European Commission

Study on Greening the Union Civil Protection Mechanism

FINAL REPORT

Main Report

COWI

January 2023

EUROPEAN COMMISSION

Directorate-General for European Civil Protection and Humanitarian Aid Operations
Directorate A — Emergency Management and rescEU
Unit *A.1* — Emergency Response Coordination Centre (ERCC)

Contact: Emergency Response Coordination Centre

E-mail: ECHO-ERCC-SECRETARIAT@ec.europa.eu

European Commission
B-1049 Brussels

Study on Greening the Union Civil Protection Mechanism

FINAL REPORT

Main Report

Authors	COWI: Edmunds Akitis, Felix Arnold, Simon Davies, Thomas Ilhe, Anna Mensch, Michael M. Sørensen
Quality Assurance	Malene S. Jespersen
Approval	Malene S. Jespersen
Version	1

Luxembourg: Publications Office of the European Union, 2023

PDF ISBN 978-92-76-98960-8 doi: 10.2795/717511 KR-07-23-039-EN-N

TABLE OF CONTENTS

ABBREVIATIONS

CCA	Climate change adaptation
CCM	Climate change mitigation
CCI	Cross-cutting issues
CEAP	The EU Circular Economy Package and Action Plan
CECIS	The Common Emergency Communication and Information System
CO_{2e}	CO_2 equivalent
CP	Civil protection
CS	Contract signature
CSDP	The Common Security and Defence Policy
DEFIS	Directorate-General for Defence Industry and Space
DG CLIMA	Directorate-General for Climate Action
DG ECHO	Directorate-General for European Civil Protection and Humanitarian Aid Operations
DRM	Disaster risk management
EDA	European Defence Agency
EEAS	European External Action Service
ECPP	European Civil Protection Pool
EEHub	The Environmental Experts' Hub
EHA	The Environment and Humanitarian Action
EIB	European International Bank
ENER	Directorate-General for Energy
ENV	Directorate-General for Environment
EPBD	Energy Performance of Buildings Directive
ERCC	Emergency Response Coordination Centre
ERDF	European Regional Development Fund
ESIF	European Structural and Investment Funds

ESI	Emergency Support Instrument
EV	Electric vehicles
FEAT	Flash Environmental Assessment Tool
FEMA	Federal Emergency Management Agency
FFH	Aerial forest firefighting module using helicopters
FFP	Aerial forest firefighting module using airplanes
FRB	Flood rescue using boats
GFFF-V	Ground forest firefighting using vehicles
GHG	Greenhouse gas
GRRT	Green Recovery and Reconstruction Tool
HA	Humanitarian aid
HDV	Heavy-duty vehicle
ICRC	International Committee of the Red Cross
IFRC	International Federation of Red Cross and Red Crescent Societies
IHP	International Humanitarian Partnership
DG INTPA	Directorate-General for International Partnerships
JEU	Joint Environment Unit
JRC	Joint Research Centre
LCA	Life cycle assessment
MARE	Directorate-General for Maritime Affairs and Fisheries
MEVAC	Medical aerial evacuation of disaster victims
MOD	Ministry of Defence
MS	Member States
DG NEAR	Directorate-General for Neighbourhood and Enlargement Negotiations
NEAT +	The Nexus Environmental Assessment Tool
NEWMOA	A New England-based waste clean-up organisation
OCHA	United Nations Office for the Coordination of Humanitarian Affairs

PFAS	Perfluoroalkyl chemicals
PPRD East 3	Prevention, Preparedness and Response to natural and man-made disasters in Eastern Partnership countries – phase 3
PS	Participating States
SAF	Sustainable aviation biofuels
SOP	Standard operating procedure/protocols
UCPM	Union Civil Protection Mechanism
UNEP	United Nations Environment Programme
WFP	World Food Programme
WHO	World Health Organisation
WtW	Well-to-wheel
WTT	Well-to-tank

ABSTRACT

English version

This study assesses policies, practices and actions that already support, or could be initiated to further green[1] the Union Civil Protection Mechanism (UCPM), drawing on experiences from civil protection and related areas (e.g., humanitarian aid). Progress towards reducing emissions, reducing packaging and encouraging green behaviour are underway in civil protection and related areas. However, more can be done. Greening efforts should centre on: (i) data collection to estimate baseline environmental footprint, establish indicators and track progress; (ii) grants to help finance greening of capabilities to improve disaster resilience and crisis management; (iii) feedback loops to ensure environmental lessons from crisis response lead to actions that reduce environmental impacts from crises, make communities more resilient and improve response effectiveness; (iv) circular economy and waste management actions to reduce, reuse and recycle better, and prevent water contamination; and (v) climate change mitigation by reducing greenhouse gas emissions, especially from transport. DG ECHO has an important role in greening the UCPM (including rescEU). It has levers available to implement greening actions including sharing knowledge (e.g., green products/effective vehicles), producing guidelines (e.g., wastewater clean-up) and there clearly exists interest among national civil protection bodies for increased leadership from DG ECHO in greening the sector.

Version française

Cette étude évalue les politiques, pratiques et actions existantes, ou à venir, visant à renforcer le verdissement du mécanisme européen de protection civile (MPCU), en tirant parti des retours d'expériences de secteurs connexes (notamment l'aide humanitaire). Des progrès ont été obtenus dans la réduction des émissions et des emballages et dans l'encouragement de comportements écologiques. Cependant, il est possible de faire plus. Dès lors, les initiatives de verdissement devraient se concentrer sur : (i) la collecte de données afin d'estimer l'empreinte carbone ; (ii) les subventions pour minimiser l'impact écologique de la gestion de catastrophes ; (iii) le partage d'information via les retours d'expérience pour s'assurer que les leçons sur l'impact environnemental tirées de la réponse aux crises conduisent à des actions qui réduisent l'impact environnemental, rendent les communautés plus résilientes et rendent la réponse plus efficace ; (iv) les actions en matière d'économie circulaire et de gestion des déchets, afin de mieux réduire, réutiliser et recycler, et prévenir la contamination des eaux; et (v) l'atténuation du changement climatique en réduisant les émissions de gaz à effet de serre, en particulier dues au transport. La DG ECHO a un rôle important à jouer dans le verdissement du MPCU (y compris pour la réserve rescEU). Elle dispose de leviers pour mettre en œuvre des actions de verdissement, avec notamment le partage des connaissances (ex. : produits verts/véhicules efficients) et la production de guides pratiques (ex : épuration des eaux usées). Les organismes nationaux de protection civile font preuve d'un intérêt commun à voir le rôle de coordinateur de la DG ECHO se renforcer afin de promouvoir le verdissement du secteur.

[1] Make less harmful to the environment, furthermore a draft definition specifically related to civil protection is recommended.

EXECUTIVE SUMMARY

Context and rationale

The EU is fully committed to reducing the Union's environmental footprint by reducing greenhouse gas emissions, reducing natural resource use and restoring biodiversity. Under the European Green Deal and Fit for 55, the EU has committed to cutting net greenhouse gas emissions by at least 55% by 2030 compared to 1990 levels and becoming a carbon neutral economy by 2050. Important elements of these efforts include the biodiversity strategy, which aims to 'put Europe's biodiversity on the path to recovery by 2030' and boost society's resilience to the impacts of climate change and forest fires. The circular economy action plan aims to cut waste by reducing, reusing and recycling products and packaging. In addition, the citizens of the EU are facing new geopolitical and energy market realities and their societal impact, following Russia's invasion of Ukraine in February 2022. These tragic events further highlighted the need to accelerate the energy transition, including green[2] and sustainable solutions. This is reflected in the REPowerEU.

Delivering a package of greening reforms will be challenging for many sectors, likely including civil protection and related areas. However, the European Commission's Directorate General for Humanitarian Aid and Civil Protection Operations (DG ECHO) has already taken steps to reduce its environmental footprint, and so have Member States and Participating States to the Union Civil Protection Mechanism (UCPM). Within this context, the UCPM – and civil protection more broadly – should aim at being greener and more sustainable. Greening actions will allow the UCPM to: (i) contribute to the EU environmental goals; (ii) adapt to changes as a result of greening actions elsewhere in the economy (e.g. the European Taxonomy for Sustainable Activities or the packaging and waste directive); (iii) take advantage of opportunities presented by broader greening efforts across the EU; and (iv) adapt to the new geopolitical and energy market realities. As a result, in February 2022, the progressive approach to make UCPM actions greener and more sustainable was emphasised during the French Presidency of the Council of the European Union (2022). Member States agreed to make civil protection operations greener and more sustainable in all phases of the disaster management cycle and to promote research, innovation, and knowledge sharing. This includes its external action, also taking into consideration that climate change is one of the key drivers of an increasing number of crises globally.

Objectives

This study aims to present recommendations on how the UCPM can green its activities. The seven primary objectives are listed below.

1. Assess the carbon footprint of civil protection.
2. Provide an overview of policy evolution in Member States/Participating States.
3. Provide an overview of relevant policy evolutions and greening activities in other fields with a possible impact on the greening of civil protection.
4. Provide an overview of current greening activities in the area of civil protection.
5. Map out further incentives to green the UCPM and identify the potential role for the Commission therein.
6. Provide recommendations for developing a strategy for the further greening of the UCPM.

[2] Make less harmful to the environment, furthermore a draft definition specifically related to civil protection is recommended

7. Present recommendations for developing a catalogue of best practice for greening initiatives.

Methodology

To assess policies, practices and actions that already support, or could support, greening the UCPM, this study has: (i) reviewed literature on reducing environmental footprints from fields relevant for civil protection such as humanitarian aid, supply chains and logistics, and defence; and (ii) consulted focus groups and interviewed a range of stakeholders, including from Member States/Participating States, European External Action Service, other Commission Services, humanitarian actors, and the private sector. The first part to this study (termed the *baseline study*) sets out existing greening policies, practices or action that may be relevant for the UCPM across all three areas of civil protection (prevention, preparedness and response). The baseline in particular addresses the following issues.

- Identifying examples of 'greening initiatives' (implemented or planned/considered) that could serve as inspiration or stepping-stones for possible further initiatives in the context of the UCPM.
- Identifying the perceived gaps and needs among stakeholders in promoting a greener approach to disaster prevention, preparedness and response.
- Analysing the current carbon footprint of civil protection transport based on available data.

Building on the baseline, the second part of this study focuses on the roles of five themes in promoting greening of the UCPM: (i) data collection and management; (ii) disaster resilience grants; (iii) feedback loops; (iv) circular economy and waste management; and (v) climate change mitigation. These themes emerged as key conclusion during the baseline investigations. For each theme, the study considers:

- How it could contribute towards the greening of the UCPM.
- Whether there may be an impact on response effectiveness.
- Feasibility, barriers or opportunities.
- Practical options or levers to promote greening within the UCPM and to support Member States and Participating States in their greening efforts.

Key conclusions

Data collection and management

The analysis under the baseline study revealed that environmental footprint data and indicators are not as readily available as needed for an accurate estimation and monitoring of: (i) carbon emissions and (ii) the broader environmental footprint. The baseline study found that improved data availability related to vehicle/equipment use and goods purchased would make it possible to estimate and monitor the carbon footprint of the UCPM, as well as the broader environmental footprint of civil protection activities. At the same time the baseline analysis found that developing 'greening indicators' based on available data would have additional benefits. These include helping define key greening aims and focus areas for the UCPM as well as facilitating tracking progress over time. The following two key efforts related to data would greatly facilitate greening.

Collect more data on resources used during preparedness and response. This includes which specific products are purchased and where and when they are used; and which specific vehicles are used and where they travelled from/to.

Establish definitions of greening and monitor greening indicators with extensive stakeholder participation to monitor the level of greening. Indicators should be Specific, Measurable, Achievable, Relevant and Time-bound (SMART) and initially focused on a pre-defined limited field, such as CO_2 emissions from transport. They could also be yes/no indicators such as whether greening conditions are included in tenders. These could be expanded over time and eventually incorporate indicators related to practices such as procurement (e.g. preference for recycled/recyclable packaging), vehicle and equipment efficiency, coordination of transport of goods, implementation of water and waste management practices, GHG emissions, among others.

Disaster resilience grants[3]

Analysis under the baseline study found that DG ECHO grant schemes could be adjusted or complemented to encourage greening by boosting their uptake and increasing their value for greening efforts. Through disaster resilience grants[4], DG ECHO provides funding to Member States and Participating States to improve disaster risk management capabilities. These grants support studies, training, development of risk assessment systems and tools and, to some extent, they already support greening. However, funding for infrastructure or equipment in Member States and Participating States is out of the scope of these grants[5].

Existing grants can be used to encourage and facilitate greening in two main ways: (i) *Include greening in the objectives of the disaster resilience grants.* The greening focus in these grants could be made more prominent by including greening as one the main objectives, and by including examples and explanation of what greening would mean when applied to projects financed under the grants. (ii) *Add a greening requirement as part of application selection or award criteria.* This could include a requirement to describe in the application how the project would contribute to greening. Including criteria on specific elements to be included in the projects would help to focus on greening. For example, that a project should cover greening in relation to at least one of the main thematic areas of circular economy, climate change mitigation, and nature and biodiversity.

Use grants in a way that facilitates access to other funding including other EU funding that contribute to greening. For example, grants could be used to finance a part of greening projects or research, with other funding sources contributing the remainder. Alternatively, grants could finance the initial – often riskier – stages of project development and other sources of financing could be used for implementation. DG ECHO could facilitate this by providing information on additional EU sources of financing and application procedures.

[3] Disaster resilience grants is in this study used for Technical Assistance for Disaster Risk Management and the Knowledge for Action in Prevention and Preparedness (KAPP)

[4] Technical Assistance for Disaster Risk Management Grants apply to projects in a single country setting covering both prevention and preparedness. Their purpose is capacity building of public authorities with focus on the national policy framework. Knowledge for Action in Prevention and Preparedness (KAPP) funding applies to multi-country projects covering both prevention and preparedness. The focus is on cross-border cooperation and improving disaster risk assessment and management. The projects often include a wider set of also private stakeholders.

[5] Note that the DG ECHO Adaption Grants support response equipment and infrastructure. In addition to the disaster resilience grants, DG ECHO provides funding through the Adaptation Grants which support preparedness by co-funding upgrade and repair of response capacities. The Adaption Grants focus on upgrading or repairing response capacities to a state of readiness and availability that makes them deployable as part of the European Civil Protection Pool.

Feedback loops

Feedback loops provide EU Civil Protection experts with information (sharing lessons learnt or best practices) to ensure that future actions reduce the impact from crises, make communities more resilient and make response more effective. Analysis under the baseline study found that many civil protection actors perceived a lack of reporting and acting on information from crises that could reduce the impacts from future crises and provide information on which greening efforts were most effective. A significant role emerges for DG ECHO in establishing a reporting and feedback framework and disseminating knowledge/lessons learnt, and in supporting Member States and Participating States in their contributions.

Embed greening lessons learnt for all UCPM deployments in the existing lessons learnt programme and provide debriefings on environmental lessons learnt. When new greening approaches are being implemented in response activities, the lessons learnt could be broadly shared. This could include reflections on their feasibility, benefits and challenges. Publication and dissemination of such success stories would, in turn, incentivise Member States and Participating States to act on the implementation of greening opportunities.

Deploy environmental experts for prevention/preparedness and response and extend their role to include feedback on environmental issues. The environmental experts' role could include feedback responsibilities and transferring the knowledge from crisis lessons learnt to prevention and preparedness activities. Making these experts available not only to civil protection missions but also to Member States and Participating States would support their work to implement these (and other) greening efforts.

Establish a feedback framework for important lessons learnt from response to inform the prevention and preparedness stage, as well as the broader disaster risk management community. Providing overviews of existing feedback mechanisms and guidelines on how to use them for communicating: (i) lessons learnt related to effectiveness, benefits and challenges of greening efforts; (ii) how improvements in prevention could have reduced the impacts of a disaster. The Disaster Risk Management Knowledge Centre is well-suited to inform planning authorities on potential disaster threats to infrastructure projects, or the need for prevention measures. The EU Civil Protection Knowledge Network would be well-suited to serve as a platform for responders to report on the effectiveness of implemented prevention measures as well as greening measures, which would then in turn inform planning authorities.

Circular economy and waste management

The circular economy refers to the ability to reduce, reuse, repair or recycle existing products as much as possible[6]. Better waste management includes reducing the amount of waste produced and ensuring waste water does not contaminate water bodies. Analysis under the baseline study found that efforts to implement circular economy actions and improve waste management are already underway in civil protection and related areas. This includes efforts to purchase products with alternative packaging (e.g., biodegradable), use packaging that can be used for other purposes during response, train responders in waste water management and implement specific

[6] Circular economy: definition, importance and benefits | News | European Parliament (europa.eu)

protocols for potentially hazardous waste such as medicines. While efforts have begun, the baseline study found that further greening opportunities exist. DG ECHO could promote greening through several areas:

Reduce packaging and green supply chain management (preparedness). While packaging is essential for the safe transport and storage of goods, it can often be greened by choosing goods with less or alternative packaging or by working with suppliers to reduce packaging. Examples of alternative packaging include compostable or biodegradable options, as well as packaging that can be reused (e.g., for other purposes such as storage during response or reused for re-transport). Working with manufacturers to reduce packaging or seek alternatives and using software that identifies greener products could both be effective approaches. Developing guidelines on how to green supply chains could include information on how to identify greener products, how to work with suppliers to reduce environmental footprints of products, and how to incorporate greener products or packaging into tenders. Raising awareness through examples of best practice (leaflets, online presentations and discussions) and sharing knowledge through lists of greener products would similarly support national greening efforts.

Green training and exercise events (preparedness). Using blended online and in-person training can reduce the amount of waste generated during in-person events. Further developing online modules could also have co-benefits such as expanding the reach of training and make it easy to include additional modules (e.g., on greening). Selecting greener venues for in-person training would help to reduce on-site waste. More and smaller exercises could similarly help to reduce the environmental footprint of exercises.

Reduce and safely manage waste and water contamination (preparedness & response). Adopting clear guidelines or SOPs that follow best practices would help response teams reduce waste and manage contamination. Response capacities must have equipment to deal with waste and water contamination in relevant response capacities. Incorporating environmental expertise during response would help identify waste and water contamination risks and propose appropriate actions. Raising awareness of the benefits of better waste management and avoided environmental and financial costs would also help to promote action in this area. This could be done through knowledge/experience sharing on good waste clean-up practices, listening to stories of communities impacted by water contamination in webinars and producing knowledge-sharing leaflets. Developing model guidelines or SOPs and training (e.g., during exercises) on identification and management of waste and water would facilitate national efforts in this area. During the response stage, making environmental expertise available would facilitate national efforts.

Climate change mitigation

Climate change mitigation refers to making the impacts of climate change less severe by preventing or reducing the emission of greenhouse gases (GHG) into the atmosphere[7]. In civil protection, climate change mitigation includes reducing CO_2 emissions through expanding environmentally friendly capacities, better planning, and enhanced climate awareness. The baseline study found that some civil protection authorities have already begun the process of purchasing greener vehicles. However, there are still significant information gaps and challenges such as cost and effectiveness in some crisis contexts. There are opportunities to green both the way vehicles and equipment are used and to scope to use greener vehicles, which could be supported by DG

[7] What is the difference between adaptation and mitigation? — European Environment Agency (europa.eu)

ECHO. Actions at UCPM level could serve as inspiration at the national level, where DG ECHO could play a facilitating role towards greener vehicles and equipment.

Encourage greener vehicles and equipment (preparedness). Adapting rescEU procurement practices to favour low-carbon options would reduce the carbon footprint. This could include adapting tenders, working with manufacturers/suppliers and identifying low-carbon options using appropriate supply chain/procurement software. Selecting and using low-emission vehicles for rescEU and ensuring low-emission standards for inclusion in the European Civil Protection Pool (ECCP) would reduce the carbon footprint of operations.

Rethink transport and equipment use (preparedness and response). Mapping detailed rescEU/ECPP capacities (vehicles, equipment) in their host country (city-level, exact vehicle/equipment type) and tracking their use in UCPM operations would help to: (i) establish distance travelled by different vehicles and equipment and therefore the carbon footprint; (ii) make it clear where different vehicles and equipment are situated, thereby making it simpler to select those that need to travel the least distance to respond to a crisis (also potentially increasing response speed).

Provide and facilitate knowledge of financing for greener vehicles and equipment for Member States and Participating States (preparedness and response). This could be done by providing a catalogue of funding options available and/or by proposing new or adapting existing grants to facilitate the purchase of greener vehicles and equipment. Leading detailed studies on life cycle cost of ownership and GHG emissions would help raise awareness not only of up-front costs but also other benefits including lower overall cost of ownership. Researching and providing information or recommendations regarding relevant software to estimate overall emissions throughout the value chain for goods (scope 3 emissions).

Rethink transport and equipment use (response). Defining typologies of interventions and response phases including the types of vehicles and transport modes that could be considered for each type or phase could facilitate choices to use low-emission vehicles and equipment. For example, during urban disasters, smaller and electric vehicles may be preferred over larger vehicles. Similarly, during the return phase, return transport could be delayed in order to favour lower emission transport options.

Levers and quick wins

DG ECHO has several levers available to implement greening within the UCPM and facilitate Member States' and Participating States' efforts. These include incorporating greening into training and exercises, boosting available grants and their uptake, developing guidelines and SOPs, and facilitating knowledge and information sharing. Several quick wins have been identified including: (i) Establishing a platform on greening and initiating further work on data collection (including location of bases for vehicles/equipment, indicators and definitions in this context); (ii) Organising knowledge-sharing and developing information sheets on key greening topics; (iii) Developing a shareable list of low-packaging products and suppliers; (iv) Cataloguing funding options available to Member States and Participating States to support purchase of greener vehicles; and (v) Creating an environmental section in the ERCC with the support of the Union Civil Protection Knowledge Network.

RÉSUMÉ EXÉCUTIF

Contexte et exposé des motifs

L'UE s'est pleinement engagée à réduire son empreinte environnementale en diminuant les émissions de gaz à effet de serre et l'utilisation des ressources naturelles, et en restaurant la biodiversité. Dans le cadre du pacte vert pour l'Europe et du paquet législatif « Ajustement à l'objectif 55 », l'UE s'est engagée à réduire les émissions nettes de gaz à effet de serre d'au moins 55 % d'ici 2030 par rapport aux niveaux de 1990 et à devenir une économie neutre en carbone d'ici 2050. Parmi les éléments importants de ces initiatives figurent la stratégie pour la biodiversité, qui vise à « mettre la biodiversité de l'Europe sur la voie du rétablissement d'ici 2030 » et à renforcer la résilience de la société face aux impacts du changement climatique et des incendies de forêt. Le plan d'action pour une économie circulaire vise à diminuer les quantités de déchets en réduisant, réutilisant et recyclant les produits et les emballages. En outre, suite à l'invasion de l'Ukraine par la Russie en février 2022, les citoyens de l'UE sont confrontés à de nouvelles réalités en termes de géopolitique et de marché de l'énergie, ainsi qu'à leur impact sociétal. Ces événements tragiques ont encore souligné la nécessité d'accélérer la transition énergétique, avec notamment des solutions vertes et durables. Cette approche est prise en compte dans le plan REPowerEU.

La mise en œuvre d'un ensemble de réformes de verdissement sera difficile pour de nombreux secteurs y compris, probablement, pour la protection civile et les secteurs connexes. Cependant, la direction générale de la protection civile et des opérations d'aide humanitaire européennes (DG ECHO), ainsi que les Etats membres et participants du mécanisme européen de protection civile, ont déjà pris des mesures afin de réduire leurs empreintes environnementales. Dans ce contexte, le Mécanisme Européen de Protection Civile Européen – et plus largement la protection civile – devrait viser à être plus verte et plus durable. Les actions de verdissement permettront au MPCU : (i) de contribuer aux objectifs environnementaux de l'UE ; (ii) de se conformer aux critères de verdissement formulés dans des textes règlementaires (ex. : la taxonomie européenne pour les activités durables, ou la directive relative aux emballages et aux déchets d'emballages) ; (iii) de profiter des opportunités présentées par des initiatives de verdissement plus larges menées à travers l'UE ; et (iv) de s'adapter aux nouvelles réalités en matière de géopolitique et de marché de l'énergie. En conséquence, en février 2022, l'approche progressive visant à rendre les actions du MPCU plus vertes et plus durables a été mise en avant lors de la présidence française du Conseil de l'Union européenne (2022). Les États membres ont convenu de rendre les opérations de protection civile plus vertes et plus durables dans toutes les phases de gestion des catastrophes, et de promouvoir la recherche, l'innovation et le partage des connaissances. Cela inclut son action externe, tout en prenant également en considération le fait que le changement climatique est l'un des principaux moteurs d'un nombre croissant de crises à l'échelle mondiale.

Objectifs

Cette étude vise à présenter des recommandations sur la façon dont le MPCU peut verdir ses activités. Les sept objectifs principaux sont répertoriés ci-dessous.

1. Évaluer l'empreinte carbone de la protection civile.
2. Fournir un aperçu de l'évolution des politiques dans les États membres/États participants.
3. Fournir un aperçu des évolutions politiques pertinentes et des activités de verdissement dans d'autres secteurs ayant un impact potentiel sur le verdissement de la protection civile.
4. Fournir un aperçu des activités de verdissement actuelles dans le domaine de la protection civile.
5. Élaborer de nouvelles incitations au verdissement du MPCU et identifier le rôle potentiel de la Commission à cet égard.
6. Fournir des recommandations en vue d'élaborer une stratégie de renforcement du verdissement du MPCU.

7. Présenter des recommandations en vue de développer un répertoire des meilleures pratiques pour les actions de verdissement.

Méthodologie

Pour évaluer les politiques, les pratiques et les actions qui soutiennent déjà, ou pourraient soutenir, le verdissement du MPCU, cette étude : (i) a analysé l'information disponible sur la réduction des empreintes environnementales dans des domaines pertinents pour la protection civile tels que l'aide humanitaire, les chaînes d'approvisionnement et la logistique, ainsi que la défense ; et (ii) a consulté des groupes de discussion et de nombreuses parties prenantes, notamment des États membres/États participants, le Service européen pour l'action extérieure, d'autres services de la Commission, des acteurs humanitaires, et le secteur privé. La première partie de cette étude (appelée « *étude de référence* ») définit les politiques, pratiques ou actions existantes de verdissement qui peuvent être pertinentes pour le MPCU dans les trois domaines de la protection civile (prévention, préparation et réponse). L'étude de référence porte notamment sur les questions suivantes.

- Identifier des exemples d' « actions de verdissement » (mises en œuvre ou planifiées/envisagées) qui pourraient servir d'inspiration ou de tremplins pour d'éventuelles actions supplémentaires dans le contexte du MPCU.
- Identifier les lacunes et les besoins perçus parmi les parties prenantes, dans la promotion d'une approche plus verte de la prévention, de la préparation et de la réponse aux catastrophes.
- Analyser l'empreinte carbone actuelle des transports de la protection civile en fonction des données disponibles.

En s'appuyant sur les données de référence, la deuxième partie de cette étude se concentre sur le rôle de cinq thèmes dans la promotion du verdissement du MPCU : (i) la collecte et la gestion des données ; (ii) les subventions pour renforce la résilience face aux catastrophes ; (iii) les retours d'expérience ; (iv) l'économie circulaire et la gestion des déchets ; et (v) l'atténuation du changement climatique. Ces thèmes ont été identifiés comme clés durant l'étude de référence. Pour chaque thème, l'étude examine les aspects suivants :

- Comment cela pourrait-il contribuer au verdissement du MPCU ?
- Peut-il y avoir un impact sur l'efficacité de la réponse aux catastrophes ?
- Faisabilité, obstacles ou opportunités.
- Choix pratiques ou leviers permettant de promouvoir le verdissement au sein du MPCU et de soutenir les États membres et les États participants dans leurs actions de verdissement.

Conclusions clés

Collecte et gestion des données

L'analyse réalisée dans le cadre de l'étude de référence a révélé que les données et les indicateurs en matière d'empreinte environnementale ne sont pas aussi facilement disponibles que nécessaire pour obtenir à la fois une estimation et un suivi précis : (i) des émissions de carbone et (ii) plus largement de l'empreinte environnementale. L'étude de référence a révélé que l'amélioration de la disponibilité des données liées à l'utilisation des véhicules/équipements et autres biens achetés permettrait d'estimer et de suivre l'empreinte carbone du MPCU, ainsi que l'empreinte environnementale plus large des activités de protection civile. En parallèle, l'analyse initiale a révélé que le développement d' « indicateurs de verdissement » sur la base des données disponibles aurait des avantages supplémentaires. Ils contribueraient notamment à définir les objectifs clés de verdissement et les domaines prioritaires pour le MPCU tout en facilitant le suivi des progrès réalisés. Les deux actions clés suivantes liées aux données faciliteraient considérablement le verdissement.

Collecter davantage de données sur les ressources utilisées pendant la préparation et la réponse. Cela comprend l'identification des produits achetés et de leurs modalités d'utilisation (dates et périmètre géographique) ; ainsi que l'identification des véhicules utilisés et de leurs itinéraires.

Établir un/des définitions du verdissement du verdissement et indicateurs de verdissement, en faisant appel aux parties prenantes. Ces indicateurs doivent être spécifiques, mesurables, atteignables, réalistes, définis dans le temps (selon le principe dénommé « SMART ») et initialement axés sur un champ limité et prédéfini, tels que les émissions de CO_2 émanant du transport. Il pourrait également s'agir d'indicateurs qualitatifs, formés à partir de choix de réponse binaires « oui/non » associés à des questions permettant de définir le niveau de verdissement d'un projet ou d'une réponse à appel d'offres. Ceux-ci pourraient être élargis au fil du temps et éventuellement intégrer des indicateurs liés à des pratiques telles que l'approvisionnement (ex : préférence pour l'emballage recyclé/recyclable), l'efficacité des véhicules et des équipements, la coordination des transports de produits, la mise en œuvre des pratiques de gestion de l'eau et des déchets, les émissions de gaz à effet de serre (GES), entre autres.

Subventions de l'appui à la résilience face aux catastrophes[8]

L'analyse réalisée dans le cadre de l'étude de référence a révélé que les types de subventions de la DG ECHO pouvaient être ajustés ou complétés pour encourager le verdissement en stimulant leur adoption et en augmentant leur valeur pour les initiatives de verdissement. Grâce aux subventions d'appui à la résilience face aux catastrophes[9], la DG ECHO fournit un financement aux États membres et aux États participants pour l'amélioration de leurs capacités de gestion des risques de catastrophe. Ces subventions soutiennent des études, des formations, le développement de systèmes et d'outils d'évaluation des risques et, dans une certaine mesure, elles soutiennent déjà le verdissement. Cependant, le financement des infrastructures ou des équipements dans les États membres et les États participants ne rentre pas dans le champ d'application de ces subventions[10].

Les subventions existantes peuvent être utilisées afin d'encourager et de faciliter le verdissement de deux manières principales : (i) *Inclure le verdissement dans les objectifs des subventions de renforcement de la résilience face aux catastrophes.* L'objectif de verdissement de ces subventions pourrait être renforcé en incluant le verdissement comme l'un des principaux objectifs visés, et en incluant des exemples ainsi qu'une explication de ce que le verdissement signifierait si elle était appliquée aux projets financés dans le cadre des subventions. (ii) *Ajouter une exigence de verdissement dans le cadre de la sélection des demandes ou des critères d'attribution.* Cela pourrait inclure une exigence consistant à décrire dans quelle mesure le projet contribuerait au verdissement. Le fait d'inclure des critères sur des éléments spécifiques à faire figurer dans les projets aiderait à mettre l'accent sur le verdissement. Par exemple, le fait qu'un projet puisse couvrir le verdissement par rapport, au minimum, à l'un des principaux domaines thématiques

[8] Les subventions d'appui à la résilience face aux catastrophes sont dans cette étude utilisées au titre de l'Assistance technique pour la gestion des risques de catastrophe et des Connaissances en matière d'actions de prévention et de préparation (KAPP)

[9] Les subventions au titre de l'Assistance technique pour la gestion des risques de catastrophe s'appliquent aux projets menés dans un seul pays et couvrant à la fois la prévention et la préparation. Leur objectif est le renforcement des capacités des autorités publiques en mettant l'accent sur le cadre national des politiques mises en œuvre. Le financement des Connaissances en matière d'actions de prévention et de préparation (KAPP) s'applique aux projets impliquant plusieurs pays et couvrant à la fois la prévention et la préparation. L'accent est mis sur la coopération transfrontalière et l'amélioration de l'évaluation et de la gestion des risques de catastrophe. Les projets comprennent souvent un ensemble plus large de parties prenantes également privées.

[10] Il est à noter que les subventions d'adaptation de la DG ECHO soutiennent les équipements et les capacités de réponse. Outre les subventions de résilience aux catastrophes, la DG ECHO fournit également un financement par le biais des subventions d'adaptation qui soutiennent la préparation en cofinançant la mise à niveau et la réparation des capacités de réponse. Les subventions d'adaptation se concentrent sur la mise à niveau ou la réparation des capacités de réponse en vue d'obtenir un état de préparation et de disponibilité qui les rende susceptibles d'être déployées dans le cadre de la réserve européenne de protection civile.

de l'économie circulaire, de l'atténuation du changement climatique, de la nature et de la biodiversité.

Utiliser les subventions d'une manière qui facilite l'accès à d'autres financements, y compris à d'autres financements de l'UE qui contribuent au verdissement. Par exemple, les subventions pourraient être utilisées afin de financer une partie des projets de verdissement ou de la recherche, tandis que d'autres sources de financement apporteraient le reste des fonds nécessaires. Également, les subventions pourraient financer les étapes initiales – souvent plus risquées – du développement des projets, et d'autres sources de financement pourraient être utilisées pour la mise en œuvre. La DG ECHO pourrait faciliter cette approche en fournissant des informations sur des sources complémentaires de l'UE de financement et sur les procédures de demande en ce sens.

Retours d'expérience

Les retours d'expérience fournissent aux experts de la protection civile de l'UE des informations (partage des enseignements tirés ou des meilleures pratiques) afin de garantir que les actions futures réduisent l'impact des crises, rendent les communautés plus résilientes et améliorent l'efficacité de la réponse apportée aux catastrophes. L'analyse réalisée dans le cadre de l'étude de référence a révélé que de nombreux acteurs de la protection civile percevaient un manque de rapports et d'enseignements tirés d'interventions précédentes. Pourtant, ces actions pourraient réduire les impacts des crises futures et fournir des informations sur les initiatives de verdissement les plus efficaces. Un rôle important se dessine pour la DG ECHO en ce qui concerne : (i) l'établissement d'un système visant à intégrer les leçons tirées des interventions précédentes ; (ii) la diffusion des connaissances/enseignements tirés ; et (iii) le soutien à apporter aux États membres et aux États participants dans le cadre de leurs contributions respectives.

Intégrer les enseignements tirés en matière de verdissement pour tous les déploiements du MPCU dans le cadre du programme actuel des enseignements tirés, et fournir des comptes rendus sur les enseignements tirés en termes d'environnement. Lorsque de nouvelles approches de verdissement sont mises en œuvre dans les activités de réponse, les enseignements tirés pourraient être largement partagés. Cela pourrait inclure des réflexions sur leur faisabilité, leurs avantages et leurs difficultés. La publication et la diffusion de ces exemples de réussite inciteraient à leur tour les États membres et les États participants à agir sur la mise en œuvre d'opportunités de verdissement.

Déployer des experts environnementaux pour la prévention/la préparation et la réponse, et étendre leur rôle pour inclure des retours d'expérience en matière de questions environnementales. Le rôle des experts environnementaux pourrait inclure des responsabilités en matière de retour d'expérience et le partage des connaissances découlant des enseignements tirés aux activités de prévention et de préparation. La mise à disposition de ces experts non seulement pour les missions du MPCU, mais aussi pour les États membres et les États participants, viendrait soutenir leur travail pour la mise en œuvre de ces actions de verdissement (et autres).

Établir un cadre de rétroaction pour les enseignements importants tirés de la phase de réponse afin d'informer les stades de la prévention et de la préparation, ainsi que la communauté de gestion des risques de catastrophe dans son ensemble. Fournir des aperçus sur les mécanismes de retours d'expérience existants, et des guides pratiques sur la manière de les utiliser afin de communiquer sur : (i) les enseignements tirés concernant l'efficacité, les avantages et les difficultés des actions de verdissement ; (ii) la façon dont des améliorations en matière de prévention auraient pu réduire les impacts d'une catastrophe. Le réseau européen de connaissance en protection civile est bien adapté pour informer les autorités de planification sur les impacts potentiels des crises sur les projets d'infrastructure, ou sur la nécessité de mettre en place des mesures de prévention. Le Réseau européen de connaissances en protection civile serait bien adapté pour servir de plateforme permettant aux intervenants de rendre compte de l'efficacité des mesures de prévention mises en œuvre ainsi que des mesures de verdissement engagées, ce qui permettrait ensuite d'informer les autorités de planification.

Économie circulaire et gestion des déchets

L'économie circulaire fait référence à la capacité de réduire, réutiliser, réparer ou recycler autant que possible des produits existants[11]. Une meilleure gestion des déchets comprend la réduction de la quantité de déchets produits et le fait de veiller à ce que les eaux usées ne contaminent pas les plans d'eau. L'analyse réalisée dans le cadre de l'étude de référence a révélé que des initiatives visant à mettre en œuvre des actions d'économie circulaire et à améliorer la gestion des déchets sont déjà en cours dans la protection civile et les secteurs connexes. Cela inclut des initiatives visant à acheter des produits dotés d'emballages alternatifs (ex. : biodégradables), à utiliser des emballages pouvant être utilisés à d'autres fins pendant la phase de réponse, à former les intervenants à la gestion des eaux usées, et à mettre en œuvre des protocoles spécifiques pour les déchets potentiellement dangereux tels que les médicaments. Bien que des initiatives aient déjà été lancées, l'étude de référence a révélé qu'il existe d'autres possibilités de verdissement. La DG ECHO pourrait promouvoir le verdissement dans plusieurs domaines :

Réduire les emballages et verdir la gestion de la chaîne d'approvisionnement (préparation). Bien que l'emballage soit essentiel pour assurer le transport et le stockage des produits en toute sécurité, il peut souvent être écologisé en choisissant des produits exigeant moins d'emballage ou offrant un emballage alternatif, ou en travaillant avec les fournisseurs afin de réduire l'emballage. À titre d'exemple d'emballage alternatif, on peut citer les emballages compostables ou biodégradables, ainsi que les emballages qui peuvent être réutilisés (à d'autres fins telles que le stockage pendant la phase de réponse, par exemple, ou réutilisés pour le réacheminement). Les efforts pour travailler avec les fabricants afin de réduire les emballages ou de rechercher des alternatives, et d'utiliser un logiciel permettant d'identifier des produits plus écologiques pourraient constituer des approches efficaces. L'élaboration de guides pratiques sur le verdissement des chaînes d'approvisionnement pourrait inclure des informations sur la manière d'identifier des produits plus écologiques, de travailler avec les fournisseurs afin de réduire l'empreinte environnementale des produits, et d'intégrer des produits ou des emballages plus écologiques dans les appels d'offres. La sensibilisation par le biais d'exemples de meilleures pratiques (dépliants, présentations et discussions en ligne) et le partage de connaissances par le biais de listes de produits plus écologiques viendraient soutenir de la même manière les initiatives nationales en matière de verdissement.

Verdir les événements de formation et d'entrainement (préparation). Des formations mixtes en ligne et en présentiel peuvent permettre de réduire la quantité de déchets générés pendant la formation. La poursuite du développement de modules en ligne pourrait également avoir des avantages connexes, tels que l'élargissement du public des formations, et faciliter l'inclusion de modules supplémentaires (sur le verdissement, par exemple). La sélection de sites les plus écologiques pour les formations en présentiel contribuerait à réduire les déchets générés sur place. Le fait d'organiser des exercices plus nombreux mais de moindre ampleur pourrait également contribuer à réduire leur empreinte environnementale.

Réduire et gérer en toute sécurité les déchets et la contamination de l'eau (préparation et réponse). L'adoption de guides pratiques ou de procédures d'intervention claires qui suivent les meilleures pratiques aiderait les équipes de réponse à réduire les déchets et à gérer la contamination. Les capacités de réponse doivent intégrer des équipements permettant de faire face aux déchets et à la contamination de l'eau dans les capacités de réponses concernées. L'intégration d'une expertise environnementale lors de la phase de réponse permettrait d'identifier les risques liés aux déchets et à la contamination de l'eau et de proposer des actions appropriées. La sensibilisation aux avantages liés à une meilleure gestion des déchets et aux coûts environnementaux et financiers évités contribuerait également à promouvoir l'action dans ce domaine. Cela pourrait se faire par le partage de connaissances/d'expériences sur les bonnes pratiques de traitement des déchets, par l'écoute (dans le cadre de webinaires) de récits de communautés touchées par la contamination de l'eau, et par la production de dépliants de partage de connaissances. L'élaboration de guides pratiques types ou de normes d'intervention et de formations (pendant les

[11] Économie circulaire : définition, importance et bénéfices | Actualité | Parlement européen (europa.eu)

exercices, par exemple) sur l'identification et la gestion des déchets et de l'eau faciliteraient les initiatives nationales dans ce domaine. Au cours de la phase de réponse, la mise à disposition d'une expertise environnementale faciliterait les actions nationales.

Atténuation du changement climatique

L'atténuation du changement climatique consiste à rendre les impacts du changement climatique moins graves en prévenant ou en réduisant les émissions de GES dans l'atmosphère[12]. Dans le domaine de la protection civile, l'atténuation du changement climatique comprend la réduction des émissions de CO_2 grâce au développement de capacités respectueuses de l'environnement, une meilleure planification et une meilleure sensibilisation aux questions climatiques. L'étude de référence a révélé que certaines autorités de protection civile ont déjà entamé le processus d'achat de véhicules plus écologiques. Cependant, il existe encore d'importantes lacunes en matière d'information ainsi que des difficultés liées notamment au coût et à l'efficacité dans certains contextes de crise. Il existe des possibilités de verdir la manière dont les véhicules et les équipements sont utilisés et d'envisager d'utiliser des véhicules plus écologiques ; ces mesures pourraient être soutenues par la DG ECHO. Les actions menées au niveau du MPCU pourraient servir d'inspiration au niveau national, et à cet égard la DG ECHO pourrait jouer un rôle de facilitateur dans l'acquisition de véhicules et d'équipements plus écologiques.

Encourager l'utilisation de véhicules et équipements plus écologiques (préparation). L'adaptation des pratiques de la réserve rescEU en matière d'achats de manière à favoriser les options à faibles émissions de carbone permettrait de réduire l'empreinte carbone. Cela pourrait inclure l'adaptation des appels d'offres, la collaboration avec les fabricants/fournisseurs, et l'identification d'options à faible émission de carbone à l'aide d'un logiciel de chaîne d'approvisionnement/d'achat approprié. La sélection et l'utilisation de véhicules à faibles émissions pour la réserve rescEU et l'inclusion de normes à faibles émissions dans la réserve européenne de protection civile (ECPP) permettraient de réduire l'empreinte carbone des opérations.

Repenser les transports et l'utilisation des équipements (préparation et réponse). Le recensement des capacités détaillées de la réserve rescEU/de l'ECPP (véhicules, équipements) dans chaque pays hôte (localisation géographique précise, type exact de véhicules/équipements) et le suivi de leur utilisation dans les opérations du MPCU contribuerait : (i) à établir les distances parcourues par les différents véhicules et équipements et donc leur empreinte carbone ; (ii) à indiquer clairement où se trouvent les différents véhicules et équipements, afin de sélectionner les véhicules situés au plus près d'une crise (ce qui pourrait minimiser la distance à parcourir et augmenter la vitesse de réponse).

Fournir et faciliter les connaissances nécessaires en matière de financement de véhicules et d'équipements plus écologiques pour les États membres et les États participants (préparation et réponse). Cela pourrait se faire en fournissant une liste des options de financement disponibles et/ou en proposant de nouvelles subventions ou en adaptant les subventions existantes afin de faciliter l'achat de véhicules et d'équipements plus écologiques. La réalisation d'études détaillées sur le coût des biens utilisés sur leur cycle de vie et sur leurs émissions de GES contribuerait à sensibiliser non seulement à la question des coûts initiaux, mais également à d'autres avantages, dont notamment un coût global de possession moins élevé. Rechercher et fournir des informations ou des recommandations concernant les logiciels pertinents permettant d'estimer les émissions globales tout au long de la chaîne de valeur des biens (émissions de catégorie 3).

Repenser les transports et l'utilisation des équipements (réponse). La définition des typologies d'interventions et des phases de réponse, y compris les types de véhicules et les modes de transport qui pourraient être envisagés pour chaque type ou phase, pourrait faciliter les choix en faveur de l'utilisation de véhicules et d'équipements à faibles émissions. Par exemple, lors de catas-

[12] What is the difference between adaptation and mitigation? (Quelle est la différence entre l'adaptation et l'atténuation ?) — Agence européenne pour l'environnement (europa.eu)

trophes urbaines, les véhicules électriques de petite taille pourraient être préférables aux véhicules plus importants. De même, pendant la phase de retour, le transport pourrait être retardé afin de privilégier des options de transport à faibles émissions.

Leviers et actions à court terme

La DG ECHO dispose de plusieurs leviers pour mettre en œuvre le verdissement au sein du MPCU et faciliter les actions des États membres et des États participants. Il s'agit notamment d'intégrer le verdissement dans la formation et les exercices, de renforcer les subventions disponibles et leur utilisation, d'élaborer des guides pratiques et des normes d'intervention, et de faciliter le partage des connaissances et des informations. Plusieurs actions pouvant produire des résultats à court terme ont été identifiées, dont notamment les suivantes : (i) Création d'une plateforme sur le verdissement et lancement d'autres travaux sur la collecte de données (y compris en ce qui concerne l'emplacement des bases opérationnelles pour les véhicules/équipements, les indicateurs et les définitions dans ce contexte) ; (ii) Organisation du partage des connaissances et élaboration de fiches d'information sur les principaux sujets en matière de verdissement ; (iii) Élaboration d'une liste publique de produits et de fournisseurs à faible consommation d'emballage ; (iv) Recensement des options de financement disponibles pour les États membres et les États participants afin de soutenir l'achat de véhicules plus écologiques ; et (v) Création d'une section environnementale au sein du Centre de coordination et de la réaction d'urgence (ERCC) avec l'appui du réseau européen en charge du partage de connaissances en matière de protection civile.

1 INTRODUCTION

This report constitutes the final deliverable of the study on 'Greening[13] the Union Civil Protection Mechanism'. The study was launched under the framework contract CLIMA.A4/FRA/2019/0011. The study commenced in June 2022. The study has been implemented by COWI A/S.

The study is a 'scoping study'. Based on consultations with a wide range of stakeholders and on a literature review, the study provides the broader picture of the current situation and trends regarding greening in relation to civil protection, and it provides suggestions on how to promote the greening of the UCPM and the role that DG ECHO could play in this – together with Member States and Participating States. The study's objective and scope are further elaborated below.

1.1 Study objective and scope

The study aims to investigate paths towards more ambitious actions to reduce the environmental impact of civil protection in the context of the Union Civil Protection Mechanism (UCPM), and thereby to provide a concrete contribution to the European Green Deal (EGD). The study finds that there is scope to improve the environmental performance of civil protection without hindering response effectiveness. This can be achieved through: (i) data collection to estimate baseline environmental footprint, establish indicators and track progress; (ii) grants to help finance greening of capabilities to improve disaster resilience and crisis management; (iii) feedback loops to ensure environmental lessons from crisis response lead to actions that reduce environmental impacts from crises, make communities more resilient and improve response effectiveness; (iv) circular economy and waste management actions to reduce, reuse and recycle better, and prevent water contamination; and (v) climate change mitigation by reducing greenhouse gas emissions, especially from transport. The Union Civil Protection Knowledge Network (Knowledge Network) is a relevant instrument for the sharing of knowledge and best practice[14]. This study has focused on initiatives that could be promoted by DG ECHO in cooperation with Member States and Participating States, building on recent experiences and practices and the need to keep progressing.

In investigating opportunities to achieve this ambition, the study considered priority areas listed in the Terms of Reference[15], and categorised them according to whether they relate to prevention, preparedness, or response. Further, the study investigated the state of play and further greening opportunities through a literature review and consultations with stakeholders (national civil protection authorities, stakeholders from related fields such as humanitarian aid and defence, the civil protection supply chain, transport and logistics suppliers). Concretely, the study addressed seven primary objectives, as defined in the Terms of Reference:

1. Assess the carbon footprint of civil protection;
2. Provide an overview of policy evolution in Member States/Participating States;
3. Provide an overview of relevant policy evolutions and greening activities in other fields with a possible impact on the greening of civil protection;
4. Provide an overview of current greening activities in the area of civil protection;

[13] Make less harmful to the environment, furthermore a draft definition specifically related to civil protection is recommended

[14] Specific Terms of Reference, Study on Greening of the Union Civil Protection Mechanism under Framework Contract CLIMA.A4/FRA/2019/0011.

[15] Note that the Terms of Reference provides the full description of each of these objectives.

5. Map out further incentives to green the UCPM and identify the potential role for the Commission therein;
6. Provide recommendations for developing a strategy for the further greening of the UCPM;
7. Present recommendations for developing a catalogue of best practice for greening initiatives.

1.2 Study approach and methodology

To meet the above objectives, the study was conducted in two phases, each of which is reported separately. Firstly, the baseline study, essentially relating to objectives 1-4 above. Secondly, the synthesis, focuses on objectives 5-7 above and constitutes this report.

The key findings are summarised at the start of each relevant chapter in this report. Where more detail is considered important, is included in the Annex Report to this report and in Appendix F. The Annex Report provides specific chapters on prevention, preparedness, and response, as well as on the identified horizontal issues (impacting prevention, preparedness and response). Appendix F to this report provides the analysis of the current carbon footprint.

The baseline describes the current state of greening practices in the UCPM, national civil protection authorities and other related fields (e.g., humanitarian aid and defence, the civil protection supply chain, transport and logistics suppliers). The baseline description builds on an extensive literature review and consultation process, with a focus on providing a comprehensive overview of the current situation. The baseline analysis in particular addresses the following issues:

- Identifying examples of 'greening initiatives' (implemented or planned/considered) that could serve as inspiration or stepping stones for possible further initiatives in the context of the UCPM (the study also includes greening initiatives of relevance mainly to the national level, where the DG ECHO support was indicated as potentially helpful by national civil protection authorities);
- Identifying perceived gaps and needs amongst stakeholders in promoting a greener approach to disaster prevention;
- Analysing the current carbon footprint of civil protection transport based on availability data.

To inform this work five focus group sessions were conducted. All Member States/Participating States were invited to participate in one such focus group. A summary of the outcomes is found in Appendix E.

Appendices A and B to this report provide the list of consulted literature and the list of bilateral interviews conducted as part of preparing the baseline. Appendix D provides a structured overview of the potential interventions to promote the greening of civil protection as they have been identified in literature and/or through interviews. Identified interventions include those suggested by stakeholders (especially by Member States/Participating States but also by the wider stakeholder community where ideas or existing actions were considered of potential relevance in the context of the UCPM) as relevant examples of their efforts or ideas to promote greening of civil protection. Further, it also includes areas identified in the consultation process where future initiatives in the context of the UCPM could play an important role in promoting the greening of civil protection (gaps and needs). Appendix D is organised so that a distinction is made between:

- Horizontal issues, i.e., issues that extends across prevention, preparedness, and response;

- Prevention related issues;
- Preparedness related issues;
- Response related issues.

The identified interventions are presented in tables in the Appendix. The tables thus provide summaries of the key baseline observations *with regard to observed actions and identified gaps*. The table should, however, not be seen as a set of recommendations for further action. Rather, it summarises the key baseline findings related to perceived needs and gaps, as well as existing interventions. Thus, the table is intended to provide an overview of the baseline findings that underpin the forward-looking analysis provided in this report.

Each of the tables in Appendix D provides, for each identified intervention, a summary explanation of what the intervention is and how it contributes to greening. Thereafter, it summarises or provides example of real-life experiences with the intervention[16]. The table does not seek to evaluate the different interventions. However, it does provide an assessment of whether the identified intervention is relevant in the context of the UCPM and hence in the context of this study. Lastly, the table indicates whether an intervention relates to one or more of the identified priority actions that were listed in the Terms of Reference (included at the end of the Appendix for ease of reference). More detailed explanations and background for the different interventions are provided in the Annex Report to this main report.

As part of the baseline analysis, working definitions were developed. A working definition of 'greening' in the context of the UCPM has thus been developed for the purpose of this study. Further, and again for the purpose of this study, the environmental themes that ren-der themselves particularly relevant when discussing greening the UCPM have been identified. These working definitions are found as Text Box 2-1 and Text Box 2-2 in Chapter 2.

The baseline observations are reported on as shown below.

Table 1-1 Structure of baseline study elements (See Annex Report for specific contents)

Section	Scope
Annex Report: Chapter on horizontal issues	Explain findings from literature review, bilateral interviews with stakeholders and focus group sessions with Member States and Participating States – setting out activities undertaken that may constitute a basis for or inspire more promotion of greening in the context of the UCPM and setting out key observed needs and gaps to address the objective of a greener UCPM. While interviews and focus groups were planned to be conducted along the lines of the priority actions for consideration set out in the Terms of Reference, discussions with stakeholders also identified essential horizontal and important issues. Consequently, they are discussed in the first of these four chapters.
Annex Report: Chapter on prevention	
Annex Report: Preparedness	
Annex Report: Response	
Appendix F of this report: Methodologies and illustrative calculations of UCPM transport-related carbon footprint	This appendix sets out the ideal methodologies for assessing the carbon footprint, it discusses the related feasibility, and it applies the well-to-wheel approach to provide illustrative calculations for

[16] Or, at times, where there is no experience, it notes that it is included because there is a perceived need for it amongst stakeholders.

	selected vehicles and uses that is the basis for developing corresponding illustrative calculations at the level of specific interventions.

1.3 Baseline analysis

The baseline analysis identified several key needs, many of which are under implementation by some national civil protection authorities, defence, or humanitarian aid agencies, and which may serve as inspiration for the UCPM. The baseline findings are summarised at the start of each chapter and include the following:

- Developing a clear definition of greening within the context and accompanying indicators and targets.
- Improving data to develop indicators and monitor progress, as well as to estimate and monitor CO_2 emissions and other environmental footprints of civil protection.
- Increasing financial resources (and knowledge of financing opportunities) for the purchase of greener transport and equipment.
- Encouraging further greening through the grant system through inclusion of greening in criteria.
- Improving feedback loop reporting and information sharing within and beyond the civil protection community to assess the effectiveness of greening measures and to share information on what prevention measures could have reduced the impacts of disasters.
- Greening the supply chain to reduce packaging and carbon emissions up the value chain, by working with suppliers/manufacturers and using software that facilitates this, including for equipment and consumables.
- Improving waste management to ensure no trace is left behind, including using (green) incinerators, recycling, removal and otherwise safe disposal of products (including medical waste).
- Ensuring water sources are not contaminated during responses by implementing relevant guidelines/SOPs, providing relevant training, support and ensuring suitable equipment is incorporated into response teams, as well as reducing 'forever chemical' use in firefighting.
- Leading studies into lifetime cost of ownership and emission reductions from cleaner vehicles to better assess whether up-front costs are outweighed by reduced running costs.

1.4 Greening of civil protection: the way forward

Building on the findings of the baseline study, recommendations to further promote greening in the context of the UCPM are identified by addressing the final three of the seven study objectives listed above (repeated below).

5. Map out further incentives to green the UCPM and identify the potential role for the Commission therein.
6. Provide recommendations for developing a strategy for the further greening of the UCPM.

7. Present recommendations for developing a catalogue of best practice for greening initiatives.

The recommendations put forward in this report are clustered by themes. The themes emerged from the baseline observations. These are: conceptualisation and data; disaster resilience grants; feedback loops; circular economy and waste management; and climate change mitigation.

Objectives 5 and 6: For each theme, the analysis presented in this report sets out what the theme is about in the context of the UCPM. This is followed by an analysis that does the following:

- Sets out how incentives in this thematic area would contribute to the overall objective of greening the UCPM.
- Discusses how the effectiveness of response may be impacted by implementing greening initiatives. This is a concern that was raised by many stakeholders, and it is embedded also in the working definition of what greening means in the context of the UCPM (see Text Box 1).
- Analyses essential barriers and feasibility considerations. Only through addressing perceived or real barriers and feasibility considerations will incentives succeed in contributing to greening.
- Last, the chapter on each theme concludes by providing concrete recommendations for actions that could be taken by DG ECHO in the context of the UCPM to promote the specific theme.

Objectives 6 and 7: The thematic recommendations constitute the basis of a strategy as well as a catalogue of best practices. It should be noted that the scope of this study is broad. The study was guided by the 'priority actions for consideration' provided in the Terms of Reference[17] (also reproduced in detail on the last page of Appendix D). However, interviews and focus groups brought further perspectives, gaps and challenges into the picture that have also been taken into consideration. An essential output of the study is thus identifying the main themes and potentially relevant greening actions within each theme. However, it has not been within the scope of this

[17] The priority actions are: (1) prevention: (i) mainstreaming prevention proposals; (ii) civil protection included in portfolio of thematic expert on environment. (2) Preparedness: (i) carbon footprint data and recommendations for reduction; (ii) greener development and upgrade/repair of response capacities through recommendations for standards/procurement to take into account as a minimum; (iii) minimum standards for greener transport and logistics to be promoted through policies and with a transitional period when applicable; (iv) prepositioning of capacities; (v) including environmental aspects into exercise and training activities through recommendations. (3) Response: (i) carbon footprint data and recommendations for reduction relating to the transport of goods and people, including limiting prolonged transport, even if cheaper; (ii) greener deployment through recommendations for guidelines taking into account minimum the following elements; (iii) establishing an environmental section in the ERCC to develop and maintain expertise; (iv) leave no trace behind promoted through guidelines; (v) purchase of in-kind assistance locally promoted through SOPs and guidelines thereby limiting the transportation of heavy in-kind assistance and replacing it by cheaper in-kind assistance; (vi) best practice for greening shared through the lessons-learnt programme; (vii) the use of environmental experts through mainly online counselling promoted through recommendations for SOP for this

study to undertake the detailed assessment of impacts and effectiveness of possible actions by DG ECHO to promote the greening of the UCPM (e.g., the exact impact on CO_2 emissions of a specific action). This would demand a more targeted data collection and stakeholder consultation guided by a narrower selection of possible actions from the onset. This study can, however, constitute an important basis for this selection.

1.5 Structure of this report

The report structure is set out below. Chapters 3-7 are organised according to the analytical steps explained above. It should be noted that these chapters discuss the theme in question across the disaster management cycle (prevention, preparedness, and response), and include a final section on how the theme in question could be promoted through the UCPM. The concluding section always distinguishes between the three stages: prevention, preparedness, and response.

Table 1-2 Structure of the final report

Chapter		Scope
1	Introduction	Study background, objectives, and scope; approach and methodology; structure of report
2	Greening in the context of UCPM	The study context; key working definitions
3	The role of conceptualisation and data in greening of the UCPM	Each chapter sets out: What the theme is about How it contributes to greening of the UCPM Whether there is a risk that it could negatively impact the effectiveness of response Observations relating to feasibility and barriers How the theme could be promoted through the UCPM
4	The role of disaster resilience grants in greening of the UCPM	
5	The role of feedback loops in greening of the UCPM	
6	The role of circular economy and waste management in greening of the UCPM	
7	The role of climate change mitigation in greening of the UCPM	
8	Recommendations for the further greening of the UCPM, also including recommendations for developing a catalogue of best practice	Translating the conclusions from the preceding chapters into a coherent set of recommendations to green the UCPM Identifying areas where best practice could play an important supporting role in promoting the greening of civil protection
Appendices		A. Stakeholder consultation activities B. List of consulted literature C. Focus groups D. Overview of identified relevant actions and needs identified in the baseline study E. Greening of civil protection in Member States and Participating States: key observations F. UCPM related carbon footprint
Annex Report		Baseline findings on existing/planned/needed initiatives of relevance to the greening of civil protection: Horizontal issues Prevention Preparedness Response

2 GREENING IN THE CONTEXT OF THE UCPM

This chapter begins with a short explanation of the rationale for the greening of the UCPM. It also provides a working definition of what greening means in the context of the UCPM. The working definition has been developed in the context of this study and for the purpose of this study only. Thereafter, the chapter summarises the objectives of the UCPM, provides definitions of disaster prevention, preparedness and response, and the essential actions in the context of the UCPM including the role of the Commission. Last, the chapter further adds to the definition of greening in the context of UCPM by setting out the key environmental themes that are particularly relevant when considering the objectives and actions related to the UCPM.

2.1 Rationale for the greening of the UCPM

Climate change and environmental degradation are existential threats to the world. An overarching ambition of the European Union is to transition into a modern, resource-efficient and competitive economy while ensuring carbon neutrality by 2050, an economy that decouples economic growth from resource use and ensures that no person or place is left behind. This is enshrined in the European Green Deal (EGD). These ambitions call for an effort to be made throughout the European economy and European society.

The progressive approach to make the UCPM actions greener and more sustainable was emphasised during the French Presidency of the Council of the European Union (2022). Member States agreed to 'make civil protection operations greener and more sustainable in all phases of the disaster management cycle and promote research, innovation, and knowledge sharing. This includes its external action, also taking into consideration that climate change is one of the key drivers of an increasing number of crises globally'[18].

In addition, citizens of the EU are facing new geopolitical and energy market realities and their societal impact following Russia's invasion of Ukraine in February 2022. These tragic events further highlighted the need to accelerate the energy transition, including green and sustainable solutions. This reflects the pillars of the REPowerEU. Against this background, it is relevant to consider whether there are opportunities for greening in the context of the UCPM – opportunities that are today not fully captured – and how to realise these opportunities.

For the purpose of this study, a working definition of what greening means in the context of the UCPM has been developed. However, it should be noted that this definition solely serves the purposes of this study. To apply it more widely and generally, it would need to be thoroughly discussed and defined with stakeholders. This concretisation could, among other things, aim to specify in more detail the environmental areas where greening would be of most relevance in the context of the UCPM[19].

[18] 7146/22 'Council conclusions on civil protection work in view of climate change'.

[19] Text Box 2-2 provides a summary of the key themes that this study has identified as being most relevant in the context of the UCPM.

Text Box 2-1 Working definition of what constitutes greening in the context of the UCPM

Green solutions are measures that reduce the environmental footprint/impact of prevention, preparedness, and response activities. They not only mitigate negative environmental impacts but can also have positive outcomes for the natural environment. Greening of civil protection means that *feasible* green solutions, investments, and behaviours are chosen *on the condition* that the *effectiveness* of disaster response is not put at risk, nor negatively impacts prevention measures. Green solutions, investments, and behaviours should be feasible in terms of costs implications, skills needs and availability of the needed goods and services (implying that some options may be feasible in the short term, while others may become more feasible over time). Greening of civil protection would relate to all activities and decisions along the disaster management cycle: prevention, preparedness and response, but not to the day-to-day operations of facilities and staff since this falls under the purview of general greening initiatives within the Commission. The 2013 Decision on the Union Civil Protection Mechanism,[20] and later revisions, lay down the objectives, definitions and sets the scope for greening of the UCPM.

2.2 Scope of the UCPM: objectives and actions

The objective of the UCPM, provided in Decision No 1313/2013/EU (Article 1.1) is 'to strengthen the cooperation between the Union and the Member States and to facilitate coordination in the field of civil protection in order to improve the effectiveness of systems for preventing, preparing for and responding to natural and man-made disasters.' Under Article 1.3, the UCPM 'shall promote solidarity between the Member States through practical cooperation and coordination, without prejudice to the Member States' primary responsibility to protect people, the environment, and property, including cultural heritage, on their territory against disasters and to provide their disaster-management systems with sufficient capabilities to enable them to cope adequately and in a consistent manner with disasters of a nature and magnitude that can reasonably be expected and prepared for.' Article 1.2 further lays out that protection under the UCPM shall cover primarily people, but also the environment and property.

To set the framework and to properly delineate the exercise of assessing greening options in the context of UCPM, it is useful to recall the above objectives and the following definitions and actions related to the UCPM that are relevant to greening. The UCPM provides relevant definitions for response, preparedness and prevention related to specific objectives and sets out UCPM actions (Articles 5-18) in the context of UCPM. The definitions are set out below, followed by a summary of the key actions of relevance to greening.

Prevention is defined in Article 4.4[20] as any action aimed at reducing risks, or mitigating adverse consequences of a disaster for people, the environment and property, including cultural heritage.

Preparedness is defined in Article 4.3[20] as a state of readiness and capability of human and material means, structures, communities and organisations, enabling them to ensure an effective rapid response to a disaster, obtained as a result of action taken in advance.

Response is defined in Article 4.2[20] as any action taken upon request of assistance under the Union Mechanism in the event of an imminent disaster or during or after a disaster, to address

[20] Decision No 1313/2013/EU of the European Parliament and of the Council of 17 December 2013 on a Union Civil Protection MechanismText with EEA relevance (europa.eu), Chapter 1, Article 1.

its immediate adverse consequences. The coordination in the context of the UCPM contributes to rapid and efficient response in the event of disasters or imminent disasters.

To scale up prevention and preparedness in the Union, DG ECHO has established various instruments. Among these are voluntary peer reviews, namely a tool for sharing good practices where an independent team of experts is deployed to different countries. In addition, the UCPM may support with prevention and preparedness advisory missions, by deploying experts from Member States and Participating States to provide tailor-made support and advice for better response to the negative impacts of natural and human-induced hazards. Scientific analysis and expert support may also be provided upon request. Under prevention and preparedness, projects may be financed which lead to improved cross-border cooperation in the area of disaster prevention and preparedness. Shared knowledge and expertise, good practices and networking are facilitated.

The EU Civil Protection Knowledge Network (henceforth: the **Knowledge Network**) promotes research and innovation and the uptake of scientific knowledge into civil protection and it facilitates the sharing of skills and good practices. In this way, the Knowledge Network contributes to improving prevention, preparedness, and response. Activities within the Knowledge Network include a training and exercises programme, an exchange of experts programme, a lessons-learnt programme, scientific advice and innovation, thematic workshops and conferences, community engagement and partnership facilitation. The training and exercises programme aims to enhance the coordination, compatibility and complementarity of capacities and to improve the skills of experts. The exchange of experts programme aims to foster exchange of expertise and best practice in the area of disaster management. DG ECHO manages a programme of lessons learnt from civil protection actions conducted in the context of the UCPM. These provide a basis for knowledge development, sharing lessons learnt, and the promotion of the changes based on these lessons learnt. In addition, it provides the basis for the development of methods and tools for gathering, analysing, promoting and implementing actions based on lessons learnt. Last, the use of new technologies for the purpose of the UCPM is encouraged and stimulated.

In terms of response, when a country is hit by a disaster which overwhelms its response capacity, it may request assistance via the UCPM. The UCPM then triggers the ERCC to mobilise assistance or expertise from UCPM Member States and Participating States. The Emergency Response Coordination Centre (**ERCC**) operates 24/7 to support Member States and Participating States (as well as other countries) in responding to requests for assistance under the Mechanism. The response can make use of Member States' capacities, from the European Civil Protection Pool, rescEU, or voluntary/ad hoc offers.

The **European Civil Protection Pool (ECPP)** is a pool of voluntarily pre-committed response capacities of the Member States and Participating States and include modules, other response capacities and categories of experts. Countries that participate in the UCPM make these resources available for UCPM emergency response operations. The pool includes resources such as urban search and rescue teams, forest fire fighting capacities, emergency medical teams, water purification equipment, high-capacity pumping units, etc. Resources in the pool are available for immediate deployment worldwide, following a request for assistance through the ERCC. The Commission defines the types and specifies the number of key response capacities required, defines quality requirements for the response capacities that Member States and Participating States commit to, and establishes and manages the process for certification and registration of the response capacities that Member States and Participating States make available to the European Civil Protection Pool. The Commission awards adaptation grants to co-finance up to 75% of the

costs of upgrading or repairing ECPP capacities, after or before they are certified, so they are fully operational for UCPM response operations.

rescEU was established in 2019, providing an extra layer of protection. rescEU is a European reserve of resources, that will ultimately include a variety of assets, such as firefighting planes and helicopters, medical evaluation planes, stockpiles of medical items, shelters, emergency medical teams, transport and logistics, chemical, biological, radiological, and nuclear (CBRN) assets. The Commission defines the minimum standards for rescEU capacities, in agreement with Member States, and finances up to 100% of the costs of developing a rescEU capacity.

Apart from the financing of the above-described actions of the UCPM, financial support can also be provided for other related actions. Those of possible relevance to promoting the greening of civil protection are summarised below.

Table 2-1 Examples of actions eligible for support (in supplement to the financing of coordinating functionalities and responsibilities of the UCPM)[21]

Stage	Examples of eligible actions
General	Studies, surveys, modelling, and scenario building to facilitate the sharing of knowledge, best practice and information
	Training, exercises, workshops, exchange of staff and experts, creation of networks, demonstration projects and technology transfer
	Monitoring, assessment and evaluation actions
	Public information, education and awareness raising and associated dissemination actions
	Establishment and running of a programme of lessons learnt from interventions and exercises in the context of the UCPM including on areas relevant to prevention and preparedness
Prevention and preparedness	Co-financing of projects, studies, workshops, surveys and similar actions to strengthen and improve prevention
	Supporting training, exercises, lessons learnt and knowledge dissemination in the field of preparedness
	Financing in full the development and maintenance of rescEU response capacities, as well as costs related to deployments
	Costs related to certification of capacities for the purposes of the ECPP
	Non-recurrent costs necessary to upgrade or repair a response capacity from a national use to a state of readiness and availability that makes them deployable as part of the ECPP. The eligible 'adaptation costs' may include costs related to interoperability, autonomy, self-sufficiency, transportability and packaging

[21] Source: Decision No 1313/2013/EU.

Response	Financing transport resources necessary for ensuring a rapid response to disasters up to 55% of total eligible cost, and up 75% if the costs relate to capacities pre-committed to the voluntary pool or when the assistance is necessary to address a critical need. Further, costs related to pooling may be covered 100% if this relates to short-term rental of warehousing capacity, re-packaging, and/or the local transport of pooled assistance. rescEU is 100% financed.

2.3 Thematic areas for greening of civil protection

The following thematic areas are potentially relevant for greening the UCPM. Each thematic area is well reflected in the European Green Deal Policy (EGD) Objectives.[22] The basis for setting out these tentative thematic areas is twofold: a) the inputs and considerations provided through the consultations of stakeholders; and b) the consultant's assessment of the activities inherent in civil protection activities and their greening potential.

Text Box 2-2 Tentative identification of thematic areas of relevance for the greening of civil protection in the context of the UCPM developed for the purposes of this study

Circularity: Put simply, circularity is about reducing resource use and reducing waste generation. Thus, circularity involves moving away from the linear 'take-make-use-dispose' model and transitioning to a regenerative growth model. In a circular economy, the value of products, materials and resources is maintained in the economy for as long as possible, and the generation of waste is minimised. Circularity is promoted at all stages through, for example, product design, repairability, repurposing, recycling, reuse and refurbishment. In the context of the EGD the need for transitioning the industry to a clean and circular economy is promoted through a range of large-scale policies in the fields of sustainable products, reduction of single use plastics, and waste reduction.

In the context of civil protection, circularity considerations can directly influence the environmental footprint of a response intervention. This can apply to equipment and to goods that are mobilised. Circularity during a response can be promoted through, for example, emphasising re-use of relevant goods and minimising waste generation.

Circularity can also be promoted through the way that preparedness actions are undertaken, e.g., embedded into the organisation and the planning of training and exercises. Ensuring the embedding of circularity considerations at the response stage are largely influenced by the extent to which circularity has been taken into consideration at the preparedness stage.

Climate change mitigation: Climate change mitigation is considered through several EGD objectives: increasing the EU's climate ambition, boosting clean energy production, sustainable and smart mobility, building renovation and energy efficiency.

In the context of the UCPM, climate change mitigation is about reducing the carbon footprint from crisis response. To a large extent this relates to the CO_2 emissions resulting from response activities. Climate change mitigation can be achieved by reducing emissions from transport – for example, through reduced mileage, changes in the transport modalities, or the use of cleaner vehicles. CO_2 emissions can also be reduced through the use of cleaner fuels to operate equipment. Increasing energy efficiency of on-site infrastructure and buildings used can also decrease the carbon footprint. As with circularity, the carbon footprint of response actions is to a large extent determined by decisions taken and actions undertaken at the preparedness stage.

Nature and biodiversity: The EGD stresses the importance of maintaining crucial ecosystem services to society by preserving and restoring ecosystems and biodiversity.

In the context of disaster management, response can help to reduce the destruction of nature and biodiversity that results from a disaster. Ecosystems can be protected by the ability to respond to disasters, including limiting the destruction of nature and biodiversity, but response can also leave a negative impact

[22] https://eur-lex.europa.eu/resource.html?uri=cellar:b828d165-1c22-11ea-8c1f-01aa75ed71a1.0002.02/DOC_1&format=PDF

on nature and biodiversity. Examples of nature and biodiversity being negatively affected by response activities could include forest fighting in vulnerable areas, and waste that is not properly taken care of, resulting in the pollution of drinking water reservoirs and soils. This also links to the zero-pollution ambition for a toxic-free environment as part of the EGD objectives – to prevent air, water soil and soil pollution.

Promoting nature-based prevention rather than built defences such as sea walls, where possible, can contribute to better protection of nature and biodiversity, whilst at the same time providing equally effective prevention solutions.

New ways of responding, some of which need to be made feasible through actions taken at the prevention stage, can contribute to a lower environmental footprint of civil protection. Timely and appropriate prevention contributes to reducing the inherent environmental and climate impact of response activities.

3 THE ROLE OF CONCEPTUALISATION AND DATA IN GREENING OF THE UCPM

3.1 What it is

Through the European Green Deal, the EU has agreed on several specific objectives related to the green transition. They include targets such as climate neutrality by 2050, and the zero-pollution objective for 2050. Civil protection will need to adapt to the changing regulations. Yet, there is still much uncertainty attached to the concept of greening among civil protection stakeholders. Clarifying what it means within the context and developing resulting indicators would help to focus attention on the key issues and track progress over time.

Text Box 3-1 Overview of baseline findings: Conceptualisation and Data (source: Annex Report)

Conceptualisation and Data

A lack of a clear definition of greening civil protection and the need for a joint understanding was expressed by stakeholders to be able to conceptualise greening measures. Specifically, the following points were highlighted by stakeholders:

- A lack of indicators to assess progress towards sustainability goals;
- The need for EU-wide guidelines (provided by the EU Commission) and indicators to assess the environmental performance of civil protection and point out further areas for development;
- Collecting and sharing data on greening relevant areas (CO_2 emissions, procurement data etc.), e.g., through the Knowledge Network or risk data hub;
- The need for training and workshops specifically targeted at identifying and embedding greening aspects in operations.

GHG emission data at response stage

The illustrative carbon footprint analysis conducted (see Appendix F) points to the need for the collection of more specific data from response activities to determine the CO_2 footprint. In particular, the calculation and monitoring of transport-related GHG emissions require a data collection framework and consistent method of analysis, coordinated by DG ECHO. Data collection and monitoring could be conducted through the following means.

- Before interventions: collection through Part A forms on the transport journey aspects of the country requesting assistance. Key metrics such as the number/type/fuel consumption and type/load of vehicles, the distance and duration of trips would have to be included.
- After interventions: collection of actual energy/fuel consumption data by DG ECHO (on-site and journey back) through a dedicated form to be filled out by Member States/ Participating States, to be compared with initial data collected before interventions. Thereby annual statistics can be calculated to monitor the evolution of the UCPM transport carbon footprint as well as the CO_2 impact of DG ECHO decisions in transport.

In the context of this study the thematic areas of circularity, climate change mitigation and nature and biodiversity for greening civil protection across prevention, preparedness and response have been identified as especially relevant to the greening of the UCPM – as explained above. The conceptualisation of greening civil protection is understood as breaking down the thematic areas into specific civil protection working fields/actions and how types of actions could be made greener in line with the overall definition (see, for example, the working definition provided in Text Box

1-1). An example of what it would mean is illustrated by DG ECHO's *Minimum Environmental Requirements and Recommendations*[23] for humanitarian aid.

A way to conceptualise greening could be to apply the greening principles to prevention, preparedness, and response, a first step of which is already being taken in this study. Furthermore, the principles should be made operational in relation to each disaster, whether human-induced or natural.

The second element under this heading is about data. It relates closely to the conceptualisation of greening, as the baseline and progress on greening concepts need to be supported by data to be traceable and measurable. Data that describe, possibly by means of indicators, the current carbon and environmental footprints would form the basis for understanding where civil protection is now and what could be specific future targets and thereby what is required to reach the target. This is something that will take some time (and is out of the scope of the present study) and is likely to require a specific team or focus group since the challenge of identifying suitable indicators, establishing the appropriate frameworks to gather data to populate the indicators and the task of collecting the data itself should not be under-estimated. Thus, the level of ambition would need to be balanced with practical feasibility. In that regard, the active involvement and buy-in from stakeholders from the beginning is essential, and they will play a key role in providing data to populate the indicators.

3.2 How can better data contribute to greening of the UCPM?

Developing a detailed operational definition of greening (as described above) and related indicators of what greening means across all UCPM activities could assist in generating awareness and understanding among all stakeholders of what is needed and why. This would also provide a common understanding of the direction and the rationale behind it and help to generate knowledge to support better decision making: a better understanding of 'what matters the most'.

While the impacts are indirect, working to develop a clear definition of greening and related indicators is likely to play an important role in providing the foundation and knowledge for promoting other initiatives (set out in the remainder of this report). More awareness and knowledge will allow and incentivise stakeholders to better integrate guidelines, knowledge, lessons learnt and other more concrete elements into their approaches.

3.3 Impact on the effectiveness of response

Conceptualisation of greening is an important element for stimulating a change in the culture and mindset of civil protection stakeholders. It contributes to and supports efforts to convey how civil protection can be made greener in its actions without jeopardising the effectiveness of response.

The impact on the effectiveness of response is an important and fundamental concern of many stakeholders, and this concern is further accentuated by an expressed uncertainty and lack of knowledge among some stakeholders with regard to the opportunities and need for greening civil protection. Acknowledging this valid concern explicitly in the work on definitions and indicators would thus be essential. At the same time, sharing examples of greening as they occur in related sectors demonstrates how efforts can be made without jeopardising response and, indeed, highlights ways that response could even be enhanced.

[23] DG ECHO's minimum environmental requirements and recommendations

3.4 Feasibility and barriers

Based on the definition of greening as set out above, key stakeholders should be engaged to promote the acknowledgment of and interest in the greening aspirations. DG ECHO could play an important role in steering and coordinating these efforts.

To ensure that the definitions that have been produced are workable and sufficiently integrate relevant EU policies and policy trends, it may also be necessary to consult with other EU entities, especially but not solely from within the Commission. This requires time and coordination. Of particular relevance may be the EU taxonomy for sustainable activities, which defines what and under what circumstances an activity can be considered to be sustainable[24]. Also, key stakeholders, especially Member States and Participating States should be consulted/involved in the elaboration of the definition.

Establishing indicators to monitor the level of greening is feasible, yet the exercise needs to be carefully limited to focusing on what matters the most and on areas where it is assessed that good indicators can be developed, and frameworks created for collection of the needed data. This study demonstrates that even in the case of transport, assessing carbon emissions is not possible with the current level of available data other than example based.

In that regard, it is worth pointing to the concept of SMART indicators, i.e., indicators that are Specific, Measurable, Achievable, Relevant and Time-bound. Taking guidance from these requirements when defining indicators and initially focusing on a pre-defined limited field, such as CO_2 emissions from transport, could be a feasible way forward. The establishment of a comprehensive data-driven list of indicators on the state of greening in civil protection would be a significant task, encompassing significant data/information collection from a broad range of sources including from up the value chain. Examples of data needs are listed below:

- Circularity
  - Quantity and fabric of packaging material, single-use material used.
  - Environmental footprint, lifetime and repairability of equipment used.
  - Harmful substances (quantities and toxicity) released through response activities/exercises.
  - Effectivity of waste recycling and waste treatment throughout response actions and preparedness activities.
- Climate Change Mitigation
  - Carbon footprint of equipment used in manufacturing and use during lifetime (based on LCA) and disposal/reutilisation/disposal.
  - Carbon footprint during training and exercises.
  - Emissions at the response stage of transported personal, equipment and goods.

[24] EU taxonomy for sustainable activities (europa.eu)

- Nature and Biodiversity
  - Exposition of natural environments to harmful substances through response actions and exercises.
  - Area of vulnerable areas affected by response activities and exercises, such as protected areas and fragile ecosystems.
  - Area of vulnerable areas affected by prevention measures, e.g., hard infrastructure.

However, even when the scope is narrowed down to only one among the above examples, investments would also need to be made in selecting, developing, and gathering data/information for indicators, and possibly external support, e.g., from JRC for data collection and aggregation, would be needed to ensure a sufficient pace in the work.

3.5 Promoting conceptualisation and data through UCPM

The work regarding definitions and indicators needs to be further detailed. DG ECHO could take this work forward, in cooperation with Member States and Participating States. This in turn would demand prioritisation and effort on the side of DG ECHO to ensure:

- The active involvement, engagement and buy-in from stakeholders;
- That agreements with and coordinating and leading the work of external contributors (e.g., JRC or external consultants), serves the purposes of the initiative in an efficient manner;
- That outputs produced are shared amongst the relevant stakeholder community including that developed definitions become 'alive' in the sense that they are used and referred to within the UCPM;
- That data is collected to an extent that makes the indicators reliable and that the resulting indicators are communicated and used.

4 THE ROLE OF DISASTER RESILIENCE GRANTS IN THE GREENING OF THE UCPM

4.1 What it is

The UCPM provides funding through various grant schemes. In this section, the disaster resilience grants are discussed. Disaster resilience grants, as specified in the multi-annual work programme, will from 2023 onwards address both prevention and preparedness through the Technical Assistance for Disaster Risk Management and the Knowledge for Action in Prevention and Preparedness (KAPP) grants. These two grant schemes cover what has been supported until 2022 under four separate calls for proposals known as: Prevention & Preparedness Track 1 & Track 2; Knowledge Network Partnership Projects and Full-Scale Field Exercises.

There are also the adaptation grants, which support preparedness by co-funding the upgrade and repair of response capacities in relation to the European Civil Protection Pool and grants for rescEU[25]. The ECPP and rescEU grants related to capacities are not covered in this section of the study but discussed in the sections on Circular Economy and Waste Management, as well as in the section on Climate Change Mitigation (see Section 6.5.1 and Section 7.5.1). During the baseline analysis (see Annex Report for baseline findings) focus group participants and interviewees pointed to the relevant role of the UCPM grants in greening civil protection.

Text Box 4-1 Overview of baseline findings: Prevention/Disaster Resilience grants (Source: Annex Report)

- Prevention grants were mentioned as a relevant source for supporting capacity building and cooperation on disaster risk management.
- More explicit greening criteria could be included in determining grant awards.
- The uptake of the grants was affected by the current level of awareness of the grants and what they can finance.

UCPM Disaster Resilience Grants provide funding to Member States and Participating States to improve their disaster risk management capabilities. While the two types of grants are different in purpose and scope, they could both play an important role in supporting the greening process.

The specifics of these two UCPM grants are presented in the text box below.

Text Box 4-22 UCPM Disaster Resilience Grants – Technical Assistance for Disaster Risk Management and the Knowledge for Action in Prevention and Preparedness

The grant schemes under the Technical Assistance for Disaster Risk Management and the Knowledge for Action in Prevention and Preparedness (KAPP) provide co-financing of projects that support Member States' and Participating States' efforts in the field of disaster preparedness and prevention. The grants are divided into two calls for proposals:

- Technical Assistance for Disaster Risk Management funding is available for capacity-building projects proposed by a disaster risk management competent authority from a single country and may cover prevention and/or preparedness activities. The available budget varies from year to year and is expected be EUR 6.5 million in 2023.

[25] Adaptation grants focus on upgrading or repairing response capacities to a state of readiness and availability that makes them deployable as part of the European Civil Protection Pool.

- KAPP funding applies to multi-country projects covering prevention or preparedness activities, including full-scale exercises. The budget for 2023 is expected to be around EUR 15 million.

Both grant schemes support projects that produce outputs such as risk analysis/assessment, prevention strategies, disaster risk management plans, feasibility studies, training, decision support systems, methodology development, information system, numerical modelling, awareness raising, capacity building, and exercises.

In summary, the produced outputs lead to knowledge building and sharing, and in this way, improve the basis for decision making on prevention and preparedness actions.

The grants support Member States and Participating States in developing their disaster risk management capabilities. The grants support studies, training, and the development of risk assessment systems and tools. However, funding is not provided for infrastructure or equipment in the Member States, which is out of the scope of these specific grants[26].

Among the Track 1 grants (which are for a single Member State/Participating State), there are examples of funded projects that serve as a basis for applying for additional EU funding (for example through the European Structural and Investment Funds (ESIF)) where equipment and infrastructure at Member State level can be supported.

Other financing opportunities also exist outside of the above grants. For example, the European Defence Agency (EDA) uses funding provided through Horizon 2020 as part of efforts to develop or demonstrate innovative greening efforts for the sector regarding sustainable energy[27].

These grants can already support some aspects of greening. Effective prevention and preparedness mean the crisis is not occurring and/or its impacts are reduced. It consequently means that environmental damage caused directly by the crisis or indirectly by the response is avoided or reduced. As will be further discussed below in relation to details of possible actions, the objectives for both the Technical Assistance for Disaster Risk Management and KAPP grants include references to nature-based solutions and green transition.

An accelerated effort towards greening in the context of the aforementioned grants could be promoted through more explicitly including environmental and climate aspects into the application procedures. Thus, applications could be required to include descriptions of how the project in question will impact the environment and climate and/or measures taken in the project implementation to reduce its environmental and climate footprints. The possible initiative described in the previous chapter on data and conceptualisation could provide an input into concretising such elements. Also, the calls could explicitly encourage applications to prepare for seeking funding for larger scale infrastructure projects thus stimulating a 'green gearing' of the grants.

A final point is that more objectives and impacts could be achieved by increasing the available funding through the Technical Assistance for Disaster Risk Management and KAPP. Nevertheless, it should be remembered that the most important EU funding instruments for disaster risk management are the ESIF and the Reconstruction and Recovery Plans.

[26] Note that the DG ECHO adaptation grants support response equipment and infrastructure.

[27] Consultation Forum concludes first round of defence energy deliverables (europa.eu)

4.2 How can Disaster Resilience Grants contribute to greening of the UCPM?

An accelerated greening of the UCPM disaster resilience grants could contribute to greening of the UCPM in several ways for prevention and preparedness.

Prevention: Preventing a disaster also prevents the negative environmental impacts of the disaster. Hence, by supporting prevention, the UCPM grants contribute to preventing disasters and/or reducing their impacts and thereby reduce the environmental damage (addressing all three thematic areas for greening as well as broader disaster risk management efforts). Natural disasters such as flooding and forest fires damage natural ecosystems. Thus, reducing the frequency and magnitude of such disasters reduces the damage. Most natural disasters damage physical infrastructure and assets and therefore lead to generation of waste as well as energy and material use through reconstruction. Hence, reducing frequencies or magnitudes will reduce the negative impacts in relation to circular economy and climate change.

In addition to the positive greening effect of prevention as such, prevention activities could also become greener. By choosing nature-based solutions where feasible, there will be a positive impact on the natural ecosystems (greening by increasing carbon sinks, preventing or reducing the impact of disasters and hence reconstruction efforts, as well as literally ensuring more greenery). In relation to this greening element, the frequency and magnitude of some natural disasters are affected by man-made changes to the natural environment. It means that bringing back or safeguarding existing nature to increase the resilience of natural ecosystem will reduce the risks.

Prevention actions are often the responsibility of several authorities in each Member State and Participating State and do not always involve the civil protection authorities to any great extent. Such issues are discussed below. What is relevant here is that the UCPM grants can promote these types of greening (as well as information, including lessons learnt from disasters, discussed later as feedback loops) – even though the responsibilities are in Member States and Participating States and may not be anchored with the civil protection authorities.

Preparedness: In relation to preparedness, the Technical Assistance for Disaster Risk Management and KAPP grants could finance Member States' and Participating States' efforts to develop strategies and action plans for the greening of preparedness. In this way, the grants could contribute to greening across the identified relevant themes. For example, on the circular economy and waste (see section 6), the grants could be used to prepare for green procurement of equipment. The grants cannot finance large-scale infrastructure and assets, but they can be used to support the preparation of feasibility studies and/or action plans. In this way, grants can be used to leverage additional greening efforts above and beyond their immediate value.

For the Technical Assistance for Disaster Risk Management and KAPP grants, greening could also be achieved through changing the ways that studies/projects/training financed by grants are undertaken. It could for example be that more meetings are conducted online, thereby reducing the climate change impact of the projects themselves.

4.3 Impact on effectiveness of response

The action of greening the UCPM disaster resilience grants is not likely to have any negative impact on the effectiveness of the response. The outputs of the Technical Assistance for Disaster Risk Management and KAPP grants are improved knowledge that should facilitate better decisions, along with reduced vulnerability and enhanced preparedness, which should lead to reduce damage and a more effective response.

The objective of the grants is in all cases to support the Member States/Participating States' disaster management capabilities. Therefore – if anything – the effectiveness of response would be positively affected: new ways of responding enabled through an intensified focus on prevention contribute to a greener footprint and a lower carbon footprint of civil protection. Timely and appropriate prevention contributes to reducing the inherent environmental and climate impact of response activities.

Thus, if greening the grants were to lead to studies/projects that include more considerations on greening, this could in turn improve the knowledge on greening potentials, and thereby contribute to reducing the perception that greening compromises the effectiveness of response.

For example, by supporting a feasibility study on whether equipment with a reduced environmental and climate footprint can be purchased without compromising the effectiveness of the equipment in the response phase, the grants are used to analyse such potential trade-offs and thereby improve knowledge on whether the concerns of such possible negative impacts on the effectiveness of response are justified and how they can be mitigated.

Work conducted outside of DG ECHO may also serve as inspiration for studying greening options, implementing greening actions or assessing its potential impacts. For example, as noted above, the EDA's *Consultation Forum for Sustainable Energy in the Defence and Security Sector (CF SEDSS)* facilitates knowledge sharing and studies on how to improve energy management, increasing energy efficiency and how best to incorporate or shift to sustainable energy in defence, without jeopardising its effectiveness[28].

As with any other greening actions, it should be checked in each case whether there could be any negative impact on the effectiveness of response. This is discussed further in the following section on feasibility and barriers.

4.4 Feasibility and barriers

Greening the Technical Assistance for Disaster Risk Management and KAPP grants seems to be relatively feasible. It requires changes to the objectives and criteria of the calls for proposals under the grants. It means that next time a call is published, the specific changes to the objectives and criteria could be included. However, including **more criteria** in the application process might lead to **fewer applications** and potentially therefore less support through this grant mechanism.

Enabling factors to pursue the greening of Technical Assistance for Disaster Risk Management and KAPP grants described here could include the below.

The actions on **conceptualisation** and **data** (see Chapter 3) would provide a better understanding of what greening of civil protection means in practice. This will make it easier to include guidance and examples in the calls for applications by illustrating how the prevention and preparedness activities supported by the grants could be made greener. **Having indicators on the degree of greening** would also help to document/illustrate the relevance of focusing on the greening contents of the project applications for the UCPM grants.

[28] Consultation Forum concludes first round of defence energy deliverables (europa.eu)

In addition to that, the grants could inspire wider implementation in Member States and Participating States. **Good practice examples and lessons learnt** could be developed and presented on projects financed by the grants.

Although the total available budgets for the Technical Assistance for Disaster Risk Management and KAPP grants are relatively small, they could play a very important role as **leverage for other EU funds**. Using the grants to prepare applications for EU funds, for example under the cohesion policy, could promote getting more substantial funding support to purchase preparedness equipment and/or invest in nature-based prevention solutions and infrastructure.

4.5 Promoting greening through UCPM Disaster Resilience Grants

The specific ways that greening could be promoted through the Technical Assistance for Disaster Risk Management and KAPP grants are described below.

Initially, a relatively soft encouragement could be initiated focusing on increasing the greening elements in the funded projects, followed by stricter requirements such as including greening in the criteria for applications and the award of grants.

Including greening in the objectives of the Technical Assistance for Disaster Risk Management and KAPP grants. Currently, the criteria include a set of objectives which mention some greening elements. The general objectives for Technical Assistance for Disaster Risk Management grants are presented in the text box below.

Text Box 4-3 – 3General objectives for the Technical Assistance for Disaster Risk Management grants[29]

- To support Member States' efforts to enhance their institutional and technical capacity for preparing, implementing, monitoring, evaluating and improving strategic disaster prevention and preparedness activities.
- To sustain Member States' efforts to anticipate future systemic shocks, related to pandemics and/or other hazards, by fostering a culture of prevention and by improving cooperation between the civil protection, disaster risk management, and other relevant services.
- To support the preparation and implementation of prevention and preparedness investments, strategies and reforms.
- To support new and future Participating States in fulfilling their responsibilities under the Mechanism.
- To further develop plans, procedures and/or arrangements aimed at ensuring effective cross-sectoral, cross-border or trans-national crisis prevention, preparedness and response, while ensuring integration with the overall UCPM efforts.

[29] C(2022) 9290 final *ANNEX on the financing of the Union Civil Protection Mechanism and adopting a multi-annual work programme for 2021-2025 repealing and replacing Implementing Decision C(2022) 961 final.*

For the most recent call – the one for 2022 – there were specific objectives that included a focus on the green transition, such as to facilitate access to financing for investment in disaster prevention and preparedness including for the green transition or to generate evidence and knowledge for improved policy and practice on disaster prevention and preparedness planning, climate resilience and green transition.[30]

Thus, references to the green transition are already applied, and there are similar objectives for the KAPP grants. While there is already some mention of greening, the focus on greening could be made more prominent by, for example:

- By including greening more prominently in the set of objectives; and
- By including examples and explanation on what greening would mean in order to specify how the projects in the application could be made greener.

The above-described changes to the objectives and the provision of more examples of what greening would mean in relation to different types of projects funded under the Technical Assistance for Disaster Risk Management and KAPP grants would encourage Member States and Participating States MS to increase the focus on greening. Such changes could be made as a first step as they will not increase the work required by applicants during the application process. Subsequently, based on the experience of promoting a greener focus in the grant applications, more stringent criteria could be considered.

Greening requirement as part of application selection or award criteria. To strengthen the efforts on greening, additional greening requirements could be included in the calls. Modifications to the eligibility or award criteria in the calls could lead to more projects with more focus on greening. This could be done by considering different possible types of criteria.

- A requirement to describe in the application how the project would contribute to greening.
- Criteria on specific elements to be included in the projects. For example, that projects should cover greening in relation to one or more of the main thematic areas of circular economy, climate change and nature and biodiversity.

Promoting the grants as leverage for making applications for other EU funding. This is already part of the objectives to use UCPM grants for supporting applications for other EU funding, notably those under the cohesion policy. This could be reinforced by providing examples on how it could be done and include it more prominently in the set of objectives for the calls[31].

Further streamlining of the application process. The final element which was identified through the interviews with Member States and Participating States was the perceived burdensome administrative procedures for applying for the grants that was expressed by some stakeholders. While it seems to be a relatively lean process, it is always possible to review the procedures with the aim of further streamlining it. It could be done in relation to the above-discussed actions relating to increasing the focus on greening in the calls.

[30] Single Country Grants for Disaster Risk Management ('Track 1') Annex II: Conditions for Application.

[31] Consultation Forum concludes first round of defence energy deliverables (europa.eu)

As mentioned, the procedures do not seem complex, but to increase the number of applications, the following steps could be considered:

- Prepare a simple step-by-step guidance on how to apply;
- Include examples of applications or examples of what should be part of each element/field in the application form;
- Advertise the grants and their focus on supporting disaster risk management with a green perspective so that more Member States and Participating States would become aware of their existence and how they can support Member States and Participating States.

All the above actions could lead to the DG ECHO Technical Assistance for Disaster Risk Management and KAPP grants providing more support to greening of the UCPM and of civil protection activities in Member States and Participating States.

5 THE ROLE OF FEEDBACK LOOPS IN GREENING OF THE UCPM

5.1 What it is

Feedback loops – information passed from disaster response – constitute an important part of civil protection work to share best practices and lessons learnt across Member States/Participating States. With regard to greening, focus group sessions and interviews point to the potential relevance of creating feedback loops from the response stage to the prevention/preparedness stage to learn from past disasters with regard to their environmental consequences by adapting prevention/preparedness measures accordingly (see Text Box 5-1). Based on the information collected throughout this study, two main categories of feedback loops have been identified that are relevant for the greening of the UPCM.

Text Box 5-1 Overview of baseline findings: feedback loops (Source: Annex Report)

- UCPM actors reported on a lack of feedback loops or lessons learnt on the environmental consequences of disasters[32].
- Learning from past disasters and broadly sharing this information could reduce risks and/or impacts of future disasters.
- Response actions could, accordingly, be conducted in such a way to increase the resilience of communities in the future.
- It was concluded that existing feedback loops platforms were either not broadly known and used by stakeholders, or that there is a need for additional platforms for feedback loops.

The first category relates to the sharing of lessons learnt from crisis and crisis response to prevention, to improve disaster risk management and to prevent crises or alleviate their consequences, thereby mitigating/lowering the environmental damage from crises and the need for response activities.

The second category encompasses the sharing of greening best practices gained from the response stage to inform the preparedness and response stage. This includes best practices on:

- More sustainable waste management/recycling approaches;
- The use of lower-emission vehicles in response activities;
- The use of equipment and material with a lower environmental footprint;
- Efficient transport/logistics of goods and equipment;
- The protection of biodiversity, ground water and soil;
- Considerations on the overall environmental impact of the response activity.

A range of platforms suitable for feedback loops already exist in the context of the UCPM (as explained below) and relate mainly to the sharing of knowledge and experiences on disaster risk

[32] Interview EU 3

management. The promotion of feedback loops in the UCPM could either occur through raising the awareness of greening dimensions in existing suitable platforms, thus extending their use to greening approaches, or by creating new dedicated feedback mechanisms for disaster risk reduction and greening approaches.

Raising awareness on current feedback mechanisms and extending their use.

The **EU Civil Protection Knowledge Network** already pursues the goal of supporting the sharing of knowledge, experiences, lessons learnt and best practices between civil protection and disaster risk management actors[33]. The Knowledge Network and the UCPM lessons learnt programme were therefore identified in interviews and focus group sessions to have the potential to serve as feedback platforms.

Climate-ADAPT is central to sharing knowledge on climate change impacts, risks and vulnerability. In addition, EU, national and transnational adaptation strategies, adaptation case studies and options are presented, thus contributing to sound disaster risk management. The platform is therefore essential to the concept of build back better, and not allowing disasters to affect the same piece of land/infrastructure with all the inherent environmental impacts.

The **Disaster Risk Management Knowledge Centre*[34]*** under the JRC provides disaster loss data, risk analysis mapping tools and other features to provide a disaster risk management knowledge basis. Other available tools such as **WISE*[35]*, Copernicus Climate Change Services*[36]* and Atmosphere Monitoring Service[37]** offer more specialised data on freshwater resources, marine environments, and the effects of climate change.

5.2 How can feedback loops contribute to greening of the UCPM?

As noted above, the contribution of feedback loops to the greening of the UCPM can be divided into two information streams. One informs prevention based on experiences in response, and the other informs preparedness based on experiences in response.

Reducing the disaster risk and the inherent environmental footprint by sharing lessons learnt from response. Feedback loops from response to prevention can ultimately improve prevention with regard to: (1) preventing or alleviating the occurrence of a crisis and its environmental impacts; (2) preventing or alleviating the occurrence of a crisis also impacts the necessity for response, and thus also the inherent environmental impacts of response activities (material, transport emissions etc.); (3) sharing greener lessons learnt from response can lead to greener prevention measures, e.g., the implementation of nature-based solutions instead of hard infrastructure prevention methods.

[33] Union Civil Protection Knowledge Network Strategy 2022-2026 (europa.eu)

[34] Home - European Commission (europa.eu)

[35] WISE - Water Information System for Europe (europa.eu)

[36] Homepage | Copernicus

[37] Homepage | Copernicus

Reducing environmental impacts from response through lessons learnt for preparedness. Feedback loops from response to preparedness result in multiple environmental benefits across all dimensions of greening:

(1) environmental performance of activated goods and equipment; (2) behaviours of how efficiently equipment is used; 3) possible involvement of local procurement/use of local services to save transport emissions; 4) best practices on on-site waste management and recycling; 5) best practices to alleviate the overall negative environmental impacts from the disaster itself; 6) best practices to lower the overall environmental footprint of the response itself.

5.3 Impact on effectiveness of response

The promotion of feedback loops for greening of the UCPM does not entail any negative impacts on the effectiveness of the response. Feedback loops from response to prevention and preparedness must be seen as separate work-streams that do not directly interfere with the response activities. They build either on existing feedback mechanisms or new mechanisms separate from the actual response measure.

5.4 Feasibility and barriers

Several barriers hinder the optimal uptake of existing feedback loops, and the three key ones are described below.

Cross-sectoral challenge of communicating across all UCPM actors in Member States/Participating States. Despite the existence of several suitable platforms for feedback mechanisms, it remains difficult to reach all relevant actors across the different governmental levels. Prevention measures such as flood prevention are often funded by structural funds and the actors implementing such flood plans are very different from the civil protection response actors on the ground. A civil protection responder on the ground might very well be able to document whether certain greening measures work well or less well in the response operation, or if a prevention measure sufficiently withstands/mitigates a disaster. But the challenge is to convey this information to the competent planning authority that is responsible for the prevention measures to achieve an impact. Organisations on the ground range from fire departments, police and army to volunteers, often under a complex organisational hierarchy. It therefore proves challenging to use the existing feedback mechanisms to inform the competent actors involved.

Culture and mindset hindering the use of existing feedback mechanisms to the full extent. Civil protection actors, Member States and Participating States actors are often unaware of the possibility of communicating greening matters through existing feedback mechanisms as they do not constitute a part of their day-to day operations (see Text Box 5-1). The relevance of communicating greening considerations after a response action would need to be more established in civil protection teams and module feedback, e.g., as part of the final report.

5.5 Promoting feedback loops through the UCPM

Opportunities for promoting feedback loops through the UCPM would include those described below.

Providing overviews and guidelines of existing platforms to Member States and Participating States civil protection actors. Framed by the UCPM, overviews of existing feedback mechanisms and guidelines on how to use them for communicating greening-related matter could be provided. In providing distinctions between the scope and information type of the platforms,

more clarity could be created among civil protection actors on what platforms to use for accessing/sharing certain types of information. The DRMKC is, for example, well suited to informing planning authorities on potential disaster threats to infrastructure projects or the need for prevention measures in a certain area. The EU Civil Protection Knowledge Network would, on the other hand, be better suited to serve as a platform for responders to report on the effectiveness of implemented prevention measures, which would then in turn inform planning authorities.

Make debriefings on **environmental lessons learnt** an integral part of the **UCPM deployments.** When new greening approaches are being implemented throughout response activities, the lessons learnt could be more broadly shared with all UCPM actors that were not part of the mission. Dedicated debriefings and reporting, facilitated by the ERCC (such as the existing one for emergency response) could, therefore, take specific account of greening approaches and their feasibility. In this way, response takeaways could be made accessible to all relevant UCPM actors. In order to create operational and feasible de-briefing methods after response for civil protection actors, guidelines or standard templates could be provided within the UCPM, for example embedded in the existing lessons learnt programme. Although difficult, it may sometimes be possible to monitor outcomes of successful feedback loops, with regard to their positive impact on prevention and preparedness. Publication and dissemination of such success stories would in turn incentivise Member States and Participating States actors to act on the implementation of feedback loops.

In this respect, the UCPM Knowledge Network could be play a role in publishing and disseminating success stories.

Further integrate the experience of the environmental experts for disaster risk reduction/prevention. The UNEP/OCHA Joint Environment Unit (JEU) is the UN's unified response to the environmental dimensions of emergencies. By coordinating international efforts and mobilising partners, the JEU assists countries affected by disasters and crisis and works to enhance the environmental sustainability of humanitarian action. DG ECHO, operating through the UCPM, is among JEU's most important partners for supporting the response. The expertise from deployed experts could be further integrated, both in terms of providing (online) advice during UCPM deployments and in relation to feedback loops in the UCPM.

Extend the role of the thematic expert on environment, as deployed in the field of humanitarian aid to feedback greening activities from response to prevention/preparedness. In humanitarian aid, the thematic expert on environment '*performs a support and advisory function and ensures overall coordination*' with regard to compliance with the minimum environmental requirements[38]. Assuming that this role would be extended to the field of civil protection, the expert's advisory function could encompass the initiation, support and dissemination of feedback loops.

Establish an environmental section in the ERCC to develop and maintain environmental expertise, collect data and develop guidelines and SOPs. As previously considered by DG ECHO a newly established environmental section in the ERCC would bring environmental concerns to the forefront of coordinating green aspects related to all phases of the crisis management cycle. If such a section is established, it could take up a coordinating role in collecting feedback streams from ERCC-steered response actions, processing them according to the field concerned

[38] Guidance on the operationalisation of minimum environmental requirements - DG ECHO

and disseminating them among the relevant actors. This could, for example, be done in collaboration with the EU Civil Protection Knowledge Network and the JRC Disaster Risk Management Knowledge Network.

6 THE ROLE OF CIRCULAR ECONOMY AND WASTE MANAGEMENT IN GREENING OF THE UCPM

6.1 What it is

The circular economy refers to the ability to reduce, reuse, repair or recycle existing products as much as possible[39]. Overall, this implies reducing waste to a minimum. Promoting the circular economy is highly relevant for all European actors as it is one of the main building blocks of the European Green Deal[40]. As such, the circular economy action plan (CEAP) was adopted by the European Commission in March 2020[41]. This is a 'living product' with the Circular Economy Package: Round 2 released in November 2022[42]. It proposes targets such as full recyclability of all packaging by 2030 and minimum recycled contents in packaging.

In the civil protection context, circular economy and waste management includes reducing resource use, reducing waste, and recycling wherever possible and when it does not hinder response effectiveness. Specific examples include purchasing goods with minimal or biodegradable packaging (at the preparedness stage), selecting training/conference facilities that minimise waste (preparedness), ensuring that waste generated during response is recycled and not left behind (response), and ensuring that wastewater does not contaminate other water sources (e.g., when treating wildfires). Three concrete areas related to circular economy and waste management are discussed that are relevant for the UCPM to consider for greening actions, either for DG ECHO's own operations or to support efforts made by Member States and Participating States.

[39] Circular economy: definition, importance and benefits | News | European Parliament (europa.eu)

[40] A European Green Deal | European Commission (europa.eu)

[41] Circular economy action plan (europa.eu)

[42] Circular Economy Package: Round 2 | EUROPEN (europen-packaging.eu)

Text Box 6-1 Overview of baseline findings on circular economy and waste (Source: Annex Report)

In general, **initial progress in greening has been made through recommendations, guidelines, or training courses.** These include DG ECHO's Greening Humanitarian Aid course, which suggests several possible adjustments to procurement practices including the addition of environmental specifications to procurement tenders such as reduced/biodegradable packaging. The IFRC and the Joint Initiative on Sustainable Humanitarian Assistance report recommends working together with suppliers to reduce packaging and single-use plastics. The World Health Organisation includes guidelines for disposal of unwanted pharmaceuticals following emergencies, as well as safeguarding wastewater (updated in 2021) and ECHO response teams should follow these.

Implementing these measures has proven to be challenging but progress is being made. For example, some national members of the IFRC have made significant greening supply chain efforts. This included completing a greenhouse gas (GHG) inventory and estimating the GHG footprint, researching commercially available tools to estimate supply chain emissions, and identifying alternative products. As part of their greening supply chain efforts, the IFRC reviewed goods storage locations to reduce transport needed to potential disaster sites. In addition, the IFRC has also aimed to localise some procurement, when the availability and quality is sufficient, with the aim of reducing waste associated with transport (although this must be balanced against the fact that sometimes emissions associated with the production of goods can be higher when purchased locally). Some Member States and Participating States have encouraged repair and reuse among response teams, including through an online training programme for firefighters, 'Green skills for firefighters', which was shared as a best practice for training firefighters on the use of resources, waste management and the reuse of materials.

One important area where progress has been uneven includes PFAS firefighting foam ('forever chemicals' with environmental risks and health risks for those who use them). Legislation means that this will eventually be phased out in Europe and alternatives used. Some Member States and Participating States have already switched while others are still learning about alternatives and their effectiveness.

Some **challenges** have been noted, including concerns regarding the cost of greener packaging, upfront costs related to recycling or waste disposal, the response effectiveness of new products, legacy procurement processes and rules, and knowledge of greener options. At the same time, potential **enablers and solutions** include the fact that greener packaging can be cheaper, better waste management – especially of contaminated water – can subsequently reduce environmental clean-up costs and risks, and the need to adapt to and align with new EU circular economy regulations in itself can act as a promoter of greening within civil protection.

Reduce packaging and green supply chain management for consumables. In the context of civil protection (and, indeed, other contexts), greening packaging means favouring products with reduced or alternative packaging such as compostable or biodegradable (noting the importance of ensuring real environmental friendliness[43]). In addition, it can include identifying packaging options that can later be used for other purposes rather than immediately discarded. It is also important to eliminate or safely manage packaging that could pose harm to the local environment. Simple examples may include reducing use of single-use water bottles, purchasing

[43] Biodegradable and compostable plastics — challenges and opportunities — European Environment Agency (europa.eu); The Truth About Bioplastics (columbia.edu)

supplies of goods to be stockpiled and used during emergency response with less packaging waste (e.g., food, thermal blankets, etc.). Greening supply chains may also include seeking greener equipment when there is a need to replace equipment. This may include equipment such as pumps and generators (or solar replacements), where it will be important to consider lifecycle emissions including disposal costs. Carbon emissions are discussed in more detail in Appendix F (in relation to transport) and in Chapter 7. While many of those products will be used during the response stage, greening packaging largely needs to be considered during the preparedness stage, which is where most procurement decisions are made.

The drive to reduce packaging waste more broadly has grown during recent years, and it will be important for civil protection to adapt to changing product markets. McKinsey (2020) reports that around 40% of plastic packaging is recycled in Europe – only around half the rate of paper, glass, or metal[44]. The public is becoming increasingly aware of the challenge, and laws and regulations – including at the EU level – are increasingly tackling such waste[45]. Archetypal products that have attracted the public's attention include disposable plastic straws and disposable drinking bottles. The Commission is currently working on revising the Packaging and Packaging Waste Directive[46]. The revision includes the proposal that all packaging on EU markets should be recyclable (and each Member State should set packaging recycling targets), a minimum recycled content for each packaging (with targets growing over time), and increased use of compostable packaging, among others. Given these likely market changes, it will be important for civil protection to both contribute towards these targets and to adapt to product availability. This can help to ensure they are ahead of the curve and do not find key products suddenly disappearing from the market without suitable replacements. Regarding safe disposal of medical products, the UCPM follows the WHO guidelines, which have recently been updated and further emphasise the need for green packaging[47]. This includes the need to ensure that waste packaging is not harmful and to favour packaging that can be used for other purposes during a response.

Ongoing efforts to reduce packaging are being made by humanitarian agencies such as the IFRC as part of a broader effort to green supply chains[48,49]. DG ECHO's guidance for environmental considerations in humanitarian operations also recommends reducing 'secondary and tertiary packaging of food and non-food items', and 'reducing or eliminating single-use plastics'[50].

Greening training and exercises events. In the context of civil protection, greening training and exercises events consists of: (i) preferring online training instead of face-to-face, when feasible, and (ii) reducing waste from in-person training/exercises when possible. The UCPM has already opted for a blended approach to training, with some training being moved online as a result of the COVID-19 pandemic. Currently, DG ECHO's Humanitarian Aid offers some eLearning courses, virtual classrooms, and webinar sessions via ELSE – DG ECHO Learning Solution Environment – DG ECHO's new learning platform[51]. UCPM online courses are managed under the EU

[44] The drive toward sustainable packaging | McKinsey

[45] Examples include the EU Directive for Single-Use Plastics: Single-use plastics (europa.eu)

[46] Draft released in November 2022: Proposal Packaging and Packaging Waste (europa.eu)

[47] Classification and minimum standards for emergency medical teams (who.int)

[48] GreenResponse_QuickGuide.pdf (ifrc.org)

[49] Classification and minimum standards for emergency medical teams (who.int)

[50] https://civil-protection-humanitarian-aid.ec.europa.eu/document/download/c6b17ea3-807c-4c5f-ad86-484477c78173_en

[51] DGEcho WebSite (dgecho-partners-helpdesk.eu)

Academy Learning Management System[52] and virtual classrooms are not yet available. With the revision of the UCPM training programme, effective from 2023 onwards, blended learning will be enhanced via a separation between deployable and non-deployable civil protection stakeholders. While operational profiles will continue to receive in-person training where relevant, civil protection and disaster risk stakeholders will have access to online courses from the EU academy, and other dedicated courses, including thematic workshops, will increasingly be held online[53]. When it comes to MODEX exercises, some table-top exercises have been conducted online with a reduced number of participants during the COVID-19 pandemic, but this has not been extended to non-pandemic contexts.

It also includes selecting greener venues and reducing waste on site. For training and exercises (e.g., tabletop exercises) which must be held face-to-face, it may be important to select venues that have received environmentally friendly certifications (e.g., energy efficiency standards, no single-use plastics, environmentally friendly catering)[54]. In that regard, the Commission has issued guidelines to select green venues and organise sustainable events such as the 2018 *Guidelines on organising sustainable EC meetings and events*[55] approved by the Eco-Management and Audit Scheme (EMAS) or the Commission's *7 steps for greener events*[56]. Several other websites also provide guidance on how to do this and/or list green venues[57]. In addition, the European public database 'EU Ecolabel Catalogue' (ECAT) allows all stakeholders to find more information on products and services certified with an EU Ecolabel[58]. The EU Ecolabel covers a wide range of products including accommodation and venues, which can be booked via the Commission's website[59]. Other examples include using simulators or virtual reality to avoid resource waste and unnecessary contamination during training and exercises and avoiding large amounts of unnecessary packaging on basic items such as foods[60].

Reduce and safely manage (harmful) waste and contamination. While some waste management procedures and systems can be improved during the preparedness stage[61], other waste management efforts relate directly to practices during the response stage. Three areas have been identified where greening actions may be important: (i) destroying or safely treating harmful waste, including contaminated water, by using equipment that incinerates medical waste and treats sewage; (ii) safely storing and transporting waste back for treatment; and (iii) preventing contaminated water (e.g., following firefighting) from running into water sources or environmentally sensitive areas.

Significant steps forward have been made by many humanitarian aid agencies in this respect and are highly relevant to civil response in many cases. The key principles involved in treating waste

[52] EU Academy (europa.eu)

[53] Interview with DG ECHO (EU8).

[54] Venues for training courses are often training centres in and from EU member states and participating states.

[55] https://ec.europa.eu/environment/emas/emas_for_you/news/news84_en.htm

[56] 7 steps for greener events | European Commission (europa.eu)

[57] Eco-Friendly Venues Around the World (bcdme.com); 13 Green Meeting Hotels | BIO HOTELS® - BIO HOTELS ; Green Venues for Hire | Environmentally Friendly Event Venues (chooseyourvenue.com)

[58] EU Ecolabel: Ecolabel Products - European Commission (europa.eu)

[59] EU Ecolabel: EU Ecolabel Hotels and campsites - European Commission (europa.eu)

[60] See interim Report, Section 6.4.1 Text Box 6-1.

[61] For example, through purchasing products with low- or biodegradable packaging or selecting firefighting foam without health or environmental risks – see Annex Report on Preparedness.

effectively in humanitarian operations include doing no harm and leaving no trace. This means that actions during response should not create current or future environmental or human problems. These principles are also highly relevant in the civil protection context. Details, such as the need to avoid contaminating rivers and lakes (e.g., with human or chemical waste) and the need to safely dispose of medical waste, are provided in Text Box 6-2, and these recommendations are highly applicable in many civil protection contexts too. This includes minimising waste, segregating it, treating it appropriately and disposing of medical waste in a safe way. In addition, for wastewater, it is necessary to establish a grey water management system with treatment before disposal and ensure safe sewage disposal[62].

[62] Classification and minimum standards for emergency medical teams (who.int)

Text Box 6-2 Examples of guidelines for waste treatment in humanitarian response

Examples of efforts to improve waste treatment – including water – among humanitarian interventions can be found in key guidance documents. DG ECHO's 2022 Guidance on the operationalisation of the minimum environmental requirements and recommendations for EU-funded humanitarian aid operations highlights the need not to contaminate water sources, while the World Health Organisation's 2021 Classification and Minimum Standards for Emergency Medical Teams and 2022 Compendium of WHO and other UN Guidance on Health and Environment highlight best practice for dealing with medical waste, including protecting it from water sources.

While the context may be different in some cases (notably humanitarian aid organisations often establish camps that can exist for years), several requirements or recommendations are relevant in the civil protection context. These largely relate to the need to 'do no significant harm' to the environment and to 'leave no trace'.

> *Under no circumstances dispose of any treated or untreated biological waste like faecal sludge into surface water like lakes or rivers. (DG ECHO Requirements)*
>
> *Where surface water is used and treated with chemicals, ensure that the residual sludge is properly disposed of, including in instances when filtration membranes are used. (DG ECHO Requirements)*
>
> *Design and build excreta management facilities based on risk assessment of potential contamination of nearby surface or ground water source, taking into consideration current and future climate related risks. (DG ECHO Requirements)*
>
> *In contexts where collection and disposal depend on external actors, at least ensure segregation and separate storage inside the healthcare facility (HCF), while working with the HCF managers to set up safe health waste disposal in or outside the HCF. In cases where waste is collected and transported to locations with a dedicated facility for the safe disposal of medical waste, safe transportation of contaminated waste should be ensured. (DG ECHO Requirements)*
>
> *Improve methods of biological waste management such as anaerobic waste digestion to produce biogas, and low-cost alternatives to the open incineration of solid waste. Where incineration is unavoidable, use of combustion technologies with strict emission controls are critical. (WHO Compendium)*
>
> *Designated waste storage sites should be protected and fenced from water/rain and pests and with an appropriate mechanism to prevent access to unauthorized staff and the local population. (WHO Minimum Standards)*

6.2 How does circular economy and waste management contribute to greening of the UCPM?

Reduce packaging and green supply chain management. While packaging is essential for the safe transport and storage of goods, it also increases waste, along with storage and transport space and weight. Reducing unnecessary packaging would contribute towards greening civil pro-

tection principally through reduced resource use and reduced need for disposal/recycling. In addition, it would also: (i) reduce storage and transport space needed for goods (since less packaging means reduced space and lighter shipments, contributing towards reduced transport emissions – discussed in Chapter 7); (ii) reduce the need to transport used packaging back from disaster zones (again, reducing transport-related emissions); and (iii) reduce the need for recycling (reducing use of energy associated with recycling). While green procurement efforts principally need to occur during the preparedness stage, they also support greening goals such as 'leave no trace', as leaving less waste in the wake of a response helps to leave behind a cleaner, greener environment.

Greening training and exercises events. Improving the logistics and planning of training and exercises events can, to different extents, positively contribute toward greening of the UCPM.

- **Reducing carbon footprint associated to training and exercises** by (i) reducing the need for transport thanks to online and/or combined training, or (ii) optimising transportation for necessary physical exercises.

- **Reducing GHG emissions linked to energy inefficient venues** by selecting more sustainable training and exercises venues.

- **Reducing on-site waste generation** through better resource use, reduced packaging or use of alternative packaging types.

Reduce and safely manage (harmful) waste and contamination. Improving waste management and reducing contamination risks contributes to greening by preventing harm to the local environment and biodiversity from response actions – and especially in relation to (potable) water sources – and by leaving behind no (harmful) waste. Studies in California, which suffers from significant fires, have demonstrated that the wastewater runoff can contaminate drinking sources for years after the event[63]. One notable contaminant – which also has negative health impacts for those who use it – is PFAS chemicals in firefighting foam, the use of which is being phased out in Europe and North America (see Text Box 6-3).

Text Box 6-3 PFAS in firefighting foams

Multiple focus group participants raised the issue of perfluoroalkyl (PFAS) chemicals in firefighting foams, and the challenge of water contamination that results from their use.

PFAS are a group of chemicals widely used in non-stick cookware, water-repellent clothing, stain resistant fabrics and firefighting foams[64]. They do not break down naturally in the environment and are therefore termed 'forever chemicals'. Studies have connected significant accumulations of PFAS with various human health conditions. Concern exists for the health impacts of PFAS for firefighters as well as people who live in areas where it is used to fight fires, particularly if it contaminates water sources.

Their use is therefore being severely curtailed both in the EU and elsewhere. In the US, the Environmental Protection Agency (EPA) and some states are taking steps to limit their use. Several lawsuits are also

[63] Water Quality & Wildfire | USGS California Water Science Center / The link between wildfires and drinking water contamination - American Chemical Society (acs.org)

[64] PFAS chemicals overview | ATSDR (cdc.gov)

pending.[65] In the EU, PFAS chemicals are currently in the process of a near-complete phase-out, with their use allowed only where they are essential for society and suitable alternatives do not exist[66].

PFAS in firefighting foam will be banned in the EU (although a date is not yet determined) since alternatives exist and any cost increases are more than offset by reduced pollution impacts[67]. One study estimated that less-polluting foams without the negative health or environmental side-effects would cost around 27 million EUR per year in the EU[68]. These additional costs would be offset by savings from lower disposal and clean-up costs. The 'potential order of magnitude of avoided remediation could be hundreds of millions… to billions of EUR' [69].

Alternatives include hydrocarbons, detergents, siloxanes and protein foams. Services in Member States and Participating States that maintain use of PFAS firefighting foam are encouraged to review alternative options, clearly documented at: https://echa.europa.eu/documents/10162/28801697/pfas_flourine-free_alternatives_fire_fighting_en.pdf/d5b24e2a-d027-0168-cdd8-f723c675fa98. An online seminar presentation is also available at: Alternatives to PFAS in Fire Fighting Foams - YouTube. NEWMOA, a New England-based waste clean-up organisation, researches and provides in-depth information, including from alternative foam manufacturers, regional regulators, academics/researchers, militaries seeking alternatives, and others at: NEWMOA - Emerging Contaminant – PFAS

6.3 Impact on effectiveness of response

Reduce packaging and green supply chain management. Reducing packaging or using green alternatives to classic plastic packaging is expected to have little impact on the effectiveness of response. Reducing unnecessary packaging may even benefit response activities by reducing additional procedural burdens (such as recycling or shipping waste back home). This also comes with opting for more reusable and durable types of packaging, such as cotton or non-woven polypropylene bags[70]. Regarding the switch to alternative types of packaging (i.e., biodegradable or compostable materials), it is worth noting that the durability and resistance does not match that of plastic. However, according to the study *Durability Enhancement of Sustainable Concrete Composites Comprising Waste Metalized Film Food Packaging Fibers and Palm Oil Fuel Ash* (2022), green composites in film food packaging (MFP) only negatively impact certain aspects of the strength of packaging and only to a small extent. While durability is also reduced, it has been argued that the impact of green composites on durability can be limited[71].

Greening training and exercises events. *Greening training* could impact the effectiveness of response if it is not undertaken well. Some training could be moved online. However, to ensure a good relationship between experts/staff who may be deployed together, and who work in their

[65] States Take on PFAS 'Forever Chemicals' With Bans, Lawsuits | The Pew Charitable Trusts (pewtrusts.org) ; EPA Actions to Address PFAS | US EPA

[66] PFAS - Chemicals - Environment - European Commission (europa.eu)

[67] PFAS - Chemicals - Environment - European Commission (europa.eu)

[68] https://echa.europa.eu/documents/10162/28801697/pfas_flourine-free_alternatives_fire_fighting_en.pdf/d5b24e2a-d027-0168-cdd8-f723c675fa98

[69] https://echa.europa.eu/documents/10162/28801697/pfas_flourine-free_alternatives_fire_fighting_en.pdf/d5b24e2a-d027-0168-cdd8-f723c675fa98

[70] How to reduce the impacts of single-use plastic products (unep.org)

[71] Sustainability | Free Full-Text | Durability Enhancement of Sustainable Concrete Composites Comprising Waste Metalized Film Food Packaging Fibers and Palm Oil Fuel Ash (mdpi.com)

home countries under different systems, it would be important to maintain a certain amount of in-person training. Maintaining some in-person training sessions would allow for bonding between experts who may be deployed together, which in turn facilitates smoother interventions. *Greening exercises* may impact the effectiveness of response insofar as physical exercises are key when preparing modules for response interventions. This is because exercises allow a better understanding of the standard operating procedures and equipment of other modules. In that sense, conducting exercises online may hinder future interoperability. Mindful of the need to contribute and adapt to circular economy-related reforms, the European Defence Agency coordinates the Incubation Forum for Circular Economy in European Defence (IF CEED)[72] to look at ways to develop a more circular economy in defence. It groups experts, industry representatives, international institutions, and others to consider and include projects related to materials and innovative designs, processes, and digitalisation. These include elements which could not only contribute to circularity but even make responses more effective, such as improved textiles and additive manufacturing.

Reduce and safely manage (harmful) waste and contamination. While enhanced management of waste is not foreseen to have a direct impact on the effectiveness of response, safely managing waste may require some additional human resources and time. In addition, the boundaries between waste management as part of the response phase and the recovery phase can be thin and challenging to determine, as exemplified in the *Disaster Waste Management Guidelines* (Joint UNEP/OCHA Environment Unit)[73]. The need to better manage waste may lengthen the duration of interventions.

6.4 Feasibility and barriers

Reduce packaging and green supply chain management. The main barriers to greening packaging that have been identified are listed below.

- **Lessons learnt** from COVID-19, such as how to hold trainings online;
- **Perceived cost** of greener packaging may prevent investment. In some cases, it may indeed be more expensive. Yet several humanitarian aid organisations indicated that costs can also be reduced thanks to reduced supplier packaging costs and knowledge of such **cost reduction potential could help enable** this.

Knowledge of potential products and supplier awareness. Procurement officers may be unaware of the existence of low or greener packaging products or how to seek them. At the same time, existing and potential suppliers may unaware of demand for low-packaging products and either do not bid for contracts or do not adapt their packaging, as a result.

- **Perceived durability** may result in reluctance to shift. Knowledge of robust green options may reduce this reluctance.
- **Knowledge** of how to adjust procurement systems and good practices to procure low-packaging products. Legacy procedures may require minimum qualification standards for firms for public procurement, such as a certain turnover or years of businesses. This prevents newer, smaller companies from participating in bidding.

[72] if-circular-economy-eda.pdf (europa.eu)

[73] Joint UNEP/OCHA Environment Unit (2013)

The main enablers to greening packaging that have been identified are as follows:

- **Awareness of co-benefits** of low-packaging products. Co-benefits can include lower costs associated with lower packaging – a benefit noted by respondents in humanitarian aid. They can also include reduced storage and transport needs thanks to smaller and lighter packages. This can reduce storage and transport costs and associated emissions (discussed later under climate change mitigation). As noted above, the EDA has implemented the Incubation Forum for Circular Economy in in the area of defence to incubate and test ideas that could contribute to improved performance in circular economy, some of which could have co-benefits of improving overall response effectiveness[74].

- **Adapting to EU legislation.** This means both contributing to broader objectives and adapting to a new market environment. For example, civil protection will need to both contribute to achieving aspirations of the revision of the Packaging and Packaging Waste Directive[75] (e.g., by reducing packaging waste), and also to adapt to a market in which there are limited options for single-use plastics and non-recyclable packaging.

Greening training and exercises events. The main barriers to greening training and exercises events that have been identified are given below:

- **The benefits of face-to-face training** are hard to match online. This is especially the case because there may be some cultural reticence towards moving certain training sessions online. When it comes to exercises (table-top and field exercises), holding the exercises online may not be a feasible option for all exercise types. As a planning and organisational exercise, some table-top exercises have been held online because of the COVID-19 pandemic, even though they have been deemed less impactful by organisers[76]. Field exercises are, however, hard to organise online as they consist of simulating a disaster to test out procedures (SOPs), equipment and modules functioning in a real-life scenario.

- **Organisational challenges**. Although online training sessions require less logistical planning, large-scale training sessions are harder to hold online. This is because online meetings with too many participants are deemed less effective. This problem may be more relevant for exercises where participants are asked to interact with one another in order to test and learn procedures. Information- or knowledge-sharing sessions may effectively be held online.

- **Service contract.** Currently, service contractors oversee the design, planning and organisation of training and exercise programmes. DG ECHO monitors the activities and could provide further recommendations to think in more sustainable ways.

Two main enablers may facilitate greening training and exercises events:

- **Lessons learnt** from COVID-19, such as how to hold trainings online;

[74] if-circular-economy-eda.pdf

[75] News update: European Commission Proposal for the Revision of the Packaging and Packaging Waste Directive | EUROPEN (europen-packaging.eu)

[76] Interview EU-15

- **Cost savings** linked to reduced transportation, logistics and planning.

Reduce and safely manage (harmful) waste and contamination. The main barriers to reducing and safely managing waste and contamination that have been identified are as follows:

- **Knowledge** of how to prevent water run-off. During focus groups some – but far from all – Member States and Participating States indicated that they lacked both the knowledge on how to deal with water run-off and, as a result, the capacity to do so.

- **Different actors paying the costs and reaping the benefits.** The up-front **cost** of purchasing equipment to deal with waste on-site as well as **additional time during response** to deal with waste run-off rests largely with civil response teams. The benefits are reaped later by the impacted area in the form of a cleaner environment and clean-up cost savings.

- **Visible financial costs but largely invisible benefits.** While the financial costs are clear, the benefits tend to be somewhat invisible since they pertain to clean-up costs that no longer need to be paid and environmental damage which does not occur.

The main identified enablers to reducing and safely managing waste and contamination are as given below:

- **Lessons learnt** from humanitarian aid organisations and some national civil protection agencies indicate that reducing and safely manage (harmful) waste and contamination is not only feasible but highly desirable in terms of doing no harm and ensuring a devastated region is better able to recover due to having one less need.

6.5 Promoting circularity and waste management through UCPM

The ways by which circularity and waste management can be promoted through the UCPM relate mainly to the preparedness stage and the response stage. The interventions seek to build on the enablers and to assist in overcoming the barriers.

6.5.1 Promoting circularity and waste management in preparedness

Reduce packaging and green supply chain management

This can be **promoted directly by DG ECHO**, including through implementation in adaptation grants for ECPP capacities and in the procurement of rescEU assets. In particular, the following steps could be implemented:

- **Visible financial costs but largely invisible benefits.** While the financial costs are clear, the benefits tend to be somewhat invisible since they pertain to clean-up costs that no longer need to be paid and environmental damage which does not occur.

- **Adapting procurement standards**, the UCPM, in particular through rescEU, could purchase more environmentally friendly goods for emergency stockpiles (e.g., food, medical equipment, thermal blankets), other consumables used during operations, and equipment. This could include, for example, further improving the environmental friendliness of packaging requirements to tenders, sourcing goods with lower or more environmentally friendly packaging, and working with suppliers to reduce packaging. In addition to reducing pack-

aging, this may have a positive demonstration effect for both national civil protection authorities and for manufacturers, who may identify a market for low-packaging products in the area of civil protection. *This would help to overcome challenges related to procurement systems and help to overcome some knowledge barriers by demonstrating that effective green products exist, have durable packaging and that they need not always cost more.*

- **Coordinating procurement** among rescEU and Member States and Participating States to increase leverage vis-à-vis suppliers. This could also help increase the market size for key products. By ensuring manufacturers are aware of overall demand, they may find it better value to invest in adapting packaging. This may mean sourcing the same products and working together with manufacturers to green packaging. It may also mean encouraging Member States and Participating states to include green packaging criteria systematically in tenders. Such efforts have already begun through procurement of rescEU assets, which are procured by Member States and Participating States through EU grants.

DG ECHO could further facilitate this greening action at Member States and Participating States level. Some Member States and Participating States reported steps towards reduced packaging in their purchases, others faced barriers, which DG ECHO could help to overcome. Barriers included, inter alia, lack of knowledge of greener products; procurement rules that make it difficult to purchase from smaller companies or start-ups, who may be at the forefront of such products, concerns regarding costs of such products. Levers to facilitate may include the following.

- Developing **guidelines** on the kinds of products where reduced packaging may be feasible, how to identify products and work with suppliers or manufacturers to reduce or change packaging, and the benefits (e.g., lower cost). In addition, it may include how to incorporate packaging requirements into product specifications during tender packages. *This would help to overcome challenges related to knowledge of alternative green products and products with green packaging and the potential benefits such as lower cost. It could also promote some enablers, such as how actions could help to meet EU legislation requirements and provide co-benefits.*

- **Raising awareness** of procurement practices that facilitate the purchase of low-packaging products by: (i) providing good-practice examples of procurement processes that support low-packaging purchases through information sheets; (ii) organising knowledge-sharing events with Member States and Participating States that have already successfully adjusted procurement practices.

- Facilitating **knowledge sharing** by: (i) providing lists of low-packaging products frequently purchased by civil protection authorities and suppliers; (ii) organising knowledge- or experience-sharing events, or information sheets, for Member States and Participating States with experience to share information with those with less experience; (iii) organising 'mentors' to match Member States and Participating States that would like to learn more with those who have experience, and, where there is interest, experienced partners could accompany Member States and Participating States through implementation; (iv) organising a standing forum to explore and test circular economy options along the lines of the Incubation Forum for Circular Economy in European Defence[77]. *This would help to overcome*

[77] if-circular-economy-eda.pdf (europa.eu)

knowledge barriers by sharing specific product information and, potentially, cost information. It could also help overcome knowledge barriers by promoting knowledge sharing, including of co-benefits.

Greening training and exercises events

This could be **promoted directly by DG ECHO**, notably by including environmental aspects into the planning and running of UCPM training and exercises events by modifying/adapting current organisational processes and requirements. This includes the following:

- Making increased use of **hybrid training** (online and in-person), by developing eLearning, virtual classrooms, and webinar sessions via EU Academy. *Opting for a hybrid form of trainings provides space for increased flexibility and adaptability, which in turn may help ease concerns regarding the benefits of face-to-face training. In the case of exercises, it could allow to keep the current field-exercise format, while encouraging some table-top exercises to take place online (although it is unlikely that they could fully move online since some elements of table-top exercises, such as interoperability, need to take place in person).*

- Adding **environmental criteria to service contract calls** regarding (i) venue selection, (ii) resource use and waste management to promote less packaging and better recycling. *This would help to overcome current limitations linked to sub-contracting of training and exercises to third parties. Although the implementation would remain in the hands of sub-contractors, this intervention ensures compliance with EU environmental requirements.*

Reduce and safely manage (harmful) waste and contamination

This could be **promoted directly by DG ECHO**, notably by enhancing standards under **rescEU**. This is likely to mean ensuring clarity on the standards that rescEU should follow, including the WHO standards on storage, transport and disposal of medical waste, and wastewater disposal. All equipment required – such as (environmentally friendly) incinerators and water management equipment – could be incorporated into rescEU and clear guidelines issued.

DG ECHO could further facilitate this greening action at MS/PS level. Significant differences emerged between Member States and Participating States in terms of processes, knowledge, and capacities to clean up waste and prevent contaminations. Measures that could support such improvements include:

- **Raising awareness** of the later benefits of leaving no trace and preventing water contamination by: (i) creating short leaflets on the benefits of the avoided environmental and monetary costs; (ii) organising knowledge- or experience-sharing events for Member States and Participating States with experience in good waste clean-up practices to share information with those with less experience, and to provide communities impacted by, for example, polluted water following disasters, to share their experiences to demonstrate why preventing contamination is important. *This would help to overcome knowledge barriers and the invisibility of benefit barrier by raising awareness among the civil protection community. The aim would be to encourage better clean-up and change on-site behaviours.*

- Developing **guidelines** on how to identify the risk of potential waste issues (including wastewater runoff contamination risks) at the start of a response, and how to address the issues which may arise from the simple (e.g., reverse transport of waste) to the complex (e.g., good practice to prevent wastewater contaminating potable water sources). *This*

would help to overcome knowledge barriers by providing guidance on how to go about cleaning up waste.

- **Incorporating compliance on good practices on waste and contaminated water clean-up in UCPM training and exercises**. UCPM trainings could include modules on scenarios related to waste and contamination and how to contain them, while exercises could incorporate scenarios requiring implementation of good practices. *This would help to overcome knowledge and skills barriers by directly training teams on how to clean up waste and contaminated water.*

6.5.2 Promoting circularity and waste management in response

Reduce and safely manage (harmful) waste and contamination.

This could be **promoted directly by DG ECHO**, by ensuring relevant guidelines are followed during response operations. This would include following, for example, WHO guidelines related to medical and wastewater disposal. It would require that these guidelines are being prepared prior to the response.

How DG ECHO can facilitate this greening action by Member States and Participating States. Significant differences emerged between Member States and Participating States in terms of processes, knowledge, and capacities to clean up waste and prevent contaminations. Measures that could help them to improve this area include the following.

- **Providing environmental expertise during response.** Since some Member States and Participating States reported a lack of access to relevant expertise, extending the mandate of DG ECHO's Environmental Advisors and ensuring relevant skills and knowledge for civil response among those advisors would be helpful for some Member States and Participating States. These advisors could advise remotely or, if required, in person. One option would be to add environmental experts to the ERCC, and it could be considered whether they would be as surge capacity or back-office support. *This would help to overcome knowledge barriers and less visible benefits by providing a skilled expert who is able to explain risks and provide practical solutions that do not hamper response effectiveness.*

- **Ensuring lessons learnt are recorded and fed back into prevention.** Response teams may identify opportunities that could have reduced the risk or disaster or the extent of the disaster impact. For example, response teams could report back when it appears that better flood defences (man-made or natural) could have reduced the impact of a shock, or when buildings have been constructed in flood plains, increasing the damage resulting from a shock (see section 5 on feedback loops for more details). *This would help to overcome knowledge barriers related to feedback loops as discussed in section 5.*

- **Developing guidelines for response teams to 'leave no trace behind".** This may be a simplified version of other guidelines or SOPs designed to be easy to refer to and help response teams to verify that they do no significant harm to the environment in which they operate. This may include ensuring all waste is properly disposed of and ensuring minimal damage to the natural environment, including forests and water bodies, especially by ensuring no contamination. *This would help to overcome knowledge barriers identified and could act as a 'checkbox' exercise to facilitate response teams' efforts to leave no trace.*

- **Evaluating implementation during response stage.** While most background work (e.g., training, purchase of equipment, guidelines) is undertaken during the preparedness

stage, it needs to be effectively implemented during response. Monitoring and evaluating the extent of implementing actions during response, and adjusting if needed, will be important. *This would help to assess whether actions taken in the preparedness stage have been effective, require additional training or resources, have had any negative response feedback, and learn how to adjust them when needed.*

Table 6-2 Potential timing of facilitating actions and who implements them

Timing	Facilitating actions
Reduce packaging and green supply chain management	
Quick wins	• Organising knowledge-sharing events and developing information sheets. (DG ECHO) • Developing a shareable list of low-packaging products could probably be quickly crowdsourced from Member States and Participating States and gradually expanded with more information. (DG ECHO with Member States and Participating States contributions)
Medium-term	• Developing guidelines on low-package product replacements and benefits. (DG ECHO) • Including reduced/greener packaging requirements in tenders and calls for proposals and ensuring suppliers are aware of these requirements. (DG ECHO/Member States and Participating States)
Long-term	• Implementing reforms to procurement procedures, including drafting them and how to obtain approvals. (Member States and Participating States) • Coordinating procurement among rescEU and Member States and Participating States to increase leverage vis-à-vis suppliers/manufacturers to reduce or green packaging. (DG ECHO with Member States and Participating States contributions)
Greening training and exercises events	
Medium-term	• Organising online/hybrid trainings and exercises. (DG ECHO) • Adding environmental criteria to contract service open calls. (DG ECHO)
Reduce and safely manage (harmful) waste and contamination	
Quick wins	• Organising knowledge-sharing events and creating leaflets to raise awareness. (DG ECHO)
Medium-term	• Expanding role of Environmental Experts to support civil protection in areas such as waste management and water runoff management. (DG ECHO) • Developing good practice guidelines. (DG ECHO)

	• Expanding co-finance for relevant waste clean-up equipment. (DG ECHO)
Long-term	• Implementing change at the Member States and Participating States level, including skills and equipment, could take time but this could be facilitated by medium-term actions, which could encourage purchase of equipment and provide Member States and Participating States with guidelines to follow.

7 THE ROLE OF CLIMATE CHANGE MITIGATION IN GREENING OF THE UCPM

7.1 What it is

According to the European Environmental Agency (EEA), climate change mitigation refers to making the impacts of climate change less severe by preventing or reducing the emission of greenhouse gases (GHG) into the atmosphere[78]. In other words, this means reducing greenhouse gases in the atmosphere thanks, for example, to increase energy efficiency, the use of renewable energies or enhancing carbon sinks (forest, soil, ocean and seas, or carbon extraction). Important sectors in the EU that should support climate change mitigation efforts, because of their current GHG emissions, include electricity generation, transport, and agriculture, among others.

In the civil protection context, climate change mitigation includes reducing CO_2 emissions through expanding environmentally friendly response capacities, planning, and enhanced climate awareness. Specific examples of these include owning greener vehicles, equipment and goods (preparedness stage), optimising transportation and the use of equipment (response stage) and adding/mainstreaming climate change concerns across existing training and exercises (preparedness stage). The text box below presents an overview of the findings from the baseline study providing insights from interviews, focus groups and literature review.

Three concrete areas related to climate change mitigation and relevant to the UCPM are identified in this chapter, either directly to be pursued by DG ECHO or to support Member States and Participating States. The three areas are identified and described after the text box.

Text Box 7-1 Overview of baseline findings: climate change mitigation (source: Annex Report)

- Some Member States and Participating States have already begun the process of purchasing greener vehicles in civil response (and in other areas of the public sector). This includes both special vehicles and supporting passenger or freight ones. It was also reported that some Member States/Participating States have adapted their legal procurement system through the obligation for public authorities to acquire and use greener vehicles such as electrical ones. Mixed opinions were exchanged on the idea of using smaller vehicles due to the uncertainty linked to the evolution of disasters.
- It was highlighted that transport could be further optimised by reducing the duplication of vehicles, making further use of pre-positioning and pre-deployment, enhancing pooling of goods and equipment and shifting to locally supplied goods when possible.
- The perceived barriers and challenges identified to greening transport and logistics were: (i) the large up-front investment costs; (ii) lack of knowledge, skills and capacities to successfully embed new practices; (iii) lack of suitable green products or convoluted procurement rules; and (iv) successfully incorporating new vehicles into existing fleets. However, cost-savings linked to reduced/optimised transport and the long-term benefits of lower maintenance vehicles (i.e., electric vehicles) were identified as potential opportunities to further green civil protection activities.
- Regarding greening training and exercises, initiatives in the humanitarian aid sector was identified as potential inspiration. One of the earliest examples of green training programmes can be found in the World Wildlife Fund's (2010) *Green Recovery and Reconstruction: Training Toolkit for Humanitarian Aid*[79], a 10-module toolkit and training programme on why and how to green disaster relief. More

[78] What is the difference between adaptation and mitigation? — European Environment Agency (europa.eu)

[79] Green Recovery and Reconstruction: Training Toolkit for Humanitarian Aid - World | ReliefWeb

recently, DG ECHO's *Greening Humanitarian Aid*[80] is an excellent example of a general training designed for all humanitarian aid workers. In parallel, some national civil protection services have introduced specific training programmes dedicated to greening civil protection activities, such as *Green skills for firefighters*.

Owning greener vehicles, equipment and goods. One of the main sources of GHG emissions in civil protection relates to the manufacturing and use of motorised transport modes and equipment, and their consequent consumption of fossil fuels. Transport here refers to the ownership (purchase, use, recycling) of vehicles (special vehicles used for civil protection or supporting vehicles to carry staff and goods). The term 'owning' is favoured over 'purchasing' to embrace the fact that emissions are not only generated when using the vehicle but also in the manufacturing and recycling stages, as well as to account for the transport of fuel/energy. The complete carbon footprint of vehicles and equipment can be assessed through a Life Cycle Assessment (LCA). This is a calculation method to calculate GHG emissions at all stages of the life of vehicles/equipment and emissions are expressed in CO_2-equivalent (CO_{2e}). LCAs are typically led by academic entities and consulting firms and conducted for several vehicle types: passenger cars, light goods vehicles (LGVs), and heavy goods vehicles (HGVs). The results vary, largely according to the weight, category and usage of vehicles, as well as the assumed method to produce fuel/energy (e.g., electricity production). Assuming that the most suitable type(s) of alternative vehicles is defined, EU funding support mechanisms available for Member States/Participating States would then need to be identified. As regards aerial modes, there are currently no alternative to existing modes (which are powered by fossil fuels) and developing this would take time.

In addition to purchasing greener vehicles and equipment, goods with lower carbon footprints can also be favoured. This is related to efforts to reduce packaging discussed above. However, this presents different challenges as it demands an effort to understand the cumulative emissions of a good throughout its production and distribution processes. Understanding the carbon footprint of goods used in response or in stockpiles (e.g., emergency food, tents, thermal blankets) usually requires specialised software, the use of which can then be incorporated into the procurement process[81]. This allows organisations to estimate and report scope 3 emissions[82] from their procured goods. IFRC efforts to track supply chain carbon footprint for a single operation proved to be hard work and required identifying and assessing relevant software on the market, adjusting procurement processes to incorporate carbon footprint requirements and the identification of alternative products[83].

Optimising transport activities and use of equipment. Ensuring that the right number and type of vehicles is used has an influence on the quantity of fuel consumed during an intervention. The consumption of fuel usually happens during three intervention phases:

- Away journey from the Member State(s) and/or Participating State(s) offering the assistance, and to the location requesting it;

[80] DG ECHO. Greening Humanitarian Aid - public version. Accessed from: Greening Humanitarian Aid - public version - Overview (dgecho-partners-helpdesk.eu)

[81] Examples of such tools include: Watershed — The enterprise climate platform; Tapio - Carbon Strategy Platform; https://normative.io/

[82] Scope 3 emissions are all other indirect GHG emissions not directly related to an organisation's direct consumption (travel tickets, purchased goods and equipment, investments, leased assets, etc.). Source: https://ec.europa.eu/environment/emas/emas_for_you/news/news21_en.htm

[83] Greening-IFRC-Supply-chains.pdf (climatecentre.org)

- On-site use of vehicles during intervention;
- Return journey to Member State(s) and/or Participating State(s) offering assistance.

Other organisational aspects of transport usage could be prepared before an intervention (at the preparedness stage, or in the early moments of response) such as relying more on local vehicles; defining typologies of interventions to densify shipments of goods (in-kind assistance) through pooling (several countries offering assistance in a disaster zone and coordinated by a single Member State/Participating State (or DG ECHO); use of rail for interventions in Europe whenever it is possible); or a more strategic pre-positioning of ECPP/rescEU capacities (this would involve precise mapping of ECPP/rescEU capacities/modules and careful consideration of potential areas of intervention in Europe or on other continents). This should be possible as the data on the capacities' location is already available to DG ECHO.

Adding and/or mainstreaming environmental concerns across training and exercises. In the context of civil protection, adding and mainstreaming environmental concerns across training and exercises refers to ensuring the inclusion of greening components into the content of training and exercises. Currently, such greening considerations have rarely been included or mainstreamed across UCPM training and exercises. Regarding training, some DG ECHO eLearning courses for humanitarian aid already exist (i.e., *Greening Humanitarian Aid* and *Pour une aide humanitaire plus verte*) and some virtual classrooms (i.e., *Minimum Environmental Requirements and Recommendation in Humanitarian Aid operations*)[84]. Civil protection examples may include training on how to use environmental assessment tools or artificial intelligence enhanced software to forecast risks (e.g., how wildfires are likely to spread). Some such training programmes have already been developed and offered in the humanitarian aid sector. The World Wildlife Fund (2010) stands as a pioneer with its *Green Recovery and Reconstruction: Training Toolkit for Humanitarian Aid*, a 10-module toolkit and training programme on why and how to green disaster relief[85]. It can help to demonstrate to national stakeholders that have yet to incorporate these greening options how they work in practice, along with their benefits, and challenges. It is worth noting that some Member States and Participating States have already designed national green training programmes for firefighting teams. This '*Green skills for firefighters*' programme seeks to equip firefighters with some practical skills regarding resource use, waste management or the reuse of material relevant to the fire-fighting interventions and clean-up[86]. When it comes to real-life situation exercises, civil protection examples may include practical exercises to learn how to use more environmentally friendly firefighting foams, operating drones from a distance or manoeuvring big electric vehicles.

Climate change mitigation potentials associated with reducing and/or optimising travel to training and exercises events are outlined in the text box below.

Text Box 7-2 The climate change mitigation potentials of greening training and exercises events

Several options exist to reduce the carbon footprint of UCPM training. For example, through:

(i) The selection of training/exercise centres that are closer to where attendees live; and

[84] DGEcho WebSite (dgecho-partners-helpdesk.eu)

[85] Text Box 7-1.

[86] Text Box 7-1.

(ii) The optimisation of transportation to mandatory physical training by preferring trains to air travel, and/or encouraging participating Member States/Participating States to fly planes at their full capacity when possible.

Simple examples may include duplicating training/exercises across geographical clusters of participants instead of organising a single training session that requires participants to fly far from their place of residence[87]. This would also enable increased use of train rather than air travel.

7.2 How can climate change mitigation contribute to greening of the UCPM?

Owning greener vehicles, equipment, and goods. Owning greener vehicles has an impact on reducing the long-term emissions of response interventions. The definition of greener vehicles usually encompasses the following types of fuels: electric vehicles, hydrogen, biofuels (bioethanol and biodiesel), biogas and e-fuels[88]. As an intermediate step, it may also include more efficient fossil fuel vehicles. Assessing the long-term emissions of vehicles and equipment is done through LCAs. Promoting such vehicles is in line with the objectives to reduce carbon emissions in the EU by 2055. As mentioned earlier, LCAs are carried out mostly for ground vehicles, since no alternative modes are robust enough for aerial modes. Estimating the carbon footprint of vehicles/equipment using different types of energy is necessary to allow for a consistent and comprehensive comparison that considers several key variables that contribute to the carbon footprint:

- The extraction of raw materials and the manufacturing process of the car and some of its key components (motors, electrical batteries);
- The production and transport of fuel/energy required by the vehicle/equipment;
- The characteristics of the different vehicles (fuel consumption);
- The carbon footprint relating to the fuel properties (vehicle/equipment usage).

Currently, there is no clearly defined methodology in an EU legislative text for assessing the life-cycle emissions of vehicles (for passenger cars). EU legislation does, however, provide methodologies for calculating GHG emissions from vehicle usage and defining alternative fuels for some vehicle segments, as below.

- Directive 2019/1161 (amending Directive 2009/33/EC): defines the maximum CO_2 thresholds for clean light-duty vehicles during usage and set minimum procurement targets for clean transport vehicles (both light and heavy-duty vehicles).

[87] Developed from an answer to one of the SLIDO poll held during the focus groups for the question 'What are options for greening the exercise programmes? Are there any example of good practice?'.
The comment reads, 'Maybe the locations of exercise programmes could be examined, where you could separate it into a regional approach reducing travel or deliver it through a National Authority'.

[88] E-fuels like e-methane, e-kerosene and e-methanol are all fuels in gas or liquid form that are produced from renewable (solar or wind power, for example) or decarbonised electricity, source: https://www.engie.com/en/news/e-fuels-what-are-they

- Regulation EU/2019/1242 setting CO_2 emission performance standards for new heavy-duty vehicles (HDVs). The Regulation should be amended to incorporate an LCA approach in its next amendment by 2023, as planned in the initial text[89].

- Directive 2014/94/UE defining that alternative fuels are electricity, hydrogen, some biofuels, LPG, CNG and e-fuels.

As an illustration, the study carried out by one Member State's firefighting services (and financed under the UCPM Track 1 grant)[90] focuses on CO_2 emissions generated by vehicle usage (tank-to-wheel). Its results show that only passenger vehicles can be easily replaced with electrical ones, while specialised firefighting vehicles do not currently exist in greener versions that would allow similar levels of efficiency, safety, and security.

Most of the recent work on the topic is being led by academics and specialist consultants on behalf of public authorities. The most comprehensive study retrieved so far is the study led by Ricardo-AEA and commissioned by DG CLIMA[91]. The study estimates, based on assumptions and current knowledge, the assumed life cycle carbon footprint of several vehicle segments (passenger cars, vans, rigid lorries up to 12 tonnes, articulated lorries, etc.) that use different fuels. Thus, the study provides an insight into how alternative fuelled vehicles compare to existing fossil-fuelled ones, under different scenario assumptions (electricity/fuel production per country and evolutive production-mix scenarios, vehicle segment, intensity of fleet replacement and compliance with political objectives, entry in service of the vehicles, autonomy before recharging, etc.). The different vehicle segments considered and relevant for the present study are: lower-medium passenger car, large SUV passenger car, van (N1 Class III, 3.5 t), rigid lorry (12 t), articulated lorry (40 t).

For all segments of vehicles and from a purely environmental perspective, and with the assumptions made, the results show that electrified powertrain vehicles, in particular battery electric vehicles (BEV), have an overall lower carbon footprint per vehicle-km or tonne-km than their fossil-fuel-based alternatives and other alternative fuels (LPG, CNG, H_2). However, a few caveats need to be mentioned to interpret these results, as detailed below.

- For each vehicle segment, the same mileage or lifetime of vehicles is assumed for all vehicles, irrespective of their energy source.

- The source of the input data used to determine the lifetime per vehicle segment seems to be derived from an average lifetime of existing vehicles. The future lifetime of some alternative-fuelled vehicles could be deemed as uncertain.

- The carbon footprint of electric vehicles (especially battery electrical vehicles) varies strongly depending on the energy source used to generate electricity and to manufacture

[89] See Introduction Paragraph 42, and Article 15 paragraph 5.

[90] '"*Tīro*"' *un energoefektīvo autotransporta līdzekļu ieviešanas iespēju izpēte un tehniskās specifikācijas sagatavošana risinājumu izstrādei un integrācijai VUGD*', 21/04/2022. The findings of this study are not available in English.

[91] *Determining the environmental impacts of conventional and alternatively fuelled vehicles through LCA*, *Final Report for the European Commission*, DG Climate Action, 13 July 2020, https://climate.ec.europa.eu/system/files/2020-09/2020_study_main_report_en.pdf

the battery. For instance, the carbon footprint of a lower-medium BEV passenger car in Estonia would be higher than an equivalent petrol car whereas, for a BEV running in Sweden, the life cycle carbon footprint is estimated to be around 75% lower than the footprint of petrol car.

- Sensitivity analysis showed that the lifetime of BEVs has a big impact on their overall carbon footprint. A higher lifetime (in number of km) would result in a competitive (lower) carbon footprint of BEV versus other fuel types.

- Some alternative fuels (sustainable biofuels) seem not to have been taken into consideration as the main type of fuel per vehicle segment.

In addition, it is important to remember that replacing an existing fossil-fuelled vehicle with a 'greener' one should be done only when all options to extend the lifetime of the existing vehicle have been considered. Indeed, a large part of the GHG emissions of some alternative vehicles (especially BEV) are generated at the manufacturing stage. This also tends to be the case for large equipment. The reduction of the emissions is thus achieved over the entire life of the vehicles.

Thus, a dedicated study building on the findings to date gathered by DG CLIMA could be useful to define which green vehicles could be considered for civil protection.

With regard to aerial transport, the introduction of greener vehicles (planes, helicopters) is not a short-term objective. Thus, the greening potentials would lie in the introduction of sustainable biofuels for aerial modes.

It is thus important that greener vehicles are progressively introduced to reduce the carbon footprint of the UCPM. The deployment of these vehicles should ideally be done in line with the overall EU energy policy options selected for transport, while maintaining an optimal level of operational efficiency of civil protection vehicles (autonomy, recharging and safety are therefore key concerns). This means that several 'greener' fuel energy technologies could be introduced, thereby avoiding dependency on only one type of energy. Some Member States and Participating States consulted during focus groups have started to introduce greener vehicles such as BEVs mostly for their staff, but less so for special vehicles used during interventions. Pilot projects are being led by several cities (Berlin, London, Stockholm, Los Angeles) and operational results should be known soon.

Regarding other goods that are needed during a response, purchasing goods with lower embedded carbon emissions would contribute to climate change mitigation by reducing scope 3 emissions of civil protection. It may also have a dynamic impact as suppliers and manufacturers would experience a demand from the civil protection community for low-carbon alternatives, thus sparking efforts to cut supply chain emissions.

Reducing/rethinking transport activities and use of equipment. The end objective of reducing/rethinking transport activities and use of equipment is to reduce the GHG emissions linked to response interventions, through reducing fossil-fuel consumption. This can be pursued through different actions aiming at better coordinating stakeholders (Member States and Participating States) involved in response interventions, as below.

- Better coordination between Member States and Participating States offering/requesting assistance to ensure the right number and size of equipment is sent for intervention. This implicitly relies on the use of local support equipment (especially support vehicles and goods) as much as possible. This coordination is needed to tackle the redundancy of some vehicles/equipment during interventions. This issue was pointed to by some Member States and Participating States during focus groups.

- Defining typologies of interventions for transport pooling (this could be made more systematic when several countries offer assistance to the same requesting country, depending on their respective geographical locations, and especially for in-kind assistance outside Europe). An assessment of the urgency of the assistance is a key parameter to consider here in order to avoid negative impacts on the effectiveness of response.

- Defining typologies of interventions to promote the use of rail for in-kind assistance. This would be relevant for operations in Europe mostly. An assessment of the urgency of the assistance would also be important here.

- Checking the use of available space in already planned logistics modes (flights, trucks, rail). The use of broker services could be of help to find out what options are available.

- Assessing whether smaller/alternative vehicles could be used instead of traditional ones. Smaller vehicles tend to use less fuel/energy than larger ones.

- At the preparedness stage, reflecting on the pre-positioning of ECPP/rescEU modules and capacities to reduce the distance between their host place and the potential places of intervention

Adding and/or mainstreaming environmental concerns across training and exercises. Making sure that all civil protection staff receive substantial training on how response activities impact our environment and practical ways to mitigate these impacts can contribute towards an **improved general climate awareness**. In turn, enhanced climate awareness can facilitate **behavioural and mindset changes**. It is now widely recognised that pro-environmental behavioural change interventions such as training/education do have a positive effect on behavioural and mindset change, even if sometimes small[92]. This is because training informs individual decision-making by enhancing the individual's knowledge base.

7.3 Impact on effectiveness of response

Owning greener vehicles, equipment and goods. Introducing new fuel technologies brings operational challenges for civil protection interventions. It is important to distinguish between the vehicles which are crucial for response interventions (special vehicles such as firefighting trucks,

[92] Rau H, Nicolai S and Stoll-Kleemann S (2022) A systematic review to assess the evidence-based effectiveness, content, and success factors of behavior change interventions for enhancing pro-environmental behavior in individuals. *Frontiers in Psychology*. 13:901927. Available from: A systematic review to assess the evidence-based effectiveness, content, and success factors of behavior change interventions for enhancing pro-environmental behavior in individuals (europepmc.org)

for example) on the one hand, and the vehicles which support response interventions or are used by staff or to carry equipment on the other.

Three main possible negative effects on the effectiveness of response have been identified for ground vehicles:

- The autonomy of vehicles;
- The availability of recharging infrastructures;
- The safety of the alternative vehicles during interventions (in floods or firefighting situations).

The study led by a national civil protection service echoed some of the doubts expressed by Member States and Participating States about the autonomy of EVs during operations. It concluded that for the passenger car segments without a trailer (small car, SUV, van), electrical vehicles would be the most adequate vehicle to match both effectiveness and environmental criteria. The conclusion is different for SUVs and vans with a trailer (of around 750 kg), and heavy vehicles, for which hybrid vehicles would be favoured to ensure the performance of operations, especially in rural areas. According to the study led by Ricardo for DG CLIMA, the plug-in hybrid vehicle had the lowest carbon footprint among hybrid vehicles and showed good results when compared to traditional fossil-fuelled vehicles. However, this may contradict new findings about the underestimated carbon footprint of plug-in hybrid vehicles, thus illustrating the need and the difficulties surrounding life cycle assessments[93].

The acquisition of greener vehicles will, however, need to be accompanied by a strategy to deploy recharge infrastructures. This deployment must be consistent on two geographical scales:

- At the national level, to support daily civil protection operations;
- At the European level, to ensure the adaptability of vehicles used as part of the UCPM (spontaneous offer, ECPP and rescEU).

Reducing/rethinking transport activities and use of equipment. The most likely impact on the effectiveness of response activities could lie in the potential delay of response interventions caused by insufficiently coordinated efforts. Most of the actions that would contribute to the greening of the UCPM identified section 7.2 do indeed require an effort of coordination through ERCC. Therefore, adequate strategies to prepare this enhanced coordination should be defined beforehand.

Adding and/or mainstreaming environmental concerns across training and exercises. Adding and/or mainstreaming environmental concerns across training and exercise is not expected to have a significant impact on the effectiveness of response. However, it may lead to increased time spent on training, which may in turn impact the availability of resources for response interventions.

[93] https://www.transportenvironment.org/discover/plug-in-hybrids-to-lose-low-co2-status-as-eu-reassesses-how-green-they-really-are/

7.4 Feasibility and barriers

Owning greener vehicles, equipment and goods. Three main obstacles which may hinder the deployment of 'greener' vehicles can be identified:

- The definition of greener vehicles as part of civil protection (with a focus on special civil protection vehicles for which 'greener' alternatives are not always available) and knowledge sharing in the community of national civil protection authorities;
- The effectiveness of vehicles during operations;
- The funding mechanisms to support the acquisition of greener vehicles/equipment.

The first two barriers have been discussed above, but it should be noted that the availability of greener alternatives to fossil-fuelled vehicles is essential. As of now, most alternative-fuel vehicles can be found in the passenger car segment (EVs, CNG, biofuels), for which development and commercial deployment have been achieved. The availability of greener special civil protection vehicles is more uncertain. For example, in the firefighting truck segment, alternative-fuel vehicles (EVs, CNG, H2) are being developed by the main two manufacturers on the market, Magirus[94] and Rosenbauer[95], and seem to be targeted for urban operations (thus not complying with the GFF-V module's requirements, for instance). The Berlin Firefighting Department reported that they are currently testing one Rosenbauer Electrical truck in urban operations. The alternative to this lack of alternatives for operations in rural operations could lead civil protection authorities to opt for hybrid tractors/trailer paired with larger water tanks[96].

Another obstacle reported by most Member States and Participating States interviewed during focus groups reported was the high cost of purchasing greener vehicles – much higher than their fossil-fuel equivalent. A Rosenbauer RT (electrical truck) starting price would be around EUR 850,000, while the price for an equivalent diesel truck is around EUR 100,000-150,000[97]. Even though the gap between EVs and fossil-fuel vehicles is not as pronounced in the passenger car segment, the purchasing cost of EVs remains higher on average. In addition to the purchasing cost of vehicles, the cost associated with the deployment of a charging infrastructure must also be considered as a necessary investment.

An efficient counterbalancing argument could be that the total cost of ownership of greener vehicles (especially EVs) could be lower than fossil-fuel equivalents due to lower operational expenditures (OPEX). As with the LCA needed for the comparison of carbon footprint per vehicle segment, an analysis on the TCO per vehicle segment and fuel technology should be conducted to confirm this assertion and to constitute the basis for establishing an improved knowledge base regarding costs, amongst Member States and Participating States.

A last point to be discussed involving DG ECHO and Member States and Participating States should be around the potential EU funding mechanisms that could be mobilised to support Member States and Participating States in acquiring greener civil protection vehicles. There is a lack of knowledge among Member States and Participating States about which funding options could potentially be relevant. As of today, the main source of funding has been the Cohesion Policy (i.e., Romania

[94] https://www.magirusgroup.com/de/en/products/innovative-drive-line-idl/

[95] https://www.rosenbauer.com/fr/be/rosenbauer-world/vehicules/vehicules-municipaux/rt

[96] Interview with Latvian Firefighting Agency (VUGD).

[97] Study led by the Latvian Firefighting Agency (VUGD).

and Poland purchased response assets under the 2014-2021 period (source: Kohesio (europa.eu) & Kohesio (europa.eu)). The UCPM adaptation grants are dedicated for the upgrade/repair of modules registered as part of ECPP. However, these grants do not cover the purchasing costs of vehicles, are only available for national civil protection authorities (several decentralised Member States and Participating States have regional authorities competent in civil protection) and are also reserved for capacities offered/committed to ECPP modules. Cohesion funds could be mobilised to fund non-fossil fuel civil protection vehicles in the future[98], in line with the 'Fit-for-55' measures[99]. For the current programming period 2021-2027, however, this would depend on the priorities of the specific programmes developed in Member States, and it would not be a relevant funding option for Participating States. A comprehensive and succinct catalogue of EU funding options to acquire greener vehicles would probably benefit the civil protection authorities of Member States and, to some extent, of Participating States.

Reducing/rethinking transport activities and use of equipment. Two barriers can be identified that hinder the above-mentioned coordination efforts to improve the use of vehicles/equipment.

First, as previously mentioned, better coordination requires **strategic planning** to be carried out to define typologies of interventions beforehand (places of origin, destination, modes available, defining level of urgency that may impact the choice of the mode of transport or logistics organisation, types of vehicles to be used).

Second, the additional strategic planning work and potential increased coordination effort at the early response stages may require **additional human resources** in the ERCC. This could translate as an increase in operational expenditures for DG ECHO but could in return also result in reduced operational expenditures during interventions (lower transport costs to reimburse as part of co-financing).

Adding and/or mainstreaming environmental concerns across training and exercises. Two main barriers or perceived barriers to adding and/or mainstreaming environmental concerns across training and exercises were identified throughout the study and are detailed below.

First, **the role of service contractors in training and exercises.** Although the Commission – in agreement with Member States – defines the topics and conceptualise courses, the design and implementation remain in the hand of sub-contractors[100]. However, as mentioned previously, it will be possible to request that bidders include greening considerations in the content of training and exercises when the contract is renewed.

Second, the **policy mandate to justify the need for changes and additions to training and exercises.** There is a perceived need among interviewed DG ECHO professionals for a policy mandate or guidelines to (i) justify, (ii) require and (iii) ensure the take-up and implementation of such adaptations to the current UCPM programmes.

[98] Agreement reached on the 2021-2027 EU Regional and Cohesion Funding, Press Release, 08/12/2020: https://www.europarl.europa.eu/news/en/press-room/20201207IPR93206/agreement-reached-on-the-2021-2027-eu-regional-and-cohesion-funding

[99] Please find the infographics for the Fit-for-55 transport package, and the detailed measures here: https://www.consilium.europa.eu/en/infographics/fit-for-55-afir-alternative-fuels-infrastructure-regulation/

[100] Interview EU-8.

However, some existing enablers may facilitate overcoming these challenges.

Lessons learnt from humanitarian aid efforts in the same direction, and training to green their operations. As laid out earlier, the humanitarian aid sector has already advanced towards including greening considerations into their training and exercises activities. Given the close relations and similarities between humanitarian aid and civil protection, these existing training programmes can be a source of inspiration – and an opportunity to learn about the benefits and challenges of implementing greening-specific training.

The restructuring of the UCPM training and exercises programme. As of 2023, the UCPM training programme will be restructured to further specialise and account for the breadth and diversity of civil protection professionals requiring training. One of the additions to the new programme will be the 'thematic' workshops and/or training. This can be seen as an opportunity to add a greening-specific course directed at all civil protection professionals.

7.5 Promoting climate change mitigation through the UCPM

7.5.1 Promoting climate change mitigation in preparedness

Owning greener vehicles, equipment and goods could be promoted by DG ECHO through a variety of means, as detailed below.

- By providing a catalogue of available EU funding options, which are possibly most relevant to Member States, but also of potential, yet somewhat more limited relevance to Participating States to support the acquisition of greener vehicles. This could take the form of a succinct document summarising the EU funds that are available, along with eligibility criteria and amounts where that is available and/or can be obtained. This could be done in parallel to a study focusing on the life cycle emissions and costs of civil protection vehicles (please see hereafter).

- By boosting the amounts available in grants to help Member States and Participating States acquire greener vehicles, which are indeed more costly to acquire than fossil-fuel-driven ones. If a new grant is established that allowed them to finance vehicles only for national use, this would need to be determined. In this regard, it should be noted that the Adaptation Grants' total annual budgets are rarely allocated in full.

- By adapting rescEU procurement practices for goods purchased for stockpiles and response capacities to ensure that low-carbon options are favoured, ECHO could reduce the carbon footprint, learn about relevant facilitating software and products, and inspire Member States and Participating States to adapt. This could be achieved by: (i) favouring low-emission goods in tender requirements; (ii) using new software to estimate carbon footprint in supply chains; (iii) identifying goods with smaller carbon footprints.

DG ECHO could also facilitate this move at Member States and Participating States level. Some Member States and Participating States reported significant efforts towards greening vehicles, equipment and goods. Others reported that they could benefit from support from DG ECHO. Levers to facilitate may include the following.

- Leading a **detailed study** intended for the civil protection authorities of Member States and Participating States. This should detail the **GHG life cycle emissions** and **Total Cost**

of Ownership (TCO) of civil protection vehicles per energy source and per vehicle segment (dissociating special civil protection vehicles and supporting conventional vehicles such as passenger cars and light-duty vehicles).

- Facilitating **knowledge sharing** by: (i) research and providing information/recommendations regarding relevant software to estimate scope 3 emissions for goods; (ii) providing information on or a list of low-emission alternatives that different Member States and Participating States have found to be effective; (iii) organising knowledge- or experience-sharing events, or information sheets, so that Member States and Participating States with experience could share information with less-experienced States about good low-emission product alternatives and relevant software.

Reducing/rethinking transport activities and use of equipment could be facilitated by DG ECHO as follows.

- At the preparedness stage, a precise mapping of ECPP/rescEU capacities (vehicles, equipment) in their host country could be prepared (city-level). Scenarios of interventions (buffer areas or risk-related areas) could be pre-defined to assess whether the current positioning of the capacities matches the probability of disaster risk in neighbouring areas and thus of mobilisation of these capacities. Anchored with the A3 Unit (Security and Situational Awareness) a coordinated effort could be undertaken to analyse the previous areas of interventions of these capacities and the distance between their location in the host country and in the country of intervention, as well as the likely evolution of risks in the different European regions. This comparison of past interventions and potential evolutions could lead to a more efficient pre-positioning of capacities, even though they have always – to date – been positioned based on national risks.

Adding and/or mainstreaming environmental concerns across training and exercises. The following levers could be used to embed climate change mitigation into training and exercises.

- **Adding a greening component/section in open calls for service contracts regarding the content of trainings and exercises.** This would help to overcome current limitations linked to sub-contracting of trainings and exercises to third parties by ensuring compliance with EU environmental requirements.

- **Developing an environmental training for trainers in the UCPM training programme**[101] to ensure common understanding of what is meant by greener interventions. Discussed during one of the focus groups, this greening opportunity was deemed to be a way forward to ensure a certain perennity in the inclusion of environmental considerations into the content of training and exercises. It was notably explained that the level of understanding and sensibility towards what greening is varied considerably between trainers. This intervention could help respond to the perceived need for a policy mandate or guidelines to justify and ensure the actual take-up of greening the content of civil protection training and exercises. There may be less reticence to programme change if those directly impacted are onboarded on the modification process.

[101] Focus group session with national civil protection actors (E-4)

- **Developing an environmental section in the Union Civil Protection Knowledge Network** to make general environmental considerations available to a wider audience. Again, this may be an opportunity to widen the reach of training and to onboard everyone along this new greening path.

- **Geographically clustering in-person training and exercises.** Clusters could be created and nearby or 'central' training centres could be further used. *In cases where in-person training and/or exercises are deemed essential, this intervention could help (i) minimise travel needs, reducing the carbon footprint associated with long-distance travel and (ii) use train travel instead of planes. This would also help overcome bonding and relational concerns linked to moving training and/or some exercises online.*

7.5.2 Promoting climate change mitigation in response

Reducing/rethinking transport activities and use of equipment could be promoted by DG ECHO directly in the following ways.

- By defining new typologies of interventions to introduce greener usages during response interventions. A first phase could consist in internal strategy work to define, for example, the types of interventions where pooling (by plane, truck), rail (in Europe mostly), and the use of a lower number of vehicles/smaller vehicles are possible.

- The key deliverables of such a strategy work could be of two types: the first would be a guide of good practices to pre-define typologies of response interventions intended for Member States and Participating States requesting and offering assistance, and a likely amendment or definition of guidelines for ERCC specific deployment plans[102] (to support ERCC's work during early response stages)

Table 7-4 Potential timing of facilitating actions and who implements them

Timing	Facilitating actions
	<u>Owning greener vehicle, equipment and goods</u>
Quick wins	• Catalogue of funding options available to Member States and Participating States to support the acquisition of greener vehicles (document could be amended in line with the results of the study focusing on the carbon footprint and TCO of civil protection vehicles). • Study assessing the life cycle carbon footprint and TCO of civil protection vehicles, per energy type and vehicle segment, dissociating civil protection special vehicles and supporting ones.
Medium-term	• Expand the available resources from grants for greener vehicles/equipment.

[102] Annex VI of Implementing Decision (2014/762/EU)

	• Introduce further criteria for greening in developing rescEU capacities (demonstrate certain standards of CO_2 emissions or restrict the potential options for acquiring ground vehicles to only greener energy sources). • Research relevant software that provides information on supply chain emissions and share recommendations with the civil protection community (DG ECHO). • Research low-carbon footprint products and share with civil protection community (DG ECHO).
<u>Reducing/rethinking transport activities and use of equipment</u>	
Quick wins	• Build a database (with the base city of the capacity) of ECPP/rescEU complete list and location of capacities and modules, and define disaster-related intervention scenarios, with the support of DG ECHO A.3).
Short-term	• Internal DG ECHO work for better coordination in early response stages leading to a green/environmental guide for good practices for early response interventions. • Potential revision of ERCC specific deployment plans to introduce questions aimed at preparing the typologies of response interventions (use of rail, pooling, etc.)
<u>Mainstreaming environmental concerns across training and exercises</u>	
Quick wins	• Develop an environmental section in the Union Civil Protection Knowledge Network.
Medium-term	• Add greening criteria in open calls.
Long-term	• Develop an environmental training for trainers.

8 RECOMMENDATIONS FOR THE FURTHER GREENING OF THE UCPM

This report has introduced the most relevant themes for promoting and accelerating the greening of the UCPM. For each of these themes the report has explained what they mean in the context of UCPM and how they would contribute to greening. It has also provided reflections on the role that DG ECHO, and Member States/Participating States could play in releasing this greening potential.

This chapter translates the above analyses into a set of recommendations on how to move forward with a green and sustainable future for the UCPM. The strands are defined so that each of them represents either an individual (set of) of actions in pursuit of a specific aim as described in the previous chapters, or the use of existing tools to promote greening. Each strand could be pursued individually, but the effect of pursuing more or all of them would provide for substantial synergetic effects. Some strands relate directly to corresponding thematic chapters (e.g., data and conceptualisation), whereas others relate to more than one thematic chapter (e.g., guidelines and knowledge sharing which relate to circularity and waste management). Since this chapter builds on the preceding chapters there are some repetitions, but the chapter focuses more on the role of DG ECHO as regards the UCPM. Details are provided in the preceding chapters.

Table 8-1 Recommendation strands described in this chapter

	Strand	Green theme addressed (see text box 2-2)	Stage of disaster cycle
A	Data and conceptualisation	Mitigation (and circularity/waste management)	Horizontal relevance, data produced and delivered at response stage
B	Development of tools	Mitigation (and circularity/waste management)	Data produced and results used at response stage
C	Feedback loops	Mitigation, circularity & waste management, nature & biodiversity	Feedback produced in/upon completion of response and provided to prevention/preparedness for action
D	Guidelines and knowledge sharing	Mitigation, circularity & waste management, nature & biodiversity	Preparedness
E	Training and exercises	Mitigation, circularity & waste management, (nature & biodiversity)	Preparedness
F	Greening disaster resilience grants	Mitigation, nature & biodiversity, (circularity & waste management)	Prevention (and preparedness)
G	UCPM response capacities (ECPP and rescEU)	Mitigation, circularity & waste management, nature & biodiversity	Response

H	Developing a catalogue of best practices	Mitigation, circularity & waste management, nature & biodiversity	Prevention, Preparedness, Response

8.1 Strand A: Data and conceptualisation

As set out in chapter 3, an important cross-cutting challenge (extending across prevention, preparedness and response) relates to the issue of conceptualisation and data. A clear definition of what greening in civil protection means will provide a common basis of understanding across the UCPM– and, more broadly, civil protection– of what is to be promoted and why. The present study has developed a working definition for the purpose of this study. However, for a definition to become alive, used and be a relevant reference point it needs not only to be validated and tested thoroughly and widely, but also to be accompanied by operational directions, including at least some headline indicators.

This points to the issue of data and knowledge, which is also analysed in Chapter 3. The analysis highlights a need to improve data and knowledge to provide a solid basis for understanding the environmental and carbon footprint of the UCPM. This is essential for defining concrete actions and understanding their contributions to greening in terms of GHG emissions. In the present study, the focus has been placed on carbon footprints related to transport and transport capacities in order to provide up-to-date evidence on the greenest types of vehicles on the market (life cycle assessment) and to provide a basis for calculating and monitoring GHG emissions linked to the UCPM interventions (see Appendix F). This analysis, however, has also demonstrated the limitations of the current level of data availability. Thus, such an analysis could be deepened and improved with improved transport/logistics data.

Thus, further efforts to improve data and knowledge and to provide a conceptual framework for estimating GHG emissions must go hand in hand: a preliminary overall definition can assist in the initial scoping on data and knowledge, and lessons learnt from that can feed into further refining and operationalising the definition, which again then informs the further work on data and knowledge. Generating data and knowledge to inform a definition, to guide the efforts towards greening and for the purpose of monitoring achievements is a demanding exercise that would need to be pursued with a view to feasibility and timeliness: it needs to be doable, and it needs to deliver applicable results within a reasonable timeframe.

DG ECHO will need to play a vital role in leading such an initiative. Concomitantly, UCPM stakeholders are essential contributors to data collection. This would facilitate their inclusion and sensitisation to reducing the carbon footprint of activities, both at EU-level and national level. A high degree of engagement and buy-in will, in addition, stimulate and accelerate the appreciation of the need to go green among the civil protection community. Providing concrete definitions and improved data and knowledge will help the community measure their progress and identify areas for further improvement. Furthermore, a range of additional stakeholders could be mobilised to pursue this strand: for example, the JRC could play a supporting role in developing definitions, relevant indicators and the associated mapping of data needs as well as the related strategy for data collection. The effort would also benefit from coordination and inspiration from the ongoing efforts in DG ECHO to promote greening of humanitarian aid.

The replicability of some research work also needs to be ensured. Life cycle assessments are a good example. On the one hand, they provide a strong basis for assessing the carbon footprint of vehicles/equipment. On the other hand, they are demanding, in terms of both time and data,

and cannot lead to concrete actions if their results are not clear, available and understandable. Even though assessments are available at product level, they might still be cumbersome to base the effort on due to a) the question of wider replicability of LCA results across a given product group, and b) the outcomes of the LCA are heavily dependent on the assumptions applied. Therefore, suppliers should also be considered as a stakeholder group that it is essential to work with – both to gather data and relevant assumptions, and to encourage development of products with lower life cycle emissions, by ensuring they are aware of the demand for such products.

In order to pursue a feasible and realistic approach, first it is recommended to focus on establishing the appropriate data foundation for calculating and monitoring the transport-related carbon footprint. At the same time, an effort should also be directed towards gathering and synthesising available information on environmental and carbon footprints relevant to the purchase and use of other capacities and goods.

To that end, a first step would be to anchor this initiative within DG ECHO, and to assign the appropriate resources to it. One option would be to do this through an environmental section created in the ERCC. Anchoring it within the ERCC would make sense from the perspective that data to inform indicators would relate largely to response activities, even if purchase choices are largely made during the preparedness stage.

A second step would be to establish the appropriate platform for involving stakeholders, possibly in the framework of the Knowledge Network. Besides Member States and Participating States, other key stakeholders should be invited to participate, including not least the JRC, and also bring in the experience from other relevant EU-level stakeholders, such as from the humanitarian aid side and defence.

The carbon footprint from transport in UCPM-coordinated actions is, as shown and explained in Appendix F, a delineated exercise that does not capture all civil protection transport activities but focuses only on those under the UCPM mandate. Recognising the complexity of establishing the data foundation for solid carbon footprint assessments, it would, however, be an implementable exercise to work further along the lines set out in Annex F and results could be delivered within a relatively short term. However, in the beginning results would be more illustrative than representative, but a continuation of the work would still lay the foundation and provide the incentive to improve the data and take active steps to find solutions to reduce emissions. The illustrative calculations performed in the baseline analysis of this study, known as well-to-wheel (WtW) emissions, provides examples of which types of data can be collected (inputs such as vehicle usage data during response interventions) and used for calculations. While tedious, improving the data foundation for conducting WtW assessments as a minimum should be feasible. It could be achieved in the following two ways.

- By asking Member States and Participating States to provide input data beforehand (Part A forms and grant applications) and afterwards (to double check the data and provide data for on-site usage). Calculations of well-to-wheel GHG emissions would be then done by DG ECHO.

- By asking Member States and Participating States to directly calculate WtW emissions according to a methodology shared by DG ECHO, which will need to check the results.

This exercise would empower DG ECHO to build good data foundations and to calculate aggregate annual statistics to be monitored and compared every year.

A wider focus on establishing the data foundation for assessing or illustrating environmental footprints (see examples in section 3.4) and carbon footprints from other capacities and goods is likely to be a more demanding exercise, not least due to the many different types of products involved. Besides vehicles, it could be considered focusing on the carbon footprint of motorised equipment such as generators, where comparisons between fossil-fuel-based and solar-driven generators could be performed. Analysis of other goods purchased would probably require specialised software[103].

This data collection work could initially be implemented at rescEU level as an internal pilot project by DG ECHO in cooperation with relevant Member States/Participating States. The data to be collected should be in relation to the scope described above.

- At the preparedness level, creating a geodatabase to locate all registered capacities in their host country (city, depot) and their past interventions (countries, regions). These data will enable an analysis of the average distance run by vehicles/capacities as part of UCPM interventions and provide the basis for drafting possible future geographical interventions or amendments of their location (city-level) within the host country.

- At the response level, data on vehicle usage during UCPM interventions (Part A forms, grant applications, feedback from Member States/Participating States on the operations). These variables should provide the necessary inputs to calculate CO2 emissions and should thus detail the number of rescEU vehicles engaged in an intervention, their mileage during the different moments of the intervention (before, during, after), the type of fuel used, as well as a descriptive feedback, post-intervention, on the proportionality of capacities engaged initially versus those used during the intervention.

8.2 Strand B: Development of tools

Inspired by the parallel initiative led by DG ECHO in the field of humanitarian aid, monitoring tools could be developed to support the data collection described under Strand A, but also to encourage authorities to provide input data on equipment and goods mobilised for an intervention (to estimate fuel consumption by vehicle characteristics). Based on these input data, calculations of carbon footprints can be performed based on these input data. As in Strand A, this could be relatively easy to implement, first focusing on transport activities, then possibly extending it to other energy consuming equipment, possibly followed by key environmental indicators such as estimates of volumes of waste generated.

As in Strand A, the development of tools would be steered by DG ECHO and anchored within the proposed platform. Inspiration could be obtained from the similar work by DG ECHO in the humanitarian aid field, and external assistance could assist in the development of monitoring tools. Indeed, external assistance in the form of off-the-shelf tools or customised support may be essential to report, monitor and verify (MRV) carbon emissions associated with the purchase of goods with long value chains.

Existing rapid assessment tools, which could be anchored with the environmental section proposed in Strand A, could be used, adapted, or developed to monitor the environmental risks from a crisis.

[103] Examples of such tools include: Watershed — The enterprise climate platform; Tapio - Carbon Strategy Platform; https://normative.io/

8.3 Strand C: Feedback loops

Establishing a framework and the related tools for structured feedback loops on green dimensions could ensure that important lessons learnt from a response would come into use at the prevention and preparedness stage (as well as for the wider disaster risk management community). This could be in terms of both detecting good practices and experiences that could be replicated and it in terms of detecting areas where a follow-up effort at the prevention/preparedness stage could prevent or reduce the observed negative impacts on the environment and nature and/or in terms of carbon emissions.

Establishing and implementing such feedback loops based on clear tools for UCPM-coordinated response activities could generate information of value to prevention and preparedness activities in the context of the UCPM and serve as possible inspiration for Member States and Participating States at the domestic level to engage in similar exercises.

A key factor in achieving the ultimate greening results is, however, the effectiveness of the feedback loops in ensuring that lessons learnt do in fact reach and impact prevention and preparedness. Therefore, consideration could once again be given to anchoring this in a possible environmental section of the ERCC, that would be responsible for 'translating' feedback into observations relevant to prevention and preparedness and for sharing them both internally in DG ECHO, and where relevant in the wider forums of the UCPM and disaster risk communities. The debriefs taking place upon completion of deployment could be the forum in which to define the lessons learnt and the feedback.

The procedures, tools and lessons learnt from implementing it could be shared in general, for example through the Knowledge Network or through the above-mentioned platform on data and conceptualisation. An effort towards such sharing would contribute to possibly enhancing the use of structured feedback loops across the UCPM community and facilitate the sharing of relevant lessons learnt from it.

8.4 Strand D: Guidelines and knowledge sharing

In general, the elaboration of guidelines and the facilitation of knowledge sharing is a key means by which DG ECHO could promote greening in civil protection. This study has identified the following themes that are of relevance to different aspects of preparedness.

- Development and sharing of knowledge about the process involved in the purchase of 'green substitutes', as well as knowledge of product choice. This may relate to sharing experience relating to national procurement procedures or requirements and how to emphasise the green aspects of procurement when purchasing vehicles/equipment or other goods for response. An initiative to promote such sharing could include drawing up information sheets to address perceptions that might constitute barriers to green procurement. Such constraints may relate to a perception that green substitutes are more expensive or that traditional products have a stronger performance. While up-front costs are sometimes higher, greener products can be cheaper – e.g., because of less packaging. In addition, the lifetime costs may be lower. Another barrier may relate to uncertainty as to what constitutes a green replacement and who supplies it. Sharing information on relevant products, suppliers and performance would be helpful to address these barriers.

- Development and sharing of knowledge on clean-up and waste management options at the end of an intervention. This may relate to waste clean-up and waste sorting options after an intervention. Insights from waste management during/after large-scale disasters may

be relevant to incorporate in future guidelines. Indicatively, the text box below provides an overview of some waste management options and examples.

- Development and sharing of knowledge on current national initiatives on greening training and exercises for potential inspiration/replication. During focus groups held with Member States and Participating States, many participants were eager to listen and learn from other countries' practices/ activities to improve their processes. When it comes to training and exercises, some best practices were shared, such as the use of simulators or adapting exercise sites to minimise transport needs.

- Development and sharing of knowledge about greener alternative vehicles (types, characteristics, price, usage) used by civil protection authorities, both on specialised vehicles and support vehicles (for staff and goods). The knowledge to be shared could comprise both technical studies led by Member States/Participating States on their own as well as practical experience based on operational conditions (testing of a vehicle in an operation or exercise).

Text Box 8-1 Large scale disaster waste management

- **Concerns over waste management improvement in the realm of disaster response have been underpinned by questions over waste management in cases of large-scale emergencies, in particular during international deployments.**

- Disaster waste management is understood to be divided into three phases: (i) emergency response, where debris and direct threats need to be removed from the disaster site; (ii) the recovery phase where the waste is managed and (iii) the reconstruction phases, where debris and waste are used for rebuilding purposes[104]. According to the World Bank[105], the bulk of disaster waste in large-scale disasters comprises construction and demolition materials such as concrete, steel or wood. Sometimes, natural debris may also be included.

- Various waste management options exist, including but not limited to recycling, temporary storage, incineration and deconstruction[106]. Deconstruction appears to be of growing interest in the case of large-scale disasters. By relying on reclaiming materials from landfills, the construction sector can redirect materials back into local buildings and avoid some of the waste associated with demolition[107]. For example, Denhart explored the impacts of deconstruction following the 2005 hurricanes Katrina and Rita. Demolition costs amounted to $5.50 per square foot, while deconstruction and selling or reusing the raw materials resulted in a net cost of only $3.80/sqft, and, in some cases, could even turn profitable (estimated at a profit of up to $1.53/sqft)[108].

[104] What a Waste 2.0 : A Global Snapshot of Solid Waste Management to 2050 | Policy Commons

[105] What a Waste 2.0 : A Global Snapshot of Solid Waste Management to 2050 | Policy Commons

[106] Disaster Debris Management: a systems approach (canterbury.ac.nz) ; Incorporating recycling into post-disaster debris disposal - ScienceDirect ; Large-scale disaster waste management under uncertain environment - ScienceDirect

[107] Deconstructing disaster: Economic and environmental impacts of deconstruction in post-Katrina New Orleans - ScienceDirect

[108] Deconstructing disaster: Economic and environmental impacts of deconstruction in post-Katrina New Orleans - ScienceDirect

- Disaster waste management is highly contextual: feasible waste management options will depend on the local context – available waste management infrastructures, local norms, networks etc. In that regard, waste management experts have identified disaster-specific factors which need to be accounted for when choosing waste management options. These may include volume of waste; degree of mixing of waste; human and environmental health hazards; areal extent of the waste; community priorities; funding mechanisms; and existing and disaster-specific regulations[109]. Even among popular waste management systems such as recycling, the appropriateness of on- or off-site waste separation is highly dependent on the disaster type and local context (resource availability, mixing of waste, human and public health hazards etc.)[110]

- Some plans, guidelines and case studies regarding disaster waste management already discuss the technical solutions to waste management in the case of large disaster or emergencies[111]. However, partly due to the need to take the context into account, these guidelines are not always able to provide clear guidance regarding the best ways to select waste management options post-disaster, especially on ways to approach existing the legislation and organisational and funding structures of disaster waste management programmes[112].

8.5 Strand E: Training and exercises

There are two approaches to greening training and exercises, as discussed in chapter 6 and 7: the first is to embed circularity and waste management principles into the organisation of training and exercise events, while the second focuses on ensuring climate change mitigation by greening the content of the courses.

(1) ***Planning sustainable training and exercises events.*** In a first instance, it is recommended to move towards online forms of training when possible and feasible, and/or hybrid forms of training and exercises where this would be possible. It is important to note, however, that the effectiveness of the training and exercises must not be negatively affected by this. This could be an opportunity for DG ECHO and Member States/Participating States to test out and provide concrete examples to Member States and Participating States on ways to make the most out of digital tools, and, in turn, share their lessons learnt via the Knowledge Network. Moreover, circularity principles could be further embedded into the organisation of events by rethinking packaging and promotional material to reduce the amount of waste generated, and by selecting green venues closer to the majority of those attending events (if possible, reachable by train rather than plane for many participants).

A more ambitious step could be to create geographical clusters and duplicate/organise training while acknowledging places of residence. Given its coordination responsibilities, DG ECHO would be the relevant entity to oversee such a process.

[109] Recycling disaster waste: Feasibility, method and effectiveness - ScienceDirect

[110] Recycling disaster waste: Feasibility, method and effectiveness - ScienceDirect

[111] DWMG.pdf (unocha.org)

[112] Disaster Debris Management: a systems approach (canterbury.ac.nz)

(2) ***Mainstreaming greening into training courses and exercises.*** Introducing new thematic courses, the restructuring of the UCPM training and exercise programme could be a simple opportunity to add environmental-specific courses as part of the training programme. Some of these could be completed online (a public version of DG ECHO's Greening in Humanitarian Aid is available online). Other elements could be incorporated into both table-top and field exercises. The latter could include safely disposing of waste and preventing water contamination using relevant equipment and practices.

A more ambitious step could be to mainstream environmental considerations throughout most of DG ECHO's trainings and exercises to ensure joint understanding of what greening means in civil protection context.

8.6 Strand F: Greening Disaster Resilience Grants

The disaster resilience grants – the Technical Assistance for Disaster Risk Management and the KAPP grant schemes – could support greening by funding studies/projects that improve knowledge and practices on greening of civil protection.

The practical implementation of this recommendation could be done through modifications to the calls for proposals. In the short term, this could include elements that encourage Member States and Participating States to focus more on greening in the projects funded through these grants. For example, greening could be included in the objectives for specific calls for applications. That could be supplemented by guidance in the form of examples of what greening means for different types of projects/studies. This element links with the recommendations on conceptualisation as having more clear definitions of greening, possibly linking to each of the phases of civil protection (prevention, preparedness and response) and will support Member States and Participating States in including greening in their applications.

- Include greening more prominently in the set of objectives.
- Include examples and explanation on what greening would mean, so specifying how the projects being applied for could be made greener.
- Promote the grants as leverage for making applications for other EU funding (for example the structural and cohesion funds).

In the medium-to-longer term, there could be a specific requirement for applications to describe how greening is included or for applications to comply with certain criteria. This should consider the experience from the first phase with changed objectives and whether they have increased the greening element in the supported studies/projects. The criteria could, for example, be as shown below.

- Include a requirement to describe in the application how the project would contribute to greening.
- Include criteria on specific elements to be included in the projects. For example, that it should cover greening in relation to each of main thematic areas on circular economy, climate change and nature and biodiversity.

8.7 Strand G: UCPM response capacities (ECPP and rescEU)

Recommendations for further greening laid out in this report may be applicable for DG ECHO's direct areas of control or strong influence (e.g., rescEU or ECPP) and/or for DG ECHO's ability to facilitate or influence greening efforts by Member States and Participating States. It is notable that during the focus groups, many Member States and Participating States indicated that they would welcome guidance or support from DG ECHO in a number of areas including guidelines, targets, options and opportunities for greening, financing support and information, and coordination.

Nonetheless, DG ECHO has the most direct control over developing rescEU assets and upgrading or repairing ECPP capacities and this could be a way to both green DG ECHO activities and provide a demonstration effect for national civil protections. Therefore, below we highlight several recommendations for the greening of UCPM response capacities.

- **Adapting procurement standards**, the UCPM, through rescEU or ECPP adaptation grants, could purchase more environmentally friendly goods for emergency stockpiles (e.g., food, medical equipment, thermal blankets, etc.) and response capacities (i.e., combining staff and equipment). This may include, for example, adding packaging requirements to tenders, sourcing goods with lower or more environmentally friendly packaging or working with suppliers to reduce packaging. In addition to reducing packaging, this may have a positive demonstration effect for both national civil protection authorities and manufacturers, who may observe a market for low-packaging products in the area of civil protection.

- **Coordinating procurement** among rescEU and Member States and Participating States to increase leverage vis-à-vis suppliers. This could also help to increase the market size for key products. By ensuring manufacturers are aware of overall demand, they may find it better value to invest in adapting packaging. This may mean sourcing the same products and working together with manufacturers to green packaging. It may also mean encouraging Member States and Participating states to include green packaging criteria systematically in tenders.

- **Identifying and investing in software to identify value-chain emissions for rescEU purchases.** In general, software is required to estimate the emissions from products up the value chain (i.e., scope 3 emissions)[113]. Follow up by demonstrating sharing the experience with this software with Member States and Participating States.

- **Developing clear SOPs/guidelines for waste/medical disposal, based on WHO guidelines and ensuring rescEU has sufficient equipment to follow these.** The WHO guidelines for the classification and minimum standards for emergency medical teams were updated in 2021[114] and include guidance on the safe disposal of medical waste and the packaging of medical products, and safe practices for other factors impacting health, such as safeguarding drinking water. RescEU may wish to ensure they have sufficient equipment to meet these best practices as well as sufficient training and relevant SOPs to operationalise the guidance.

[113] Examples of such tools include: Watershed — The enterprise climate platform; Tapio - Carbon Strategy Platform; https://normative.io/

[114] Classification and minimum standards for emergency medical teams (who.int)

- **Collecting and maintaining updated detailed data in a geo database on rescEU and ECPP capacities including host countries (city, depots), past interventions (countries, regions), exact vehicle type, stockpiles.** See Strand A for more details of the data that may be collected and how this could help track CO_2 emissions.

- **Including green equipment in rescEU and ECPP capacities.** For example, include solar power – in particular for lighting in shelters and water pumps and bio-digester systems.

- **Improving warehouse and stockpile storage facilities and introducing standards for the future facility establishment for rescEU stockpiles.** This would help with standardisation and compatibility issues and would support the procurement standardisation.

- **Informing rescEU capacities through established feedback loops and** adapting the procurement with equipment according to lessons learned from response.

8.8 Strand H: Developing a catalogue of best practices

A catalogue of best practices should be accessible for civil protection professionals, easy to update, classified in a clear and logical way, and provide broadly similar information for each best practice. If feasible, it could also provide contact information for those with relevant experience.

Our review[115] of several catalogues of best practice across a diverse range of topics found that, although each one was specific to their focus, several overarching organisation patterns emerged. Similarities are listed below.

- They tend to categorise practices according to a classification that makes sense within the context. In the case of civil protection, this may be according to prevention, preparedness and response. However, other categorisations could be relevant.

- They tend to ensure that each category or practice presents broadly similar information for each category or practice. As a minimum, titles are the same or similar. In the case of civil protection, this may include the title of a greening policy/action; an explanation of what it is; the benefits; and an example. These same headings would be included for all practices.

- Most use very concise and accessible language to summarise practices.

One of the simplest ways to organise a catalogue for civil protection would be to classify practices by prevention, preparedness, response and cross-cutting. We have followed these categories below and added sub-categories.

Information included for each sub-category, or each practice could include:

- Type/sub-category of action (if applicable)

[115] Examples include (but not limited to): D 2.3 Catalogue of best practices (spice-project.eu) / Booklet-EnR-150421-website-min.pdf (enr-network.org) / Catalogue of Best Practices for the Provision of Social Care Services | United Nations Development Programme (undp.org) / fichas-bpec-i-en-web_def_tcm30-525011.pdf (miteco.gob.es)

- Title of action
- Short explanation of intervention
- Why it is beneficial
- Example(s)
- Relevant contact (if feasible and with restricted access, following GDPR)

Below, we first present a list of potential actions to include in such a catalogue following a simplified version of the above sub-categories. Examples are meant to be illustrative and reflect recommendations on how to go about developing a best-practice catalogue. While these may provide inspiration and have been selected because they are considered potentially relevant inputs into such a catalogue, the examples listed are not meant to be exhaustive.

Prevention

As noted above, the area of prevention is broad and involves a multitude of actors, including national governments, regional and city authorities and the private sector – including the financial sector. Financing to prevent or reduce the impact of disasters also stems from a multitude of sources. Thus, efforts are broad based and we consider civil protection to have some interest in most efforts since they can reduce the likelihood of disaster or reduce its impact, and therefore the need for or scope of a response. Therefore, examples of prevention activities detailed below are not usually directly within the purview of civil protection authorities. Nonetheless, they are provided here because (i) they are of relevance and (ii) civil protection authorities, including the UCPM, may have influence over how other actors address prevention efforts, including through feedback loops.

Title: Preserve/regenerate biodiversity more effectively
Explanation, benefits: Preservation of biodiversity is an important part of preventing natural disasters. These include measures such as preservation or restoration of wetlands to prevent floods or droughts; forest management to prevent forest fires (reducing spread of forest fires by having spaces).
Examples: Examples include efforts to regenerate mangroves (such as in Greece or Turkey) or sea grass around much of Europe's coastline, which act as a significant barrier against cyclones, floods and landslides[116]. Indeed, they are estimated to provide at least $1.6 billion a year worth of ecosystem services through such protections[117].

Title: Make cities more resilient
Explanation, benefits: Making cities more resilient will help to minimise the impact of some disasters. Actions include adjusting building codes (e.g., resilience to earthquakes, not placing generators in basements that flood easily, increasing insulation to reduce impact of extreme heat or cold weather); creating green areas in cities to prevent floods and reduce heat islands; preserving riverbanks to have room for flooding without causing damage to buildings.

[116] Mangrove conservation for disaster risk reduction | PreventionWeb

[117] Restoring mangroves for disaster protection in the Philippines - Blue Natural Capital

Examples: The refurbishment of Gomeznarro Park in Madrid[118] included the use of permeable surfaces and the revegetation of areas at risk of erosion. Similarly, flood risk management in Barcelona has included the construction of storm water retention and other efforts[119].

Title: Feedback loops
Explanation, benefits: Response teams and deployed (environmental) experts should report back to the broader disaster prevention community their observations regarding the causes of the disaster and what efforts may have prevented it or mitigated its impacts. For example, would a forest fire have been more contained with greater breaks in the forest? Could a sea flood have been better contained with less biodiversity loss? Could damage to buildings have been reduced had regulations regarding building on flood plains been imposed?
Examples: The UNDRR includes in its knowledge base a category called Learning from Past Disasters[120]. This is a repository of documents summarising disasters globally. Several governments collate information on topic-specific disasters in their territory. One such example exists in New South Wales, Australia, where they have also developed a course and repository of information specifically related to past mining disasters going back to the 19th century with the aim of reducing such disasters in the future[121]. DG ECHO also leads an extensive lessons-learnt programme that – to a larger degree – could incorporate environmental feedback loops.

Preparedness

Title: Green procurement practices
Explanation, benefits: This involves implementing procurement rules, processes, and software to facilitate the purchase of goods and equipment with low environmental footprints. This includes low emissions throughout the value chain, low or alternative packaging options, facilitating reduced waste, and recycling or reuse. This may involve updating procurement practices or rules, identifying software to estimate carbon footprint of different product or equipment choices or even working with manufacturers to reduce or change packaging types, all of which can be challenging. It can, however, result in reduced costs, smaller, lighter shipments and reduced reverse transport needs, and make it easier to leave no trace behind" following operations by reducing purchases that lead to significant waste generation.
Examples: Some Member States and Participating States have adopted a decree in green public procurement for all public services at a national level (including civil protection – although carve-outs tend to exist for certain emergency response vehicles or items). In the humanitarian space, the IFRC aimed to map GHG emissions and green supply chains[122]. This involved conducting market research to assess relevant measurement, reporting and verification software to do this already on the market, and developed training materials and conducted workshops on how to do this to ensure buy-in and knowledge-sharing. They also worked with some suppliers to reduce packaging and reduce costs as a result.

Title: Upgrade to low-emission vehicles
Explanation, benefits: This includes purchasing electrical and other low emission vehicles, including fire trucks. It may also include using drones instead of helicopters. In addition, it may include using smaller vehicles to tackle smaller emergencies (and improve access in narrow urban

[118] The refurbishment of Gomeznarro park in Madrid focused on storm water retention — English (europa.eu)
[119] Europe: Barcelona city, a successful case in flood risk management | PreventionWeb
[120] Learning from past disasters | Knowledge base (preventionweb.net)
[121] Learning from disasters | NSW Resources Regulator
[122] CaseStudy_Greening-IFRC-Supply-chains.pdf (climatecentre.org)

streets). In addition to lower emissions, these may include benefits such as lower lifetime costs (lower fuel and maintenance costs) but also present challenges such as high up-front costs and – for EVs – range issues when tackling distant disasters (e.g., forest fires).
Examples: One specific case of green procurement is the purchase of emergency response vehicles. A Member State has conducted a feasibility study on energy efficiency in vehicles funded by the EU. It was designed to support the development of electric vehicles. The results should be translated into policies and recommendations for others. The outcomes of the different activities from programmes and projects should be interchangeably linked within the UCPM. Several global cities have begun experiments with electric fire trucks including Berlin[123], London[124] and Los Angeles[125].

Title: Green power generation
Explanation, benefits: Another specific example of civil protection procurement that can be greened includes greening power generation options for response capacities. This is relevant for both rescEU and the ECPP, as well as more broadly. This includes switching away from diesel generators and towards alternative power sources such as solar power, whenever a switch will not impede response effectiveness. This reduces the need to transport fuel to disaster sites, local air pollution and the cost of purchasing fuels. Up-front investment costs are required, and back-up generators will be needed for some purposes – notably some medical facilities.
Examples: Switching to greener on-site energy alternatives has been implemented by numerous humanitarian aid agencies and in military contexts. The use of solar power – in particular for lighting in shelters and water pumps – has become increasingly widespread. Examples include the IFRC's use of solar powered water pumps[126], and the International Organisation for Migration's Solar Humanitarian Hub[127].

Title: Mainstream greening into training organised by the UCPM
Explanation, benefits: This includes adding modules related to greening options into existing training (and may include the development of specific courses related to greening). This could help to share knowledge of greening opportunities, best practices, benefits and potential drawbacks. A broad range of topics could be included, such as greening supply chains and equipment, providing feedback from response to disaster reduction communities, and on-site behaviours such as leaving no trace behind (e.g., waste). This could be an effective way to normalise greener practices and behaviours and to generate new greening ideas based on feedback from participants, who will often have significant civil protection experience.
Examples: The Green Recovery and Reconstruction training Toolkit for Humanitarian Aid by WWF[128] is a 10-module toolkit and training programme on how and why to green disaster relief. It includes an extensive teaching guide explaining different ways to teach each module. It also includes steps to integrate the environment into project planning, including using indicators, con-

[123] eLHF Soon in Operation (smart-city-berlin.de)
[124] London Fire Brigade first to deploy electrified engine - BBC News
[125] LA Now Has America's First Electric Fire Truck (jalopnik.com)
[126] Working closely with communities makes solar-powered water pump project a success in Pakistan - Canadian Red Cross Blog
[127] The Humanitarian Hub in Malakal, South Sudan Goes Green | International Organization for Migration (iom.int)
[128] Green Recovery and Reconstruction Toolkit (GRRT) | Publications | WWF (worldwildlife.org)

sidering potential environmental consequences (e.g., use of different seeds, fertiliser, construction, procurement etc). Similarly, DG ECHO's Greening Humanitarian Aid course[129] provides training (including through an online course) on why mainstreaming environmental considerations is important and how to incorporate it into projects.

Response

Title: Embed environmental experts in response teams (remotely), including into response teams coordinated by the UCPM

Explanation, benefits: Embedding environmental experts into response teams, either in person, or remotely, can help ensure that environmental considerations are given full consideration during emergency response. This may include risks related to the disaster itself or from potential response actions. For example, identifying the risk of wastewater runoff contaminating potable water supplies may be identified by an environmental expert and a suitable practical mitigation plan quickly identified. This can have benefits for reducing whatever risks are identified, preventing waste being left behind, local pollution, or any other potential environmental risk.

Examples: DG ECHO's Humanitarian Assistance provides a pool of environmental experts, whose role could be broadened to include civil protection. These could work remotely when appropriate to reduce transport and allow them to react more rapidly. Examples of remote support, also used through the UCPM, include remote drone operators after obtaining a licence from the EU Aviation Safety Agency[130].

Title: Use environmental risk assessment tools, including UCPM and rescEU response teams.

Explanation, benefits: These tools can be used during response to assess environmental risks associated with both the disaster and response. They are designed to be user-friendly for non-environmental experts and are often 'rapid' – taking only a few hours immediately following response. More in-depth assessments can be undertaken during the following days, supported by (remote) environmental experts.

Examples: Examples include NEAT+, a 'rapid and simple project-level environmental screening tool for humanitarian operations' [131]; the Rapid Environmental Assessment Tool (REA), designed for 'rapidly assessing and analysing the environmental context of a crisis or disaster'[132]; and the Flash Environmental Assessment Tool (FEAT), which 'helps to identify existing or potential acute environmental impacts that pose risks for humans, human life-support functions and ecosystems, following sudden-onset natural disasters'[133].

Title: Use more ecologically friendly fire extinguishing foam

Explanation, benefits: Traditional firefighting foams are effective, but studies have shown that they are harmful for the environment, drinking water and the health of those who use them regularly. Concern exists for the health impacts of PFAS for firefighters as well as people who live in areas where it is used to fight fires, particularly if it contaminates water sources. Their use is therefore being severely curtailed both in the EU and elsewhere. More ecologically friendly fire extinguishing foams are available and effective. These are more costly (estimated at an additional

[129] Greening Humanitarian Aid - public version - Overview (dgecho-partners-helpdesk.eu)

[130] Drone operators & pilots | EASA (europa.eu)

[131] NEAT+ - Nexus Environment Assessment Tool (neatplus.org)

[132] Rapid Environmental Assessment Tool (REA) - EECentre

[133] The Flash Environmental Assessment Tool (FEAT) 2.0 - EECentre

EUR 27 million in costs annually in the EU) but benefits in terms of avoided health and environmental costs are in the order of hundreds of millions[134].
Examples: Alternatives include hydrocarbons, detergents, siloxanes and protein foams, and many EU firefighting services are switching to these. NEWMOA, a New England-based waste clean-up organisation, researches and provides in-depth information, including from alternative foam manufacturers, regional regulators, academics/researchers, militaries seeking alternatives, and others at: NEWMOA - Emerging Contaminant – PFAS.

8.9 Summary of DG ECHO actions to promote greening

Key elements in promoting and accelerating the greening of the UCPM would be as follows.

- Establishing a forum of stakeholders through the Knowledge Network in which initiatives can be anchored and discussed, where experiences can be shared, and via which achievements can be shared more widely, be it in terms of guidelines, information sheets, developed tools or good practices. Further, the forum of stakeholders would constitute an essential mechanism for producing methodologies, tools and data to enhance the decision basis for making the right green decisions.

- Ensuring that the initiative to promote greening of the UCPM is well anchored within DG ECHO for example through establishing an environmental section in the ERCC that is well connected to DG ECHOs activities also in regard to prevention and preparedness, and which has the resources and the authority to move the agenda forward.

- Once this set-up is in place, initiatives can be promoted along several strands, many of which are mutually supportive. They would serve to increase knowledge through data, best practice, guidelines, information sheets; to build an appreciation of the green agenda amongst the civil protection community through the mentioned initiatives and through the joint development of a definition of a greener UCPM; and to incite green behaviours and purchases through the development of tools and through knowledge sharing that meets perceptions with fact/experience-based knowledge.

- Driven by DG ECHO, procedures and tools could be established for feedback loops that aim to gather green lessons learnt from UCPM responses and to translate those into activities if relevant at the prevention/preparedness stage. Similarly, greening can be promoted in the prevention and preparedness grants.

The following specific initiatives could be candidates for a fast roll-out in the sense that they can be implemented and/or communicated within a relatively short time horizon.

- Establishing a platform on greening and initiating further work on definitions in this context.

- Organising knowledge-sharing events and creating information sheets on key greening topics including: (i) reduced packaging benefits (e.g., lower costs, easier transportation); (ii) greener firefighting foam, including benefits (e.g., health benefits for users and populations, and environmental/water contamination benefits) and alternatives; (iii) benefits of

[134] https://echa.europa.eu/documents/10162/28801697/pfas_flourine-free_alternatives_fire_fighting_en.pdf/d5b24e2a-d027-0168-cdd8-f723c675fa98

better waste management and, in particular, the benefits for the communities after the response team leaves. Where relevant, 'stories' could be included for improved communication.

- Developing a shareable list of low-packaging products and suppliers, probably 'crowdsourced' from Member States and Participating States (and gradually expanded with more information).
- Cataloguing funding options available to Member States and Participating States to support the purchase of greener vehicles (both DG ECHO and other sources).
- Developing a database with the base city of all ECPP/rescEU capacities, modules and stockpiles, and ensuring this is easily accessible for all Member States and Participating States Civil Protection teams.
- Creating an environmental section ERCC with the support of the Union Civil Protection Knowledge Network. Several knowledge-sharing activities discussed in this report could be housed within this team.
- Developing a standardised lessons learnt reporting sheet to begin to encourage green feedback loops by response teams for prevention/preparedness teams as well as the broader disaster risk management community. Later a sub-set of these could be selected for more in-depth investigations and sharing for feedback.

APPENDIX A STAKEHOLDER CONSULTATION ACTIVITIES

Institution		Interviewee	Interview scope
DG ECHO	B.1	Asta Mackevicuite	Potential ideas to prevent and mitigate maritime pollution, as well as challenges in responding to maritime pollution events.
	B.3	Hana Kolic	The 2023 changes to UCPM training and potentials and barriers for reducing related transport activities
	B.1	Sofia Zanatta	The functioning of the unit and its collaboration with other international bodies, barriers and options
	A.3	Diego Cadelli-Godeaux	Functioning of the unit and options for greening
	A.2	Stephane Halgand	The functioning of the ECPP, the role of adaptation grants and support schemes for response, options for greening
	B.2	Cristina Brailescu	Prevention projects, their contribution to greening and options for strengthening the greening of them
	A.1	Edouard Smith	Barriers and options for greening
	A.1 ERCC	Ester El-Haddad	Functioning of the ERCC and co-financing rules
	B.2	Karolina Kalinowska	Lessons learnt from greening in humanitarian aid and options/barriers to greening in civil protection
	B.1	Simon Stermann	Understanding DG ECHO cooperation with military counterparts, and discussing examples of greening in the military sector.
	A.2	Francesco Pontiroli Gobbi	Description of rescEU activities, capacities used, funding support

	B.2	Maria Braettemark	Describe B.2 role in exchange and coordination on disaster prevention, eligible disaster resilience grants (track I and II grants)
	B.3	Donatella Salvi	Description of UCPM exercises and greening initiatives
IFRC (Global Logistics, Procurement and Supply Chain Excellence)		Juan Galvez	IFRC greening activities in supply chain and logistics, including the challenges of running a decentralised organisation, measuring baseline emissions.
IFRC (Green Response)		Richard Casagrande	Greening day-to-day activities and humanitarian response, the most relevant levers to win buy-in, to encourage national members to green interventions, and examples of greening response to date.
Maersk		Anne Jacobsen, Anders Dalsgaard	Description of Maersk services to Member States and Participating States, logistics organisation and interactions with DG ECHO
VUGD (Latvian Firefighting Services)		Viktorija Leskova Ģirts Sirsniņš	Detailed findings of the study led on the potential alternative green vehicles to renew the firefighting agency's vehicle fleet
WHO		Flavio Salio	WHO initiatives on improving environmental activities related to health interventions, pipeline and potential greening options
EDA		Constantinos Hadjisavvas, Maja Kuzel	Description of EDA activities and greening initiatives in defence
EEAS		Johanna Lauritsen, Arturo Arribas Santiago, Ugo Scribot	Description of CSDP (Common Security and Defence Policy) Missions

APPENDIX B LIST OF CONSULTED LITERATURE

Agency	Title
Rayed Alyousef, Hossein Mohammad Hosseini, Ahmed Abdel Khalek Ebid, Hisham Alabduljabbar, Shek Poi Ngian and Abdeliazim Mustafa Mohamed (2022)	Durability Enhancement of Sustainable Concrete Composites Comprising Waste Metalized Film Food Packaging Fibers and Palm Oil Fuel Ash
American Chemical Society (ACS)	The link between wildfires and drinking water contamination
Agency for toxic substances and disease registry (ATSDR)	What are the health effects of PFAS?
BBK	Wie funktioniert der deutsche Bevölkerungsschutz-?
Centre for Strategy and Evaluation Services LLP (CSES)	Evaluation Study of Definitions, Gaps and Costs of Response Capacities for the Union Civil Protection Mechanism
DG CLIMA	Determining the environmental impacts of conventional and alternatively fuelled vehicles through LCA, Final Report for the European Commission, June 2020
DG ECHO	DG ECHO's approach to reducing the environmental footprint of humanitarian aid
DG ECHO	Minimum Environmental Requirements and Recommendations
DG ECHO	Voluntary Pool Monitoring Tool
DG ECHO	"CERTIFICATION AND REGISTRATION" OF RESPONSE CAPACITIES IN THE EUROPEAN CIVIL PROTECTION POOL (ECPP), 2019
DG ECHO	UCPM Conditions for awarding grants without a call for proposal, ECPP Upgrade or Repair of Response Capacities, Annex I
DG ECHO	Maps of ECPP Offered and Registered Capacities, 2022
DG ECHO	ECPP Certification Process Assessment Tool (Template)
DG ECHO	Compendium of good practices for a greener humanitarian response
DG ECHO	DG ECHO's approach to reducing the environmental footprint of humanitarian Aid

Agency	Title
DG ECHO	Guidance on the operationalisation of the minimum environmental requirements and recommendations for EU-funded humanitarian aid operations
DG ECHO	Prevention and Preparedness Projects in Civil Protection
DG ECHO, PPRDEast Programme, 2021	Practical guidelines for integrating gender, human rights, and environmental issues in disaster risk management
DG ENV	Proposal for a revision of EU legislation on Packaging and Packaging Waste
Environment and Humanitarian Action (AHA) Hub (by JEU)	Disaster Waste Management Guidelines
Environment and Humanitarian Action (AHA) Hub (by JEU)	The Environmental Experts' Hub (EEHub)
European Defence Agency	Consultation Forum for Sustainable Energy in the Defence and Security Sector (CF SEDSS)
European Defence Agency	A Roadmap For Sustainable Energy Management In Defence And Security Sector
European Commission	Commission notice on Technical guidance on sustainability proofing for the InvestEU Fund
European Commission	COMMISSION IMPLEMENTING DECISION of 16.12.2021 on financing emergency response actions under the Union Civil Protection Mechanism for 2022
European Commission	COMMISSION IMPLEMENTING DECISION of 21.2.2022 on the financing of the Union Civil Protection Mechanism and adopting a multi-annual work programme for 2021-2024 and repealing Implementing Decision C(2021)

Agency	Title
European Commission	COMMISSION IMPLEMENTING DECISION of 25.4.2022 amending Commission Implementing Decision C(2021)9256 on financing emergency response actions under the Union Civil Protection Mechanism for 2022
European Commission	Directive (EU) 2019/904 of the European Parliament and of the Council of 5 June 2019 on the reduction of the impact of certain plastic products on the environment (Text with EEA relevance)
European Commission	A European Green Deal, Striving to be the first climate-neutral continent
European Commission	Circular economy action plan
European Commission	New Guidelines on organising sustainable EC meetings and events
European Commission	7 steps for greener events
European Commission	EU Ecolabel: Ecolabel Products
European Commission	PFAS
European Environment Agency (EEA)	Biodegradable and compostable plastics — challenges and opportunities
European Environment Agency (EEA)	What is the difference between adaptation and mitigation?
European Environment Agency (EEA)	Use of renewable energy for transport in Europe
European Parliament	Decision No 1313/2013/EU of the European Parliament and of the Council of 17 December 2013 on a Union Civil Protection Mechanism
European Parliament	COMMISSION IMPLEMENTING DECISION of 16 October 2014 laying down rules for the implementation of Decision No 1313/2013/EU of the European Parliament and of the Council on a Union Civil Protection Mechanism

Agency	Title
European Parliament	Directive (EU) 2019/1161 of the European Parliament and of the Council of 20 June 2019, amending Directive 2009/33/EC on the promotion of clean and energy-efficient road transport vehicles
European Parliament	Circular economy: definition, importance and benefits
EPA (United States Environmental Protection Agency)	EPA Actions to Address PFAS
Food and Agriculture Organisation of the United Nations (FAO)	Assessment of agricultural plastics and their sustainability: a call for action
Global Logistics Cluster	Environmental Sustainability in Humanitarian Logistics.
International Bank for Reconstruction and Development / The World Bank	Investment in disaster risk management in Europe Makes Economic Sense
IFRC (2022)	Green response: environmental quick guide
IRCRC (2020)	Red Goes Green Barriers and enablers for effectively greening practices and strengthening environmental sustainability across the International Red Cross Red Crescent Movement
IRCRC (2021)	Green Response
IRCRC (2017)	Greening IFRC supply chains; mapping our GHG emissions
Kunz and Gold (2015)	Sustainable humanitarian supply chain management – exploring new theory.
Latvian State Fire and Rescue Services	Feasibility study for green civil protection vehicles and related maintenance facility
McKinsey & Company	The drive toward sustainability in packaging—beyond the quick wins
PEW	States Take on PFAS 'Forever Chemicals' With Bans, Lawsuits

Agency	Title
Platform on Sustainable Finance	includes disaster risk management/emergency services
Rau H, Nicolai S and Stoll-Kleemann S (2022)	A systematic review to assess the evidence-based effectiveness, content, and success factors of behaviour change interventions for enhancing pro-environmental behaviour in individuals
Union Civil Protection Knowledge Network (UCPKM)	Strategic Plan 2022-2026
UCPM	Topic: Cross-border risks and marine pollution: Logical framework (illustration)
UCPM	Peer Review Assessment Framework
UK Civil Service, Ministry of Defence (MOD) Approach	Climate Change and Sustainability Strategic Approach
UN DRR	Europe's opportunity to manage risk and build resilience: Recommendations to the European Green Deal
UNEP	Addressing Single-Use plastic Products Pollution: Using a Life Cycle Approach
UNEP	How to reduce the impacts of single-use plastic products
UNEP/OCHA Joint Environment Unit	Environmental Assessment Tool (NEAT+)
UNEP/OCHA Joint Environment Unit	Flash Environmental Assessment Tool (FEAT) to identify acute environmental risks following disasters
USGS California water Science Center	Water Quality after a Wildfire
Wood, Ramboll, COWI	The use of PFAS and fluorine-free alternatives in fire-fighting foams

Agency	Title
World Health Organisation (WHO)	Classification and minimum standards for emergency medical teams
World Wildlife Fund (2010)	Green Recovery and Reconstruction: Training Toolkit for Humanitarian Aid
Zarei, M.H., Carrasco Gallego, R. and Ronchi, S. (2018)	To greener pastures: An action research study on the environmental sustainability of humanitarian supply chains.

APPENDIX C FOCUS GROUPS

We have conducted five focus group interviews with Member States and Participating States. All were offered the opportunity to participate in a focus group session. However, some had to decline due to other commitments, while expressing large interest in the topic. On this basis, the focus groups covered 23 Member States/Participating States: Estonia, Finland, Sweden, Denmark, Norway, Lithuania, Poland, Ireland, Netherlands, Latvia, France, Spain, Cyprus, Malta, Hungary, Czech Republic, Slovakia, Serbia, Germany, Romania, Bulgaria, Croatia, Slovenia. While this does not represent all Member States/Participating States, it however covers for a wide spectrum of countries in terms of for example: Covering different parts of Europe with different disaster risk profiles (e.g. focus group 3 covering the Mediterranean countries being subjected to droughts, forest fires and seismic risks), covering Member States and Participating States, covering small and large countries, covering countries with a centralised versus a decentralised approach to disaster management and covering different income (per capita) levels.

All focus groups lasted for 2 ½ hours. They were organised so that a short introduction by the consultant and by DG ECHO was followed by a session on prevention/preparedness and one on response: both of equal length. To kick off discussions, each of the themes commenced by a brief presentation by each of the participants who had been invited to reflect on the issue beforehand following the instructions in the concept note.

The participants found the focus groups either limitedly relevant (38%, 7/18 respondents) or very relevant (62%, 11/18 respondents) to their organisation in terms of new inputs on the greening of civil protection measures.

APPENDIX D OVERVIEW OF IDENTIFIED RELEVANT ACTIONS AND NEEDS IDENTIFIED IN THE BASELINE STUDY

The tables provided here present the identified actions and identified needs. The tables build on the observations and information provided in the Annex Report. The overview identifies each action, describes briefly what it is, to which extent previous experience exists and/or whether there is an expressed need for it. There are separate tables presenting the identified actions for prevention, preparedness, and response respectively, and preceding those, the first table presents the identified horizontal actions/needs. The second last column of each table presents the assessment of whether the action in question is considered relevant in the context of greening of the UCPM, and the last column provides an assessment of whether the action identified could be embedded in one or more of the priority actions set forth in the Request for Service that this study responds to. It should be noted that the tables merely serve to summarise the actions as such, and hence, the more detailed description and assessment is provided in the Annex Report, as well as being considered in this report (for actions concluded to be of relevance to promote greening of the UCPM). The tables provide information on:

- "**Category**" classifies the actions according to the categorisations emerging from the baseline study (reported on in the Annex Report). The categorisation is an ad-hoc grouping of actions established so that comparable types of actions are presented within a shared heading. This column is only used for preparedness and response and reflects the way that these chapters are structured in the baseline.
- **"Actions"** refers to the specific identified activity or action that contributes to greening.
- **"What it is & how it greens"** provides a description of the action in question and explains how it contributes to greening.
- **"Observed Experience with the measure/Expressed need of it"** sets out where the baseline has identified either an expressed need for action, and in that case, by whom as well as whether there is already factual experience in implementing the action.
- **"Relevant to UCPM"** assesses, whether the action is relevant to the UCPM and can be influenced by it.
- **'Fit with TS'** assesses whether the identified action fit into one of the priority areas identified in the Technical Specifications (TS). These priority areas are replicated below the tables for easy reference.

Table A.E.1: Identified relevant actions/need: horizontal issues

Action	What it is & how it greens	Observed Experience with the measure/Expressed need of it	Relevant to UCPM	Fit with TS
Improving the data availability and management.	Collection and analysis of data to understand the current environmental- and carbon footprint, and to provide rationale and direction for action. Improved data can point to where to focus action and help to establish a culture and mindset that is appreciative and open to the opportunities for greening. Would entail also the establishment for a framework to collect and use data.	An expressed need among Member States and Participating States. An issue that also other stakeholders such as the ICRC Movement works with.	Yes. Relevant for DG ECHO to coordinate and lead an initiative to generate data and to offer interpretations of it.	2.1 3.1
Conceptualisation of greening in the context of UCPM.	Establish a joint understanding (including a definition) among UCPM stakeholders what greening in the context of UCPM means. A joint understanding can provide a joint foundation for understanding the need for changed behaviors and approaches towards greening by means of establishing a shared language and a shared understanding of 'where we are heading and why' thus addressing the need for a change in culture and mindset.	A need expressed directly by some Member States and Participating States and confirmed by others participating in focus groups.	Yes. DG ECHO would be the right place to anchor a joint understanding	NEW

Table A.E.2: Identified relevant actions/need: Prevention

Action	What it is & how it greens	Observed Experience with the measure/Expressed need of it	Relevant in the context of UCPM	Fit with TS
Explicitly address greening in the disaster resilience grants.	Adding the possibility or requirement that applicants list the intended environmental impacts, or adding environmental criteria to the application form, or adding funding priorities for greener disaster risk management. Depending on the scope, this would contribute to greening through increasing applicants' awareness of the green impact (negative and positive) of their projects and thereby also an increased attention on the options for greening the projects even further.	A possibility raised by Member States and Participating States.	Yes. DG ECHO could introduce greening into open calls by adding a section in the application form for applicants to list how they intend to reduce their environmental impacts – how they address DNSH (Do No Significant Harm Principle). Yes, DG ECHO could introduce a call specifically aimed at supporting 'green solutions' such as for example preparations/feasibility studies related to Nature Based Solutions.	1.1
Increase the funding for prevention relevant projects.	In light of the good cost-benefit ratio of investing in disaster prevention, increase the funding for Technical Assistance for Disaster Risk Management and KAPP grants. Assuming that the increased funding would be absorbed, this would contribute to 'more prevention'. The contribution to greening would be achieved through reducing the impacts of disasters and therefore the extent of the response and all its associated impacts.	A consideration raised by relevant EU stakeholders in interviews. The strong benefit/cost rationale of investments in disaster prevention is stated in literature. However, for it to deliver on greening, the increased funding needs to be absorbed.	Yes. Existing funding could leverage finance from other sources (by e.g. financing only a share of a larger project, financing the initial feasibility studies, or financing lessons learnt studies).	NEW

Contribute to building of knowledge of funding opportunities.	Create a cross-sectoral overview of sources of funding for prevention activities. This can support Member States and Participating States in accessing financing to support greening.	An expressed need among Member States and Participating States. An issue that also the IFRC works with.	Yes. This could be seen as part of coordination activities within the UCPM. Improved knowledge of funding could in combination with examples and sharing of best practice on greening of prevention, as well as the merits of prevention per se play a strong role in a strengthened and greener prevention which would contribute to reducing the scale of disasters. It is important that the knowledge includes overviews and links to other relevant coordination platforms such as ClimateAdapt. This could be done through the European Civil Protection Knowledge Network.	NEW

Table A.E.3: Identified relevant actions/need: Prevention/preparedness

Action	What it is & how it greens	Observed Experience with the measure/Expressed need of it	Relevant to UCPM	Fit with TS
Create better feedback loops from response and into prevention/preparedness.	Raising awareness/promoting the use of current feedback mechanisms by using the EU Civil Protection Knowledge Network and with the inspiration of other platforms (e.g., as provided by Climate Adapt, WISE, Climate Change Services, the Disaster Risk Management Knowledge Centre, Atmosphere Monitoring Service). This can help to share information related to environment more broadly and encourage efforts even outside of UCPM that can reduce disaster risk and encourage "build back better" or more resilient.	Observed gap by Member States and Participating States	Yes. DG ECHO could introduce such reflections into debriefings upon completed UCPM missions. This could be anchored in the ERCC. Focus areas could include lessons learnt of relevance to disaster risk reduction as well as of relevance to the environmental and carbon impacts from the response as such.	NEW
Better feedback loops from response and into prevention/preparedness.	Create an additional feedback mechanism specifically for environmental and climate concerns (of relevance to disaster risk reduction, and to assessing the environmental and carbon impact from a response). This can help to generate knowledge that can be shared more information related to environment more broadly and thus encourage further efforts towards at preparedness and prevention stages greening	An expressed need among Member States and Participating States. An issue that also the Red Cross Red Crescent Movement works with.	Yes. DG ECHO could develop guidelines, facilitate experience sharing or organise targeted training on effective feedback loops, and could introduce such processes for responses coordinated in the context of UCPM.	NEW

Table A.E.4: Identified relevant actions/need: preparedness

Category	Action	What it is & how it greens	Observed Experience with the measure/Expressed need of it	Relevant to UCPM	Fit with TS
Circular economy and waste management	Reduce packaging and green supply chain management Purchase products with fewer emissions throughout the supply chain.	Purchase products with less packaging to reduce packaging waste and emissions associated with packaging manufacturing. This could include through adjusting procurement rules/procedures, using different software for procurement that includes emissions estimations or using software that estimates supply emissions, and through guidelines and standards. Implement/promote experience sharing regarding procurement rules and systems that encourage or defines requirements for purchase of goods with lower carbon/environmental footprints	Implemented in humanitarian aid (e.g., addition of environmental specifications to procurement, increased number of items per secondary packaging; standardised packaging).	Yes. DG ECHO could also take a role in promoting greener procurement thus incentivising Member States and Participating States to pay attention to this: through e.g. by providing examples of potential suppliers of greener products or best practice training in working with suppliers to green supply chains. Training in relevant software could also be provided. DG ECHO could also work with suppliers to encourage them to shift to more sustainable practices. Further, such considerations could be an embedded part of how training and exercises are conducted so that national organisations can learn more about how to go about this. It may also be relevant for DG ECHO to produce information sheets (e.g. best practice) and encourage knowledge sharing among participants in training on how they have achieved this. DG ECHO could also work with suppliers to encourage them to shift to more sustainable practices.	2.1 2.2

	Reduce waste during a response through use of less disposable packaging and shipping packaging.	This will reduce the need to recycle during or after an operation and reduce waste left behind following an operation.	Efforts widespread in humanitarian aid guidance and literature through changed procurement guidelines, identification of alternative products, working directly with suppliers to reduce packaging.	Yes. Could be incorporated into guidelines for Member States and Participating States, including sources for relevant purchase options. As a part of leave no trace behind, can be included in UCPM SOPs.	3.4
	Repair broken equipment such as broken generators, firefighting equipment, when safe to do so.	This will reduce the volume of waste from broken equipment and extend their lifecycle – reducing purchase needs. While new equipment may be less polluting, it reduces pollution, emissions (and costs) associated with production and end-of-life.	Some civil protection examples including green training for firefighters in one Member State. This includes elements on how to repair commonly damaged or broken equipment.	Yes. Through the UCPM training on repairing broken equipment could be introduced. SOPs can indicate which equipment can be repaired, and modules can include repair parts/equipment if needed.	NEW
	Improve inventory and warehousing management.	Co-warehouse with other organisations to reduce the need for warehousing facilities and use more energy efficient options.	Implemented in humanitarian aid (e.g., GHG inventory; joint warehousing, reduction of emergency travels).	Yes, see above	NEW
	Extend life service of equipment.	Modify the way equipment is being used, focusing on maintenance and repair. Through resulting reduced breakages and extended lifetime, purchase needs are reduced (and costs) resulting in reduced emissions from production and end-of-life treatment	Some Member States and Participating States have modified the way they use their equipment with an aim to extending the service life.	Yes. ED ECHO could promote such initiatives through the knowledge sharing platforms.	(2.2)

	Extend life service of equipment.		Recommendations in several online guidance including UCPM online training (humanitarian aid) and UN best practice.	Yes. For recommendations/guidance.	(2.2)
Transport and logistics	Launch a study on the environmental sustainability/effectiveness of civil protection vehicles.	Assess the life time CO2e emissions of vehicles (LCA) while reviewing the operational benefits/constraints of each mode. This can help to demonstrate overall emissions during the lifetime to assist in decision-making regarding vehicle choice with a view to reducing CO2 emissions whilst maintaining effectiveness of response.	Member States and Participating States reported they did not know exactly what a green vehicle is in civil protection.	Yes. The outcomes could be used as a criterion to support the acquisition of greener vehicles: - Increase the adaptation grant budget available for the acquisition of green vehicles to be used as part of ECPP. - Increase the scope of adaptation grants, and support the acquisition of green vehicles for civil protection national uses.	2.3
	Conduct and share comparisons of costs over the lifetime of vehicles to improve the knowledge base.	Assess the total cost of ownership (TCO) of similar vehicles that use different sources of energy. This can help to demonstrate that some types of vehicles have significantly lower environmental footprint than others over a lifetime and can, at the same time deliver lower total costs, even when up-front costs are higher. Throughout generating and sharing this knowledge, a further incentive for an effort towards purchasing greener vehicles is provided thus resulting in reduced CO2 emissions	As of now, and similarly to the environmental aspect of civil protection vehicles, Member States and Participating States do not seem to be aware of the TCO of non-fossil fuel civil protection vehicles. The cost of purchase of electrical vehicles, appear to Member States and Participating States as very high, even though they did not carry out a detailed study in order to compare existing vehicles with alternative ones.	Yes. The findings of such studies could be used in relation with the outcomes of the LCA for civil protection vehicles, in order to define the type of green vehicles which present the best TCO figures and operational capabilities.	NEW

	Acquire greener vehicles, possibly linked to having green procurement rules in civil protection in general.	Review all existing funding supports emanating from EU Commission for Member States and Participating States to acquire greener special and supporting passenger or freight vehicles, to reduce transport associated emissions. Reflect on how the existing funding support offered by DG ECHO (adaptation grants) could be used in order to fund these acquisitions. Taking into account the LCA perspective of vehicles thus not encouraging the replacement of vehicles where it would, from an LCA perspective make better sense to keep them	Some Member States and Participating States have adapted their legal procurement system to ensure that greener vehicles for public authorities are purchased. Currently, ECPP Adaptation grants are only reserved for the upgrade or repair or vehicles committed to ECPP, and not for national use only. Upfront costs were expressed by Member States and Participating States as a barrier.	Yes. Relevant for DG ECHO to further promote its adaptation grants (and maybe extend their scope) and other funding support.	NEW
	Reduce the need for transport by avoiding duplication of vehicles sent to the same operation.	This would reduce number of vehicles transported, thus reducing emissions (and transport costs).	While being already pursued, this was noted at as possible gap by Member States and Participating States	Yes. As a co-funder for transport activities and in its coordinating function, DG ECHO could take a stronger role in promoting this, however a complex exercise given the coordinating role of DG ECHO.	NEW
	Promote the use of smaller vehicles	This can reduce GHG emissions since smaller/lighter vehicles need less fuel to run.	Mixed opinion among Member States and Participating States on the idea of using smaller vehicles – could jeopardize effectiveness.	Yes. Could become good practice guidelines.	NEW

	Pre-position of vehicles or modules (especially when likelihood of disaster is known to be high for a particular region).	Position vehicles tailored for responding to a certain type of disasters in a strategical location in their home country, in order to minimise the distance run by vehicles as part of a response intervention. Transport of these vehicles should be done via sea freight (if going far) – air transport should be avoided. Supposes that both assisting/requesting Member States and Participating States share the same seasonal risk of disaster occurrence. Greening impacts would however need to be investigated more	This could already be the case for FFF-P and FFF-H certified vehicles, but limited access to information on the location of certified modules in their host countries.	Yes. Could become a recommendation for some UCPM modules.	2.4
Facility management and use	Make buildings environmentally friendly through renovation/rehabilitation.	Examples include better insulation, automatic switch-off of lights/electrical equipment etc. This can reduce emissions through better energy efficiency in heating/cooling as well as other energy uses such as lighting. Switching to renewable energy (through the installation of solar panels on roofs) will further reduce emissions.	Many Member States and Participating States have shared examples of such effort (e.g., light sensors, fitting solar panels on office roofs, retrofitting double glazing). Some focus group participants reported that some are facing difficulties with material supply due to the war in Ukraine. In focus groups, participants were asked to present their activities in the area of greening of civil protection, and quite a lot of presentations pointed to actions in this area.	No. This is driven by other EU legislation not in DG ECHO's domain and does not relate to the civil protection activities as such.	NEW

	Encourage greener behaviour in the office such as use of online meetings, printing only when needed, switching off monitors etc.	This can reduce emissions associated with energy use and reduce costs.	Many Member States and Participating States have reported encouraging greening efforts (e.g., online meetings, less promotional material, recycling etc.) Although, it was reported that it can be challenging to translate individual practices into work practices.	No. This is driven by Commission's internal facility management and rules/guidelines for facility use.	NEW
	Green procurement rules or guidelines including for office equipment.	This can reduce waste, encourage the purchase of goods with lower emissions, as well as lower-energy consumption products (e.g., printers, fridges, etc.).	Some Member States and Participating States have adopted green procurement decrees/ legal frameworks.	No. DG ECHO to follow rules and guidelines for EU institutions, and rules and guidelines do in fact exist also in many Member States and Participating States.	NEW
Training and exercises	Incorporate greening into training through adding such modules or sections into existing training.	This can help to raise awareness, skills and opportunities to incite the changes that reduce emissions and pollution during preparedness and response stages.	Dating back to at least 2010 in humanitarian aid. DG ECHO's own training for humanitarian aid includes this. Some Member States and Participating States have included this into elements of their training.	Yes. DG ECHO can incorporate greening elements into existing training and potentially elements of exercises.	2.5
	On-line training and simulators for some of the existing training and exercises (can include hybrid (blended) training).	This can reduce emissions and pollution associated with travel needs and conferences/facilities.	Increased use of such measures during COVID-19 including in civil protection.	Yes. Could be used for part of the UCPM training and potential use of simulators, which simulate 'real world' visuals for table-top exercises.	2.5

Table A.E.5: Identified relevant actions/need: Response

Category	Action	What it is & how it greens	Observed Experience with the measure/Expressed need of it	Relevant to UCPM	Fit with TS
Circular economy and waste management	Improve inventory and warehousing management.	Further purchase and store goods close to likely disaster sites to avoid transport related emissions (pre-positioning). The pre-positioned items should be transported by sea and/or road to avoid emission-heavy flights.	Implemented in humanitarian aid (e.g., GHG inventory for storage; joint warehousing, reduction of emergency travels), as well as in relation to rescEU	Yes. Could be further relevant for rescEU stockpiles and ECHO could make recommendations to MS on how to procure and store stockpiles in ways that reduce emissions.	NEW
	Recycle locally. During UCPM operations, form agreements with local recyclers for waste such as paper/wood/plastics. This could be undertaken remotely or in partnership with local civil protection services.	This would reduce local waste pollution, and reduce lifecycle emissions of goods used as they are not disposed of in rubbish dumps. The action relates to response, however enabling it demands actions at preparedness level	Humanitarian aid interventions engage in such agreements. Examples include WWF in Ethiopia, large joint humanitarian hub in South Sudan.	Yes. This could be incorporated into guidelines for Member States and Participating States as well as SOPs for UCPM activities. Training sessions on how to do this could be completed. UCPM could pre-identify a list of local counterparts that could organise recycling should the need arise.	3.2
	Recycle in response camps.	This would reduce local waste pollution.	Militaries and long-term humanitarian aid interventions have experience with this.	No. This is likely to be more relevant for longer-term engagements.	3.2

	Destroy or treat harmful waste, including contaminated water by using equipment that incinerates medical waste and treats sewage, prevent and incorporate this into response operations.	This will reduce local pollution and contribute towards efforts to leave no trace behind following response operations.	Growing use in humanitarian aid and military. ESP medical response team incinerates medical waste, IFRC in Cox's Bazar established sewage treatment facilities.	Yes. This could be incorporated into guidelines for Member States and Participating States as well as SOPs for UCPM activities. Grants could also be used to support purchase of equipment.	3.2
	Prevent contaminated water running into potable water sources or environmentally sensitive areas.	This will reduce local risks to water and human health risks associated with contaminated water, including related to PFAS foams, if used. The action relates to response, however enabling it demands actions at preparedness level	Many Member States and Participating States are aware of needs to contain contaminated water and some can call local experts to assist on how to control water run-off.	Yes. This could be incorporated into guidelines for Member States and Participating States as well as SOPs for UCPM activities. Grants could also be used to support purchase of equipment.	3.2
Screening, monitoring and surveillance	Use rapid assessment tools for acute environmental risks. These tools are app /checklist based and are used to screen for environmental risk from a disaster or intervention. Examples include NEAT+ and the Flash Environmental Assessment Tool (FEAT).	Identifying environmental risks from a disaster or from the intervention can help identify actions that can reduce risks. For example, identifying contaminated water risk can encourage teams to bring in relevant experts on how to treat or prevent it from contaminating elsewhere.	Growing use in humanitarian aid – including for urgent humanitarian interventions to verify environmental impacts of intervention and risks associated with a disaster. Support to the use of the NEAT+ (through environmental experts) as part of a DG ECHO financed project (but for humanitarian contexts).	Yes. DG ECHO can incorporate use of such tools into training and exercises, in order to be used by UCPM responders. The more rapid tools (designed to be carried out within a day of an intervention) may be more appropriate for UCPM. Use of such tools could eventually become a part of standard operation procedures for UCPM as well as good practice guidance.	NEW

		The action relates to response, however enabling it demands actions at preparedness level			
	Further use drones or other technology to monitor fire expansion risks using low-pollution technologies such as drones and satellites and modelling.	This can help to reduce emissions and damages by making it easier to tackle fires in the most likely expansion areas before they spread and cause further damage to forests and wildlife but also reduce emissions from the planes used for forest fire monitoring.	Widespread use of drones in Member States and Participating States for civil protection; some use of satellite and AI but more training requested.	Yes. DG ECHO could incorporate into relevant guidelines and SOPs, notably related to forest fires.	NEW
	Include environmental experts in response teams to assess and recommend actions to reduce or mitigate local pollution, environmental risks and emissions.	This can help to ensure that teams identify the most likely environmental risks from a disaster or from the response and that relevant measures to reduce risks or contain the impacts are taken.	Some use in humanitarian aid, including DG ECHO. Some Member States and Participating States reported having access to environmental expertise (including specific – e.g. water/forest) when needed, while others felt they could benefit from this.	Yes. UCPM could assess whether it would be feasible to include a list of experts who could be made available (remotely) for UCPM responses. The effort could build on the environmental experts currently deployed through the UCPM to post-disaster contexts (requested by the JEU), so there is a roster of such experts who could then be integrated into all UCPM activations.	(3.7)
Transport and logistics	Define typologies of interventions for densifying shipments to reduce fuel con-	This would reduce emissions as well as fuel consumption & GHG emissions.	Sometimes occurring. The aim appears to be widespread in humanitarian aid and civil protection.	Yes. Potential opportunity to make transport more efficient during UCPM response and enable good practices.	3.1

	sumption and GHG emissions. This will include pooling transport.				
	Data collection and analysis of transport-related activities at Response stage.	Enabling the definition and the use of a data-collection framework to collect/calculate transport-related GHG emissions during Response interventions. This would help better understand emissions overall and from different types of missions. It could also potentially help understand the main contributors toward emissions.	As of now, carbon footprint data are not systematically collected/calculated by DG ECHO. The only existing sources of data to calculate the carbon footprint of response interventions are Part A forms and grant applications, which do not always present either: i) GHG emissions calculated by Member States and Participating States; ii) detailed input variables enabling DG ECHO to calculate these GHG emissions themselves (distance, number of vehicles including supporting vehicles, fuel consumption of the vehicles). In addition, no similar data seem to be collected after the interventions to understand the use of fuel by vehicles during the duration of interventions. For interventions requiring the help of the Broker, GhG emissions of journey to and back intervention site are not yet calculated by the broker and presented to DG ECHO for their approval of the logistics options to be selected (usually the broker presents at least 2 transport alternatives to DG ECHO for decision).	Yes, as this could provide: -Data to analyse transport related GHG emissions during response interventions (and question duplication and use of vehicles during interventions) -A base to calculate aggregated annual statistics to monitor and compare across the years, in relation with the other actions of DG ECHO to reduce the carbon footprint of Response interventions.	3.1

	Procure locally produced goods and equipment that can reliably be purchased locally, but also work with local suppliers to ensure that the locally produced items are environmentally sustainable.	This would help to reduce emissions associated with transport (especially double-transport from region of production to donor country and back again during a response) of goods and also support local economies, so long as they are also produced in an environmentally sustainable way.	This is a long-term ambition in humanitarian aid and there exist some examples within civil protection (e.g. recently in Pakistan). This presents advantages and challenges. For example, it may be cheaper and support local economies. However, in the UCPM context, it cannot be used for the first few days, when response teams should be fully independent. Locally produced goods may or may not be greener than flying in goods from overseas, where production chains may be greener.	No. This is only relevant for long-term engagements, after the identification of local suppliers has been carried out.	3.5
	Rely on local vehicles to support operations instead of transporting them from a country to another assuming that appropriate local supplies are available and can be timely mobilized for the purpose in question.	This would reduce the transport to a disaster site, reducing emissions and potentially costs. Can be only decided when planning the details of a Response intervention, depending on the capacities of the country requesting assistance.	The option to use this was noted in several focus groups. It may not always be able to be used in the immediate aftermath of a disaster as UCPM needs to be independent. However, there may be options to increase coordination with local rescue services.	Yes, to some extent. Could be included as a Guide of best practices before Response interventions.	3.1
	Support intervention of regional civil protection authority for non-Europe interventions on the condition that this would not put the effectiveness of response at stake.	Co-funding the use of a regional civil protection authority's vehicles for an intervention happening outside Europe, rather than sending vehicles from Europe to another continent.	Several participants in focus groups noted this was a possibility.	Yes. Not a short-term possibility though as currently out of the scope of UCPM. Could however be a long-term objective.	3.1

	Provide response staff/support remotely. Can include advisors (e.g. environmental but also others) and also remote drone operators (could become more systematic than "surge capacity".)	This can reduce the number of people who need to travel to a disaster site, reducing emissions and potentially enabling a speedier response. In addition, it could provide additional support without using staff already engaged in response.	Used during COVID-19 pandemic but largely seem to be embedded in physical response. teams – even for drone users.	Yes. Guidelines could include teams with remote support. DG ECHO could consider identifying remote advisors – potentially based in the ERCC	3.7
	Use low emission transport modes. For example, use trains where possible to respond and return from disaster site (both for staff and/or goods).	This would reduce transport emissions. It could be used where it would not compromise the effectiveness of a response.	Some examples of this – such as train for shipping goods to Ukraine, using rail or inland water instead of planes for non-urgent donations.	Yes. Guidelines for vehicles included in modules.	3.1
	Use space on existing transport (broker role), i.e. if planes are not utilized to the full loading capacity.	This would reduce transport emissions. It could be used where it would not compromise the effectiveness of a response.	The broker can already use space on existing transport routes to fulfill DG ECHO requests. However, this is not an obligation and information does not appear to exist on when this has occurred.	Yes. This could become a request (or part of the contract for the broker). Better information could be collected on when this option is used.	3.1
	Reduce vehicle emissions at site. For example, use EV or other low emissions options on-site (incl. bikes).	This would reduce overall emissions associated with an operation and reduce local air pollution.	In early stages. Public sectors beginning to use EVs. Some trials for response vehicles like fire trucks.	Yes. Guidelines for vehicles included in Modules.	3.2
	Use new technologies such as drones, satellite images & AI etc. instead of planes, helicopters.	This can reduce emissions compared to use of planes of helicop-	Widespread use of drones in Member States and Participating States for civil protection; some use of satellite and AI but more training requested.	Yes. They can become part of UCPM modules (and, indeed, some countries have already pledged drones to modules).	3.1

		ters, and could also enable increased monitoring of disasters (e.g. forest fires).			
	Use sustainable biofuels, including for aviation, where EVs cannot be used effectively.	This can reduce overall GHG emissions.	Limited use but being trialed in some places (see transport section)	No. Not directly of use for UCPM. Could be a guideline for Member States and Participating States when planning their response activities and could be relevant for rescEU assets.	3.2
On-site infrastructure	Implement energy efficiency measures by changing equipment (e.g. to LED lighting).	This would reduce power consumption on-site, and, if power comes from generators, also local pollution and GHG emissions.	Widespread efforts in humanitarian response and some MP/PS in civil protection. Examples include IFRC and Member States' Medical Teams.	Yes. Guidelines could be provided on good practice for Member States and Participating States, in addition to examples of effective usage. Energy efficiency equipment can be included in Modules.	3.2
	Implement energy efficiency measures by encouraging behaviour change (e.g. switch off lights/monitors).	This would reduce power consumption on-site, and, if power comes from generators, also local pollution and GHG emissions.	Widespread efforts in humanitarian response and some MP/PS in civil protection. Examples include IFRC and MS' Medical Teams.	Yes. Behaviour change for energy savings can be included in training to increase awareness of the usefulness of such apparently 'small' actions.	3.2

	Clean power generation by using more solar PV.	This would reduce use of diesel generators, reducing local air pollution and overall GHG emissions of a response.	Widespread use of solar power in humanitarian aid. One especially large joint humanitarian centre in South Sudan. Cox's Bazar is also an example of use of cleaner power generation in a humanitarian aid mission.	Yes. Guidelines could be provided on good practice for States and Participating States in addition to examples of effective usage. Energy efficiency equipment can be included in Modules. This should be integrated into SOPs – modular solar PV units should be as easily deployable as diesel generators	3.2
	Use Bio-digester or other waste-to-energy systems to convert waste into energy.	This reduces waste and emissions related to decomposing organic matter (e.g. methane) and provides a source of energy, which can replace fossil fuels.	Militaries using this.	No. This is relevant more longer-term engagements.	3.2

Priority actions for consideration (set out in the request for service)

This section is merely a summary of the areas for consideration as set out in the Request for Service:

PREVENTION

- **Mainstreaming prevention proposals:** Recommendations for mainstreaming proposals for greening of prevention projects through minimum standards, development of sustainability indicator, with a view to other relevant funding opportunities.
- **Civil Protection included in portfolio of thematic expert on environment:** Recommendations to include civil protection aspects in the portfolio of the thematic expert on environment, being responsible for DG ECHOs operational activities in the field in the area of environmental mainstreaming across humanitarian operations.

PREPAREDNESS

- **Carbon footprint data and recommendations for reduction:** Assessment of the carbon footprint and establish recommendations for reducing CO_2 emissions related to the development and upgrade/repair of capacities.
- **Greener development and upgrade/repair of response capacities through recommendations for standards/procurement** to take into account as a minimum: assessment of the carbon and resource footprint of production, packaging waste, plastic pollution, waste management, provision of clean energy, provision of clean water, preservation of biodiversity and avoiding deforestation.
- **Minimum standards for greener transport and logistics** to be promoted through policies and with a transitional period when applicable.
- **Prepositioning of capacities:** Recommendations for principles and guidelines for prepositioning of capacities in cooperation with local actors, to ensure a more environmentally friendly approach, including decreasing long- distance transport, also taking into consideration EU's outer areas.

- Including **environmental aspects into exercise and training** activities through recommendations.

RESPONSE

- **Carbon footprint data and recommendations for reduction** relating to the transport of goods and people, including limiting prolonged transport, even if cheaper.
- **Greener deployment** through recommendations for guidelines taking into account minimum the following elements: assessment of the carbon and resource footprint of transport, packaging waste, plastic pollution, waste management, provision of clean energy and clean water, preservation of biodiversity and avoiding deforestation.
- Establish an **environmental section** in the ERCC to develop and maintain expertise.
- **Leave no trace** behind promoted through guidelines.
- **Purchase of in-kind assistance locally** promoted through SOPs and guidelines thereby limiting the transportation of heavy in-kind assistance and replacing it by cheaper in-kind assistance.
- **Best practice for greening** shared through the lessons-learnt programme**.**
- **The use of environmental experts through mainly online counselling** promoted through recommendations for SOP for this.

APPENDIX E GREENING OF CIVIL PROTECTION IN MEMBER STATES AND PARTICIPATING STATES: KEY OBSERVATIONS

As part of this scoping study, five focus groups were organised and members of all Member States and Participating States were invited to participate. Each focus group session aimed to give the participants the opportunity to share their views and experience in the field of greening of civil protection. The participants were in general keen to enhance environmental considerations in their civil protection activities. Although the extent and capacities to increase greening efforts vary widely across the Union, most - if not all – focus group participants shared progress in greening civil protection activities in their country in particular (as a common trends) with regards to facility management.

Some Member States and Participating States have opted for overarching **national greening strategies and/or action plans** which apply to all ministries/departments; others have opted for defence/ disaster/ civil protection-specific strategies and some have applied a more holistic approach. For example, the Danish Ministry of Defence (which includes civil protection) has published a green action plan, comprising 47 long and short-term greening initiatives tackling issues related to sewage and surface water pollution, resources and waste reduction and management or green procurement[135].

On the prevention side, some Member States and Participating States have invested in **early warning systems and detection tools**. For instance, Cyprus has recently acquired knowledge regarding water contamination detecting tools as part of a PathoCERT project funded by Horizon 2020[136]. In addition, many have **improved forest management** to prevent fires and enhanced communication between civil protection authorities and forest managers to better prevent and monitor the spread of fires.

[135] The Danish MoD Greeen Actien Plan 2021-2025 (fmn.dk)

[136] Pathogen Contamination Emergency Response Technologies | PathoCERT Project | Fact Sheet | H2020 | CORDIS | European Commission (europa.eu)

National training and exercises have also been greened. Many Member States and Participating States have moved trainings online and are starting to rethink physical trainings to avoid unnecessary pollution or contamination on training sites. For example, Spain uses simulators to reduce the carbon footprint of exercises, and have also reconsidered the routes, equipment uses, and waste generated[137].

In order to green response, many Member States and Participating States see investments in preparedness as pivotal, since the guidelines and equipment for response are determined at the preparedness stage. In that regard, Member States and Participating States are contemplating investing in **greener equipment, vehicles** and/or developing **research and technologies**. Some Member States and Participating States have invested in electric and/or lighter fuel-efficient vehicles. For instance, the Norwegian parliament established a national goal of making all new cars sold by 2025 zero emission[138] and EMT equipment will be upgraded and greened from 2022 onwards. Transportation is a central component of civil protection activities, wherefore its greening is widely seen as a key to the overall greening of civil protection. It is, however, challenging because (i) it often constitutes a large up-front investment, (ii) there is a perceived need to find the right balance between robust, reliable, and green transportation to avoid impacts on the effectiveness of response. More recently market availability of some goods has been impacted by the war in Ukraine. A DG ECHO-funded feasibility study to promote and raise capacities of fire and rescue service in Latvia highlighted that availability of electric heavy trucks was limited[139].

Many Member States and Participating States are making use of **monitoring tools** such as drones. The Czech Republic, for instance, made wide use of drones to monitor the large 2022 forest fires in Czech-Saxon Switzerland[140]. This was their first experience with applying drone use to such large forest fires in terms of affected area.

[137] Presentation shared by Spanish focus group participants. This presentation was also shared during the 7th Civil Protection Forum, held on June, 28th and 29th 2022. Forum booklet available from: booklet.pdf (europa.eu)

[138] Norwegian EV policy - Norsk elbilforening

[139] Track I - Feasibility studies on the promotion of better practice and raising capacity of State Fire and Rescue Service of Latvia (LV) (europa.eu)

[140] Daily Flash (europa.eu)

Procurement of green energy sources are also explored and/or implemented by many Member States and Participating States at preparedness stage and deployed during activities i.e. green generators). For example, Slovenia has recently adopted a green public procurement decree for all public services[141]. Another example is the humanitarian aid project in Malakal (South Sudan) carried out by the Danish and Swedish civil protection agencies. In this project, solar panels were used to supply energy on the camps. Solar will generate 80% of electricity demands of this humanitarian hub[142].

Improving **waste management** was identified as key to lower response activities' impact on the environment. To that end, some Member States and Participating States have considered systematising waste separation. Humanitarian aid in Spain, for example, has established classifications and colour-coding of waste to better recycling and treatment of waste[143]. Others have investigated improving packaging (e.g., use of wooden box instead of plastic) and reducing generated waste.

Lastly, some Member States and Participating States have launched **nature preservation and restoration** initiatives. Examples include reforestation initiative in Cyprus[144] and Croatia[145], or restoration of wetlands to prevent floods or droughts and preserving riverbanks in Norway[146].

[141] Green public procurement | GOV.SI

[142] The Humanitarian Hub in Malakal, South Sudan Goes Green | International Organization for Migration (iom.int)

[143] Presentation shared by Spanish focus group participants. This presentation was also shared during the 7th Civil Protection Forum, held on June, 28th and 29th 2022. Forum booklet available from: booklet.pdf (europa.eu)

[144] DEPARTMENT OF FORESTS - Co-Funded Programmes (moa.gov.cy)

[145] Ministarstvo turizma i sporta Republike Hrvatske - Brnjac announces national reforestation project at EU ministerial meeting (gov.hr)

[146] Meld. St. 14 (2015–2016) - regjeringen.no

APPENDIX F UCPM RELATED CARBON FOOTPRINT

This chapter provides a succinct description of the methodologies which could have been defined to calculate the carbon footprint of civil protection vehicles. Two related sub-chapters provide, in addition, illustrative calculations of GHG emissions. These are based on selected vehicle types often used as part of civil protection and/or DG ECHO past interventions. The two sub-chapters thus provide methodologies to:

- Guide the calculation of the carbon footprint of civil protection vehicles during their whole life cycle;
- Illustrate how data on Response interventions could be collected and used to monitor the GHG emissions generated by the transport of vehicles, staff and goods as part of Response activities.

Carbon footprint of UCPM vehicles

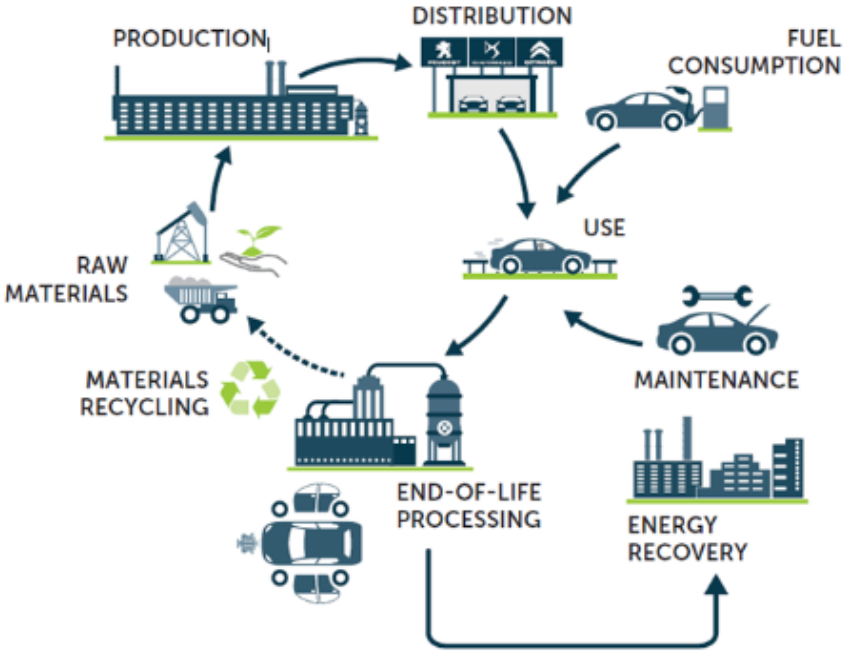
The purpose of this sub-chapter is to provide an analysis of the potential carbon footprint of a series of main vehicle groups which are commonly used by most national civil protection authorities. The objective is to illustrate, in a rather simplistic manner, the quantity of GHGs emitted by these vehicles over their lifetime under some assumptions, and to reflect, at a later stage, on potential greener alternative vehicles to be acquired and used by MS/PS and used as part of the UCPM.

This sub-chapter first elaborates on the scope of assessing the carbon footprint of vehicles and related methodological and data-related challenges. The sub-chapter then sets out the key assumptions that are applied to produce illustrative footprint calculations.

Elements of a carbon footprint analysis of transport vehicles

An ideal assessment of the carbon footprint of vehicles would calculate GHG emissions of a vehicle/equipment over his entire life cycle as summarised in Figure 6-1. This is referred as a Life Cycle Assessment (LCA).

Figure 7-1: Example of logic map summarising the principle of a life cycle analysis (LCA) of a car, source: Olivier Guyon[147]



Doing so for a vehicle requires that one can break down the calculation of GHG emissions in a series of main steps of the lifetime of a vehicle:

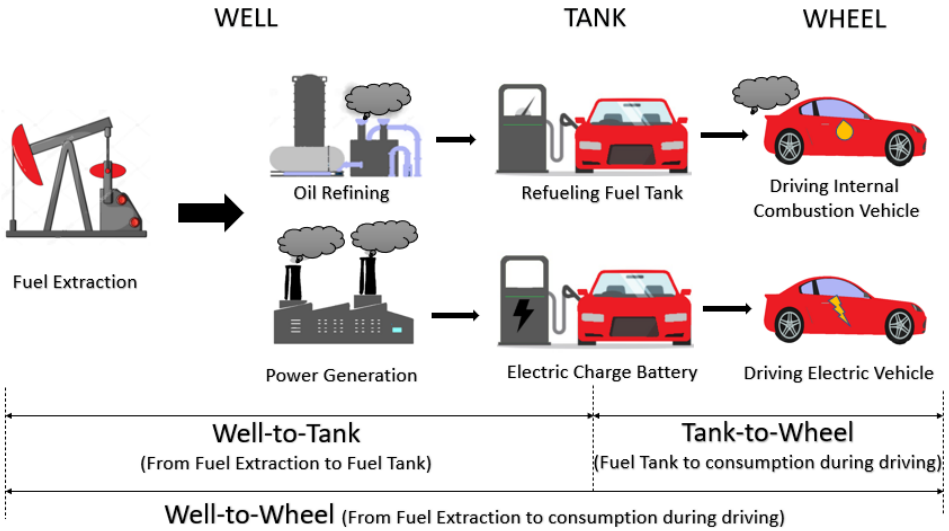
- The GHG emissions released during the extraction/production of the raw materials necessary to build a vehicle;
- The GHG emissions[148] linked to the manufacturing of the main vehicle/equipment types defined earlier;
- The GHG emissions released by vehicles/equipment during their life according to their fuel type, their characteristics (fuel consumption per day or per km), their average usage (in km or in average days during a year) and their average life expectancy;
- The GHG emissions linked to the production and transport of fuel/electricity/hydrogen, etc.;
- The GHG emissions linked to the potential recycling/reutilisation of certain components of the vehicle but also disposal of the un-recyclable parts.

Limitations to calculating a life cycle carbon footprint analysis of civil protection vehicles

Calculating a LCA therefore requires a large amount of robust data. This is typically generated by academic sources as these issues are generally studied by university researchers and specialist think-tanks. No such study seems to have been carried out for the special vehicles used in civil protection interventions. Most LCAs conducted for transport vehicles apply to conventional road transport vehicles, themselves based on a series of assumptions which are very vehicle specific (type of vehicles, fuel type, motor configuration, weight, etc.).

In this sub-chapter, the illustrative analysis will, therefore, focus on the GHG emissions released during the usage of the vehicles and the transport of the fuels (also called well-to-wheel emissions). As a reminder, well-to-wheel emissions do not include emissions at the manufacturing and recycling stages (thus this analysis is not comparable to an LCA).

Figure 7-2: Illustration of the different steps in the assessment of well-to-wheel GHG emissions analysis for a passenger car, source:



Defining a list of main vehicle categories to be analysed

For the well-to-wheel analysis to be carried out, the first intermediary step is to define the list of main vehicle categories to be considered. The list will focus on the selected main vehicles categories. Defining such a limited list makes the analysis feasible and manageable. Moreover, the analysis can be considered as illustrative only, as a range of assumptions impact the calculated carbon footprint of a certain vehicle (fuel type, fuel consumption characteristics often linked to the age of the vehicle, usage of the vehicle during a year, geographical area of intervention, etc.). Consequently, an initial list of vehicle categories has been defined (see below). The establishment of the list is informed by the vehicle types that are mentioned in the requirements to the different relevant modules and technical assistance which compose the ECPP[149].

Table 7-1 List of ECPP modules using civil protection vehicles

Module Name	Abbr.	Transport capacities (as defined in Annex II)
Aerial forest firefighting module using helicopters	FFFH	Three helicopters with a capacity of 1,000 l each
Aerial forest firefighting module using airplanes	FFFP	Two airplanes with a capacity of 3,000 l each
Medical aerial evacuation of disaster victims	MEVAC	Helicopters/planes with stretcher with a capacity to transport 50 patients per 24 hours
Ground forest firefighting using vehicles	GFFF-V	4 vehicles with off-road capacity, tank capacity of at least 2,000 l

[149] Decision 2014/762/EU, Annex II, General Requirements for modules and technical assistance and support teams

Flood rescue using boats	FRB	5 boats with the ability to carry 50 people in total excluding the staff of the module. The boats should be designed for use in cold conditions and upstream against at least 10 knots flow

As seen, the list is mainly composed of very specific vehicle types that are traditionally used in emergency operations. These vehicles are thus considered to form a core element of the ECPP modules. In addition to this preliminary list, some more conventional vehicles are used as part of UCPM operations as confirmed by DG ECHO[150]. These vehicles are typically the following: a) passenger car, b) 4x4 car, and c) minivan.

Therefore, the list of the main vehicle categories to be analysed on the basis of available knowledge will consist of these three types of conventional vehicles plus the vehicles listed in the above table.

The second intermediary step when preparing the assessment of the well-to-wheel carbon footprint is to associate each vehicle category to a series of characteristics (or variables) which have an impact on the GHG emissions. These characteristics must reflect those that would apply when the vehicles are used in real life by civil protection authorities. This is elaborated on in the following sub-section.

[150] Email correspondence with Stephane Halgand, DG ECHO A2, 07/09/2022

Defining the main assumptions to be considered as part of a well-to-wheel GHG emissions assessment

The carbon footprint analysis of the main vehicle categories will revolve around their usage and the impact of fuel/energy transport necessary to keep them working. Therefore, the main assumptions to perform such analysis are:

- The vehicle considered and its characteristics (fuel consumption, which itself depends on the age of the vehicle, its mass, power, etc.);
- Its usage on a yearly basis (which may vary according to the variability of the climate and the probability of occurrence of disasters);
- The life duration of the vehicle (with, if possible, data on the potential increase of this duration through refurbishment).

These assumptions may show variability in the values retrieved (vehicle type, usage, life duration). Regarding the vehicle characteristics selected for a vehicle category, technical vehicle features have been sought from various sources: manufacturer's website, academic papers, specialised press, or in some cases, from non-official sources. The usage data on a yearly basis (in terms of km per year or number of days of usage per year) can only be collected from a restricted number of sources given that these data are usually only known to national civil protection agencies. Despite attempts to gather these data from some sources[151], it has been necessary to establish a range of potential average usage data to make up for the lack of precise data. Table 62 summarises the vehicle models selected for each defined vehicle category. Flood rescue boats matching the criteria of the description of the module could unfortunately not be retrieved after attempted research.

[151] In 2021, the French firefighting services released a dossier de presse detailing the vehicles used for forest fire fighting, in line with ECPP modules. Despite two emails requesting more information on the usage and characteristics of the vehicles, no information/data was received by COWI. Link to the dossier : https://www.interieur.gouv.fr/sites/minint/files/medias/documents/2021-07/dossier-de-presse-feux-de-foret.pdf

Table 7-2: List of civil protection vehicles selected for a well-to-wheel analysis methodology

Module or general capacity	Abbr.	Model 1	Model 2
Aerial forest firefighting module using helicopters	FFFH	Airbus Super Puma (H215)[152]	Airbus EC145[153]
Aerial forest firefighting module using airplanes	FFFP	Canadair CL-145[154]	Dash 8 Q400 MR[155]
Medical aerial evacuation of disaster victims	MEVAC	DASH 8 Q400 MR	
Ground forest firefighting using vehicles	GFFF-V	CCF BE – 2000L[156]	CCF BE – 4000L[157]

[152] Source : https://www.interieur.gouv.fr/sites/minint/files/medias/documents/2021-07/dossier-de-presse-feux-de-foret.pdf

[153] Idem

[154] Idem

[155] Idem

[156] 4x4 vehicle used for forest firefighting by Belgium Civil Protection authority.

Source : https://www.civieleveiligheid.be/sites/default/files/ft11_feu_de_foret_4x4.pdf

[157] Source : https://www.civieleveiligheid.be/sites/default/files/ft17_camion-citerne_feu_de_foret_4000-litres_4x4_25-11-2021.pdf

Passenger car		Peugeot 308[158]	
4x4 car		Renault Duster[159]	
Minivan		Ford Transit[160]	

The assumptions per vehicle are provided in Table 7-3 below.

Table 7-3: Main assumptions required to calculate a well-to-wheel GHG emissions assessment of civil protection vehicles[161]

Models	Fuel type	Fuel tank capacity (l)	Autonomy (km or hours)	Fuel consumption (l/km or l/hour)	Usage/year (km or days)	Life duration (years)
Aerial forest firefighting module using helicopters (FFFH)						

[158] Note received by DG ECHO – ECPP.

[159] Idem

[160] Idem

[161] The variables calculated are mentioned in blue, while the assumptions (neither retrieved nor calculated) are in red.

Airbus Super Puma (H215)/ Airbus EC145	Jet A1	1556/3,000	2.4 hours/3.5 hours	650 litres-hour/857 litres-hour	46 days or 417 hours per year[162]	30
Aerial forest firefighting module using airplanes (FFFP)						
Canadair CL-415/Dash 8 Q400 MR	Jet A1	4,237[163]/4,520[164]	4.5 hours/4.5 hours[165]	942 litres-hour/ 1,000 litres-hour[166]	46 days or 417 hours per year	30
Medical aerial evacuation of disaster victims (MEVAC)						

[162] An article in the French newspaper les Echos, 'Le coût de l'heure de vol d'un Canadair évalué à près de 16 000 euros', 11/08/2006, states that on average, the 24 fire-fighting planes owned at that time by the French Civil Protection would be in service for 10,000 hours a year. Supposing that a plane is used 9 hours a day (Spain reported this, see next note), this would mean that a plane would be in service 46 days a year on average. No information could be found for helicopters and evacuation airplanes, so the same assumption was used.

[163] The Spanish Civil Protection Service reported in the Part A form submitted to DG ECHO for the co-financing of the transport costs for the assistance provided to Greece and Turkey, and shared to COWI by DG ECHO, that a CL-415 has an autonomy of 4.5 hours and is used daily for a maximum duration of 9 hours. It also says that the plane consumes 15,000 Lbs/day, or 8,474 litres of Jet A1 fuel per day (http://mye6b.com/Fuel/), which equates to 4,237 litres for an autonomy of 4.5 hours.

[164] PROJET DE FIN D'ETUDE EN VUE DE L'OBTENTIONT DU DEPLOME DE MASTER EN AERONAUTIQUE, *'AUTOMATISATION DU PROCESSUS DU POIDS ET CENTRAGE DE L'AVION BOMBARDIER DASH8-Q400'*, Teniou Aymen et Boubendira Moufdi, 2020, Institut d'aéronautique et des études spatiales, Université de Blida 1 (Algérie).

[165] Idem

[166] https://www.interieur.gouv.fr/sites/minint/files/medias/documents/2021-07/dossier-de-presse-feux-de-foret.pdf

Dash 8 Q400 MR	Jet A1	4,520	5 hours	1,000 litres-hour	46 days or 417 hours per year	30
Ground forest firefighting using vehicles (GFFF-V)						
CCF BE 2000L (Euro V)/CCF BE 4000L (Euro VI)	Diesel			0.24 litres per km[167]	10,000 km	25
Other vehicles						
Passenger car – Peugeot 308	Diesel (assumption)			0.054 litres per km[168]	10,000 km	15

[167] The two vehicles identified above and used by the Belgium Civil Protection Agency have the following characteristics: 10 and 14 tonnes gross weight respectively. Since the fuel consumption of such specialised vehicles could not be found, values for similar vehicles have been retrieved. A study published by O. Delgado, F. Rodriguez and R. Muncrief, on the ICCT website in 2017, indicates that a rigid truck (12 tonnes, full load, Euro VI) has a fuel consumption of between 22 and 26 litres per 100 km, depending on delivery conditions, p30. (Fuel efficiency technology in European heavy-duty vehicles: Baseline and potential for the 2020–2030 timeframe (theicct.org)). A dataset published by the Department for Transport (DfT) reported a value of 24 litres per 100km for rigid trucks with a gross weight of between 7.5 and 14 tonnes. Therefore, the amount of 0.24l/km has been used as a proxy here.

[168] Assumption for a small diesel car in 2022, Transport & Environment, '*Update – T&E's analysis of electric car lifecycle CO_2 emissions*', Table 2, May 2022.

4x4 car – Renault Duster	Diesel (assumption)			0.062 litres per km[169]	10,000 km	15
Minivan – Ford Transit	Diesel (assumption)			0.067 litres per km[170]	10,000 km	15

[169] Assumption for a medium diesel car in 2022, Transport & Environment, '*Update – T&E's analysis of electric car lifecycle CO_2 emissions*', Table 2, May 2022.

[170] Assumption for a large diesel car in 2022, Transport & Environment, '*Update – T&E's analysis of electric car lifecycle CO_2 emissions*', Table 2, May 2022.

The data about fuel consumption and vehicle usage reported in Table 7-3 should be multiplied by the GHG emission rate per fuel type (usually expressed in CO_2 equivalent or kgCO2e) in order to assess the GHG emitted by the vehicles as per their usage, but also incorporating the transport of fuel from its production site to the pump, also called 'well-to-tank'). The emission rates per fuel type used are those published by Ademe, the French Agence de l'Environnement et de l'Energie, which publishes values to be used as input data for carbon footprint assessments[171]. The well-to-wheel GHG emissions per fuel litre are reported in Table 7-4.

Table 7-4: GHG emissions per litre per fuel type (fuel combustion and transport), source: Ademe

Fuel type	Well-to-wheel GHG emissions ($KgCO_{2e}$ / Litre)
Diesel/gasoline	3.24
Kerosene (jet A ou A1)	3.05

Calculating a well-to-wheel carbon footprint of the vehicles used as part of UCPM activities

A simple formula to calculate these well-to-wheel GHG emissions could be defined as follows:

$$E_v = \frac{1}{1000} * \sum_{i=1}^{t} U_v . C_v . F_y$$

Where:

- Ev represents the total well-to-wheel GHG emitted by a vehicle category v (as per the categories defined in Table 6-3) over its supposed life duration t (number of years), expressed in tonnes CO_{2e}
- Uv is the annual utilisation of the vehicle category v, expressed in km or in number of days
- Cv is the fuel consumption of the vehicle category v, expressed in litre/km or litre/day
- Fy represents the fuel transport and combustion GHG emission rate per fuel type y (in kg CO_{2e} per litre)
- The following well-to-wheel GHG emissions (Table 7-5) are estimated based on the assumptions described hereabove. The results show us an example of potential WTW emissions for the different categories of vehicles identified, considering the limitations mentioned here before. It is no surprise that the carbon footprint of aerial vehicles is much higher than for ground vehicles due to their substantially higher fuel consumption.

[171] Bilan GES Ademe, Documentation Base Carbone, Scope 1 : émissions directes (et amont des combustibles) > Organiques > Liquides, Source: https://bilans-ges.ademe.fr/documentation/UPLOAD_DOC_FR/index.htm?new_liquides.htm

Table 7-5: Estimates of well-to-wheel GHG emissions of selected vehicle categories considered

Vehicle category & model	Fuel consumption (l/km or l/hour)	Fuel consumption (in unit)	Usage/year (km or days)	Usage/year (unit)	Life duration (years)	GHG (tonnes CO2e)/year	GHG (tonnes CO2e)/lifetime
FFFH - 1	litre/hour	650	Days	417	30	827	24,801
FFFH - 2	litre/hour	857	Days	417	30	1,090	32,699
FFFP - 1	litre/hour	942	Days	417	30	1,198	35,942
FFFP - 2	litre/hour	1000	Days	417	30	1,272	38,156
MEVAC	litre/hour	1000	Days	417	30	1,272	38,156
GFFF-V	litre/km	0.24	Km	10,000	25	8	194
Passenger car	litre/km	0.054	Km	10,000	15	2	26
4x4	litre/km	0.062	Km	10,000	15	2	30
Minivan	litre/km	0.067	Km	10,000	15		33

The transport sector as a whole accounts for 22% of GHG emissions across the EU[172]. Therefore, reducing the emissions attributable to transport is important. The use of greener vehicles, promoted through greener procurement in a first stage, is a strong driver to reduce emissions. However, the carbon footprint could be further assessed through the total lifetime (LCA) of the vehicles, including:

- Emissions linked to the manufacturing of a civil protection vehicle;
- Emissions linked to the usage of a civil protection vehicle (well-to-wheel emissions including fuel combustion/energy use and transport);
- Emissions at the recycling stage.

These elements justify the need, also expressed by focus group participants (see section 4.2), to define what green vehicles are. Comparing the above emissions over the life cycle of the vehicles is crucial when vehicles have different sources of energy (for example electric vs diesel, diesel vs hydrogen, kerosene (without biofuel or e-fuel blend) vs kerosene (with blend of biofuel or e-fuel)).

Conclusion

This sub-chapter shows the type of LCA needed to define the greenness of civil protection vehicles and thus the ideal methodology for guiding the procurement of greener vehicles for MS/PS. In the absence of such LCAs, the methodology and illustrative calculations presented in this sub-chapter only provide a partial analysis (well-to-wheel emissions and not a full LCA) on the carbon footprint of civil protection vehicles during their lifetime. They can, however, constitute an input for the preparation of a more in-depth LCA study comparing the life cycle GHG emissions of existing civil protection vehicles and potential alternative ones (using electricity, hydrogen or sustainable biofuels).

[172] Source: https://www.eea.europa.eu/data-and-maps/data/data-viewers/greenhouse-gases-viewer

LCA comparisons are being carried out for cars and heavy-duty vehicles (HDV) by academics and specialist consultants. However, such comparisons are not being conducted for aerial modes where, in the medium term, the greening potential lies in the use of greener fuels and a more rational use of fuel; and in the long term in the development of alternative planes or helicopters (that either consume less fuel or use a different source of energy). Therefore, an LCA study focusing on civil protection vehicles will most likely focus on estimating the carbon footprint of ground vehicles such as firefighting trucks, HDVs and other supporting vehicles (cars, vans, etc.).

Comparing the carbon footprint of two similar vehicles relying on a different source of energy rests on a series of assumptions and details at all stages of the product's life. For example, there is evidence than an electrical vehicle (EV) will generate GHG emissions at the manufacturing stage (mainly due to the high energy and resource consumption to manufacture the battery) and will compensate this over its usage (well-to-wheel emissions are very low for an EV). Therefore, some key assumptions must be considered when comparing an EV to a fossil-fuel or bioethanol car: the place of and the source of energy used to produce the battery, and its lifetime, as the lifetime of the battery will determine the lifetime of the EV. It could also be interesting to reflect on the feasibility of extending the lifetime of certain existing vehicles through retrofitting[173], as the GHG emissions from the manufacturing of a newer vehicle would be diminished. Consequently, the replacement of an existing vehicle would be justified when it cannot be used any longer or presents a risk for safety, whereas earlier replacement would need to rest on sound comparable analyses. While an EV will reduce GHG emissions related to transport activities, the GHG emitted at manufacturing stage may not justify any 'early' vehicle replacement.

The potential results of a potential LCA study will also need to be counterbalanced by the operational constraints that alternative vehicles may bring. Indeed, some focus group participants expressed their doubts on the autonomy duration of EVs during intervention. The question of the availability of recharging infrastructures is also a question that each MS/PS will need to address in line with their national strategy. Safety concerns about alternative vehicles being used in extreme conditions (heat) will need to be addressed as part of the LCA or after it has been carried out.

GHG emissions at the UCPM response stage

The purpose of this sub-chapter is to provide a methodology to calculate GHG emissions related to the use of vehicles, in a broad meaning, as part of the response activities coordinated by DG ECHO. Collecting and analysing these data in a systematic manner for each intervention will enable a consistent monitoring of GHG emissions across the years and will provide an evidence base to assess the impact of other policies and actions on green response activities.

Review of the case studies provided by DG ECHO

It is not possible to calculate the carbon footprint of the UCPM response activities due to the lack of data about the interventions coordinated by the ERCC. At present, transport-related data about past interventions seem to be collected according to a certain pre-defined methodology. Therefore, it seems that only the Part A forms and the resulting grant applications for transport and operation co-financing constitute the main source of information upon which an analysis can be

[173] https://www.oecd-forum.org/posts/retrofitting-a-frugal-circular-and-inclusive-solution-to-decarbonize-our-vehicle-fleet

based. The transport elements contained in the Part A forms are contained in the answers provided to the questions 6, 9, 10, 11, 13, 14. The applicant MS/PS provides answers to these questions. DG ECHO writes the following grant applications following a pre-established checklist[174], after probably liaising with the national civil protection authority which filled out the Part A form. The grant applications are thus more detailed than the Part A forms. Question 4 specifies the type of assistance requested by the MS/PS offering assistance.

The following examples of interventions (both Part A forms and resulting grant applications) were received from DG ECHO (Table 7-6).

Table 7-6: Examples of UCPM interventions provided by DG ECHO

Intervention (requesting country/assisting country)	Type of assistance requested	Transport/operations activities involved
Greece/Poland	1 x GFFF-V Module (46 vehicles, 2 shifts of 143 staff each)	Module travelled by road from Wroclaw to Greece, and further movements according to Greece needs. Same route back. Staff shift by plane from Warsaw to Athens (2 flights)
Nepal/Austria (coordinating on behalf of Malta and Slovenia)	Masks, face shields, oximeters (COVID-19)	Vienna-Kathmandu (cargo flight)
Madagascar/France	1 ECPP module WP and 1 module EMERPAS (total 60 rescuers 26t / 126m3)	Road within France (Paris Region) + 16 flights CDG-Antananarivo (8 round trips) + road from Antananarivo to Tamatave Port
Greece-Turkey/Spain	2 Canadair CL-415 planes (rescEU). First mission in Turkey for two planes, then 1 place in second mission to Greece. 27 personnel including aircraft crew, maintenance staff and liaison officer. Support plane (C-295 plane) to carry extra crew,	Canadair n°1: Málaga (Spain) - Cagliari (Italy) - Elefsis (Greece) - Dalaman (Turkey)- Elefsis (Greece)- Catania (Italy) - Málaga (Spain) Canadair n°2: Málaga (Spain) - Cagliari (Italy) - Elefsis (Greece) - Dalaman (Turkey)- Elefsis (Greece)-

[174] Information shared in an email sent by DG ECHO, 23/08/2022.

	maintenance staff and spare parts.	Cagliari (Italy) - Málaga (Spain) The route of the support plane was not provided.
Ukraine/Germany	In-kind assistance: 8 pieces DIN power generator 6 kVA 5.000 pieces hygiene sets 800 pieces light CSA Tychem F. Cat III type 3 50.000 pieces medical OP masks	Road convoy (truck and trailer) from Erfurt to Lisowice (Poland hub at Ukrainian border, used to then densify deliveries to Ukraine).

Those DG ECHO-funded operations, here described as case studies, are typically cross-border, thus involving long transport journeys between countries offering and requesting assistance. They are interesting as they provide an overview of what the coordination enabled by the UCPM can offer.

- Movements of modules (specialised vehicles, staff and equipment) pre-defined and certified as part of ECPP (assistance provided from Poland to Greece, from France to Madagascar) or rescEU (assistance from Spain to Greece and Turkey).

- In-kind assistance (medical materials) sent from several countries and coordinated by Austria collecting all items from Slovenia and Malta and sending them towards Nepal.

- In-kind assistance (medical materials and equipment) offered from Germany to Ukraine through a hub located at the Polish border post to Ukraine. This hub acted as a collection point of various in-kind assistance before shipping them by rail towards Ukraine.

The files provided by ECHO are saved in .doc or .pdf formats, thus only allowing a manual analysis in order to assess GHG emissions of transport-related activities from the country offering assistance and its destination, and the return trip. However, another main aspect of transport-related emissions is absent from the documents received: the GHG emissions related to the use of transport vehicles as part of the rescue operations. This sounds logical when reading the Part A forms and grant applications, but collecting these data is necessary in order to assess, after the intervention, the quantity of energy/fuel used.

The only possible way to assess the carbon footprint of the return assistance journeys (in the five examples above) from their point of origin to their destination and back to their point of origin trips of transport is to manually analyse the answers provided in questions 6, 9, 10, 11, 13 and 14 by MS/PS and completed by DG ECHO when issuing the following grant applications. It seems that DG ECHO does not question these transport-related answers (transport mode choice, route choice). Some input data necessary to calculate the carbon footprint of these assistance offers are absent (number of kilometres between place of embarkation and place of disembarkation, trip duration in hours, quantity of fuel used, type of fuel, etc.) and must thus be retrieved. It sounds logical, as these metrics are not asked for in the questions of Part A forms, but they would

be required to calculate GHG emissions. A more systematic way of data collection could be beneficial, for example, by asking MS/PS to provide these metrics in Part A forms as it would allow DG ECHO to calculate these GHG emissions that could be incorporated in the grant application documents, which would then constitute the basis for a yearly monitoring of the GHG emissions.

Illustrative calculations of GHG emissions of response interventions

Bearing in mind the limitations caused by the lack of data on the case interventions, this chapter applies a methodology close to the one defined in section 6.1.4 in order to assess (parts of) the CO_2 footprint of the transport activities of the case interventions.

The GHG emissions which can be calculated from the five intervention examples shared by DG ECHO in Table 7-6 are the well-to-tank emissions (fuel combustion and transport) of the first and final legs of an intervention. In other words, the emissions linked to the movement of modules/capacities/goods between the offering country and the requesting one (and the way back to the origin if it is about a movement of modules/capacities). Therefore, a similar methodology to the one used in section 6.1.4 is applied. The main assumptions to be defined as input data are as follows: transport modes moved; number of km or hours of flight (including the return journey); type of energy/used; load percentage if known; fuel consumption of the vehicle; GHG emissions from transport; and combustion of fuel by fuel-type.

Table 7-7 showcases an illustration of well-to-wheel GHG emissions, making use of the methodology and assumptions defined in section 6.1.4. The return distance and flight duration of vehicles are considered in order to not forget the return trip of vehicles to their originating points. Google Maps was used to retrieve the road distance between cities, while a specialised website was used to collect the duration of flights between two points[175]. An additional assumption has been used to consider the fuel consumption of conventional cargo and passenger aircrafts, supposed higher than the planes used as part of FFF-P module. A fuel consumption of 3,000 litre of kerosene per hour has been assumed[176].

Table 7-7: Illustration of the carbon footprint of return journeys in the case studies provided by DG ECHO

From	To	Mode	Model	Number of veh.	Return distance (km)	Return flight (hours)	CO2e (tonnes)
Wroclaw	Athens	Road	GFF-P	4	4,366		13.6
Wroclaw	Athens	Road	Cars	42	4,366		32.1
Wroclaw	Athens	Plane	Passenger	1		4.5	41.2
Vienna	Kathmandu	Plane	Cargo	1		7.9	72.4
Paris	Antananarivo	Plane	Cargo	1		20.6	188.5
Malaga	Dalaman	Plane	FFF-P	2		7.8	45.0
Malaga	Dalaman	Plane	Cargo	1		7.8	71.7
Erfurt	Lisowice	Road	Truck	1	1,454		1.1

Table 7-7 highlights the high consumption of aerial modes compared to ground transport vehicles but also raises the question of the number of vehicles involved in a response activity. Indeed, the high number of vehicles used as part of the assistance offered by Poland to Greece shows that

[175] https://flighttime-calculator.com/

[176] https://www.livemint.com/news/india/flights-how-much-fuel-your-plane-consumes-per-second-11592883647441.html

an important number of road vehicles can also have an important impact on the GHG emissions of a response intervention.

Conclusion

The present sub-chapter provided a succinct methodology on how to calculate the well-to-tank GHG emissions linked to the interventions coordinated by DG ECHO. The adoption of a data collection framework and a consistent mode of analysis would empower DG ECHO with an analytical tool enabling to monitor the evolution of GHG emissions of response activities over the years.

Data collection before and after interventions could be better defined and made consistent and systematic in order to be able to calculate carbon footprints of response activities. This must be in line with the methodology defined to assess the GHG emissions of transport activities at the response stage.

Before interventions, data about transport journey aspects from the country offering assistance to the country requesting assistance, and back to its point of origin, could be collected through either Part A forms or at least contained in the final grant application documents, after a check and analysis by DG ECHO.

To that end, it would be necessary to reflect on whether the structure of the Part A forms and grant application documents needs to be amended to include more precise variables on transport (distance, mode) and potential greening (GHG emissions), in a more user-friendly format (spreadsheet). A first step could be to ask MS/PS to be more precise in their transport activities, through the inclusion of key metrics regarding the transport of modules/in-kind assistance. These metrics will need to be the detail of the various modes of transport used (how many vehicles? What type? Which fuel/energy?); the transport route selected (from where to where, passing through which point, broken down into clear legs); and the distance and duration of the trips (number of km or number of hours of flight according to the route selected). It may be that a spreadsheet in a defined and formatted template would be better suited to collecting these data. It could be sent out with the Part A forms or requested by DG ECHO before issuing a grant application document. DG ECHO could then analyse the inputs provided by MS/PS and calculate GHG emissions according to a certain methodology to be defined. This methodology would make it possible to automate the calculation of GHG emissions, by having pre-defined functions and calculation steps incorporated in the spreadsheet linking the various variables necessary to calculate the GHG emissions (one sheet for each assumption such as fuel consumption by vehicle type, percentage load of the vehicles, distance in terms of km for ground transport modes, number of hours of flight for aerial modes, emission rate per fuel type, and one calculation sheet showing the result in a succinct manner). The GHG emissions result, expressed in CO_{2e}, could be included in the Grant A application form, and kept in a spreadsheet format for later calculations of total GHG emissions of an intervention (by adding the GHG emissions of the interventions once the module or vehicles on the site of intervention) and for the monitoring of annual statistics.

The same could be requested when a country offering assistance requests to use the logistical support broker (Maersk). During the interview with the broker, the company explained the way they plan their logistical activities and interact with DG ECHO. The broker explained that after receiving a request from DG ECHO, following a Part A form, it organises a call for competition between several sub-contractors from the logistics sector. These sub-contractors are the entities that physically look after the logistics aspects before the interventions. The broker thus selects

at least two transport alternatives compliant with DG ECHO's request, which they submit to DG ECHO for validation. These alternative options contain information on the transport used, the duration (hours) and the cost of the journey. DG ECHO then validates which option to select after assessing the need and budget for the intervention. A possibility here could be to require the broker to systematically calculate the GHG emissions linked to the transport and to provide it along with the other variables (mode, duration, cost) for DG ECHO's decision. This would at least ensure that DG ECHO is aware of the carbon footprint of the various transport alternatives coordinated by the broker before taking a decision.

After each intervention, DG ECHO could ask the MS/PS providing assistance to analyse their energy/fuel consumption and to fill in a specific form, which will enable DG ECHO to monitor their annual activities and calculate annual aggregated statistics. The comparison of annual statistics will make it possible to determine the impacts of DG ECHO decisions on the transport-related GHG emissions. There is a strong need for monitoring data after each intervention in a calculation-friendly format by DG ECHO (Excel). The end objective of this possible exercise would be to provide a framework to facilitate the calculation of the transport GHG emissions as part of response interventions.

KR-07-23-039-EN-N

Publications Office
of the European Union

doi: 10.2795/717511
ISBN 978-92-76-98960-8