross-border accounting and mix-methods data collection and verification (e.g. not simply quantified data points). Anthropologists, political and economic geographers, political ecologists and modellers among others will have to collaborate, and aim for accuracy. The rigorous identification of the real extractivist and energy costs from military, industrial, digital and artificial intelligence operations will allow an accurate assessment of the issue and, ideally, reveal the extent of the challenge to finally—and after fifty years of delay—begin developing de/postgrowth pathways (Fressoz 2024, Stoddard et al. 2021). By continuing to hamper such assessments, universities reproduce militarised and extractive subjects, interests and relations (Ajonye 2024, E. Griffiths et al. 2022, Martin 2024). Central to any socioecologically sensible policy, furthermore, is to globally disincentivise war, military extraction and overall consumerism, alongside incentivising the many pathways to prevent the pollution and toxification of ecosystems.

This means embracing de/postgrowth calls to develop a real circular, and socioecologically sustainable, economy. Such an embrace includes the employment of lower-carbon technologies to remediate extractive supply-webs, but instead of expanding green capitalist extractivism, it will organise real 'renewable energy' pathways, actively seeking to reduce energy use by every assessment period to achieve genuine, materially grounded, socioecological sustainability. Even the latest Intergovernmental Panel on Climate Change (IPCC) assessment report—historically compromised by extractive interests (Bonneuil, Choquet, and Franta 2021, Fressoz 2024)—now recognises the necessity to change global economic relations and industrial production from a (extractivist, expansionist, imperial) growth imperative to 'prioritise human well-being and the environment over economic growth' (Shukla et al. 2022, 514). Reflecting on the IPCC report, Parrique (2022) reminds us, that 'prioritising people and planet over profits means that regardless of how lucrative an activity is, its raison d'être should systematically be evaluated based on its social utility and ecological sustainability'. This logic must be extended to the military and military-industrial production as well. Just as there is no 'greening' the economy by continuing the same capital-driven, technology-intensive, growth-based industrial strategies, the only actual way to begin the decarbonisation of military practice is to: degrow military spending (Burton 2023); downsize military troops, bases and mandates (Bigger et al. 2023); and completely reconceptualise military doctrine to uncouple national security from fossil fuels (Crawford 2022). This includes demilitarising the—so far elusive—just transition. A just transition appears only possible with global demilitarisation.

The end-goal in our view, however, would be the abolishing of war and armed forces altogether, alongside the fostering of viable systems for non-violent conflict resolution. Schwartzman (2025b, 115) reminds us that 'recycling the huge supplies of metal now embedded in the fossil fuel and military infrastructures with the phasing out of the Military Industrial Complex, substituting common elements for rare ones, enhancing electrified public transit instead of manufacturing hundreds of millions of electric cars' would provide an abundant source of critical materials to be redistributed. While this is not an easy task, requiring self-organisation and struggle, it evidences how the challenge of socioecological catastrophe is as painfully political as it is ecological and climatic.

Developing a de/postgrowth/regenerative ecological/circular economy includes military institutions and operations. For example, Rogaly (2024) and Bigger et al. (2023) have plenty of suggestions to begin accomplishing this: arms conversion and defence diversification projects tasked with repurposing industrial capacity within the arms sector towards goods that address social and ecological needs; re-skilling the workers caught up with extractive industries and the military-industrial complex (see also K. Bell et al. 2024); creating a global military superfund investing in 'remediation undertaken by local communities and local governments across the world through direct payments, technology transfer and job training at contaminated sites by US and UK military bases and operations; demanding that imperial military powers like the US, UK, NATO, Russia and China make international climate finance contributions to affected countries to compensate for past and present greenhouse gas emissions associated with military activity. These solutions are inherently international, and entangled with geopolitical concerns.

There are meaningful precedents for international treaties tasked with collectively limiting the power of and mitigating socioecological damage from extractive industries and military activity that need to be remembered, reinforced and expanded. This means learning from the successes (and failures) of fossil fuel and mineral non-proliferation treaties, the Nuclear Non-Proliferation Treaty, and disarmament and demilitarisation treaties. Governments, and people, need to expand the efforts of the Beijing Declaration and Platform of Action, the Treaty for the Prohibition of Nuclear Weapons and the Outer Space, Nuclear Test Ban and Mine Ban Treaties. All of these reparative approaches to industrial production and war-making require significant public investment, labour force empowerment and a shift towards public ownership of land, infrastructure and the overall means of production.

While companies and militaries keep trying to fabricate a moral and 'green' image, there remain ways to begin global trends and cooperation towards disarmament, demilitarisation, detoxification and industrial degrowth. A central policy proposal—or embodied grassroots oppositional practice—is to eliminate the laws that enforce and mandate the maximisation of shareholder value (see T. Hartmann 2010, Nace 2003). This might include eliminating the 'limited liability' clause of corporations (e.g. Ltd.), altering the corporate charter to cater to socioecological sustainability and fair production instead of profits. Hickel (2020) provides numerous proposals such as eliminating planned obsolescence; heavily restricting, or banning, highly toxic 'forever chemicals'; eliminating advertising in public space; and advancing the right to repair (see van der Velden 2021), among others. Overall, the objective of industrial society and its actors—states, corporations, I/NGOs and civil society—must transform towards linking with their environments and organising production, livelihoods and lives along socioecological sustainability and collective betterment.

If such macro-level change is difficult to imagine, we can find real-world inspiration. This can be found in communities surviving apocalypses of war, extraction and colonial occupation; alongside the practice of refusal, resistance and ecosocial justice 'from below', providing progressive pathways through planetary disaster (see Benally 2023, Gelderloos 2022, Graeber and Wengrow 2021, McBay 2019a, McBay 2019b). While policy can make space to allow for autonomous development—among others legalising/tolerating squatting; providing material resources through subsidies and tax breaks; as well as altering zoning laws to support ecosocial development; and restoring the right of resistance—this remains unlikely, and will require ardent struggle, and/or engaging in permanent ecological conflict (X. Dunlap 2024).

Grassroots struggle autonomously and through municipal institutions appears more realistic than 'top-down' policy solutions. Consider Māori kaupapa disaster management techniques (Kenney and Phibbs 2015); Casa Pueblo in Puerto Rico (González 2022); rural Colombian energy communities (Guevara et al. 2022); community hydroelectric projects in Intag Valley, Ecuador (Lang 2024), and Sierra Norte, Mexico (Post et al. 2025); and other community earthquake responses in southern Mexico (Contreras, Gerardo, and Marina Flores Cruz 2025). This, moreover, extends to initiatives and organising in the Global North—from establishing Zones-to-Defend to squatting networks and collective housing associations engaged in political struggle (Bendix, Müller, and Ziai 2019, Dunlap and Tornel 2025, Kollective 2014). South and north of the globe, these are all examples of collaborative, culturally grounded alternatives to organising socioecological sustainability (and development) as well as communitarian disaster response with the power to transform socioecological relations.

The examples above, among others (Firth 2022, Gelderloos 2022, Kropotkin 1989 [1902]), reject ecological determinism, colonial (and racist) simplifications that claim that environmental 'degradation' or resource 'scarcities' must entail military interventionism, meanwhile ignoring the integration of capitalist values—competition, self-aggrandisement and violent confrontation—in areas of military occupation. People can self-manage themselves, yet governments have organised the power to plunder environments, indoctrinate dependency and facilitate unequal geopolitical (e.g. colonial) exchange (Hickel et al. 2022), which also worsens socioecological catastrophe. If there will be socioecological remediation, it will come from generalised and widespread struggle from 'above', 'below' and everywhere in-between to implement real socioecological sustainability and renewable technologies (X. Dunlap 2024). While we do not remain hopeful, it is possible.

This begins with discarding the already discredited and self-fulfiling environmental security and climate conflict discourses, policies and actions that still prevail.

Conclusion

This article has identified five categories of discursive and material practices that combine the fantasies of climate conflict and green capitalism with military-industrial strategy, and their roles in worsening socioecological crises—what we might also call a climate-military-greening complex in the service of armed green disaster capitalism. Each practice is built on statist, market and racial ideologies, meanwhile reinforced with data modelling that are incomplete, based on unfounded assumptions and bounded to specific sectors or countries even as they aspire to make global or universalising predictions. Reinforcing each other, these five practices are summarised as: environmental security/climate conflict narratives; false ideas of 'sustainable development' and 'renewable energy'; the application of the latter two strategies and technologies to justify military operations by greening/decarbonising; employing ideas of 'greening' and 'transition' to camouflage military extractivism; and, finally, war making as a process and practice that competes for energy materials and destroys lower-carbon (and other life affirming) infrastructures. Thinking of these discursive and material practices together, the article identifies a multi-layered self-reinforcing process designed to prolong military operations and imperial expansionism by green and climate means.

We recognise instead—as so many before us—that statism and capitalism will be the end of humanity, even if some humans survive. A deep critique of depoliticising categories like climate conflict expose the surreptitious fabrications of armed green disaster capitalism. Climate conflict narratives are another method of delaying, if not preventing, holistic, just and liberatory peace initiatives; regenerative agricultural programs; degrowth policies in the Global North and post-development approaches in the Global South. Instead, the system of patents, extractivism, militarism and global market forces remain intact. That is why 'climate conflict and climate change become a self-fulfilling prophecy', creating 'a positive feedback loop of militarisation, environmental degradation, and market production that are the principal causes for ecological crisis and climate change' (Dunlap and Fairhead 2014, 955). Meanwhile, governments, companies and many academics refuse to acknowledge or to seriously act against this self-fulfiling prophecy. We contend that this predicament can only be countered by degrowing, if not abolishing, capitalism *and* military powers globally. This process entails (re)growing institutional and grassroots priorities and relationships, while reinvigorating an ethic of mutual aid organised around the socioecological development of a 'good life' based on a sincere dedication to socioecological harmony.

References

For now, the massive list of references can only be found in the original, which is open access and accessible via link provided.

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08 Jun 2026

https://doi.org/10.1080/14650045.2026.2678945