



# Resilient and Robust: Climate-Proofing the Military for Increased Military Effectiveness

NATO and the European Defence Fund can support the exchange of good practices and standardization of processes by facilitating dialogue between allies and encouraging coordinated action.

**Set an enabling  
governance  
framework**

**Promote  
public-private  
collaboration**

Concrete targets for reducing military emissions and updated sustainable procurement processes are required to create incentives for the defence industry to make green R&D the main pillar for new military technology.

European defence industries should open their supply chains to start-ups and small and medium enterprises that bring scalable innovative ideas and (disruptive) green technologies.

**Promote the  
involvement of  
small & medium  
enterprises  
in R&D**

**Maximize the  
potential of  
temporary  
solutions**

In the transition process when technologies are still insufficiently advanced for military purposes, temporary solutions like energy efficiency, advanced biofuel blends and modular applications can be found.

Armed forces should not only aim to be a fast follower, but also a platform for innovation in areas where green innovations have not yet sufficiently matured.

**Embrace not  
only being a  
quick adapter,  
but also an  
innovator**





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## Low-carbon electricity generation in military installations

Photovoltaic roof tiles and solar panels on building roofs (home-base) or mobile command centers (expeditionary).



(U.S. Department of Energy, flickr)

Airborne wind energy generated from flying blades, tethered to the ground or directly to an installation



(Makani Project, X Company)

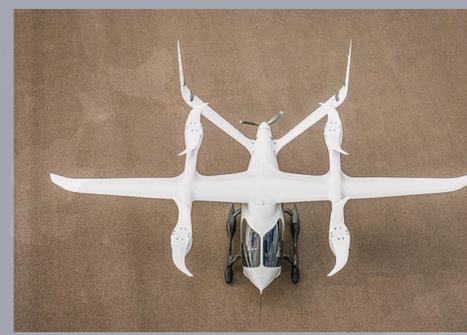
## Hybrid electric systems

General Motors unmanned Silent Utility Rover Universal Superstructure (SURUS).



(GM Authority)

Alia-250 electrical vertical take-off and landing



(BETA Technologies, Wikimedia Commons)

Hybrid propulsion systems for diesel-powered ships



(U.S. Navy, flickr)

ST-35 Silent Thunder battery-powered loitering munition



(Athlon-Avia Unmanned Solutions)

## Low-carbon heating and cooling systems

Solareast R32 Three-in-One air source heat pumps for external heat absorption into buildings



(Nenad Stojkovic, flickr)

Y-Warm thermal insulation material for internal and external building insulation



(karen, flickr)



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## Water purification and re-use

Membrane bioreactors (MBR) can provide automated wastewater treatment to produce water requiring minimal disinfection.



(Hoots, Wikimedia Commons)



(Staff Sgt. Jorge Intriago, Wikimedia Commons)

Reverse osmosis (e.g., Reverse Osmosis Systems from Pure Aqua) can provide portable clean water treatment.

Re-use of grey water can lead to a 65% reduction in necessary base water supply.



(Secretariat, Wikimedia Commons)



(US Army Environmental Command, Flickr)

Wastewater Electrochemical Treatment Technology can treat highly contaminated water and is automated and maintenance-free.

## Decarbonizing shipping and aviation

Airbus A380 100% biofuel powered passenger jet



(Todd Lappin, flickr)



(Coast Guard, flickr)

GoodFuels 100% biofuel inland container vessel

US "Green Hornet" Naval Fighter jet with GE F414 engine and noise reduction kit



(Sullivan, flickr)



(Michael Coghlan, flickr)

NYK 100% biofuel Capsize Bulker

BP/Maersk tankers with non-modified main and auxiliary engines and boiler



(Prevot, flickr)



(Torn, flickr)

Boskalis 100% biofuel dredging vessel