

Environmentally Sustainable Disposal of Weapons, Ordnance, Munitions and Explosives

Overview

This Frazer-Nash research project, supported by Cranfield University was commissioned by the UK MOD Defence Science and Technology Laboratory (dstl) via the Weapons Sector Research Framework (WSRF). It provided in-depth, impartial research into economically feasible, sustainable solutions for Weapons, Ordnance, Munitions and Explosives (WOME) disposal.

At present, recycling WOME (or even WOME components) is not cost effective. There is currently no scalable infrastructure for chemical or biological breakdown methods. A significant quantity of WOME material is therefore disposed of via open burning or detonation (OBOD), incineration processes, or shipping overseas. These methods are not sustainable as they either produce direct emissions to air or use high volumes of hydrocarbon fuels.

WOME disposal is a complex, challenging, area for carbon reduction and increasing sustainability. Our study has found that there are things which can be done, in the near future, to make significant improvements. The research project offers six recommendations and a detailed roadmap for their implementation. We suggest how the UK and other countries can improve practices (disposal and design for disposal practices) to demonstrate compliance with regulations and to help towards achieving Net Zero emission targets.

The Project

Our research focused on four exemplar munitions:

- * Small arms ammunition (SAA) – 7.62mm ball.
- * Gun ammunition (QF fixed) – 4.5" high explosive (HE) naval.
- * Pyrotechnic – orange signal smoke grenade.
- * Complex munition – brimstone guided weapon.

The literature review identified examples of where both WOME and non-WOME related items were being designed and manufactured to enable (legally compliant) environmentally sustainable disposal. This included collection and processing for reuse or recycling. Canvassing real-life practices via industry questionnaires, we determined whether material was limited to sustainable disposal within the WOME sector, or if it could take place outside the sector.

Next, we undertook a disposable materials assessment, obtaining first-hand composition information on materials' potential for reuse/recycling. Calculating a raw material value estimation, we validated its feasibility by comparing it with a relevant WOME case study. As part of our assessment, we identified barriers and drivers to sustainable disposal of weapon system items, components and packaging. We also produced a report that included a review of relevant legislation, regimes and regulatory requirements.

Developing a Roadmap to Sustainability

A roadmapping exercise investigated drivers to encourage sustainable disposal, and how improved long-term practices (both in the UK and overseas) could be implemented to create a more circular economy for WOME. An economic assessment and cost-benefit analysis, using the data from the disposable materials report and derived Net Present Values (NPV) of materials, compared options for recycling, or re-use of weapon systems, with conventional methods. The roadmap (Figure 1) provides a high-level visual demonstration of the advised steps required to improve the sustainability of WOME disposal activities.

Recommendations

Our report outlined six recommendations to enable more sustainable disposal of WOME practices:

1. Lead: Establishing leadership to improve communication and coordination regarding disposal activities.
2. Engage: Greater engagement with all involved with the design of WOME and disposal of WOME activities. To develop design for disposal and design with sustainable practices in mind.
3. Baseline: Carbon baselining to understand hotspots and advise reduction requirements across the disposal value chain.
4. Set targets: Setting carbon reduction targets for WOME disposal activities.
5. Plan: Formulate a Climate Change and Sustainability Delivery plan specifically for the WOME sector.
6. Strategize: Strategize by amending MOD policy if needed; keep the roadmap up to date to track and drive progress; and ensure that delivery teams develop sustainability strategies specific to their focus area.

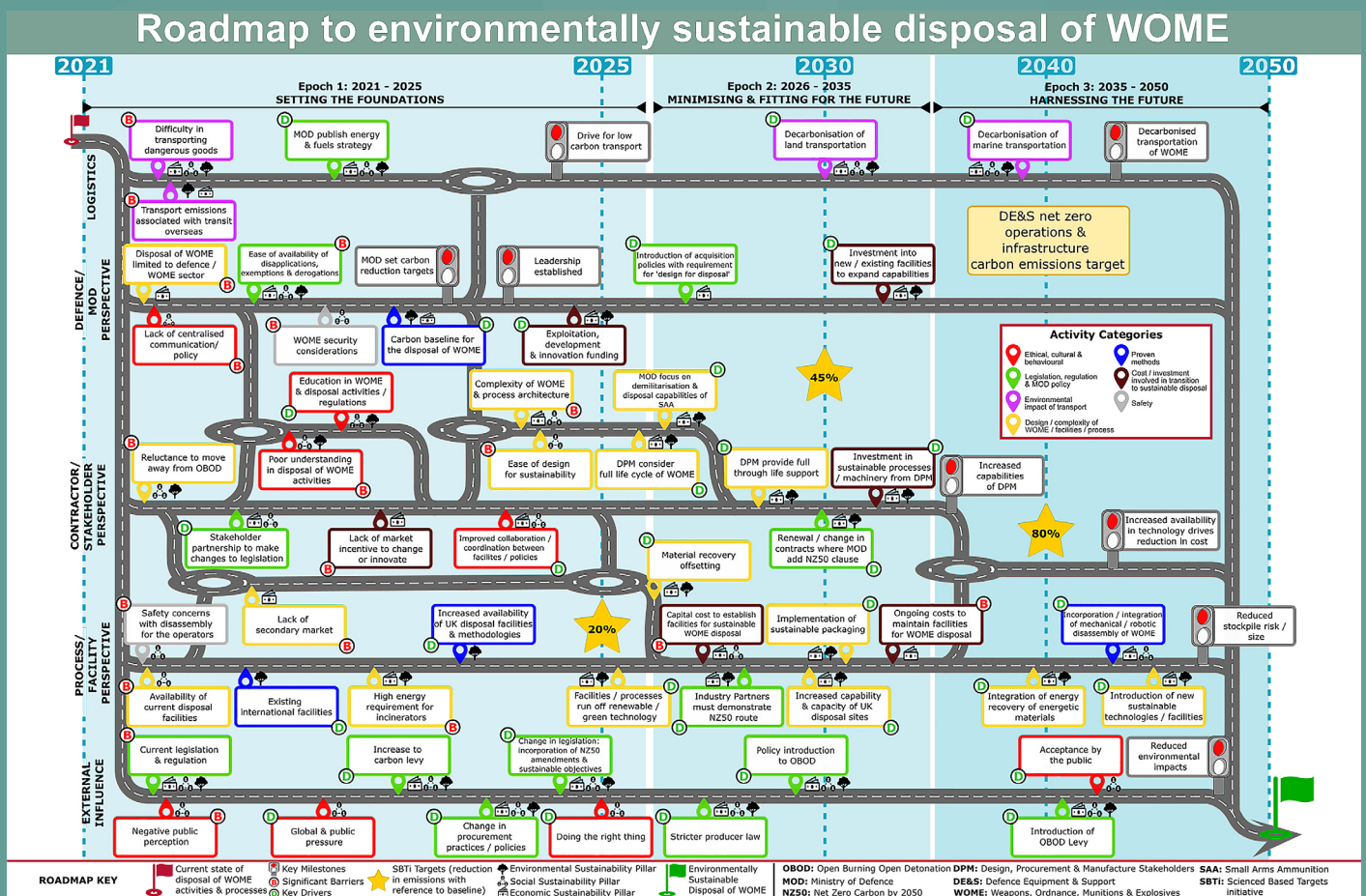


Figure 1: Roadmap outlines recommended ways to move towards more sustainable methods for the disposal WOME between 2021 and 2050.

Globally, WOME disposal practices can be improved to become more sustainable and help towards carbon reductions in-line with NZ50 targets. Our roadmap demonstrates how this can be achieved. It will require awareness and support for meaningful change to happen.

UK environmental legislation change and updates to MOD Policy are the biggest drivers to enable WOME disposal to move towards more sustainable practices and reduce emissions. A significant commitment and capital expenditure will be required to:

- Increase the capabilities/capacity of facilities for WOME dismantling and processing to enable sustainable disposal of component parts; or to build new demilitarisation facilities.
- Move away from the unsustainable status quo for WOME disposal.
- Modify facilities, and transportation of WOME, to use more sustainable energy sources.

The study recognised there is no one-size-fits-all solution for the disposal of WOME, but recommended options for each exemplar munition examined. We advise that these are reviewed periodically (approx. annually), to keep up to date with technology advancements in disposal methodologies and changes in regulations (in particular, regarding alignment with UK Net Zero targets).

To find out more about this study email: r.yates@fnc.co.uk

FOR IEXPE FELLOWS & PAST PRESIDENTS

DYNAMITE DINNER

19TH SEPTEMBER 2023

The Voco, Reading Select Car Leasing Stadium, Reading

**If you are interested in attending please
send an email to vickihall@iexpe.org**