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IMPACT ASSESSMENT REPORT

ANNEXES 7 TO 9 to the IMPACT ASSESSMENT REPORT

Accompanying the document

Proposal for a Regulation

of the European Parliament and of the Council on circularity requirements for vehicle design and on management of end-of-life vehicles, amending Regulations (EU) 2018/858 and 2019/1020 and repealing Directives 2000/53/EC and 2005/64/EC

{COM(2023) 451 final} - {SEC(2023) 292 final} - {SWD(2023) 255 final} - {SWD(2023) 257 final}

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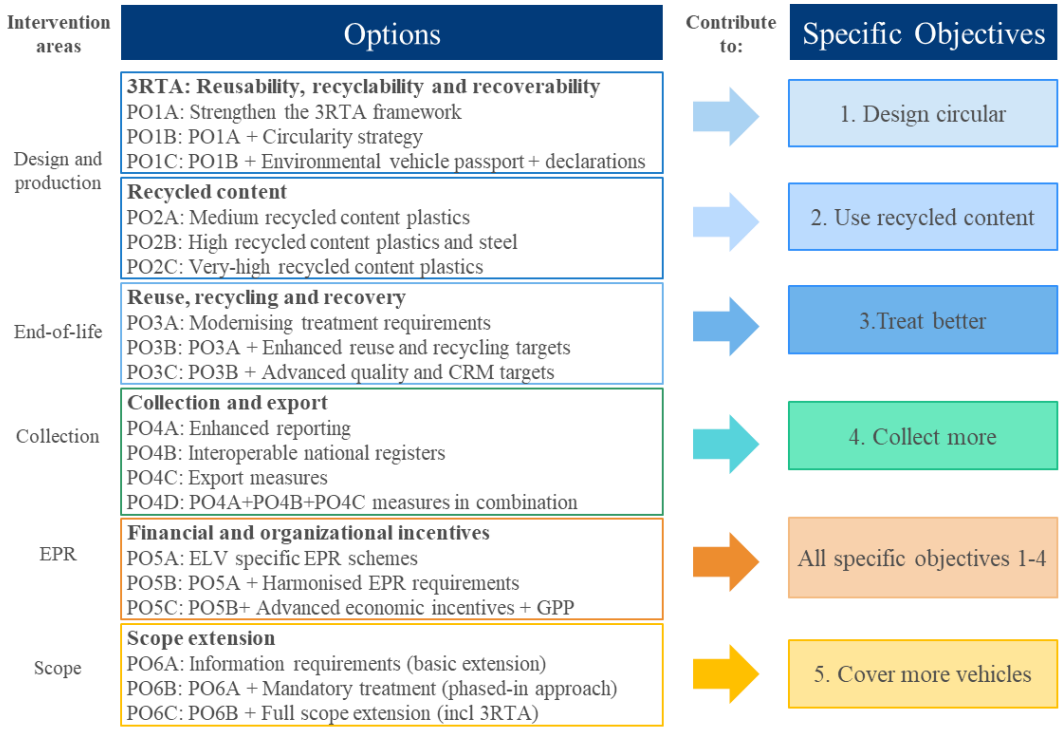
ANNEX 7: OVERVIEW OF MEASURES

7.1 Description of the policy options

As indicated in section 5.2 of this report, six policy options are analysed in this impact assessment. These options contain themselves three sub-options, which consist in different individual measures. The purpose of this Annex is to present these individual measures in a more detailed manner as what has been done in the report itself.

An overview of the options and their relation the objectives, problems and drivers of the intervention logic is described is displayed below:

Figure 7.1 Overview of options contributing to the specific objectives



A full overview of all measures per policy option, their application dates as well as the discarded measures are presented in Table 7.1.

Table 7.1 Overview of all measures considered

Policy Options	#	Measures (all implementing dates are specified as +x yrs from entry-into-force)	EIF *	Pref. *
PO1 – *Design Circular*	1A	M1 - Ensure that new 3RTA rules provide for a proper implementation of circularity requirements for new vehicle types	+1	Y
		M2 - Empowerment for the Commission to develop a refined methodology to determine compliance with 3R-requirements	+3	Y
		M3 - Provision of basic dismantling information to ELV treatment operators	+3	Y
		M4a - Declaration on substances of concern verified by 3R type-approval authorities	+3	N
		M5a - Restrictions of substances under the revised ELV Directive *(analysed separately in Annex 9)*	+1	N

	1B	*Includes measures M1,M2,M3 of PO1A.*		
		M4b - Mandatory declaration on recycled content of plastics, steel, aluminum	+5	Y
		M5b - Restrictions of substances under REACH and other existing legislation *(analysed separately in Annex 9)*	+8	N
		M6 - Obligation for vehicle manufacturers to develop circularity strategies	+3	Y
		M7 - Design requirements for new vehicles to facilitate the removal of components	+6	Y
	1C	*Includes measures M1-M3, M6,M7 of PO1A and PO1B.*		
		M4c - Mandatory declaration on recycled content for materials, other than plastics, including CRMs, steel, aluminium	+5	Y
		M5c - Hybrid approach: maintenance of current restrictions under ELV with new restrictions under REACH (*analysed separately in Annex 9)*	+8	Y
		M8 - Establishment of a digital Circularity Vehicle Passport	+7	Y
Discarded PO1		M34 - Voluntary pledges campaign to increase circularity		X
		M35 - Preparation of non-binding guidelines to improve circularity		X
		M36 - Obligatory due diligence requirements for materials used in vehicles		X
PO2- *Use Recycled Content*	2A	M9a - Mandatory recycled content targets for plastic used in vehicles - 6% recycled plastics content by 2031, 10% by 2035 at fleet-level, of which 25% of recycled material from closed loop production, calculation and verification rules at +2 yrs	+6	N
		M10a – Empower the Commission to set a mandatory recycled content target for steel, including calculation and verification rules at +3 yrs, based on a dedicated feasibility study, application to newly type approved vehicles at +7 yrs	+7	Y
	2B	M9b - Plastics recycled content: 25% in 2031 for newly type-approved vehicles only, of which 25% closed loop	+6	Y
		M10b - Steel recycled content: 20% in newly type-approved vehicles	+7	N
	2C	M9c - Plastics recycled content: 30% in 2031 for newly type-approved vehicle only, of which 25% closed loop, calculation rules and verification rules at +2 yrs	+6	N
		M10c - Steel recycled content: 30% in newly type-approved vehicles, of which 15% from closed loop	+7	N
		M11- Empowerment for the Commission to set a mandatory recycled content targets for other materials (aluminium alloys, CRM), feasibility study +3 yrs, target levels, calculation rules +5 yrs, application to newly type approved vehicles >7 yrs	>7	Y
Discarded PO2		M37 - Higher than 30% of recycled content target for plastic of in 2031		X
		M38 - Recycled content targets for copper		X
		M39 - Recycled content targets for glass		X
		M40 - Recycled content targets for rubber/ tyres		X
PO3- *Treat Better*	3A	M12- Aligning the definition of recycling (at EIF) and aligning the calculation methodology for recycling rates (+3 yrs) with other waste legislation	+3	Y
		M13a - Mandatory removal of certain parts/components prior to shredding to encourage their recycling or re-use, 'list A'	+3	Y
		M14a - New definition of 'remanufacturing' (at EIF) and new monitoring requirements (+3 yrs) for re-use/ remanufacturing	+3	Y
		M16a - Ban on the landfilling of automotive waste residues from shredding operations	+3	Y
	3B	*Includes all measures of PO3A (cumulative)*		
		M13b - Mandatory removal of longer list of components, including those that contain a high concentration of valuable metals or CRMs, 'list B'	+3	Y
		M14b - Market support for the use of spare parts	+3	Y
		M15b - Recycling targets for plastics – 30% at 5 yrs EIF. calc rules +2 yrs EIF	+5	Y
		M16b - Ban on mixed shredding of ELVs with WEEE and packaging waste	+3	Y
	3C	*Includes all measures of PO3A and PO3B (cumulative)*		
		M13c - Mandatory removal of additional components, 'list C'	+5	N
		M15c - Glass – 70% recycling as container glass quality or equivalent.	+5	N
		M16c - Setting requirements on Post Shredder Technologies (PST) to improve the quantity and quality of metal scrap recovered from ELVs	+5	N
Discarded PO3		M41 – setting specific recycling targets for metals		X
		M42 – setting specific recycling targets for non-metal materials		X
PO4 –	4A	M17a - Reporting by Member States on "missing vehicles", vehicle registrations,	+3	N

Collect More		the import and export of used vehicles, incentives to encourage delivery to an ATF and penalties		
		M18 - Obligations for dismantlers /recyclers to check and report on ELVs/ CoDs	+3	Y
		M19a - Setting minimum requirements for sector inspections and enforcement action (including non-binding Correspondents Guidelines No9)	+1	Y
	4B	M17b - Setting fines for the ELV sector if an ELV is sold to illegal dismantlers and for dealers (and electronic platforms) dealing with dismantled (used) spare parts from non-authorised facilities.	+3	Y
		M19b - Clearer definition of ELVs to ensure that there is a better distinction between used vehicles and ELVs (binding CG9)	EIF	Y
		M20 - Improving the information contained in national vehicle registries and making them interoperable	+5	Y
	4C	M19c - Provide or making available information on vehicle identification and roadworthiness available to customs authorities (VIN)	+4	Y
		M21 - Export requirements for used vehicles linked to roadworthiness	+7	Y
	4D	Includes measures M17b,M18,M19a-c,M20,M21of PO4A, PO4B and PO4C (cumulative)		Y
Discarded PO4		M43 - Establish a mandatory collection target of ELVs based on the reporting obligations on the national vehicle market		X
		M44 - Voluntary campaigns on export of ELVs incl. waste shipment correspondents' guidelines No9 on distinction ELVs and second-hand vehicles		X
		M45 – Establishing a central EU vehicle registration database		X
		M46 - Exchange of Member States on the implementation of incentives supporting effectiveness of the Certificate of Destruction (CoD)		X
		M47 - Support / software interfaces to international notification system		X
		M47a – Setting threshold for age and emission for the export of all used vehicles from the EU to third countries		X
PO5 – *EPR*	5A	M22 - Requirement for the Member States to establish collective or individual EPR schemes, incl. monitoring compliance costs and minimum financial obligations	+3	Y
		M23 - Reporting obligations for producers	+3	Y
	5B	*Includes measures M22, M23 of PO5A (cumulative)*		
		M24 - Harmonised modulation of EPR fees	+5	Y
		M25 - Transfer of the EPR fees/ guarantees (cross-border EPR)	+3	Y
	5C	*Includes measures M22-M25 of PO5A and PO5B (cumulative)*		
		M26 – Setting up national deposit refund schemes	+5	N
		M27 - Harmonised GPP criteria (voluntary)	+5	N
Discarded PO5		M48 - Establishment of an EU wide EPR scheme		X
		M49 - European-wide deposit refund scheme supervised by a single European body		X
		M50 - Collection of vehicles at holder's premises and abandoned vehicles free of charge for the last holder		X
PO6 – *Cover more vehicles*	6A	M28 - Provision of information to dismantlers and recyclers	+5	Y
	6B	*Includes measure M28 of PO6A (cumulative)*		
		M30a - Mandatory treatment of end-of-life L3e-L7e-category vehicles, lorries (N2,N3) and buses (M2,M3) and trailers (O) at ATFs + CoD	+5	Y
		M30b - Export requirements for used vehicles linked to roadworthiness status for lorries (N2,N3) and buses (M2,M3) and trailers (O)	+5	Y
		M31b - Minimum EPR requirements for end-of-life L3e-L7e category, lorries (N2,N3) and buses (M2,M3) and trailers (O)	+5	Y
		M32 - Review clause on the regulatory extension of 3RTA scope to new vehicles	+8	Y
	6C	*Includes measures M28,M30a-b,M31b of PO6A and PO6B (cumulative)*		
		M31c - Full application of EPR and advanced economic incentives	>7	N
		M33 - Full scope application of the new 3RTA and end-of-life treatment requirements to additional vehicle categories	>7	N
Discarded PO6		M51 - Extension of new requirements to special purpose, multistage vehicles and vehicles produced in small series		X
		M52 - A full regulatory 3RTA scope extension to all vehicle categories		X

** Entry-into-force of the Regulation; Pref. is preferred option, see Section 8.1*

*** Included in the preferred option, Y = YES, N = NO, See Section 8.1, X = Discarded, See Section 5.3*

7.2 Description of individual measures contained in the different policy options

7.2.1 7.2.1 Policy Options 1A, 1B and 1C (related to specific objective 1 'design circular'): Improve reusability, recyclability and recoverability, 3R Type-approval

PO1A, PO1B and PO1C target the specific objective 1 **'Design Circular'**, with an increasing level of ambition. These options are cumulative (i.e. PO1B = PO1A + additional measures; PO1C = PO1B + additional measures).

- **PO1A – "Better compliance verification** includes first the adaptation of 3R type-approval process to the new Regulation (EU) 2018/858 on type approval and market surveillance[1], including the possibility to perform conformity of production and market surveillance tests. It includes the possibility to recall vehicles, withdraw type-approval certificates and sanction manufacturers in case of non-compliance (M1). It includes an empowerment for the Commission, within 3 years, to revise the calculation methodology on how vehicles manufacturers should demonstrate compliance with their obligations on recyclability, re-usability and recoverability of new vehicles, and, if needed, to propose a modernised methodology that supports more circularity in new vehicle designs. This could be done either through supporting a change to the current ISO standard on this point, or through the development of new rules at EU level, and would be preceded by an impact assessment. (M2). **PO1A also requires manufacturers to provide treatment operators and consumers, through existing platforms, with detailed and user-friendly repair, reuse and safe dismantling instructions (M3) and information on the location of the parts/components in their vehicles containing CRMs** with a specific focus on declaration of indicative weights, locations, fastening and coating techniques as well of labelling of CRMs such as neodymium and dysprosium in e-drive motors.

PO1A contains the following Measures 1-4 (M1-M5a):

- **M1 – Ensure that the new rules provide for a proper implementation of circularity requirements for new vehicle types**

The measure consists in aligning the provisions on type-approval relating to re-usability, recyclability and recoverability with the overall type-approval framework set out in Regulation (EU) 2018/858. Regulation (EU) 2018/858 contains technical requirements that vehicles shall fulfil at the stages of type approval and placing on the market, as well as obligations for manufacturers, Member States and the Commission to ensure that these requirements are complied with. This includes the obligation for Member States market surveillance authorities to carry out regular checks (see Article 8), as well as the possibility to impose fines on vehicle manufacturers and to withdraw vehicles from the market or recall them if manufacturers fail to take adequate corrective measures in case of non-compliance. The Commission also has a duty to carry out tests and inspections to verify that vehicles comply with the requirements laid down in the Regulation (see Article 9).

[1] Regulation (EU) 2018/858 of the European Parliament and of the Council of 30 May 2018 on the approval and market surveillance of motor vehicles and their trailers, and of systems, components and separate technical units intended for such vehicles (OJ L 151, 14.6.2018, p. 1–218).

This measure will clarify how these provisions of Regulation (EU) 2018/858 will apply in relation to the requirements linked to re-usability, recyclability and recoverability.

To support the improvement of circularity in vehicle designs, and in particular the technical know-how of vehicle manufacturers and type-approval authorities about vehicle recyclability, the Commission will monitor appropriately the compliance of the issued type approvals with the 3R type-approval requirements. This may include the performance of dismantling and shredding tests at the premises of an ATF or a shredding facility.

- The dismantling and shredding tests will document the dismantling of each vehicle and analyse the information to estimate the achievability of the 3R type-approval targets at end-of-life stage. For this purpose, the ATF shall apply methods specified in the type-approval submission for the dismantling of components. Tools specified in such information shall only be applied if they are tools commonly used by ATFs. The ATF performing the test will document the parts dismantled (time of dismantling, tools used to support the task, composition of part). On this basis, the party will then estimate the probable route of treatment of each component dismantled.
- On the basis of all collected data, and comparison with the type-approval data, the Commission will provide feedback to the manufacturer and the type-approval authority.
- A report documenting the annual results of dismantling tests will be published. It shall include references to each of the vehicle cases and, where possible, recommendations as to how to improve the recycling of the concerned vehicle types at the end-of-life stage. This report can inform market surveillance actions, [which can include fines in case market surveillance authorities conclude on non-compliance by the vehicle manufacturers, as well as the requirement that the design of the type concerned is changed to meet the TA targets (and that the vehicle manufacturers would need to obtain a new type-approval before being able to put new vehicles of this type on the EU market)].

These requirements shall apply 1 year after entry into force of the new legislation.

According to Article 8 of Regulation EU 2018/858, EU Member States are already under the obligation to regularly check and verify that vehicles comply with type approval requirements, including those related to 3R type-approval.

- **M2 – Empowerment for the Commission to develop a refined methodology to calculate compliance with requirements on recyclability, reusability and recoverability of a vehicle**

This measure aims to refine the methodology to be used by vehicle manufacturers to calculate and show to which degree the materials in new vehicles are re-usable, recyclable and recoverable. In the current legal regime, the data to be presented to demonstrate compliance with the requirements on re-usability, recyclability and recoverability are contained in Annexes I and II of the 3R type-approval Directive. Annex I states that the calculation method that car manufacturers should use is set out in ISO standard 22628:2002[2].

The proposed measure introduces an empowerment to the Commission to propose, within 3 years after adoption of the Regulation, based on a comprehensive support study, a detailed calculation methodology on how vehicle manufacturers should demonstrate compliance with

[2] Standard ISO 22628: 2002.

3R type-approval rates. The proposal shall also consider the possibilities to review the current ISO 22628: 2002 standard. The aim of the review is to refine this calculation approach in order to reflect the actual potential of a new vehicle to be recycled, reused and recovered at the end-of-life while taking into account the ongoing technological progress of the 'proven technologies' that exist at the moment of vehicle placement into the market.

As a minimum, all components to be removed prior to shredding at the end-of-life stage of the vehicle (as defined in Measure M13a, 13b, 13c, see below) would be considered as re-usable if they have a potential for re-use or remanufacturing, or as recyclable when they are recycled separately to achieve higher recycling qualities or quantities.

Until the adoption of specific calculation methodology, the ISO standard for the current calculation of re-usability, recyclability and recoverability rates continues to apply.

- **M3 – Provision of dismantling information to ELV treatment operators**

The objective of this measure is to improve the communication and documentation along the automotive value chain (from design to end-of-life treatment) on all information and data which is relevant for the treatment of ELVs. Under this measure, the Regulation would establish an obligation for vehicle manufacturers to provide a set of information to the actors involved in the dismantling and recycling of ELVs. This measure builds on the existing Article 8(3) and 8(4) of the ELV Directive but will be more specific. In addition, vehicle manufacturers would have to provide evidence to the type-approval authorities concerned that they have provided this information, as part of their application to the type-approval process. The type-approval authorities would have to check and be satisfied that the vehicle manufacturers have properly submitted this information, before granting the relevant type approval. They would not have to verify the accuracy of this information. This is different from measure M4a, which contains a specific regime and obligations for type-approval authorities to verify the compliance of the declared information with the EU legislation on substances of concern.

The new provisions will list the elements and harmonise the format in which data is to be provided. The manufacturers, including their authorised representatives and importers, will be required to provide the following information free of cost through information platforms[3]:

1. Location, dismantling time and method for components for which there are depollution obligations[4].
2. Location, dismantling time and method for components with potential for re-use and/or remanufacturing[5].
3. Digital keys, also referred to as "Smart Access Control solution" and information as to the dismantling method for components using digital keys.
4. Location, dismantling time and method of components which are obligatory to dismantle for promoting re-use and/or recycling.

[3] For instance, Repair and Maintenance Information (RMI), IMDS (International Material Data System[3]) and the international dismantling information system (IDIS). More information available at: https://public.mdsystem.com/en/web/imds-public-pages

[4] Annex I (3) of the ELV Directive.

[5] See a section on the preliminary list of components in 13a and 13b.

5. Components containing materials that cannot be recycled at the time when the vehicle is placed on the market (e.g., carbon enforced plastics, composites) – i.e. those for which the recycling methodology is classified as below TRL9.
6. Information on the presence and location of selected relevant materials as defined in the EU list of critical raw materials at the time of the type-approval of the vehicle, as well as on instructions on how to dismantle them for recycling. For the e-drive motors, the core of the measure is defining design constraints on the OEM to provide clear and succinct instructions on the disassembly operations. Such instructions should include a list of interfering components and parts to be taken out to reach the e-drive motor, the different tools required as well as the number of fastening techniques to unlock and extract the e-drive motor[6]. Information required for Nd and Dy in the e-drive motors are:
    - indicative weight, location and chemical composition of all individual permanent magnets included in the product;
    - number of permanent magnets at e-drive motor level;
    - presence and use of glue in the assembly of the permanent magnet and any additives used within the e-drive motor;
    - coating used on permanent magnet;
    - labelling of e-drive motors where one or more rare earth permanent magnets are present. More information on this is presented in Annex 15.2.4[7].
7. Information on the presence and location of hazardous substances in components in the vehicle, as well as on their safe and environmentally sound dismantling and treatment.

The future legislation or a delegated act shall include a provision specifying the information or any additional obligations in terms of the systems used to provide data and minimum requirements as to the format in which data is to be submitted.

The Commission would also be tasked to update this list (relating to dismantling information to ELV treatment operators) regularly taking into account environmental benefits, the evolution of the automotive sector and cost-effectiveness.

These requirements shall apply 3 years after entry into force of the new legislation.

- **M4a – Declaration on substances of concern verified by 3R type-approval authorities**

This measure sets out a requirement for vehicle manufacturers to provide a declaration, as part of their type-approval application process, on relevant substances of concern[8] contained in the vehicle type concerned. The type-approval authorities would have a procedural obligation to verify that the information provided in this declaration complies with the EU legislation on restriction of chemicals relevant to vehicles (i.e. generic minimisation requirements for hazardous substances / substances of concern in vehicles under ELV, applicable specific

[6] Art 27 CRM Regulation refers to recyclability of permanent magnets of the following 4 types: (i) Neodymium-Iron-Boron; (ii) Samarium-Cobalt; (iii) Aluminium-Nickel-Cobalt; (iv) Ferrite

[7] N. Tazi, M. Orefice, C. Marmy, Y. Baron, M Ljunggren, P Wäger, F. Mathieux, Initial analysis of selected measures to improve the circularity of Critical Raw Materials and other materials in passenger cars, EUR 31468 EN, Publications Office of the European Union, Luxembourg, 2023, ISBN 978-92-68-01625-1, doi: 10.2760/207541, JRC132821.

[8] The definition of substances of concern contained in the proposal for ESPR should be used in that respect

restrictions in ELV, in REACH, POPs Regulation, Batteries Regulation[9]) before granting the required type-approval. This measure does not require type-approval authorities to analytically determine the presence and concentration of the concerned substances in vehicles or vehicle components.

These requirements apply 3 years after entry into force of the new legislation.

- **M5a - Restrictions of substances under the revised ELV Directive**

Under this measure, restrictions on all relevant chemicals that are used in a vehicle would be regulated in the new Regulation[10]. This includes restrictions on the four substances currently regulated in the ELV Directive (lead, cadmium, mercury and hexavalent chromium), as well as possible new restrictions.

It will provide a mechanism for restricting substances used in vehicles and components of vehicles, relying on an assessment by the relevant committees[11] of the European Chemicals Agency (ECHA) of restriction dossiers prepared by ECHA at the request of the Commission, or by Member States on their own initiative. The process would be run under the new regulation replacing the ELV Directive and any restrictions on new substances would be enacted via delegated acts under the new regulation, based on opinions submitted by ECHA to the Commission. Therefore, under this measure, a regulatory mechanism for introducing new ELV-relevant restrictions for substances is established under the new Regulation. They will be laid down via delegated acts, prepared with the support of ECHA[12].

Existing restrictions on the four currently restricted substances under the ELV Directive and exemptions to them will be maintained under ELV legislation and reviewed as appropriate, via delegated acts, with the support of ECHA (rather than using contractors to the Commission, as currently). In addition, relevant active exemptions having a review date [Annex II points 2(c)(ii), 3, 8(e) and 8(g)(ii)] will be maintained and reviewed under the new Regulation, also with the support of ECHA. Other exemptions that do not require a review will be also maintained in ELV legislation. The scope of the assessment of exemptions will be widened including an analysis of alternatives, a socio-economic analysis and a comparative analysis of the health and environmental impacts of alternatives.

For any expansion in scope of ELV to heavy-duty vehicles, trailers and L-category vehicles (as described under PO6) a new dedicated restriction process would be run under the ELV specific Regulation, via delegated acts, with the support of ECHA and/or consultants. The new legislation will assign the new tasks to ECHA with regard of the assessment of substances relevant to these vehicles.

Exemptions for the use of lead and cadmium under the ELV Directive which are specific to batteries [Annex II points 5(a) and 5(b) (lead) and 16 (cadmium)] will be, following a transition process, taken up by the Batteries Regulation (*lex specialis*) and removed from the new Regulation replacing ELV Directive via delegated acts.

[9] Regulation of the European Parliament and the Council of [date] 2023 concerning batteries and waste batteries, amending Directive 2008/98/EC and Regulation (EU) 2019/1020 and repealing Directive 2006/66/EC (OJ L […]).
[10] It should be noted that the requirements under the Authorisation title of REACH for those substances of very high concern (SVHCs) listed in Annex XIV to REACH (such as certain chromium VI salts) applies, regardless of whether restriction provisions for substances in vehicles remain in ELV or are transferred to REACH or sector / product-specific legislation.
[11] Committee for Risk Assessment (RAC) and Committee for Socio-economic Analysis (SEAC) defined under article 76 of the REACH Regulation.
[12] This is similar approach to the one used in the Batteries Regulation.

Consequently, under this measure, the restriction procedure for substances in vehicles would be contained, as a self-standing process, under the new Regulation and would have to be defined in the legal proposal. This approach would follow the Commission proposal for a Batteries Regulation[13] and, more specifically that contained in its Articles 6 and 71[14]. The measure would also grant Member States the right of initiative to propose restrictions.

These requirements shall apply 1 year after entry into force of the new legislation.

PO1B: Circularity strategy builds on PO1A with additional **requirements for vehicle manufacturers to develop (i) a specific circularity strategy for each new vehicle type which is type-approved ("type-specific strategy**"). This strategy would foster cooperation between vehicle manufacturers and actors in the dismantling and recycling sectors. The objective of this "type-specific strategy" would be for vehicle manufacturers to explain how they will ensure that re-usability, recyclability and recoverability rates at type approval for the vehicle type are realised at the end of life, with a particular focus on materials (such as CRMs) for which no recycling technology is available at commercial scale or that need to be removed prior to shredding. The findings from the strategy should be used to inform the recycling/dismantling sector, as well as by the vehicle manufacturer to improve the circular design of future vehicles. This strategy should contain a non-technical summary which should be publicly available. To provide transparency and allow for monitoring of the progress made by the sector toward circularity, the Commission will establish regular reports on circularity in the automotive sector, drawing notably from these strategies and from other data allowing to track progress. In addition to these measures, **PO1B** includes provisions on **design for dismantling and recycling**, especially a requirement that vehicles are designed in such a way that professional dismantlers can remove batteries and electric drive motors from EVs and potentially other parts/components[15] safely without excessive costs (M7). This also includes an empowerment for the Commission to develop standards or specific requirements on the design for dismantling and recycling of selected parts or components from vehicles, especially those made of plastics or containing CRMs, to be adopted within 6 years after the adoption of the new legislation. Additionally, **vehicle manufacturers are requested to provide evidence of the share of recycled content (plastics and steel, but also aluminium, and copper) used in each vehicle type**[16] (M4b). Finally, **PO1B** clarifies that all new restrictions of substances in vehicles, for reasons related to chemical safety, will be carried out primarily under REACH[17] or, for the specific case of substances in batteries used in vehicles, under the new

[13] COM(2020) 798 final and 2020/0353 (COD). https://eur-lex.europa.eu/legal-content/EN/ALL/?uri=CELEX%3A52020PC0798

[14] The description of the measure takes into account the provisional political agreement achieved between the European Parliament and the Council in the trilogue held on 9 December 2022.

[15] More information on this is presented in Annex 15, based on N. Tazi, M. Orefice, C. Marmy, Y. Baron, M Ljunggren, P Wäger, F. Mathieux, Initial analysis of selected measures to improve the circularity of Critical Raw Materials and other materials in passenger cars, EUR 31468 EN, Publications Office of the European Union, Luxembourg, 2023, ISBN 978-92-68-01625-1, doi: 10.2760/207541, JRC132821

[16] Including the shares of post-consumer, pre-consumer and closed loop percentages derived from ELV treatment on a mass-balance basis.

[17] Or as applicable under the Regulation on Persistent Organic Pollutants.

Batteries Regulation[18]. It addresses the call to ensure a legal coherence, as highlighted in F4F opinion[19]. Under this policy option the existing restrictions on lead, mercury, hexavalent chromium and cadmium in vehicles, as well as their specific exceptions in Annex II of the ELV Directive, remain with enhanced provisions[20] under the new ELV Regulation with a planned reassessment of their full take-up by REACH (M5b) at 8 years after entry into force.

PO1B contains the following Measures 4-7 (M4b-M7):

- **M4b – Mandatory declaration on recycled content of plastics and steel**

As a part of the 3R type-approval procedures, the vehicle manufacturers will be required to provide technical documentation proving that a required share [%] of recycled plastic and steel is present in a new vehicle type, for which the target levels are specified under PO2 (M9 and M10). The declared information should include a specification of the origin meaning the share of pre-consumer and post-consumer content and closed loop percentage resulting from ELV recycling. Type-approval authorities will have obligation to verify the documentation submitted by the manufacturers based on the calculation/verification methodology mentioned under PO2. To ensure a consistent approach and avoid unsubstantiated claims, clear definitions of closed and open-loop and post-consumer versus pre-consumer shares are required at entry into force of the legislation. This applies to all recycled content related measures, including measures M9, M10 and M11.

The requirements shall apply 5 years after entry into force of the new legislation.

- **M5b - Restrictions of substances under REACH and other existing legislation**

Under this measure, restrictions concerning all relevant chemicals, for reasons associated primarily to their chemical risks, that are used in a vehicle are to be removed from the ELV[21] legislation and are to be addressed primarily under REACH[22].

It means that existing restrictions on the four substances currently restricted under the ELV Directive and exemptions therefrom (currently in Annex II) are no longer maintained under ELV specific legislation and would require an "ad hoc" transfer to REACH Annex XVII[23] during co-decision. Relevant active exemptions having a review date [Annex II points 2(c)(ii), 3, 8(e) and 8(g)(ii)] would be maintained and reviewed under REACH via dedicated reviews of the corresponding restrictions introduced during co-decision. Other "inactive" exemptions that do not require a review would also be listed in Annex XVII of REACH or in a separate dedicated Appendix, that would have to be introduced in REACH.

[18] Based on the results of provisional 1st reading agreement 9 December 2022: https://www.europarl.europa.eu/news/en/press-room/20221205IPR60614/batteries-deal-on-new-eu-rules-for-design-production-and-waste-treatment

[19] For more information see Suggestion 6 at https://cor.europa.eu/en/our-work/Pages/Fit-for-Future-opinion-on-End-of-life-vehicles-and-3R-type-approval.aspx;

[20] Allowing an in depth assessment of alternatives and of their socio-economic impacts, similar to that carried out under REACH.

[21] It should be noted that the requirements under the Authorisation title of REACH for those substances of very high concern (SVHCs) listed in Annex XIV to REACH (such as certain chromium VI salts) applies, regardless of whether restriction provisions for substances in vehicles remain in ELV or are transferred to REACH or sector / product-specific legislation.

[22] or as appropriate the POPs Regulation or the Batteries Regulation

[23] Annex on restrictions

For any expansion in scope of ELV legislation to L-category vehicles, lorries, buses and trailers (as explained in PO6), restrictions on the four currently restricted substances, their possible exemptions, and any restrictions on new substances, would require the initiation of new restrictions process under REACH.

These requirements shall apply 8 years after entry into force of the new legislation.

- *Coherence with the Batteries Regulation*

To ensure a regulatory coherence between the EU sectoral legislation, all the current entries in the ELV Directive related to the use of lead in batteries in 12V applications will be covered under the Batteries Regulation. This is implemented as a complementary measure to the transfer to REACH. As a result, exemptions for the use of lead and cadmium under the ELV Directive and which are specific to batteries [Annex II points 5(a) and 5(b) (lead) and 16 (cadmium)], are, following a transition process, taken up by the Batteries Regulation (*lex specialis*) and removed from the ELV specific legislation via delegated acts.
Consequently, the new Regulation would clarify that all chemical risk related restrictions would be addressed under REACH (and as appropriate covered under the POPs Regulation) and, for batteries, under the Batteries Regulation.

- **M6 - Obligation for vehicle manufacturers to develop and implement circularity strategies**

The current 3R type-approval Directive states that "manufacturers shall recommend a strategy to ensure dismantling, reuse of component parts, recycling and recovery of materials. The strategy shall take into account the proven technologies available or in development at the time of the application for a vehicle type-approval" (Article 6(3)). Certificate of compliance, granted during the type-approval process, shall describe this strategy recommended by the manufacturer (Article 6(5)).

While the current EU legislation remains vague in terms of specifying the manufacturers responsibilities, the content of the strategy and its enforcement, the measure aims to clarify these aspects. To increase the circularity in the design, production and end-of-life treatment of vehicles, vehicle manufacturers would be obliged to establish a specific circularity strategy for each new vehicle which is type-approved ("type-specific strategy"). This obligation would build on the requirements set out in Article 6(3) of the 3R type-approval Directive.

The "type-specific strategy" should be provided to the TA authorities as part of the application for the type-approval of the vehicle type concerned. The vehicle manufacturers would have to provide an update of this strategy every 2 years, especially to provide information on the progress made in achieving its aims.

The objective of this strategy would be for vehicle manufacturers to demonstrate how, after the TA approval, they will follow-up on their obligations to ensure that the requirements on re-usability, recyclability and recoverability for this vehicle are met. It would cater for vehicle manufacturers to work in close cooperation with actors in the dismantling and recycling sectors and provide clear indications on how this cooperation will be developed.

This strategy will include the following elements:

a) actions planned to verify that the vehicles conforming to the type in question continue to meet the legal requirements on re-usability, recyclability and recoverability, as indicated in the type-approval certificate, and to support (i) the dismantling of all parts

and components that need to be removed prior to shredding and (ii) the recycling of materials for which recycling technologies are not widely available at commercial scale at the time of the TA decision.

b) a feedback mechanism to draw lessons from the actions undertaken under subparagraph (a) above, aiming to inform the recycling/dismantling sector and to be used by the vehicle manufacturer to improve the circular design of future vehicles. This feedback mechanism should in particular cover elements relating to (i) the amount and possible increase in recycled materials (such as CRMs) in vehicles, (ii) the use and possible increase of materials which are easy to dismantle for re-use or for high quality recycling, (iii) the use and possible increase of materials which are easy to recycle, and (iv) the adoption of measures to address the challenges posed by the use of materials and techniques which hamper easy dismantling or make recycling very challenging (for example composite plastics or fibre-reinforced materials).

A non-technical summary describing the content of this strategy should be made publicly available. The elements that should be included in the "type-specific strategy", as well as those that should feature in the publicly available non-technical summary, would be provided in an annex to the new legislation. The Commission shall have a delegated power to update this information. The requirements for the vehicle manufacturers to develop a circularity strategy for each new vehicle type shall apply 3 years after entry into force of the new legislation.

The Commission will have an obligation to establish regular reports on circularity in the automotive sector, which would draw from these strategies and from publicly available manufacturer roadmaps and similar information. This would provide transparency and allow for monitoring of the progress made by the sector toward circularity.

To large extent this measure builds on current practices by manufacturers, which already integrate different elements of circularity into their long-term manufacturing policies. A number of companies publish this information in a form of strategies, annual sustainability reports[24] or general overviews on their websites. Among other information, these documents include the overview on the innovations, investment into R&D, long term climate neutrality objectives, social and corporate responsibility in sourcing materials, measures taken to increase resource efficiency and decrease cost of production. New requirement for the manufacturers to prepare and implement a circularity strategy for the vehicles they produce would complement current practices, placing a clear focus on circularity and allowing for transparency, comparison and emulation.

- **M7 – Design requirements for new vehicles to facilitate removal of specific components**

This measure would include first a requirement that vehicle manufacturers shall design and place in new vehicles batteries from EVs (and potentially other parts/components containing CRMs[25]) in a way which makes them easy and cost-effective to remove by

[24] E.g. Nissan: https://www.nissan-global.com/EN/SUSTAINABILITY/LIBRARY/SR/2022/, Hyundai: https://www.hyundai.com/eu/about-hyundai/sustainability/sustainability.html; Stellantis: https://www.stellantis.com/content/dam/stellantis-corporate/sustainability/csr-disclosure/fca/fca_2020_sustainability_report.pdf; Ford: https://www.ford.co.uk/experience-ford/sustainability

[25] More information on this is presented in Annex 15, based on N. Tazi, M. Orefice, C. Marmy, Y. Baron, M Ljunggren, P Wäger, F. Mathieux, Initial analysis of selected measures to improve the circularity of Critical Raw Materials and other

repairers/dismantlers so that they can be removed prior to shredding and then recycled in line with the Batteries Regulation. A preliminary formulation of these removability requirements for batteries originates from the Battery Regulation Recital 26c[26], which recommends that these requirements are taken up in the ELV revision.

A similar requirement would apply for electric drive motors. The design of the vehicle and joining, fastening or sealing techniques should in particular not prevent disassembly operations for repair and reuse purposes of the e-drive motor. Compliance with these requirements shall be verified by type-approval authorities.

This measure also includes the possibility to develop standards or specific requirements on the design for removability, dismantling and recycling of selected parts or components from vehicles, especially those made of plastics or containing CRMs, to be adopted within 3 years after the adoption of the new legislation (*see examples for such precedents in the draft batteries[27] and packaging regulation[28]).* For more information See Annex 15.2.2.

These requirements shall apply 6 years after entry into force of the new legislation.

PO1C: Circularity Vehicle Passport: PO1C builds on **PO1B** and includes in addition the requirement that each vehicle needs to be accompanied by a digital **Circularity Vehicle Passport** (M8), containing information provided by the manufacturer on the composition of vehicles and its components, relevant for repair, maintenance, dismantling, re-use, remanufacturing and recycling as a single entry for consumers and treatment operators. In an increasingly digital society, this development is based on the suggestion of the F4F opinion and is fully consistent and coherent with the corresponding provisions that are included in the proposal for Battery Regulation (battery passport) [29], the ESPR proposal (product passport[30]) and the proposal for the Euro 7 standard (Environmental Vehicle Passport[31]. As part of the digital information, recycled content levels for all materials should be declared allowing for verification of manufacturer's claims (M4c). The Commission would be tasked to develop the technical features of this passport within 7 years from entry into force of the new legislation,

materials in passenger cars, EUR 31468 EN, Publications Office of the European Union, Luxembourg, 2023, ISBN 978-92-68-01625-1, doi: 10.2760/207541, JRC132821

[26] "SLI batteries and electric vehicle batteries incorporated in motor vehicles should be removable and replaceable by independent professionals. It is appropriate to consider provisions, including as regards joining, fastening and sealing elements, to ensure that those batteries can be removed, replaced and disassembled through relevant legislative proposal to revise Directive 2000/53/EC. For the purposes of the design, manufacturing and the repair of SLI batteries and electric vehicle batteries, manufacturers should provide the relevant vehicle on-board diagnostic information and vehicle repair and maintenance information on a non-discriminatory basis to any interested manufacturer, installer or repairer of equipment for vehicles of categories M, N and O as provided for in Regulation (EU) 2018/858. Further, the Commission should encourage the development of standards for design and assembly techniques that facilitate the maintenance, repair and repurpose of batteries and battery packs".

[27] Article 15(2) of the Regulation on Batteries and Waste Batteries lists the provisions of this Regulation, for which the Commission will request development of standards, without indicating any deadlines for issuance of such requests. EUR-Lex - 52020PC0798 - EN - EUR-Lex (europa.eu)

[28] In the proposal for a Regulation on Packaging and Packaging Waste, the Commission's commitment to request development of standards was mentioned only in the recitals, without any time-specific indications. Proposal Packaging and Packaging Waste (europa.eu)

[29] Regulation of the European Parliament and the Council of [date] 2023 concerning batteries and waste batteries, amending Directive 2008/98/EC and Regulation (EU) 2019/1020 and repealing Directive 2006/66/EC (OJ L […]).

[30] COM(2022) 142 final

[31] COM(2022) 586 final

ensuring further consistency with other similar initiatives under development in the ESPR framework and the Euro7 regulation.

PO1C contains the following Measures 4-8 (M4c-M8):

- **M4c – Mandatory declaration on recycled content for materials including CRMs, others than plastic and steel**

As a part of the 3R type-approval procedures, the vehicle manufacturers will be required to provide technical documentation proving which percentage of recycled materials, including aluminium, copper and specific CRMs like magnesium, is present in a new vehicle type. The declared information should include a specification of the origin meaning the share of pre-consumer and post-consumer content and closed loop percentage resulting from ELV recycling, on a mass balance basis. The mandatory declaration should be submitted with other documents of the application for the type-approval and will be aligned in format with additional material declarations related to presences of hazardous substances (M4a). With the declaration, the manufacturer is made responsible for the data gathering and reliability of the information from its suppliers. Type-approval authorities will have obligation to verify that the required documentation has been submitted by the manufacturers.

The aimed implementation date is 2031, aligned with the mandatory recycled content targets under PO2. Compared to M4b (which describes the declaration on recycled content plastics and steel, for which targets would be set as per PO2), under this measure type-approval authorities will only have a procedural obligation to verify the documentation. The verifiable information provided at type approval about declared recycled content levels may be used as a basis for i) (harmonised) EPR fee modulation under PO5B, or ii) in support to the establishment of future mandatory quantitative targets for additional selected materials under PO2C (M11).

These requirements shall apply 5 years after entry into force of the new legislation.

To ensure a consistent approach and avoid unsubstantiated claims, clear definitions of closed and open-loop and post-consumer versus pre-consumer shares is required. This applies to all recycled content measures including those under M9, M10 and M11.

- **M5c – Hybrid restriction approach: maintenance of current restrictions under the ELV Directive with new restrictions being taken-up under REACH**

It is a hybrid of measures 5a and 5b, maintaining the current restrictions under the revised ELV Directive with new substance restrictions being taken-up under primarily under REACH and introducing a streamlined assessment procedure with ECHA. Consequently, restrictions on the four substances already existing in the ELV Directive and their exemptions are maintained in the proposed new Regulation. It means that limitations of all vehicle-relevant new substances would be addressed under REACH[32]. This would be done under the existing REACH procedures and workstreams for restriction (via the regulatory procedure with

[32]Or as appropriate the POPs Regulation or the Batteries Regulation. It should also be noted that the requirements under the Authorisation title of REACH for those substances of very high concern (SVHCs) listed in Annex XIV to REACH (such as certain chromium VI salts) applies, regardless of whether restriction provisions for substances in vehicles remain in ELV or are transferred to REACH or sector / product-specific legislation.

scrutiny) or, as appropriate, as defined under the POPs Regulation or the Batteries Regulation (via delegated acts).

Existing restrictions on the four substances and their exemptions are maintained under the revised legislation and reviewed via delegated acts with the support of ECHA. Relevant active exemptions having a review date [Annex II of ELV Directive, points: 2(c)(ii), 3, 8(e) and 8(g)(ii)] are maintained and reviewed under new regulation replacing ELV Directive, with the support of ECHA. Other exemptions that do not require a review will be also maintained in the new Regulation. The possibility of a transfer of these restrictions, and any remaining exemptions, to REACH would be reassessed in the future once the ongoing REACH review is concluded and sufficient implementation time has elapsed to assess its functioning (potentially in 8 years).

As an exception to the point above, exemptions for the use of lead and cadmium under ELV Directive which are specific to batteries [Annex II of ELV Directive, points: 5(a) and 5(b) (lead) and 16 (cadmium)] are, following a transition process, taken up by the Batteries Regulation (*lex specialis*) and removed from the Regulation replacing ELV Directive.
The scope of the assessment of exemptions is widened beyond the current description in Article 4(2) of the ELV Directive, which only takes into account whether the "*the use of the substances is unavoidable*". A broader approach, similar to that used in assessing applications for authorisation under REACH, including an analysis of alternatives, a socio-economic impact analysis and a comparative analysis of the health and environmental impacts of alternatives (at least at the level of comparing the hazards of the different alternative substances) would be included.

For any regulatory extension to L-category vehicles, lorries, buses and trailers (as described in PO6), a new dedicated restriction process, implemented via delegated acts, would be run under the new Regulation with the support of ECHA and/or consultants within a given timeframe or addressed as new restrictions under REACH. The feasibility and appropriateness of addressing these under REACH would be decided once the ongoing REACH review is concluded and sufficient implementation time has elapsed to assess its functioning (potentially 8 years). The new Regulation will include the necessary empowerments to, in due time, act according to either of the options.

The objectives and scope in Articles 1 and 4 of the ELV Directive will be changed in the new regulation to cover impacts on human health and the environment across the full life cycle of vehicles (and not only focus on waste management). In addition, the definition of "hazardous substance" in regulation on ELV will be aligned with CLP Regulation. Similar to the approach in proposal for a Regulation on Packaging and Packaging Waste, reference to the definition of "substance of concern" will be included[33].

[33] According to Article 2(28) of proposal for a Regulation on Eco-design for Sustainable Products, substances of concern means a substance that:
(a) meets the criteria laid down in Article 57 and is identified in accordance with Article 59(1) of Regulation (EC) No 1907/2006; or
(b) is classified in Part 3 of Annex VI to Regulation (EC) No 1272/2008 in one of the following hazard classes or hazard categories:
– carcinogenicity categories 1 and 2,
– germ cell mutagenicity categories 1 and 2,
– reproductive toxicity categories 1 and 2, [to be added in the course of the legislative procedure once Regulation (EC) No 1272/2008 contains these hazard classes: Persistent, Bioacumulative, Toxic (PBTs), very Persistent very

The new requirements shall apply 8 years after entry into force of the new legislation.

- **M8 - Establishment of a digital Circularity Vehicle Passport**

To ensure a coherent implementation of information requirements, this measure would foresee that vehicle manufacturers would have a duty to develop and put in place a digital Vehicle passport containing or providing an external link to all information relevant for the proper implementation of the future legislation.

This Vehicle Passport would be built on the digital information tool contained in the Euro7 legislative proposal, i.e. 'Circularity Vehicle Passport' or 'CVP' which is defined as a record on paper and digital form containing information on the environmental performance of a vehicle at the moment of registration, including the level of pollutant emission limits, CO_2 emissions, fuel consumption, energy consumption, electric range and engine power, and battery durability and other related values. Consistency with the digital passport concept developed under the ESPR Regulation would also have to be ensured.
Complementary to these Euro 7 requirements, the vehicle manufacturers would be obliged to provide additional information elements about the vehicle to be placed on the market. The information sources would be based on the existing platforms in the automotive sector (e.g. IDIS[34] for dismantling, IMDS[35]/GADSL[36]/SCIP[37] for material declarations/ SVHC[38] declarations), individual platforms for tracking spare part availabilities (Catena-X, B-parts from individual groups of manufacturers). The simplification and reduction potential lies in a targeted extraction of key information from existing platforms to respective end-users (consumers, garages, dismantlers, shredders, recyclers etc.) with different data needs.

Comparable to the provisions foreseen under the Euro 7 legislative proposal, to ensure uniform conditions for the implementation of the provisions related to development of the vehicle passport, implementing powers would be conferred to the Commission to set up a format and specify information that shall be provided in this passport as a part of the type-approval process within 7 years of the entry into force of a new Regulation. These requirements shall then start to apply 7 years after entry into force of the new legislation.

Bioaccumulative (vPvBs); Persistent, Mobile and Toxic (PMT), very Persistent very Mobile (vPvM); Endocrine disruption],
- respiratory sensitisation category 1,
- skin sensitisation category 1,
- chronic hazard to the aquatic environment categories 1 to 4,
- hazardous to the ozone layer,
- specific target organ toxicity
- repeated exposure categories 1 and 2,
- specific target organ toxicity
- single exposure categories 1 and 2; or

(c) negatively affects the re-use and recycling of materials in the product in which it is present;

[34] IDIS (International Dismantling Information System) https://www.idis2.com/
[35] IMDS (International Material Data System) https://www.mdsystem.com/imdsnt/startpage/index.jsp
[36] GADSL (Global Automotive Declarable Substance List) https://www.gadsl.org/
[37] SCIP (database for information on Substances of Concern In articles as such or in complex objects (Products)) https://echa.europa.eu/scip
[38] Substances of Very High Concern

7.2.2 7.2.2 Policy Options 2A, 2B and 2C (related to specific objective 2 'use recycled content') : Increase the use of recycled content in new vehicles

The material specific approach of this impact assessment aims to use the right type of measure and target level in such a way that regulatory or market failure elements are adequately addressed. In simple words: in case a material is adequately removed and due to its value sufficiently attractive to be recycled into new (automotive) products, then a recycled content target is not the right instrument. This is the case for instance for copper and glass as explained in Annex 7.3.2 under discarded measures.

PO2A, **PO2B** and **PO2C** are targeting this specific objective 2 'use recycled content', with increasing levels of ambition.

In the case of plastics, the analysis of problems and drivers indicate the need to develop a recycled content target.

For other materials like steel, aluminium alloys and critical raw materials such as rare earth elements or magnesium, the analysis of problems and drivers and available literature and impact assessment data is not yet conclusive whether a recycled content target is both necessary and the right type of measure. In this case, feasibility studies are is planned which should further clarify key demand and material application trends, expected supply of secondary raw materials and their quality, economies of scale and recycling technology development and economic viability.

Only recyclates from post-consumer waste would be eligible to be accounted for the targets presented below. The proposed targets would only apply to new M1 and N1 vehicle types entering the EU market and excluding L-category vehicles, lorries, buses and trailers not covered by the current ELV Directive.

PO2A includes a requirement for recycled content targets for plastics in new vehicles of at least **6% of the overall plastics contained in the vehicle fleet by 2031, and 10% by 2035** (M9a), of which **25% of recyclates originates from closed loop** recycling from ELVs. **PO2A** includes an empowerment allowing the Commission **to lay down a target for recycled content for steel for newly type approved vehicles 3 years after entry into force** of the Regulation, based on a specific feasibility study. The necessary calculation and verification rules should be laid down at the same time. The study should assess the uncertainty and technical limitations to improve scrap utilisation. **Actual targets would start to apply 7 years** after entry into force of the Regulation (M10a). Under **PO2A**, no other mandatory recycled content targets for other materials would be set, but a voluntary declaration regarding the share of recycled materials embedded in new vehicle types at type-approval stage (see M4b for the declaration to this point).
PO2B includes **recycled content targets for plastics in newly type-approved vehicles of 25% in 2031, of which 25% from closed loop** (M9b). This would represent an annual growth of 30% until 2031 compared to the average baseline in 2022. **PO2B** would advance the setting of a cautious **mandatory recycled content target for steel at 20% for newly type approved vehicles** in the Regulation with the target to be achieved 7 years after entry into force (M10b). A review clause is foreseen in case supply and demand of steel is rapidly increasing or decreasing as material choices may be subject to change.

PO2C includes **recycled content targets for plastics in newly type-approved vehicles of 30% of recycled content by 2031 of which 25% from closed loop** (M9c). **PO2C** sets a more ambitious **mandatory recycled content targets for steel of 30% for newly type approved vehicles, including a 15% closed loop percentage** at 7 years after entry into force (M10c). In addition, the Commission would be (i) tasked to **assess the desirability, feasibility and impacts of setting out recycled content targets** in new vehicles for other materials, especially **aluminium alloys, copper and critical raw materials such as rare earth elements or magnesium** (M11), and (ii), based on this assessment, entitled to set out recycled content targets for the materials in question.

PO2A, PO2B and PO2C contain the following Measures 9-11 (M9-M11).

- **M9 - Establishment of mandatory recycled content targets for plastics**

In view of the low recycling and recycled rates of plastics from ELVs, options PO2A, PO2B and PO2C focus first on recycled content for plastics. The description of the measures is presented in detail in the JRC report on recycled plastics in vehicles.

New provisions would be introduced into the future legislation requiring a minimum share of recycled plastic to be used in new vehicles.

The scope of plastics covered by the targets incorporates all plastics[39]. Only recyclates from post-consumer waste[40] would be eligible to be accounted for the target. In addition, a minimum share of closed-loop origin is required to ensure the intended 'pull-effect' relates to the supply of secondary plastics from ELV treatment. Important consideration here is that the ratio reflects properly the potential supply in types and quality of plastics on one hand in relation to the growth in plastics content per vehicle and the number of units collected and treated versus placed on the market as new vehicles. A specific methodology for the calculation of recycled content for plastics would therefore be established, similar to what is implemented or in development, e.g. in the packaging waste regulation and in the Batteries Regulation for cobalt, lead, lithium and nickel. Depending on the options presented in the impact assessment, this measure would include different levels for the targets on recycled plastic content.

The basis for the proposed targets could either be on the total amount of vehicles placed on the market from a certain date ('fleet level' approach) or would apply from a certain date for newly type approved vehicles only. Applying a single target to newly type approved vehicles provide more certainty in production planning.

During the **open public consultation**, 70% or 146 of all the respondents agreed or strongly agreed that more recycled plastics should be used in the manufacturing of new vehicles, while only 4% or 8 individuals objected to this statement in the questionnaire. 27 individuals or 13% of the responses were neutral, while 24 individuals or 12% of all the participants had no opinion on this question. 50 stakeholders from manufacturers/importers or suppliers provided their responses to the question on setting a recycled content target. 18 of them represented large companies. From all the respondents, only 7 (TESLA, VALEO, Ford Motor Company,

[39] Thermoplastics (e.g. polyolefins, styrenics, polyamides) as well as polyurethane foams
[40] CPA. (2021). *Guidance on Waste Definitions* (Issue September).
https://ec.europa.eu/docsroom/documents/46954/attachments/8/translations/en/renditions/native

European Association of Automotive Suppliers (CLEPA), Estonian association of car sales and service companies, etc.) disagreed with setting the mandatory target for plastics. Other manufacturers or suppliers (VOLVO, Jaguar Land Rover, Borealis, Evonik Industries AG, The Society of Motor Manufacturers and Traders, Continental, Spanish Association of Automobile and Lorry Manufacturers (ANFAC)), agreed or were neutral, including the German Association of the Automotive Industry (VDA) and ACEA – the key representative of the vehicles producers in Europe. To the question what would be the other materials for which recycled content targets should be considered, steel, aluminium alloys were mostly supported by the producers. When inquired what types of costs are expected to be affected by setting a recycled content target for plastic, R&D, production and verification costs were mentioned the most.

- **M9a – a target level of 6% recycled plastics content by 2031, 10% by 2035 at the fleet-level, of which 25% of recyclates originates from closed loop**

Under this measure, based on the total amount of plastics in all new vehicles ('fleet level' approach), **a first target of 6% would be set for 2031 (i.e. at least 6 years after expected entry into force of the new legislation) and a second of 10% in 2035**. The first threshold has been chosen to reflect the frontrunner's current practices which are already in line with a 6% recycled content value. It would correspond to an annual growth rate of ca. 15% when considering a starting point of 2% recycled content as an average considering all vehicles put on the EU market recently. This corresponds with scenario 3a in the JRC study[41].

- **M9b –25% in 2031 for newly type-approved vehicles only, of which 25% closed loop**

Under this option, a target of 25% would be set for 2031 (i.e 6 years after expected entry into force of the new legislation[42]) **for newly type approved vehicles.** Considering a starting point of 2% recycled content, these targets would correspond to an annual growth rate of 29% until 2031. The targets cover 25% closed loop criteria[43].

- **M9c –30% in 2031 for newly type-approved vehicle only, of which 25% closed loop**

Compared to the previous measure, it sets higher requirements with a recycled content target of **30% in 2031[44].** This scenario will ensure a higher uptake of recyclates from the automotive sector. The targets again include the 25% closed loop criteria as in M9a and M9b.

- **M10 – Establishment of a mandatory recycled content targets for steel in vehicles**

Although the recycling rate for steel from ELVs is high, the quality of steel fractions from ELV treatment is low, resulting in significant export of low-quality steel scrap outside the EU (estimated at 20 million tonnes, with a significant share from ELV shredders). At the same time, the uptake of recycled steel by the automotive sector, especially in new vehicles, is very limited. On average, 13% of steel used in vehicles comes from recycling (including post-consumer waste and pre-consumer waste).

Environmental rationale

[41] This corresponds with the scenario JRC3a in the respective study (JRC129008).
[42] If the new legislation enters into force after 2025, the date would be later than 2030. The legislative proposal will clarity that the date applies 5 years after entry into force of the new legislation
[43] This corresponds with the scenario JRC4b in the Annex of the study (JRC129008).
[44] This corresponds with the scenario JRC4c in the Annex of the study (JRC129008).

From a global perspective, according to the IEA[45], the global decarbonisation of steel production falls short in meeting Net-Zero goals *"as the current pipeline of projects clearly falls short of what is required".*

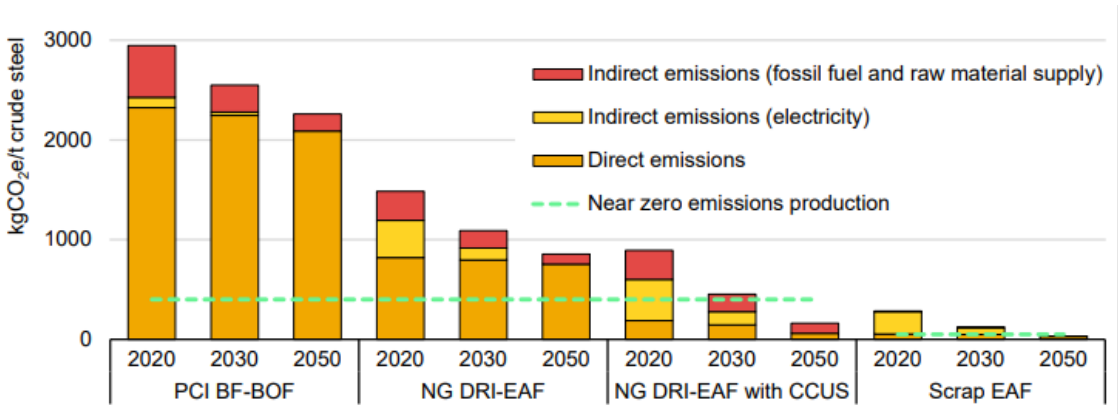
The measure aims to address the decarbonisation objective of the EU industry, by promoting the uptake of recycled steel, which results in significant environmental savings, particularly reduced consumption of coal, oil and natural gas in steel production[46]. It is estimated that improved scrap use reduces global steel production emissions from 4,300 to 3,500 million tons of CO_2eq by 2050[47], with improved circularity as a key element in the ongoing decarbonisation investments in electric arc furnaces (EAF) replacing Blast Furnaces (BF). Between now and 2040, with greening of production in the meantime, the CO2 emission generation per ton of steel is reduced between 1.8 and 1.0 ton of CO2 per ton of scrap utilised better[48]. The use of steel scrap also reduces biodiversity impacts linked to the extraction of primary raw materials (iron ore and coal).

Due to electrification, the automotive sector is characterised by a specific trend in its expected consumption of a relatively high share of flat steel products versus long steel products. The global demand for flat steel (e.g. for car manufacturing and so-called white products) is projected to increase by 87% towards 2050, while the demand for long steel products (e.g. for infrastructure and construction) will only increase by 30%. The availability of steel scrap re-entering the production cycle will increase by 167% and play an important role in decarbonising the long steel sectors globally[49]. Using recycled steel in the manufacturing of new cars can help to curb CO_2 emissions. First, using recycled steel can help reduce the demand for primary steel, which is typically produced through the process of smelting iron ore. This process requires a significant amount of energy and is a major source of greenhouse gas emissions. By using recycled steel instead of primary steel, vehicle manufacturers can help to reduce the amount of energy that is needed to produce steel, which can in turn help to reduce CO_2 emissions.

For EU domestic steel production in 2030, every ton of scrap replaces around 270 m3 of natural gas compared to natural gas fuelled DRI-EAF production per ton of hot metal produced [50]; and improved steel recycling contributes to the reduction of transportation emissions[51] and ultimately to less export of lower quality steel scraps outside the EU. A comparison of the carbon intensity for various production routes is derived from IEA with the scrap EAF routes on the right hand of Figure 7.2:

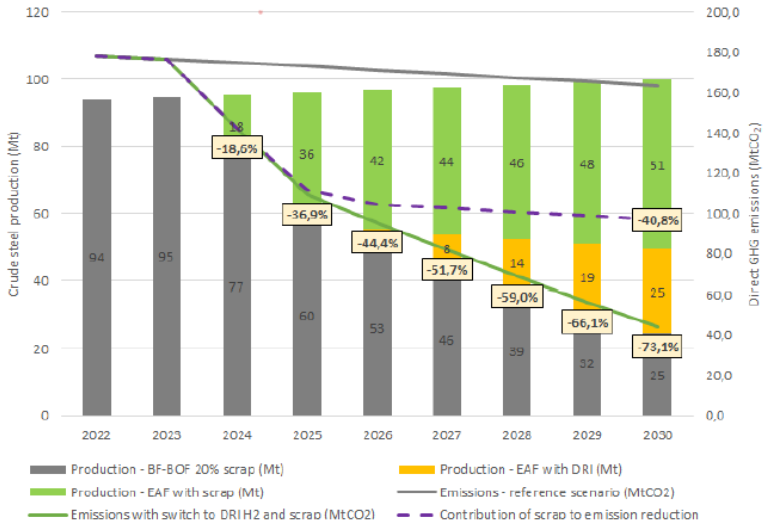
Figure 7.2 Global average CO_2 emissions of crude steel production IEA scenario[52]

[45] IEA (2022), Iron and Steel, IEA, Paris https://www.iea.org/reports/iron-and-steel, License: CC BY 4.0
[46] The Mission Possible Partnership – Making Net-Zero Steel Possible - An industry-backed, 1.5°C-aligned transition strategy, page 10
[47] The Mission Possible Partnership – Making Net-Zero Steel Possible - An industry-backed, 1.5°C-aligned transition strategy, page 10
[48] idem, page 36
[49] EPRS, Carbon-free steel production - Cost reduction options and usage of existing gas infrastructure, European Parliamentary Research Service, April 2021
[50] Z. Fan, S.J. Friedmann, Low-carbon production of iron and steel: Technology options, economic assessment and policy, Joule 5, 829-862, April 21, 2021, Elsevier Inc.
[51] R. Su, A.Assous, Starting from scrap - The key role of circular steel in meeting climate goals, Sandbag, June 2022
[52] IEA - Achieving Net Zero Heavy Industry Sectors in G7 Members, 2021



Note: All process routes use zero scrap, apart from the Scrap EAF route, which uses 100% scrap.

Figure 7.3: Contribution of scrap to GHG saving in EU steel productions[52]

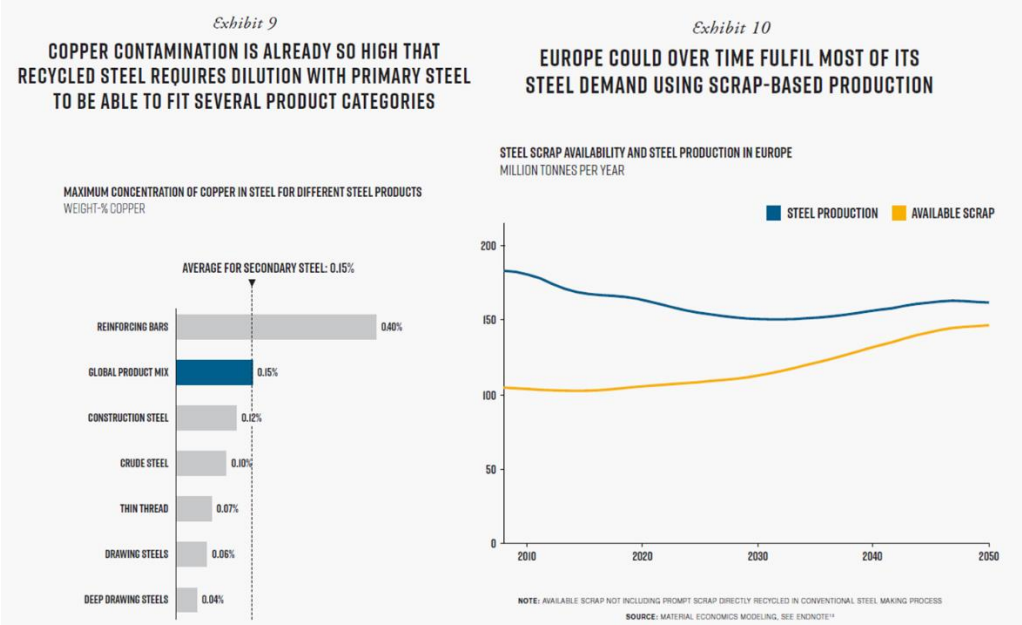


The copper roadblock in ELV steels

In theory all available EU steel scraps could over time fulfil most of the steel demand as highlighted in below Figure (right hand)[53]. This figures also illustrates that it becomes increasingly difficult to remove copper to required levels to sustain production of flat products, which demand very low tolerances for copper, typically below 0.10% (displayed left). In this regard, ELV steel scraps are a particular concern. ELV steel scraps typically contain too much copper, typically around 0.40%, hindering higher scrap utilisation rates in the future.

Figure 7.4: The copper roadblock to future scrap-based production

[53] Material Economics (2020). Preserving value in EU industrial materials - A value perspective on the use of steel, plastics, and aluminium, EIT – Climate KIC).



Combined with increasing demand of flat products, in particular for automotive applications like hoods, roofs, doors etc that are demanding even lower copper tolerances, specification trends will be essential to form a future threshold to increase recycled content rates. This 'circularity' gap in matching secondary supply in new demand will lead to increased use of primary units to dilute scrap[54] and ultimately the export of steel fractions from the EU to countries with higher demands for reinforcement bars. Automated recognition and sorting of high quality flat-product parts from ELVs is currently not available, therefore recycled content targets for these steel products are technically not feasible today. It is however possible to already include a limited amount of flat products scrap in BOF/BF furnaces up to 30% for current Best-Available Technologies and on average already around 20% of mixed scrap is used in BOF/BF and in the future also in EAF production routes[55].

Economic rationale

Improved scrap utilisation will not only reduce carbon emissions but also strengthen industrial competitiveness by shielding industrial production from volatile fossil fuel markets and support international technology leadership according to RePowerEU[56]: Improved scrap utilisation can complement decarbonised primary steel production that will be required in the future namely for flat steel production. Under RePowerEU, the Commission expects that around 30% of EU primary steel production will be decarbonized with renewable hydrogen by 2030, "*requiring 1.4 million tonnes of renewable hydrogen and investments of EUR 18-20 billion to replace blast furnaces with direct reduced iron (DRI) processes fuelled by renewable hydrogen".*

[54] According to EUROFER: "*For steel grades demanding lower Cu content (<0.1%) the EAF producer can either utilize clean iron units from primary sources or use cleaner sources of scrap. … dilution with primary iron units avoids potential issues with copper, and that there will be future constraints if copper concentrations are allowed to further increase. These constraints are not so evident today".*

[55] Somers, J., Technologies to decarbonise the EU steel industry, EUR 30982 EN, Publications Office of the European Union, Luxembourg, 2022, ISBN 978-92-76-47147-9, doi:10.2760/069150, JRC127468

[56] Communication from the Commission to the European Parliament, the European Council, The European Economic and Social Committee and the Committee of the Regions, RePowerEU Plan, SWD(2022) 230 final.

This policy option takes into account the efforts to reduce copper contamination by removal of components under the policy options 3 **as the primary measure.** In order to achieve the necessary quality, ELV scrap needs to improve as specified under M13, M16b and M16c under PO3. According to JRC, when the potential to increase scrap quality is maximised and overall steel demand is reduced, the share of scrap steel inputs used in EU steelmaking could increase from the current 50% to 60% or even 70% in high recycling scenarios[57]. For all steels, the Sandbag study[58] reviews that the improved scrap utilisation routes are the most cost-efficient possibility for decarbonisation of steel production in Europe. While improved scrap utilisation is one of the most cost-efficient possibilities to decarbonise steel production, it is important to acknowledge the role that primary low-carbon steel production will play in the future mix. This is particularly true due to increasing demand for high-quality steel, and, on the other hand, the long-lasting nature of steel in many long-product construction applications.

Recycled content friendly material specifications

According to individual vehicle manufacturers attempting to increase recycled content levels[59], there is room for allowing higher tramp element tolerances in certain vehicle steels, whereas other applications are more stringent. Volvo set the ambition by 2025 to use 25% of recycled steel[60]. Fiat Chrysler Automobiles (FCA) has a closed-loop process to return aluminium and steel scraps to selected suppliers in Europe and recycle them back into manufacturing processes[61]. From 2026 onwards, the BMW Group plans to use the lower-CO_2 steel in series production of cars at the European plants. It has also set up closed-loop material cycles for sheet steel waste with several steel suppliers[62]. Many manufacturers are researching and innovating on their steel specifications to lower the footprint of production like for example Renault using structural parts from recycled steel[63]. An improved mapping of supply and demand for automotive applications can lead on average to less demand for primary iron ores. It is estimated that the average impurity of all collected scrap is around 0.29% and for ELV scrap likely higher. With around 65 million tonnes of "virgin ore" added to the EU production system in 2017, the impurity content was in fact 0.20%, which is below the average tolerable demand of around 0.25%-0.27%[64]. This indicates actual room for improvement between supply and demand. More consistent use of steel types and improved mapping where more relaxed tolerable impurity levels are possible versus where not to avoid production and quality issues may bring significant circularity potential.

Matching secondary supply and demand

In new EVs, it is possible to use (higher quality) recycled steel for 'long products' with copper levels in secondary production up to 0.25%. These steel types are used in the chassis,

[57] Somers, J., Technologies to decarbonise the EU steel industry, EUR 30982 EN, Publications Office of the European Union, Luxembourg, 2022, ISBN 978-92-76-47147-9, doi:10.2760/069150, JRC127468
[58] R. Su,A.Assous, Starting from scrap - The key role of circular steel in meeting climate goals, Sandbag, June 2022
[59] Examples include Volvo, which has set the ambition to use 25% of recycled steel by 2025 https://www.volvocars.com/intl/v/sustainability/circular-economy and L. Petersson, Recycled content steel, Global Sustainability Team Volvo, 30/01/2023
[60] https://www.volvocars.com/intl/v/sustainability/circular-economy
[61] https://www.stellantis.com/content/dam/stellantis-corporate/sustainability/csr-disclosure/fca/fca_2020_sustainability_report.pdf
[62] https://www.press.bmwgroup.com/global/article/detail/T0405678EN/bmw-group-secures-co2-reduced-steel-for-global-production-network?language=en
[63] http://www.circulary.eu/project/renault-closed-loop/
[64] R. Su and A.Assous, Starting from scrap - The key role of circular steel in meeting climate goals, Sandbag, June 2022

main body and 'thick' reinforcement parts (around 21% of all steel in the vehicle). It is uncertain for future vehicles how the share of long products will evolve with the electrification of the drivetrains, as it is likely that this share will go down[65]. At the moment, recycled content levels for these long products from EAFs for all applications combined lies around 60% with significant upwards potential as there are no technical limits to reach 100% scrap-based production in case copper contamination levels are reduced. A recent study exploring better scrap utilisation illustrates that for all steels in between 60 to 114 million tonnes would be feasible compared to a production in Europe between 130 and 164 million tonnes[66]. However, there is uncertainty regarding to what extent flat products can contribute to the recycled content levels for all steel in future vehicles, as it is unclear what will be the share of flat products versus long products in new electric vehicles. At the moment, two important players in the US and one in Italy are blending scrap and DRI to produce high-grade flat steel like deep drawing steel, characterized by strict purity requirements[67]. A major player in the steel recycling sector reports on its new processing line[68] produces a high quality recycled raw material, the quality of which is significantly higher than that of a classic E40, e.g. with a Cu content of < 0.1%. Other accompanying elements such as Cr, Mn, Mo, Ni, Ti are also adjusted according to the required specifications and guaranteed accordingly. In addition, the material is virtually free of organic and mineral impurities. The recycled raw material can be used both in the BF (10-15%) and in the converter (25-30%). In total 32-40% for flat steel and deep drawing steel. With the future EAF route for flat steel, a recycling rate of up to 60% could be possible. As a best-case scenario it is assumed that roughly around 30% increase in recycled content is feasible.

Some vehicle manufacturers have set their own targets in terms CO2 emissions reduction as well as for the use of recycled materials in their vehicles[69] but indicated that achieving higher levels is difficult. The feasibility of using recycled steel in new cars depends on a variety of factors, including the quality, cost and availability of recycled steel, the technical requirements of the car's design, and the demand for recycled materials from manufacturers and consumers. This measure may require some changes in certification and testing of steel products to ensure further processing is not negatively affected.

Definitions and classifications

Many studies and individual responses highlighted the need for improved definitions of recycled content. Based on an industry-led automotive working group, the following elaboration is made to illustrate the desired clarity of definitions better[70].

[65] https://rmis.jrc.ec.europa.eu/veh#/v/components

[66] R. Su and A.Assous, Starting from scrap - The key role of circular steel in meeting climate goals, Sandbag, June 2022; Somers, J., Technologies to decarbonise the EU steel industry, EUR 30982 EN, Publications Office of the European Union, Luxembourg, 2022, ISBN 978-92-76-47147-9, doi:10.2760/069150, JRC127468;
Material Economics (2020). Preserving value in EU industrial materials - A value perspective on the use of steel, plastics, and aluminium, EIT – Climate KIC).

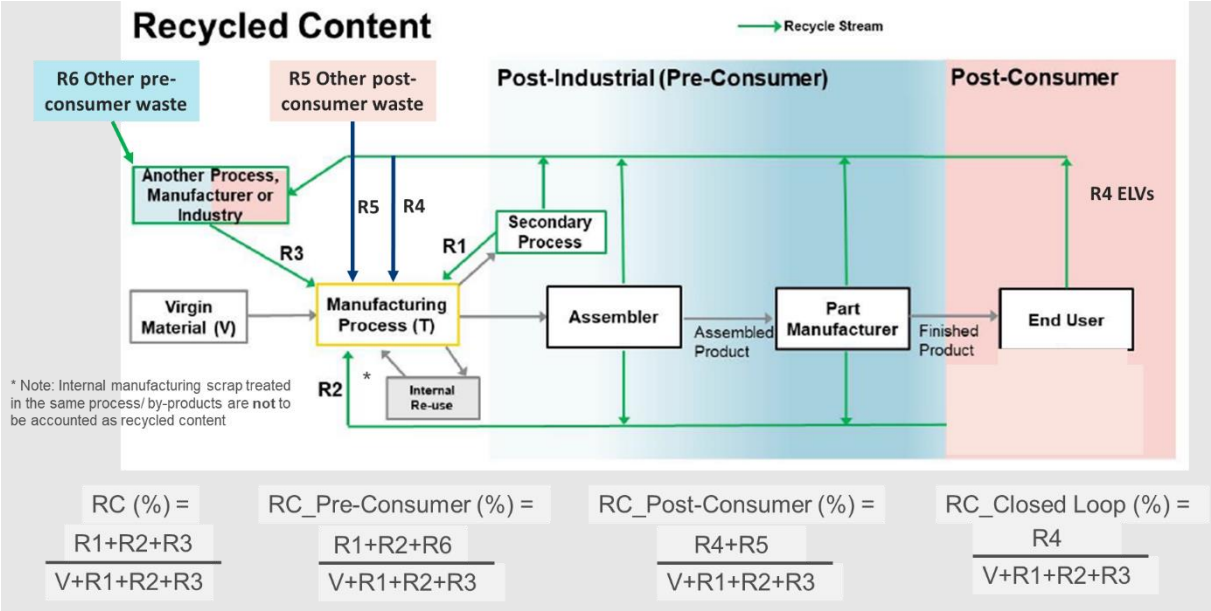
[67] R. Su and A.Assous, Starting from scrap - The key role of circular steel in meeting climate goals, Sandbag, June 2022;

[68] Planned full capacity of the first plant: > 300,000 t/a. In 2026, when several other plants will or have become operative, a capacity of 1.5 million t will be available with the same design concept and quality guarantees within the group of the major player in the steel recycling sector.

[69] According to Eurofer: "*Nearly all OEM's have set clear targets in terms of CO2 reduction and LCA carbon footprint reduction of their fleet. Some OEMs have clear targets on "recycled content" as well. Often without detailing exactly a definition for "recycled content" per material type"*

[70] Automotive Industry Action Group and suppliers Partnership for the Environment, Guidance on Measuring Recycled Content of Automotive Products, September 2021

Figure 7.5: Possible improvement to recycled content definitions



In addition, there is a need for a clearer and commonly shared definition of 'green-steel', as indicated by IEA[71] and the German steel industry[72], and improved scrap classifications for higher quality fractions from (ELV) treatment[73]. In the context of the proposed Regulation on Ecodesign for Sustainable Products (ESPR), requirements on recycled content may be considered for end products and intermediate products in the scope of ESPR, including steel. If steel is confirmed among priority products to be regulated[74], the dedicated preparatory work would address these issues and define criteria for sustainable products.

Rationale behind a recycled content target

Various studies highlight the need to improve demand related incentives in policies, for instance summarised in the IEA study[75]. It is important to include improved scrap utilisation as a more immediate solution **in relation to the longer-term green steel conversion plans both from a technical as well as demand incentive point of view.** The rationale for a recycled content type of target is that the steel industry as the recycler 'in the middle' can play a pivotal role to the solution by negotiating both the 'product' with its customers as well as the scrap specifications with its suppliers for improved matching of decarbonised demand from its automotive clients with higher quality scrap from shredders. The improved quality requirements under the policy options 3 would tackle the identified interventions on the recycling side, but will not tackle the identified market failures and lack of incentives to

[71] See the Technical Annex on page 133 of IEA - Achieving Net Zero Heavy Industry Sectors in G7 Members, 2021
[72] Green Steel Definition - A Labelling System for Green Lead Markets - Proposal of the Steel Industry in Germany, November 2022
[73] EFR - EU-27 Steel Scrap Specification, 2007.
[74] Somers, J., Technologies to decarbonise the EU steel industry, EUR 30982 EN, Publications Office of the European Union, Luxembourg, 2022, ISBN 978-92-76-47147-9, doi:10.2760/069150, JRC127468;
[75] See Table 2.4 in Chapter 2 of IEA - Achieving Net Zero Heavy Industry Sectors in G7 Members, 2021

include higher recycled content levels as a complementary 'pull mechanism' on the production side to improve **the matching of secondary supply and demand**.

Policy options for setting a steel recycled content target.
The baseline for recycled content use in automotive production is estimated at 13% for which the share of post-consumer content as opposed to pre-consumer (or process scrap) content is currently not entirely clear due to varying recycled content definitions used internationally.

Table 7.2: Proposed targets for steel recycled content in newly type approved vehicles 7 years after entry-into-force of the Regulation

Proposed targets	**Baseline**	**M10a**	**M10b**	**M10c**
Post-consumer recycled content target all steel in vehicles	13% (including pre-and post-consumer scrap)_	Commission empowerment to lay down a r target	20%	30%
of which % from closed loop (ELV steel to new vehicles)	3-7%		none	15%

All requirements would apply to the vehicle categories (M1 and N1) which are covered by the scope of the current ELV Directive.

- **M10a - Empowerment for the Commission to set a mandatory recycled content target for steel, incl. calculation rules and verification rules at +3 yrs, based on a dedicated feasibility study, application to newly type approved vehicles at +7 yrs**

PO2A includes an empowerment for the Commission for setting a recycled content target levels for steel (M10a), based on a dedicated feasibility study. The study particularly focuses on determining an appropriate target level and take into account:

- The current and forecasted availability of steel recycled from post-consumer sources of steel waste;
- The current share of post-consumer waste in various steel semi-products and intermediates used in vehicles;
- The potential uptake of post-consumer recycled steel by manufacturers in vehicles[76] to be type-approved in the future; and
- The relative demand of the automotive sector in comparison to the demand for post-consumer steel waste of other sectors.

The adoption of the target level should be accompanied with the necessary calculation and verification rules at the same time at 2 years after entry into force. Similar to the case of plastics, improved definitions of 'recycled content' and 'post-consumer' will be included in such exercise, as well as more clarity on 'green steel' definitions and the positioning of scrap in them. Actual targets would then start to apply on newly type-approved vehicles at 7 years after into force of the Regulation.

- **M10b – 20% in newly type-approved vehicles**

[76] Notably linked to the future share of steel long products in electric vehicles, which are the candidates for high scrap utilisation rates and in flat-products expected to be used more in future vehicle designs

PO2B would set **a mandatory recycled content target for steel at 20% for newly type approved vehicles** in the Regulation, with the target to be achieved 7 years after entry into force. The advantage of **PO2B** is that it sets a more upfront incentive for increasing scrap utilisation in steel production to accelerate the reduction in natural gas, coal and iron-ore dependencies faster than under **PO2A** but it contains high uncertainties related to future supply and demand balances due to changing vehicle designs. The target would not include a closed-loop percentage to retain maximum flexibility in the sourcing of post-consumer scrap. It takes into account that the number of new vehicles on the market are 15.2 million in 2035, whereas the number of vehicles collected and treated are 11.7 million units as a maximum. A review clause at years after entry into force will be needed in case supply and demand of steel is rapidly increasing or decreasing as material choices may be subject to change.

These requirements shall apply 7 years after entry into force of the new legislation.

- **M10c – 30% in newly type-approved vehicles, of which 15% from closed loop**

PO2C would be a more ambitious option, setting mandatory recycled content targets for steel of 30% for newly type approved vehicles, including a 15% closed loop percentage. The closed loop percentage accounts for the fact that typically one third of ELV steel is shredded with two-thirds of other mixed metal scraps. The closed loop percentage ensures that so-called 'E40+' ELV derived steel scrap will contribute directly to the decarbonisation of vehicle manufacturing and to avoid 'cheating' with other sources of recycled steel like demolition steel often having higher copper contamination levels. This would represent the case that automotive production would take a more equal share in the uptake of post-consumer scrap compared to other sectors and be more directly made involved in ELV treatment. This is assuming a maximum technical scrap utilisation rate of 90%-100% for long products in EAF production and an additional improvement on the use of recycled content in flat production.

These requirements shall apply 7 years after entry into force of the new legislation.

- **M11 – Provisions the establishment of mandatory recycled content targets for other materials than plastics and steel**

The use of recycled steel and plastics in new cars is just one aspect of a broader strategy to increase the use of recycled materials in the automotive industry. It may be important to target other materials commonly used by the automotive industry for which markets for secondary raw materials are underdeveloped and recycling measures are regarded insufficient. Such approach was supported by the stakeholders during the open public consultation: aluminium, rare earth elements (REEs), platinum group metals (PGMs), magnesium, gallium were indicated as additional candidate materials to set a mandatory recycled content target in addition to recycled content for plastics.

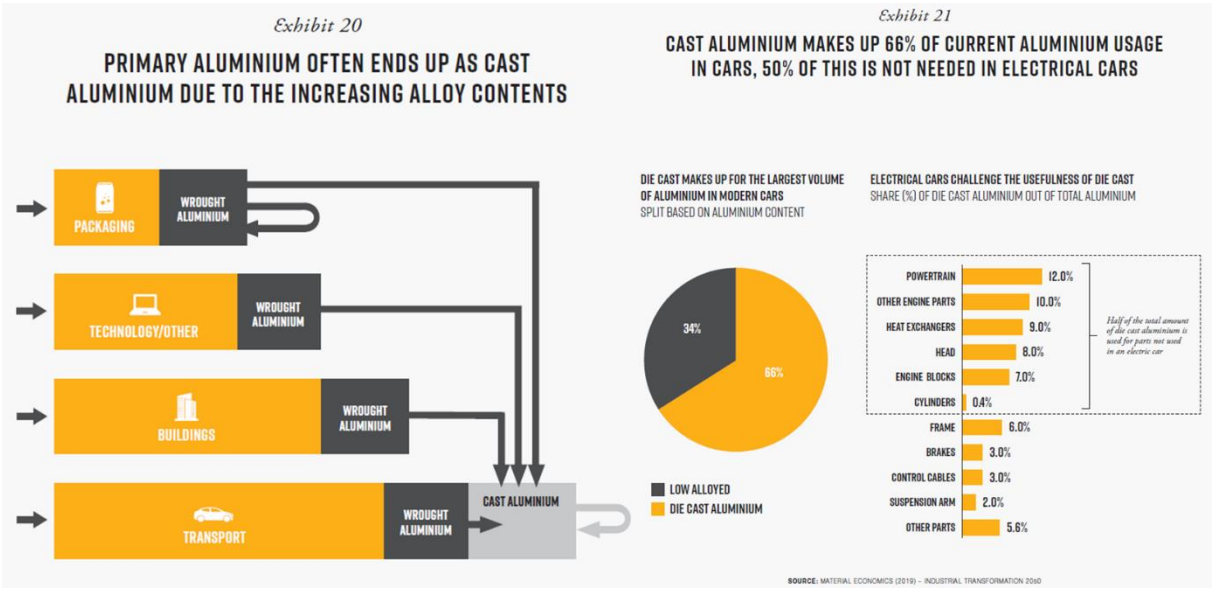
Under this measure, in addition to the recycled content targets on plastic and steel, the Commission would be (i) tasked to **assess the desirability, feasibility and impacts of setting out recycled content targets in new cars for other materials, especially aluminium alloys and critical raw materials such as rare earth elements and magnesium**, and (ii), based on this assessment, entitled to set out recycled content targets for the materials in question. The feasibility study should include an assessment of both past and expected materials trends for the future, consistent use of materials in design and production, expected supply of secondary

raw materials and their quality, the effect and necessity to realise economies of scale to re-feed recycled materials in existing production infrastructure and finally the development of recycling technologies and its future economic viability.

This feasibility study should be carried out within 3 years after the entry into force of the new legislation, accompanied with the revision proposal depending on the outcomes of the study. As an example, the key elements of the feasibility study are applied to aluminium as a first assessment:

Aluminium: Increasing secondary raw materials is hindered by the switch from cast to wrought alloys. In the case of aluminium, the transition to EVs requires lower alloying levels for wrought aluminium alloys than currently available in (ELV) aluminium scraps, posing a real and significant risk of mixed aluminium scrap surpluses, especially for high EV deployment scenarios, whereby high energy intensity materials cannot be recycled to their full potential. Similar to the case of steel, the accumulation of 'tramp elements' in aluminium alloys historically has not been an issue for the utilisation of aluminium scraps. The main destination of high alloyed and mixed aluminium has been cast alloys used in engine and gearbox production. With increasing electrification, this outlet disappears. The effect of electrification of drivetrains is explained in the next Figure 7.6.

Figure 7.6: The electrification effect forming a risk to future scrap surplus for aluminium



Due to these trends, there is a real risk of creating a so-called 'scrap surplus' situation in about 10 years from now. Meaning, secondary aluminium from ELV treatment with a high original material production footprint may not be recycled anymore (against much lower impacts) but will have to be discarded.

The feasibility study for a recycled content target will need to address the following elements:

- **Demand:** With the (automotive) market being very dynamic, it is yet unclear to what extent new large castings of battery encasing and e-drive motors may effectively replace some of the demand for cast alloys or not.

- **Consistent use of alloy (families)**: There are many alloys type with strict manufacturing requirements. Often, manufacturing specifications are very diverse in nature and even more specific than existing material aluminium classification standards. Without more consistent use of a limited number of recipes, supply and demand may be difficult to match.
- **Secondary supply:** Current ELVs do not yet contain not as much aluminium as new vehicles. After removing engines, heat exchangers, etc, at the moment not much wrought aluminium (about 20kg) is left, but this may ultimately go up to about 180kg/vehicle.
- **Economies of scale:** Economies of scale in sorting. In order to make a target function, aluminium alloys will need to be sorted in at least 8 main family types to retain alloy value as compatible fractions for new applications.
- **Recycling technology development**: Advanced sorting technologies (LIBs) may become commercially attractive soon. With significant value for wrought alloys specifically, the market may take care of the desired value retention.

Due to the complexity and uncertainty in above initial assessment results, a recycled content target for aluminium is not immediately feasible. The foreseen feasibility study should provide more clarity with more information becoming available in the coming years.

Similar feasibility considerations apply to other candidates for recycled content targets. Investigating current and expected future recycling rates targeted material is an important element in the feasibility study as well. Based on this, an initial assessment for other materials is provided below:

Rare earth elements (REEs) in e-drive motors: In case EU primary production, magnet recycling and strategic projects supporting domestic production capabilities would be realised, then a recycled content target, including production scraps, can be a strategically relevant and environmentally attractive possibility. Such a development may mirror the approach for recycled content for battery raw materials.

Platinum Group Metals (PGMs): Palladium in car electronics is relatively dispersed. When removed and car electronics treated in similar processes as WEEE, there is sufficient intrinsic value present which does not require a recycled content type of target to overcome specific failures related to the market for secondary raw materials.

Magnesium: The material is sometimes used as die-cast ‘mono-material’ in automotive parts, with significant value. It is also frequently used in aluminium alloys covered above. Removal of die-cast parts may in the future lead to relevant quantities to enable a recycled content target. However, with very low quantities, economies of scale are difficult to be realised. Therefore, information requirements for its identification to treatment operators (PO1) and the removal requirements under (PO3) are currently better alternatives compared to a recycled content target.

Other CRMs:
Candidates may be:

- Silicon steel used in e-drive motors. Here, the value, economies of scale and limited supply risk are questionable in term of warranting a recycled content type of measure.
- Other materials like gallium are too dispersed to warrant a recycled content target, the same counts for titanium parts, which although concentrated, are used very rarely so far.

The feasibility study for other materials for M11 has a wider scope than the one for steel mentioned under M10 and includes additional economic viability and cost related elements:

- The current and forecasted availability of the materials listed in the second subparagraph recycled from post-consumer waste;
- The current shares of recycled content from post-consumer waste in the materials listed in the second subparagraph in vehicles placed on the market;
- Economic viability, technical and scientific progress, including changes in the availability of recycling technologies concerning the type of materials recycled; their material specific recycling rates;
- The effective and potential contribution of a minimum share of recycled content of the materials listed in the second subparagraph, recycled from post-consumer waste in vehicles to the Union's strategic autonomy, climate and environmental objectives;
- Possible impacts on the functioning of vehicles from incorporating recycled content of the materials listed in the second subparagraph into vehicle parts and components; and
- The need to prevent disproportionate negative impacts on the affordability of vehicles containing these materials derived from post-consumer recycled content listed in the second subparagraph.

The envisaged timing for this measure is a feasibility study at 3 years after entry-into-force, adoption of calculation and verification rules at 5 years and the recycled content target to be applicable after 7 years.

7.2.3 7.2.3 Policy Options 3A, 3B and 3C (related to specific objective 3 'treat better")

With regard to objective n°2 ("5.2.2. Increase the quantity and quality of materials re-used, remanufactured and recycled from ELVs"), Policy Option 3 consists in improving the management of waste from ELVs and supporting the market for re-used and remanufactured parts, through the following three different sub-options.

PO3A modernises the current provisions of the ELV Directive to improve clarity and enhance the quality of the treatment of waste. The first element is aligning the ELV Directive with the more recent and **stricter definition of recycling** used in other sectoral waste legislation (M12) which explicitly excludes backfilling. A clearer methodology for the calculation of recycling rates would also be established, similar to what is implemented or in development in EU law and ensuring that what is accounted as "recycled" only includes materials which are effectively recycled and not just collected for recycling. As a supporting element, **a ban on the landfilling of the residues** from shredding operations ("automotive shredder residue" or ASR) would be included (M16a). The option would also clarify the obligation (currently unclear in the ELV Directive and not implemented) **that some parts and components are to be removed prior to the shredding phase**, so as to facilitate high quality recycling or re-use (M13). Finally, to support reuse and remanufacturing of spare parts, **a definition of remanufacturing** (including conditions for warranty) would be introduced in the new legislation, as well as clearer instructions for reporting on the level of

re-use and remanufacturing from ELVs (M14a). All these measures follow the suggestions provided in the F4F opinion focussing on retrieving higher volume and quality of secondary materials from the automotive sector.

PO3A contains the following Measures 12-16 (M12-M16a).

- **M12 – alignment of the definition of recycling and of the calculation methodology for recycling rates with the horizontal waste legislation**

This measure consists first in aligning the definition on 'recycling' in the ELV Directive with the Waste Framework Directive[77]. In line with Article 3 point 17 of the Directive 2008/98/EC (Waste Framework Directive), the definition of recycling will be laid down as follows in the future legislation on ELV:

- *'recycling' means any recovery operation by which waste materials are reprocessed into products, materials or substances whether for the original or other purposes. It includes the reprocessing of organic material but does not include energy recovery and the reprocessing into materials that are to be used as fuels or for backfilling operations*.

In addition to aligning the definition of recycling with the definition in the WFD, this measure also consists in providing additional clarity and guidance on the methodology that should be used by economic operators and Member States to calculate and report on recycling rates. This methodology would be aligned with the provisions of the WFD[78] which clarify that recycling targets should be based on the weight of waste which enters recycling. As a general rule, the actual measurement of the weight of waste counted as recycled should therefore be at the point where waste enters the recycling operation. As part of this methodology, the new legislation will include definitions of "calculation point" and "measurement point", similarly to what has been done for example for packaging waste through the 2019 amendment of Commission Decision of 22 March 2005 (Article 2)[79]:

- *(d) 'calculation point' means the point where waste materials enter the recycling operation whereby waste is reprocessed into products, materials or substances that are not waste, or the point where waste materials cease to be waste as a result of a preparatory operation before being reprocessed;*
- *(e) 'measurement point' means the point where the mass of waste materials is measured with a view to determining the amount of waste at the calculation point.*

This new methodology will have an impact on the reporting on the attainment of recycling targets, which is currently regulated through Commission Decision 2005/293/EC. The Commission will be empowered to introduce the corresponding changes to this Decision within 3 years after entry into force of the Regulation. In that exercise, the possibility to apply the concept of 'average loss rates'[80] will also be introduced, depending notably if rules on this issue are adopted under the umbrella of the WFD in the future.

[77] Directive 2008/98/EC of the Council and the European Parliament.
[78] Article 11a of the Waste Framework Directive.
[79] Commission Decision of 22 March 2005 establishing the formats relating to the database system pursuant to Directive 94/62/EC of the European Parliament and of the Council on packaging and packaging waste (2005/270/EC).
[80]The Commission proposed requirements on the calculation of average loss rate for municipal waste, in line with Article 11a(10) of the WFD, but these requirements have not yet been adopted: the Council objected in December 2021 to the adoption of delegated decision of 31.8.2021 supplementing Directive 2008/98/EC of the European Parliament and of the Council with regard to rules for the calculation and verification of the weight of materials or substances which are removed

- **M13a - Mandatory removal of certain parts/components prior to shredding to encourage their recycling or re-use (based on list contained in existing legislation)**

The ELV Directive sets out minimum technical requirements for treatment of ELVs to promote reuse and recycling, which include the "removal" of certain parts and components contained in Annex I(4). The provisions of the ELV Directive are however not sufficiently precise on what "removal" means and at which stage of the treatment process such "removal" should take place. Overall, these provisions have limited effect on the facilitation of the removal or disassembly of parts and components for their reuse or recycling into high quality recyclates.

This measure therefore aims to make operational and clearer the requirements contained in the ELV Directive by clarifying the conditions when removal prior to shredding would be performed with a view to increasing the potential for reuse, remanufacturing and/or high-quality recycling.

With this intention, this measure would set up an obligation that ATFs perform **"selective treatment for materials and component to be removed prior to further shredding"**, so as to facilitate high quality recycling or re-use for a selected list of parts and components (identical to the ones currently listed in the ELV Directive).

This selective treatment would include, in relation to depollution requirements (as in Annex I of current ELV Directive):

- removal or neutralisation of potential explosive components, (e.g. air bags),
- removal and separate collection and storage of fuel, motor oil, transmission oil, gearbox oil, hydraulic oil, cooling liquids, antifreeze, brake fluids, air-conditioning system fluids and any other fluid contained in the end-of-life vehicle, unless they are necessary for the re-use of the parts concerned,
- removal, as far as feasible, of all components identified as containing mercury.

It would also include removal obligation to improve reuse and recycling for the following parts/components:

- batteries,
- e-drive motors[81]
- liquified gas tanks,
- tyres,
- catalysts,
- glass, specifically windshields, rear and side windows,
- large metal components, specifically engines and gear boxes,
- large plastic components, specifically bumpers, dashboards and fluid containers.

The definition of selective treatment requires a more precise definition than currently used in the ELV Directive and should be harmonised with similar provision in the Battery Regulation and WEEE Directive Article 8 (and Annex VII). In this context 'removal' refers to manual dismantling or (semi-) automated disassembly in a non-destructive way for components with

after a sorting operation and which are not subsequently recycled, based on average loss rates for sorted waste (C(2021) 6295 final).

[81] Tazi, N., Maury, T., Orefice, M., Mathieux, F., Initial analysis of selected measures to improve circularity of Critical Raw Materials and other materials in vehicles, JRC Science for Policy Report, 2023 (XXX)

a potential reuse or remanufacturing potential and in destructive manners for components destined to further recycling. The measure would foresee that the list should be updated by the Commission through secondary legislation, taking into account novel components in vehicles in the future, technological developments and the protection of the environment.

Specific requirements apply to the mandatory removal of e-drive motors by ATFs to prevent their shredding with the car hulk and the loss of permanent magnet materials subsequently. More detailed information on this is provided in Annex 15.2 by the JRC.

The requirements shall apply 3 years after the entry into force of the new legislation. For the removal of e-drive motor, this shall apply as well to maximise their reuse potential and to support innovation projects aiming to establish novel recycling capacities for the embedded REEs in the permanent magnets.

- **M14a – Introduction of a definition of "remanufacturing" and new monitoring requirements for re-use, refurbishing and remanufacturing**

This measure first consists in the introduction of a definition of remanufacturing and refurbishment, and of remanufactured part/component, following the provisions established in the proposal on a new Ecodesign for Sustainable Products Regulation.

In 2016, six associations[82] that are part of the automotive production sector reached a common understanding as to basic definitions associated with their industry. The associations have proposed the following definitions[83]:

> *Remanufacturing process: Remanufacturing is a standardized industrial process[84] by which cores are returned to same-as-new, or better, condition and performance. The process is in line with specific technical specifications, including engineering, quality and testing standards. The process yields fully warranted products.*
>
> *Core: A core is a previously sold, worn or non-functional product or part, intended for the remanufacturing process. During reverse logistics, a core is protected, handled and identified for remanufacturing to avoid damage and to preserve its value. A core is not waste or scrap and is not intended to be reused before remanufacturing.*

In addition, European Association of Automotive Suppliers[85] had previously agreed to the following definition applicable in Europe:

Remanufactured part: A remanufactured part fulfils a function which is at least equivalent compared to the original part. It is restored from an existing part (CORE), using standardized industrial processes in line with specific technical specifications. A remanufactured part is

[82] The European Association of Automotive Suppliers (CLEPA), Motor & Equipment Remanufacturers Association (MERA), Automotive Parts Remanufacturers Association (APRA), Automotive Parts Remanufacturers National Association (ANRAP), European Organization for the Engine Remanufacture (FIRM) and Remanufacture Committee of China Association of Automobile Manufactures (CPRA).

[83] Remanufacturing Associations Agree on International Industry Definition, International agreement an important milestone in further development of a growing industry, Frankfurt, September 2016.

[84] An industrial process is an established process, which is fully documented, and capable to fulfil the requirements established by the remanufacturer.

[85] Remanufacturing Associations Agree on International Industry Definition - CLEPA – European Association of Automotive Suppliers

given the same warranty as a new part, and it clearly identifies the part as a remanufactured part and states the remanufacturer.

Currently, an ISO "Technical product documentation — Design for manufacturing, assembling, disassembling and end-of-life processing — Part 2: Vocabulary"[86] is under development. It is planned that remanufacturing definitions will also be addressed in this document.

The above clarifies that there are different options for the definition of remanufacturing and also processes underway to harmonise the definitions used by various actors.

Relevant in this regard is how the concept of remanufacturing relates to guidance under the 'Blue Guide' on the implementation of EU product rules (2022/C 247/01). Remanufacturing typically involves modifications and repairs to products, including cores. In this respect the Blue Guide states:

> *"After they are placed on the market, products may be subject to life extension processes. While some of these processes intend to maintain or restore the product to its original condition, others imply that substantial modifications are made to the product.*
>
> *A product, which has been subject to important changes or overhaul after it has been put into service must be considered as a new product if: i) its original performance, purpose or type is modified, without this being foreseen in the initial risk assessment; ii) the nature of the hazard has changed or the level of risk has increased in relation to the relevant Union harmonisation legislation; and iii) the product is made available (or put into service if the applicable legislation also covers putting into service within its scope). This has to be assessed on a case-by-case basis and, in particular, in view of the objective of the legislation and the type of products covered by the legislation in question.*

> *Where a modified product (38) is considered as a new product, it must comply with the provisions of the applicable legislation when it is made available or put into service."*

A limitation in the definition proposed by associations is that it does not clarify whether the modifications in this context are considered 'substantial', which leads to the parts to be considered as 'new', To differentiate between operations that substantially or non-substantially modify, the proposal on a new Ecodesign for Sustainable Products Regulation provides definitions for remanufacturing as well as refurbishment, where the former typically involves modifications that are considered substantial:

> *'remanufacturing' means an industrial process in which a product is produced from objects that are waste, products or components and in which at least one change is made to the product that affects the safety, performance, purpose or type of the product typically placed on the market with a commercial guarantee;*
>
> *'refurbishment' means preparing or modifying an object that is waste or a product to restore its performance or functionality within the intended use, range of performance and maintenance*

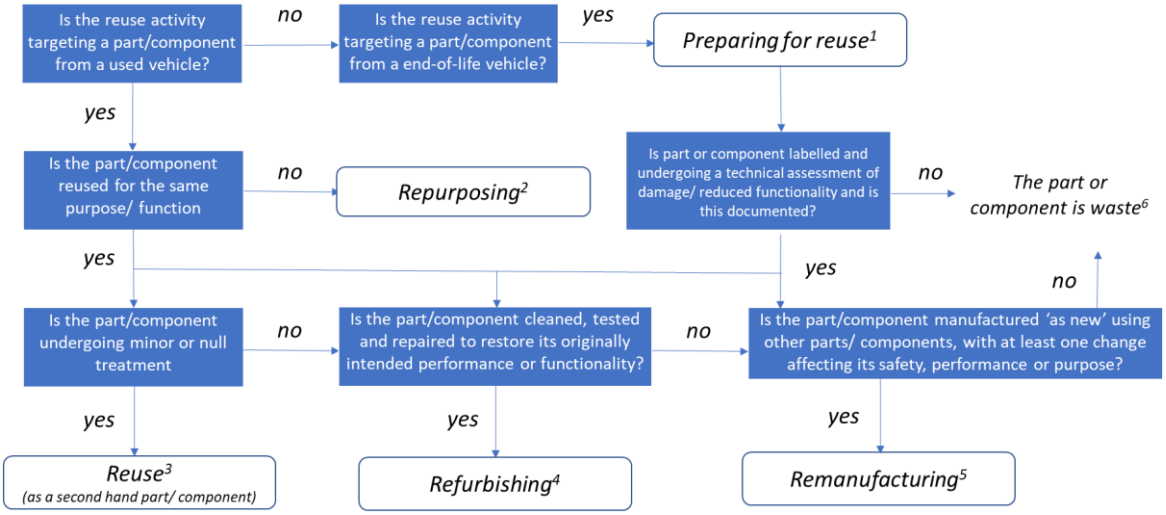
[86] ISO/DIS 8887-2 Technical product documentation — Design for manufacturing, assembling, disassembling and end-of-life processing — Part 2: Vocabulary.

originally conceived at the design stage, or to meet applicable technical standards or regulatory requirements, with the result of making a fully functional product;

To support the remanufacturing and refurbishment practice, a legal definition on remanufacturing and refurbishment will be introduced in the new legislation on ELV and 3R type-approval, by applying the definitions under the proposal on a new Ecodesign for Sustainable Products Regulation to the ELV context of parts and components removed from vehicles and end-of-life vehicles.

Linked to these definitions, the new legislation would thus contain a provision on parts and components that are fit for direct reuse, refurbishment and remanufacturing, clarifying under which conditions they shall not be considered as waste in line with Article 6(1) of the Waste Framework Directive. This would notably mean that they are not subject to the EU rules on the shipments of waste when they are shipped from or into an EU Member State.

Figure 7.7: Possible reuse definitions in the context of parts and components from ELVs



(1) 'Preparing for reuse' means checking, cleaning or repairing recovery operations, by which products or components of products that have become waste are prepared so that they can be reused […]" Waste Framework Directive, 2008;
(2) 'Repurposing' means any operation that results in parts or components being used for a different purpose or application than the one that part or component was originally designed for, Batteries Regulation;
(3) 'Reuse' or 'second hand' means any operation by which products, parts or components that are not waste are used again for the same purpose for which they were conceived, Waste Framework Directive, 2008;
(4) 'Refurbishment' means actions carried out to prepare, clean, test and, where necessary repair a part or component that is either removed from vehicles or end-of-life vehicles in order to restore either its performance or functionality within the intended use and range of performance originally conceived at the design stage applicable at the time of its placing on the market, proposal for a Ecodesign for Sustainable Products Regulation;
(5) 'Remanufacturing' means an operation in which a new part or component is manufactured from parts and components that are either removed from vehicles or end-of-life vehicles and in which at least one change is made to the part or component that affects its safety, performance, purpose or type proposal for a Ecodesign for Sustainable Products Regulation;
(6) 'Waste' means any substance, product, part or component or object which the holder discards or intends or is required to discard, Waste Framework Directive, 2008;

In addition to these definitions, this measure introduces a new requirement for the Member States to collect and report data on the type and share of automotive parts and components which are re-used or remanufactured. Such reporting obligation will allow to monitor the total level of reuse and remanufacturing at both national and the EU level per year. To ensure harmonized monitoring conditions, the new legislation will set out reporting requirements for ATFs, which will be obliged to provide information on all parts and components that were 1) dismantled and reused or 2) dismantled and remanufactured.

The new legislation will establish a **list of parts and components** that are relevant for reuse, refurbishment and remanufacturing (based on the list provided in Measure 13). The list shall

be regularly revised and updated. Vehicle manufacturers will be required to provide information on the dismantling time and method of these automotive parts and components during the vehicle type-approval procedure, as described in Measure 3. Methodology and reporting format by the Member States will be set out in the revised Commission Decision 2005/293/EC laying down detailed rules on the monitoring of the reuse/recovery and reuse/recycling targets set out in Directive 2000/53/EC of the European Parliament and of the Council on end-of-life vehicles[87].

These requirements shall apply 3 years after the entry into force of the new legislation.

- **M16a - Ban on the landfilling of automotive waste residues from shredding operations**

Under this measure, the new legislation would set out a prohibition for operators of shredding facilities to dispose waste from ELVs in landfills. While a large share of residues from ELVs are recovered or recycled after shredding operations, this is not the case for some fractions (which are parts of what is often referred to as "fluff", which typically contains plastics, textile, rubber, glass and other non-metal materials), which are then sent to landfills. In order to improve the treatment of these fractions and reduce the overall amount of waste going to landfilling, this measure would ban the disposal of these fractions in landfills. More details are provided in the supporting study in Sections 2.1.5.4.5 and 3.1.4.7.1. The aimed results are increased direction of shredder light fractions (SLF) and certain (untreated) PST fractions to waste incineration with energy recovery or chemical recycling, all higher in the waste hierarchy. Combined with the removal of window glass, the final volume to landfill would be significantly reduced.

The requirements shall apply 3 years after the entry into force of the new legislation.

PO3B: This Policy Option contains the measures in PO3A and, in addition, **new enhanced measures** to promote the re-use and recycling of relevant metals, plastics and certain CRMs. The list of parts/components to be **removed prior to shredding** (mentioned in P03A) **would be extended with parts and components with high concentrations of valuable materials or CRMs** (M13b)[88]. A derogation to this removal requirement would apply if evidence can be provided that the materials/parts/components will be separated with the same efficiency as manual dismantling/ semi-automated disassembly by post shredding technologies (PST). For monitoring purposes, Member States are to report on established and used capacities of PST plants. The option also foresees that incentives should be put in place to support the market for re-used and remanufactured parts, building on legislation and best practices in some Member States[89](M14b). To improve warranty conditions of used spare parts, information on their origin should be made mandatory as a condition for their sales (i.e., through the

[87] 2005/293/EC: Commission Decision of 1 April 2005 laying down detailed rules on the monitoring of the reuse/recovery and reuse/recycling targets set out in Directive 2000/53/EC of the European Parliament and of the Council on end-of-life vehicles (notified under document number C(2004) 2849) (OJ L 94, 13.4.2005, p. 30).

[88] The additional parts would include e.g., main wiring harness (copper), electric and electronic components (such as printed circuit boards with a surface area > 10 cm2, photovoltaic panels with a surface area > 0.2 m^2, controllers, engine motors), mono-material aluminium components with a weight > 10 kg, requiring the separate collection and treatment of cast and wrought aluminium, e.g., bumpers, wheels, heat exchangers, NdFeB magnets, electric steel and copper from EV drive train in case not destined for (preparation for) reuse/remanufacturing.

[89] See for example the measure established in France that requires garage and repair shops to provide offers for used spare parts together with new spare parts to their customers (see Article L224-67 of the "Code de la Consommation", available at https://www.legifrance.gouv.fr/codes/article_lc/LEGIARTI000032226565/2018-01-19).

provision of the VIN number of the ELV the parts come from). To boost plastic recycling and ensure a sufficient supply of recyclates to meet the demand for recycled plastics in vehicles (see PO2), a **specific plastic recycling target**[90] of 30% by 2030 would be established (M15b). To ensure improved quality of steel and aluminium scraps from ELVs, a ban to avoid mixing of ELV scraps with WEEE scraps such as whitegoods and refrigerators is included (M16b), which reduces (copper) impurities and improves traceability including the closed loop share of automotive plastics recycling[91].

PO3B contains the following Measures 13-16 (M13b-M16b).

- **M13b - Mandatory removal of larger list of components, including those which contain a high concentration of valuable metals or CRMs**

The measure is based on the description of the measure M13a. In addition to the list provided in M13a, ATFs would have to perform "**selective treatment** for materials and component to be removed either prior to further treatment in the absence of PST technology, **or as part of the treatment process**". The latter under the condition that the materials/parts/components will be separated with the same efficiency as manual dismantling/ (semi-)automated disassembly by post shredding technologies (PST) and that such selective treatment can be monitored.

Electronics components relevant for this measure can be categorised in four main categories: Controllers, Headlights, Actuators and Cables. Such components typically contain relevant concentrations for precious metals and CRM such as Palladium (Pd) and Gallium (Ga). Pd content is expected to increase due to more electronic components and due to the electrification of the EU fleet. Those metals are mostly lost at the end-of-life if the components are not removed from ELVs prior to their recycling, because car-recycling processes are currently optimized to recover basis metals such as Fe, Al or Cu. In order to improve the performance of the recovery of CRM and precious metals from vehicles, **the measure requires the removal of selected electronic components** embedded in vehicles **in order to recycle them separately in e-waste recycling facilities**, which are optimized for precious metals recovery. More information on this can be found in Annex 15.2.3 based on the initial findings of the JRC[92].

The selective treatment of the following additional parts and components either prior or as part of the treatment process are in addition to M13a:

- wheels,
- main wiring harness (copper),
- electric and electronic components (such as printed circuit boards with a surface area > 10 cm^2, photo-voltaic (PV) panels with a surface area > 0.2 m2)
- controllers (Infotainment control unit containing sound, navigation and multimedia;
- Control module or the valve box for the automatic transmission; Inverter of the EVs),

[90]Applying to ELV thermoplastics and polyurethanes.
[91] The WEEE Directive Art 5 requires separate collection for such products and Art 8/ Annex VII specifies selective treatment requirements.
[92] N. Tazi, M. Orefice, C. Marmy, Y. Baron, M Ljunggren, P Wäger, F. Mathieux, Initial analysis of selected measures to improve the circularity of Critical Raw Materials and other materials in passenger cars, EUR 31468 EN, Publications Office of the European Union, Luxembourg, 2023, ISBN 978-92-68-01625-1, doi: 10.2760/207541, JRC132821

- mono-material aluminium components with a weight > 10 kg, requiring the separate collection and treatment of cast and wrought aluminium, e.g., bumpers, wheels, heat exchangers,
- neodymium magnets (NdFeB), electric steel[93] and copper from electric vehicle (EV) drive train.

ATFs would be exempted from the obligation to remove these parts and components prior to the shredding phase if they can demonstrate that these parts/components will be delivered to a shredder which is able to perform shredding and post-shredding activities in a way that the parts and components will be recycled into materials with the same quality as if they had been removed prior to shredding.

The content of the measure reflects the stakeholders' views. Obligation for ATFs to remove certain parts of ELVs before shredding was supported by 58 participants of the open public consultation (28%), including waste management operators, automotive suppliers and producers, dealers and repair shops. 126 individuals or 61% of all respondents also supported another requirement for car manufacturers to enable the ATFs unlocking parts so that they can be reused and dismantled. With the aim to accelerate reuse of removed parts, stakeholders (70 individuals or 34%) were in favour of complimentary obligation for vehicle manufacturers to provide the dismantling centres (ATFs) information about which parts can be used as identical parts in other models of the manufacturer or even other brands.

The new requirements shall apply 3 years after entry into force of a new legislation.

- **M14b - Market support for used spare parts**

M14b would contain the following measures designed to increase the traceability of used spare parts, as well as to support the demand for such parts:

- To improve traceability on used spare parts and address problems posed by the illegal sales (including online) of used parts or components, an obligation for retailers would be introduced, according to which they would have to provide, at the point of (online) sale, information on the vehicle identification number (VIN) of the ELV the parts come from and on the registration number of the dismantler, together with the components details.
- To support the demand for used components and parts on the EU market, the Member States would be requested to put in place a series of incentives or obligations towards the various actors involved in the supply chain. This could include an obligation, as the one which has been in force in France since 2017, for companies in the maintenance and repair of vehicles to provide customers with an offer to repair a vehicle with used/remanufactured components or parts, alongside offers to repair the vehicle with new components. It is important that such requirement does not apply to repair shops or garages when this creates excessive burden or costs (for example no used spare parts can be found within a reasonable timeframe)[94]. Such incentives could also include a

[93] Electrical steel is a unique steel product which utilizes the ferromagnetic properties of iron.
[94] The measure in force in France in that respect only apply to a selected list of parts. Derogations from the obligation are foreseen where the operator is not able to find a suitable used spare parts within a reasonable amount of time (such as the time of the immobilisation of the vehicle agreed with the customer for the repair operations) or that he finds that the used spare parts available are likely to present important safety or environmental risks. It should be noted that, under the French legislation, this obligation has been extended to motorcycles since 2022.
See: https://www.legifrance.gouv.fr/jorf/id/JORFTEXT000032610837/ and
https://www.legifrance.gouv.fr/codes/article_lc/LEGIARTI000032226565/2018-01-19

streamlining of the distribution channels increasing the transparency of offers on the parts and the logistics for a timely distribution of used or remanufactured spare parts. Other measures accompanying such a process could be a certification procedure on EU level to ensure the quality of parts and foster consumer confidence or financial incentives including a reduced rate of VAT for used or refurbished spare parts.

The Commission would also be tasked to review the effectiveness of the measures above to improve the functioning of the market of used spare parts and, if they prove not to be sufficient, propose to make it mandatory at EU level for garages and repair shops to provide an offer for used or remanufactured spare parts, together with new spare parts.

This measure corresponds to the views expressed by the stakeholders of the Open Public Consultation. When inquired which measures would contribute to increase the reuse of vehicle parts, obligation for repair shops to offer customers used spare parts as an alternative to new ones was supported by 111 individuals or 53% of all participants of the public consultation. 84 of these stakeholders were SMEs, representing dismantling, recycling sectors, ATFs and repair shops.

The measures shall apply 3 years after the entry into force of the new legislation.

- **M15b – Recycling targets for plastics – 30% by 2030**

The measure introduces a mandatory 30% of recycling target for plastic based on the revised definition of "recycling" as aligned with the Waste Framework Directive. This measure would be implemented in a combination with the additional requirements of the mandatory removal prior to shredding/PST (M13a,M13b), regulation of shredder/ post-shredder facilities (M16b, M16c), disposal ban of light-weighted fractions (M16a). Introduction of material-based recycling target would be complementary to the existing combined reuse and recycling targets based on a weight would be maintained, as described in M14.

The proposed recycling level corresponds the opinion of the stakeholders considering that 30% recycling target is ambitious but achievable[95].

A recycling target would leave a discretion for waste operators to decide what processing stages to apply to ensure it is complied with. In this sense, operators could consider whether to increase dismantling and separate recycling or to adopt advanced PST and promote the development of further PST technologies, to improve their outputs but also to allow the sorting and recycling of additional plastic types. Alternatively, the Commission will consider the possibilities to set minimum performance requirements in a form of secondary legislation for PST treatment of fractions containing plastics (see M16b).

Development of additional PST technologies will be stimulated by the landfill ban of shredder light fractions that are not sent to PST and PST output fractions with a specific weight of > 1.3 g/cm^3. Mandatory requirements to remove certain parts and components (e.g. bumper) before shredding will also contribute to higher recycling efficiency.

This material specific target aims to contribute to high-quality recycling by introducing new calculation principles, clarifying that only materials recovered after recycling operations will be considered as recycled. It also includes possible calculation and measurement points for either recyclates or fractions to be recycled as well as a possible reporting point. Special

[95] Based on the information received from EuRIC (2021); a Plastics Recyclers Association (2021).

calculation methodologies shall be developed within 2 years after the adoption of the legal act and established in a form of secondary legislation.

The new calculation approach would build on the example established in the Packaging and Packaging Waste Directive, where only "the weight of packaging waste recycled shall be calculated as the weight of packaging that has become waste which, having undergone all necessary checking, sorting and other preliminary operations to remove waste materials that are not targeted by the subsequent reprocessing and to ensure high-quality recycling, enters the recycling operation whereby waste materials are actually reprocessed into products, materials or substances". It has also been applied to the WFD.

The definitions of "calculation point" and "measurement point" relevant for reporting of data on waste have been recently introduced through delegated acts, for instance in the amended Commission Decision of 22 March 2005 (Article 2)[96]:

> *(d) 'calculation point' means the point where packaging waste materials enter the recycling operation whereby waste is reprocessed into products, materials or substances that are not waste, or the point where waste materials cease to be waste as a result of a preparatory operation before being reprocessed;*
>
> *(e) 'measurement point' means the point where the mass of waste materials is measured with a view to determining the amount of waste at the calculation point.*

The possibility to introduce the concept of 'average loss rates'[97] will be analysed.

New calculation rules will also require adjustment of the existing reporting scheme within 2 years after entry into force of the new legislation in the Commission Decision 2005/293/EC as recycling operators will be obliged to monitor and report on recycled materials.

Setting material specific targets, including the recycling target for plastic, in relation to the calculation point will contribute to a higher quantity and quality of secondary plastic materials. Introduction of calculation/measurement points for materials would improve comparability of reported data among EU Member States. The intended calculation point for materials for reporting on actual recycling should refer to the recyclates obtained after recycling (losses are excluded). However, it would also retain a possibility to apply 'average loss rates' in case where no data on recyclates is available.

Within 5 years after entry into force, the Commission will conduct a feasibility study on the review of the target to be accompanied within the legislative proposal if appropriate.

Setting material specific recycling target was supported by the stakeholders during the open public consultation. 31 participants or 15% of the responses agreed that the establishment of material-specific recycling targets would increase the separate recycling of materials addressed by targets, their quality and revenues from sale of such materials while also increasing the costs of recycling. Other 24 participants equal to 12% of stakeholders answered that such target would increase separate recycling and secondary material quality while also

[96] Commission Decision of 22 March 2005 establishing the formats relating to the database system pursuant to Directive 94/62/EC of the European Parliament and of the Council on packaging and packaging waste (2005/270/EC)

[97] Delegated decision of 31.8.2021 supplementing Directive 2008/98/EC of the European Parliament and of the Council with regard to rules for the calculation and verification of the weight of materials or substances which are removed after a sorting operation and which are not subsequently recycled, based on average loss rates for sorted waste (C(2021) 6295 final).

increasing costs. The same share of participants estimate that such targets would only increase the recycling costs. However, the vast majority (64%) of all stakeholders, including SMEs, agreed that material-specific recycling targets have a positive impact on innovation.

- M16b – Ban on mixed shredding of ELVs with certain other waste streams

The measure aims to increase the quality of the shredded materials by introducing a ban to mix the automotive waste (ELV scrap) with other packaging waste (metal cans) and waste electrical and electronic equipment (WEEE).

The requirements shall apply 3 years after the entry into force of the new legislation.

PO3C contains the measures in PO3B and, in addition, specifically targets **higher quality of recycling for specific materials.** Additional components **and novel lightweight materials** would be added to the list of parts/components to be removed prior to shredding (M13c)[98]. For glass, a material specific recycling target of 70% would be set, accompanied with quality criteria to ensure that only recyclates to container glass or equivalent quality are accounted towards the recycling target (M15c). The Commission would be required within 5 years to develop specific and additional requirements to improve the efficiency of post-shredder treatment (PST) operations by setting minimum quality standards (M16c). This may be needed in case novel sorting technologies for aluminium, magnesium or CRMs are insufficient. This may be needed in case novel sorting technologies for aluminium, magnesium or CRMs are insufficient.

PO3C contains the following Measures 13-16 (M13c-M16c).

- **M13c - Mandatory removal of additional components**

Complementarily to measures M13a and M13b, this measure introduces the most advanced list of parts and components to be removed for selective treatment at end-of-life stage. Their removal would function as a preventive measure to ensure that additional valuable materials and CRMs are diluted or not recovered in the mix of automotive shredder residues, impacting the overall value and quality of the secondary materials.

Under this measure, the preliminary list of parts and components to be removed before shredding would, in addition to the parts and components indicated in M13a and M13b, include:

- Lightweight materials which are particularly difficult to recycle like (carbon)-fibre reinforce plastics;
- Mono-material aluminium components with a weight above 5 kg, requiring the separate collection and treatment of cast and wrought aluminium,
- Smaller copper and EEE parts[99];
- Small motors, controllers, actuators and inverters[100].

[98] This would include difficult to recycle lightweight materials such as glass and carbon fibre reinforced plastics, as well as smaller copper and EEE parts, small motors, inverters, etc.

[99] More detailed lists with number of occurrences, weights of components and material presences can be found in: Groke, M.; Kaerger, W.; Sander, K.; Bergamos, M. (2017): Optimierung der Separation von Bauteilen und Materialien aus Altfahrzeugen zur Rückgewinnung kritischer Metalle (ORKAM). In: Umweltbundesamt, UBA Texte (02/2017) and in Restrepo et al. (2017): Stocks, Flows and Distribution of Critical Metals in Embedded Electronics in Passenger Vehicles. Unter Mitarbeit von Restrepo E., Amund N. Løvik, Patrick Wäger, Rolf Widmer, Radek Lonka, and Daniel B. Müller. Environ. Sci. Technol.

A derogation from this obligation would be granted if ATFs and shredders provide verifiable evidence that separation using automated processes leads (e.g. shredders) to recyclates of at least similar efficiency as manual dismantling and, or (semi-)automated disassembly by post shredding technologies (PST) and that such selective treatment can be monitored.

The requirements shall apply 5 years after the entry into force of the new legislation.

- **M15c - Glass – 70% recycling as container glass quality or equivalent**

Comparable to the M13b, this measure sets a material specific 70% recycling target for glass. The attainment of the quantitative target would be accompanied with quality check criteria for the recycled materials meaning that only recyclates equivalent to the container glass quality shall be accounted towards the calculation of a recycling target.

The level of the target is based on the assessment of case studies demonstrating that 20.8 kg is recovered per ELV when destructive dismantling is applied. Assuming an average weight of 30 kg of glass per vehicle means that this reflects around 70% of the glass in a vehicle[101].

Introduction of the provision defining the quality of obtained recycled materials will allow to avoid down-cycling which is of critical importance for glass materials. In this regard, the recycled automotive glass shall be of a quality that can be applied to produce glass products.

This measure leaves open whether the glass is removed and treated separately or recovered from the shredder through application of PST. Available data suggests that current PST technologies would not result in a glass fraction that is of sufficient quality[102], however, such technologies could still be developed and applied in the future if minimum quality requirements are to be achieved. Monitoring and enforcement would require ATFs to provide evidence of the number of vehicles treated and the amount of glass dismantled from all vehicles and sent to recyclers. Shredders and PST operators would be required to report on vehicle inputs and recycled material outputs (glass sent to recyclers and glass containing mineral fractions that can be used in construction or in backfilling operations (limited amounts may be “recovered”)).

As in the case of measure M15b, setting the recycling target would be accompanied with the complementary provisions defining the calculation/measurement points, ‘average loss rates’ which methodological aspects would be further detailed in a form of secondary legislation within the 2 years after adoption of a new legislation.

The requirements shall apply 5 years after the entry into force of the new legislation.

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[100] As well as in the Swiss EVA project: Restrepo et al. (2018): Projekt "EVA": Elektronik – Verwertung - Altautos. "Zusammenfassung der Aktivitäten und Resultate". Zusammenfassung EVA und Schlussbericht zum Arbeitspaket C5. Unter Mitarbeit von Restrepo E., Løvik, A., Haarman A. & Widmer, R. Hg. v. Working-group EVA and Bundesamt für Umwelt (BAFU). EMPA. (newer study and reference available but not yet published).

[101] Based on Intertek RDC & OVAM (2013) study.

[102] Intertek RDC & OVAM (2013) explain that automotive glass separated after shredding and PST is not accepted (in 2012) by the glass recyclers. This is due to it still containing many impurities (plastics, metals, stones), as it is a mix of glass of different sources (i.e., heterogenous – sourced form ELVs but also from e.g., washing machines, car lamps) and as it is provided in very small pieces (< 8 mm) which with the current technologies applied hinders the separation at the glass recycling plant into glass of different types (composition). The mineral fraction containing automotive glass is either recycled as building material (Examples: road basement and landfill covering), to replace other mineral materials (sand, rocks…) if the quality is sufficient, or is landfilled.

- **M16c – Setting requirements on Post Shredder Technologies (PST) to improve the quantity and quality of metal scrap recovered from ELVs**

The measure aims to improve the quality of metal scrap (especially steel and aluminium scrap) from ELVs, through the adoption of treatment requirements for shredders.

Currently, the ELV Directive defines minimum technical requirements for treatment operations for depollution of ELVs (Article 6(3) and Annex I (3)) as well as for treatment and for storage, which apply to the dismantling processes performed by ATFs (Annex I (1) and (2)). There are however no such requirements for shredder processes (incl. post-shredder plant) in the current Directive.

Under this measure, the Commission would be empowered to set the following requirements, within 5 years from entry into force of the Regulation:

- minimum requirements for shredder/PST plants designed to improve the quality of scrap as output of the shredding process (for example through a definition of output qualities e.g., limiting the metal content of untreated Shredder Light Fractions envisaged for disposal to 1%, as well as limiting the copper contamination of steel and aluminium scrap to a certain level),
- national reporting obligations on:
- national capacities of PST and
- information on input/output flows, including information on the final use and indication of how much of the input materials comes from Auto Shredder Residues (ASR) in cases where plants treat multiple waste streams.

The measure will contribute to reduction of losses of residual metals while ensuring a minimum level of performance of PST operations.

Supporting information on the measure:

After depollution and dismantling, mechanical treatment of ELVs takes place in shredders of metal waste. The input materials are crushed into smaller material components. Afterwards, the obtained smaller pieces are separated into metallic and non-metallic fractions.

- Limitation of metal content in the Shredder Light Fraction (SLF)

The main output of the process is steel scrap. When this scrap has a high density, high degree of purity and homogenous size, it can be used directly in metal works to produce steel. The other obtained fractions are shredded non-ferrous fractions (containing other metallic products) and Auto Shredder Residues (ASR) containing the subfractions Shredder Light Fraction (SLR) and Shredder Heavy Fraction (SHF). These fractions can be further treated to recover as much material as possible and to minimise the amount of waste sent for disposal.

The possible further treatment of mixed non-ferrous output may be separation, for example by eddy current separations, metal-sensing or by dense media separation.

The ASR fractions can be further treated in post-shredder technology (PST) plants. Such further treatments of the mixed non-ferrous fraction and the ASR fraction can take place in integrated plants or separate (centralised) plants.

As demonstrated in several studies untreated SLF contains several percent of residual metals, representing up to 7.8 %, respectively 6.3 % (Sander et al. 2020) or according to studies performed more than a decade ago even 11 % (Duwe and Goldmann 2012).

Regarding the SLF a joint presentation of Ökopol and Umweltbundesamt (Germany) concluded (Sander et al. 2017): "Typical disposal routes for the shredder light fraction are energy recovery or incineration, backfilling, the use as landfill construction materials, or landfilling. In the case of these disposal routes, functional recycling of the recyclable materials is mostly not carried out. Therefore, a limitation of the contained recyclables, in particular of the metals, seems appropriate."

A possible maximum metal content for shredder residues, which are destined for backfilling/ landfill construction, energy recovery/incineration or final disposal/landfill sites, should be ambitious in order to recover as many metals as possible as secondary raw materials, and should orient themselves to the technical possibilities. The removal of metal from the shredder light fraction at least to below 1 % metal content by means of post-shredder is considered to be feasible[103].

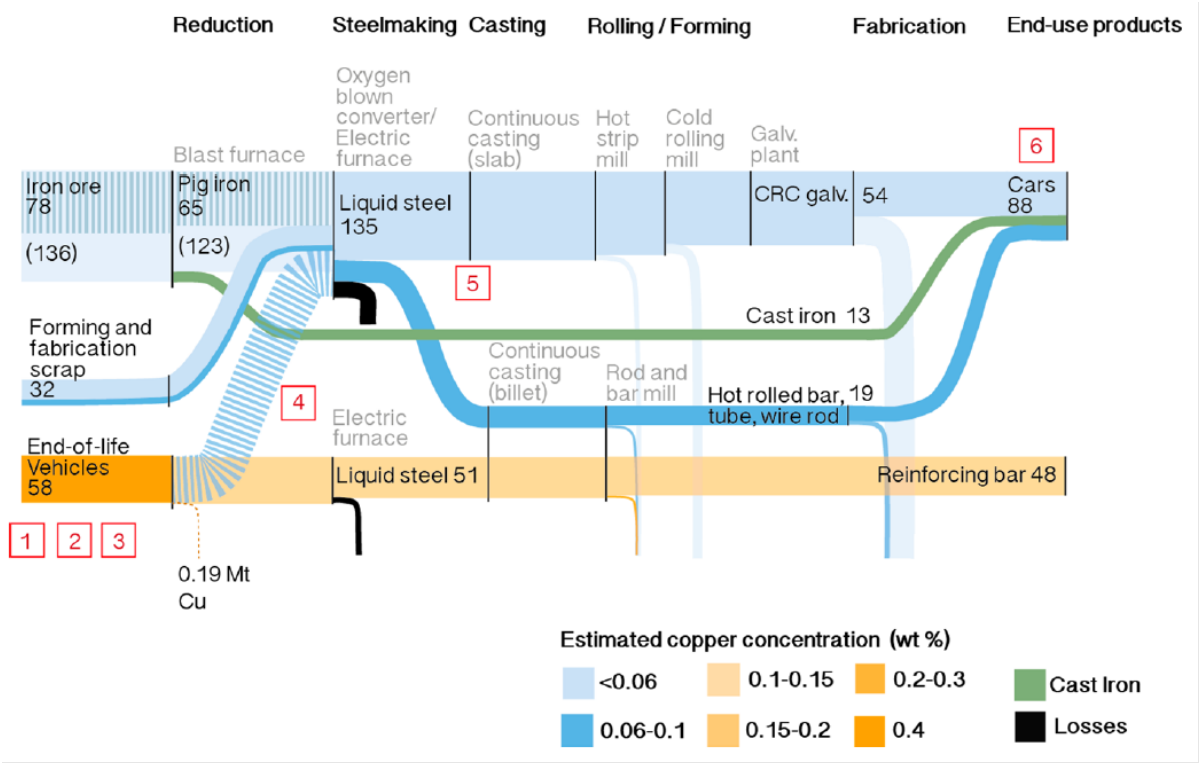
In Switzerland, such an approach is already implemented: According to Article 21 of the Swiss Waste Ordinance[104], metal pieces are to be removed and recycled from the lightest fraction that occurs during the comminution of metal-containing waste (light fraction).Copper content in steel scrap destined for recycling, is considered an impurity of steel and may affect the portfolio of applications in which secondary steel can be applied (EUROFER 27.10.21). As outlined in the consultant study supporting the impact assessment[105], copper (Cu) contamination in steel varies and ranges between 0.2 to 0.7%. Copper content in shredder/PST deliverables is considered an impurity also for fraction rich in aluminium. Similar to steel, Eurometaux state that the dismantling of components with copper prior to shredding would allow secondary aluminium of higher purity.

Figure 7.8 Steel mass flows (in Mt) corresponding to the production of cars and the recycling of end-of-life vehicles traced through the 2008 global steel system, both current practice and a theoretical closed-loop.

[103]Tabel et al. 2011; Sander et al. 2017

[104] VVEA: Verordnung über die Vermeidung und die Entsorgung von Abfällen (Abfallverordnung, VVEA) vom 4. December 2015. Switzerland.

[105] Baron, Y.; Kosińska-Terrade, I.; Loew, C.; Köhler, A.; Moch, K.; Sutter, J.; Graulich, K.; Adjei, F.; Mehlhart, G.: Study to support the impact assessment for the review of Directive 2000/53/EC on End-of-Life Vehicles by Oeko-Institut, June 2023



Legend: In the closed-loop, indicated by dashed flows, ELVs are not used for reinforcing bar production. The red numbers represent technical interventions along the supply chain to achieve a closed-loop: (1) more disassembly, (2) better shredding, (3) better sorting, (4) chemical extraction, (5) increase tolerance, and (6) reduce copper content. Source: (Daehn et al. 2017a)

According to (Daehn et al. 2017b) about 80 % of the original copper can be removed in magnetic separation. However, alternative practices exist. For instance, Sicon claims to reduce the output of their improved shredding[106] to 0.1 % of copper concentration. effectiveness copper concentration achievable) to qualitative energy/cost for various technologies to separate copper. The most common separation methods and the methods that are in practice under certain conditions are not necessary the most efficient one and can be actually also quite costly (quite high qualitative energy/cost). Methods that show higher efficiency (copper concentration achievable) and seems to be not too costly need still scale-up development[107]. Thus, it would be recommended to introduce the limit on copper contamination in steel scrap (excluding homogenous steel that contains alloyed copper) stepwise and with transition time. According to the European Steel Scrap Specification[108] that defines aimed analytical content of E40 steel scrap (output from the shredder), the aimed Cu-content is 0.25 %[109]. Additionally, sorting trials performed by ArcelorMittal with X-ray sorting machine (QXR TITECH) prove that it is possible to obtain Fe fraction with Cu-

[106] High density shredding, which produces 40-50 mm pieces more regular in shape than the about 100 mm pieces from today's low density shredding.
[107] Detail description of existing Cu-removal methos are in Daehn (2019).
[108] http://ehrhardt-recycling.de/wp-content/uploads/2017/05/Stahlschrott-Sortenliste-Englisch.pdf
[109] The values retained for the analytical contents are those which have been experienced in real terms in the various countries of the European Union and are achieved by scrap yards working normally with standard methods and standard equipment.

contamination lower than 0.25 % (obtained 0.209 %) from the shredded scrap with original Cu-contamination in a level of 0.655 %.

Thus, it seems technically achievable to set up a first threshold for average copper content of 0.25 %, which after several years could decrease, while in the meantime technology could develop. Nevertheless, it is possible to obtain the level of 0.25 % also due to improved dismantling. IRSID-USINOR & CTRA Study and presentation from ArcelorMittal[110] show that improved sorting dismantling of parts that contain copper prior to shredding significantly influence Cu-content after shredding of the dismantled ELV.

Additionally, an introduction of such provision will also require development of monitoring methods of the concentration of tramp elements in solid scrap since there are no nominal limits for this concentration (Daehn et al. 2017a). Institute of scrap recycling industries (ISRI) classifications do not classify the max. level of Cu in ferreous scrap[111]. This measure shall apply 5 years after entry-into-force.

7.2.4 7.2.4 Policy Options 4A, 4B,4C and 4D (related to specific objective 4 'collect more')

PO4A, **PO4B** and **PO4C** target the specific objective 4 **'Collect more'**, with different policy strategies. **PO4D** is a cumulative combination of all measures under **PO4A**, **PO4B** and **PO4C**, including a few synergies between them while excluding overlapping elements.

PO4A focuses on **enhanced reporting and enforcement of existing rules.** Member States are required to keep better track of their national vehicle fleets and ELVs by **mandatory annual reporting on the number vehicles registered, de-registered, treated as ELVs and shipped outside the Member State of registration** (M17a)[112]. To facilitate better traceability, a new obligation would be established for **dismantlers to issue a certificate of destruction (CoD) for each ELV treated and report it digitally** to the competent authorities of their Member State, and for **shredders to only accept ELVs with a corresponding CoD** and then to notify final destruction to the same competent authorities (M18). This is in line with the suggestions from the F4F platform which stressed that the delivery and registration of CoD need to be improved[113]. Member States are encouraged to exchange best practices on the use of incentives to achieve higher ELV collection numbers[114]. To strengthen enforcement, there is a definition of **minimum requirements for sector inspections** and enforcement actions (M19a). Finally, reporting on sanctions applied by the Member States with respect to violations of the rules set out in the future legislation is added to the national reporting requirements (M17a).

PO4A contains the following Measures 17-19 (M17a-M19a):

- **<u>M17a - Reporting by Member States on elements designed to address the problem of "missing vehicles"</u>**

[110] Russo, Philippe, Bollen, Jan, presentation on "Scrap for Decarbonized Steels" from ArcelorMittal, IARC – July 5th 2022
[111] http://www.scrap2.org/specs/20/
[112] Complementing Commission Decision 2005/293/EC.
[113] RegHub consultation on the implementation of the end-of-life vehicle Directive, 2022: https://cor.europa.eu/en/our-work/Pages/Fit-for-Future-opinion-on-End-of-life-vehicles-and-3R-type-approval.aspx
[114] Notably through deposit return schemes whereby financial support is provided to the last owner of a vehicle upon its delivery to an ATF. Such schemes are in place in a number of EU Member States already.

The persistent problem of missing vehicles relates elements design to tackle the problem including vehicle registrations, on import and export of used vehicles, on incentives to encourage delivery to an ATF and on penalties.

The measure builds on the current obligations on Member States under Commission Decision 2005/293/EC and introduces first an additional obligation for the Member States to annually report to the Commission on the national vehicle stock and detailed changes. The reporting elements will include the following data: i) total number of vehicles registered; ii) new registrations; iii) imports and exports of used vehicles; iv) temporary de-registrations, and v) permanent de-registrations.

To strengthen the effectiveness of the CoD, this measure will also provide for provisions on the exchange of information on the best practices by the Member States in applying incentives, including the economic ones[115], that encourage the last owner of an end-of-life vehicle to deliver it to an ATF and receive a CoD in return. The Member States will be asked to provide information on such incentives to the Commission as part of their regular reporting on the implementation of the regulation.

Thirdly, the measure foresees that Member States should report to the Commission on the measures taken to address breaches of the requirements contained in the new legislation (for example penalties for operators of illegal dismantling and shredding or for selling an ELV to illegal dismantlers and for dealers (and electronic platform) dealing with dismantled (used) spare parts from non-authorised facilities)).

The collected data will allow to collect evidence and verify whether all vehicles that reach end-of life are transferred to ATFs where the certificate of destruction (CoD) is issued.

The reporting period by the Member States shall be every 3 years, with a first reporting 3 years after application of the new legislation.

Example of a draft reporting form on data on the national vehicle market for M1 and N1 vehicles

➢ Reference year (n)	
➢ Certificates of destruction (CoDs) issued for domestic ELVs	
➢ CoDs issued for vehicles, not registered in the reporting country	
➢ Permanent cancellations of registration	
➢ ELVs imported for treatment (excluding transit)	
➢ Total ELVs treated in the reporting country	

	Number per year, during the reference year
(A) New vehicles placed on the national market:	
(1) Registered for the use on public roads for the first time	
(2) not registered (not for the use on public roads)	
(B) Import of used vehicles:	
(1) from other EU Member States and re-registered for the use on public roads	

[115] Examples: linking the end of the payment of insurance, administrative fees to the provision of a COD; offer of premiums in return of ELVs sent to ATFs.

(2) from non-EU countries and re-registered for the use on public roads	
(3) not re-registered (not for the use on public roads)	Estimation possible

(C) Change in vehicle stock			
	Numbers on the 31 December of the reference year (n)	Numbers on the 31 December of the previous year (n-1)	Change in stock = year (n) – year (n-1)
(1) Stock of vehicles registered for the use on public roads			
(2) Temporarily de-registered vehicles			
(3) Suspended vehicle registrations			
Total = Σ(C)			

	Number per year, during the reference year
(D) Export of used vehicles:	
(1) to other EU Member States and re-registered for the use on public roads	
(2) to non-EU countries and re-registered for the use on public roads	
(3) other exports of used vehicles, not re-registered for the use on public roads or unknown if re-registered in the country of destination	
(E) Domestical ELVs treated, proven by issued CoD:	
(1) domestical ELVs treated domestically	
(2) domestical ELVs exported for treatment	

Accompanying notes to the data reporting form:

- *For the terms: "registration", "cancellation of a registration", "suspension" pls refer to COUNCIL DIRECTIVE 1999/37/EC of 29 April 1999 on the registration documents for vehicles.*
- *The terms "temporary deregistration" and "Certificate of destruction" is defined in Article [to be completed one the articles are drafted in detail] of the revised ELV legislation.*
- *The term "permanent cancellation of the registration" means that one of the following situations apply: a) CoD issued to national vehicle register, b) proven theft of a vehicle, c) proven export of a vehicle, d) Exemptions upon specific request: e.g. a vintage vehicle is stored in a (private) kind of museum: accompanying documents demonstrate the conditions where and how the vehicle is stored. The use on private ground shall not be a reason for permanent cancellation of the registration but it shall fall under temporary deregistration.*
- *Data from intra-EU foreign trade statistics are, due to the reporting thresholds, not reliable for reporting on this intra EU export of used vehicles. Instead, data shall be available from the national vehicle registration authority using data exchange based on Article 5(2) of Directive 1999/37/EC.*
- *For the data on export to non-EU countries data from foreign trade statistics shall be used as an additional source to the data provided by the national registration authority.*
- *The submission of the data shall be accompanied by a quality report on methods used for the collection of the data, the data sources and their quality. As far as the quality report does disclose problems with data sources and quality, the report shall outline how the Member State proposes to overcome the identified problems.*

- **M18 - Obligations for dismantlers /recyclers to check and report on ELVs/ CoDs**

The measure introduces a requirement for ATFs to issue a Certificate of Destruction (CoD) for each dismantled vehicle through an electronic notification procedure to the competent Member State authority along with the delivery of the CoD to the last owner (hardcopy or electronic statement). The VIN number of a vehicle shall be clearly identifiable on the ELV parts and components sent for shredding.

The notification requirements will be accompanied with an obligation for shredders to request from the suppliers of bulks of vehicle carcasses or shear ELV scrap that these carcasses/scraps are identified by the VIN number of the ELV concerned and accompanied with a copy of the CoD of the ELV. Shredders receiving carcasses or shear scrap from ELV without this information (VIN + CoD) should report it to the competent authorities and only be authorised to use it in their shredding operations upon authorisation from these authorities.

Shredders will be requested to annually report electronically to the competent Member State authority the number of ELVs that they treat and their corresponding VIN and CoD.

This requirement shall apply 3 years after the adoption of the new legislation.

- **M19a - Definition of minimum requirements for sector inspections and implementation and enforcement action**

Under this measure, all Member States would be required to conduct at least once a year a campaign of physical inspections of the sector, comprising a) ATFs, b) repair garages not registered as ATFs and c) known/suspected illegal operators not registered at all. The campaign shall cover at least 10% of all sites/facilities each year. The campaign shall also cover inspections focusing on the shipments of used/end-of-life vehicle, such as storage places, land transport routes and harbours with the aim to verify compliance with the future legislation on ELV and the Waste Shipment Regulation.

This measure would also foresee a requirement for Member States competent authorities to cooperate with each other to ensure enforcement of the legislation, including providing access to their national registers to respective authorities of other Member States (e.g., registration authorities, customs authorities, police) to verify information on vehicles registered/de-registered from their register, including the motives of vehicle de-registration.

The Member States will have to submit a report every 5 years on the inspection campaign and their results to the Commission. Based on them, the Commission shall prepare a report summarising these findings and containing recommendations where appropriate.

This requirement shall apply 1 year after the entry into force of the new legislation.

PO4B provides new measures designed **to improve exchange of information between Member States on missing vehicles and to foster harmonised enforcement. With regard to the exchange of information between Member States**, PO4B consists in provisions to ensure that **Member States (i) provide additional information in their national vehicles registers** on elements which are necessary to track de-registered vehicles and ELVs[116] and (ii) **provide access through digital means to their national registers to all other Member State competent authorities** to improve traceability (M20). This would allow for better control of the vehicle status and strengthen the ability of enforcement authorities to carry out more stringent checks on compliance, as stressed in the F4F opinion[117]. These provisions could be added either in Directive 1999/37/EC on the registration documents for vehicles or in the new legislation on 3R type-approval - ELV. For the **export of vehicles, the definition**

[116] This should include information on the motives for which vehicles are permanently removed from the register (treatment as an ELV in an ATF, export, theft, etc.), as well as a requirement for the owner of a vehicle which is "temporarily de-registered" to report changes on the ownership of the vehicle in question to the registration authority.
[117] For more information see Suggestion 3, https://cor.europa.eu/en/our-work/Pages/Fit-for-Future-opinion-on-End-of-life-vehicles-and-3R-type-approval.aspx

of ELVs will be clarified by introducing mandatory criteria which will make it easier to distinguish waste vehicles from used vehicles (M19b) and hence avoid that ELVs are exported as used vehicles. It corresponds with the suggestion of the F4F opinion, acknowledging the illegal export of vehicles outside of the EU being is of the major issues with regard to the implementation of the ELV Directive[118]. Finally, **Member States would be required to establish appropriate sanctions for breaches of the legislation**, especially in case of selling ELVs to illegal dismantlers, illegal export, illegal sales of used spare parts from ELVs (M17b).

PO4B contains the following Measures 17-20 (M17b-M20):

- **M17b – Establishing of fines for the ELV sector in case of selling an ELV to illegal dismantlers, for dealers (and electronic platform) dealing with dismantled (used) spare parts from non-authorised facilities.**

Under this measure, the future legislation would provide for the obligation for the Member States to establish effective, proportionate and dissuasive penalties corresponding to breaches of the requirements under the ELV legislation, especially for:

1. owners who bring their ELV to non-authorised facilities;
2. illegal dismantling and shredding or for selling an ELV to illegal dismantlers;
3. operators (including online platform providers) trading (used) spare parts dismantled from ELVs from non-authorised facilities or illegally exporting used vehicles or ELVs.

As part of their reporting on the implementation of the new legislation on ELVs, Member States will be requested within 3 years after adoption of the new legislation to i) notify to the Commission the legal provisions setting sanctions, and ii) report how these sanctions are implemented (imposed). The Commission will prepare a report on the received information with the aim to share best practices among the Member States.

- **M19b –A clearer definition of ELV to ensure that there is a better distinction between used vehicles and ELVs**

The definition of End-of-Life vehicle would be improved to better distinguish between ELV and used vehicles. For this purpose, a list of mandatory legal criteria differentiating used vehicle from an ELV will be introduced into the new legislation, based on the Waste Shipment Correspondents' Guidelines No 9 on Shipments of Waste Vehicles[119]. Under this improved definition, a vehicle that is considered an economic total loss (in the country of first registration) will be considered as an ELV. The consequence would be that such vehicles should be delivered to ATFs and the Waste Shipment Regulation would apply to cross-border shipments of such vehicles.

The dealers of such vehicles will have to prove to the last owner of a total loss vehicle and to the competent authority of the Member State that the vehicle was actually delivered to an ATF. This could help avoiding that economic operators such as insurance companies sell "economic total loss cars" to unscrupulous operators, as they would be forced to hand over

[118] For more information see Suggestion 2, https://cor.europa.eu/en/our-work/Pages/Fit-for-Future-opinion-on-End-of-life-vehicles-and-3R-type-approval.aspx
[119] https://ec.europa.eu/environment/pdf/waste/shipments/correspondents_guidelines9_en.pdf

these cars (deemed ELVs) to ATFs, even when the cars are not shipped to another country but sold in the same country.

These new criteria (and the corresponding requirements) shall apply directly upon the entry into force of the new legislation.

- **M20 – Improving the information contained in national vehicle registries and making them interoperable to increase the transparency on the shipments of used vehicles**

This measure aims to increase transparency across the EU on the de-registration of vehicles. The lack of reliable information and the lack of exchange of information between Member States is a serious obstacle in the efforts to track "missing vehicles". The changes described in this measure would be introduced either in the new legislation on 3R type-approval-ELV or in the legislation on roadworthiness, which is currently under review[120].

The measure would include the following elements:

1. Member States shall include in their national register information on the reasons for which a vehicle is **permanently removed from their register**.

   These reasons shall be limited to:

   a. Dismantling of a car considered as an ELV at an Authorized Treatment Facility (ATF), upon presentation of a Certificate of Destruction (CoD);
   b. Export of a vehicle, upon presentation of the relevant export documents;
   c. Theft of a vehicle, upon presentation of police report;
   d. Exemptions upon specific request: e.g., a vintage vehicle is stored in a (private) museum.

   This information provided in the registers shall also be directly accessible by national authorities responsible for the implementation of the EU rules on end-of-life vehicles.

2. A requirement for the owner of a vehicle which is **"temporarily de-registered**" to report changes on the ownership of the vehicle in question to the registration authority.

   In this case, the original owner of a vehicle will have a duty to provide information on the details of the new owner, so that this new owner can be clearly identified and recorded in the national register of the country where a person is established.

   The aim of this measure is to avoid those vehicles which are "temporarily de-registered" are transferred to owners who would dismantle or export them illegally.

3. **Set up an obligation for Member States authorities to make available to authorities (e.g., registration authorities, customs authorities, police) in all other Member States information on vehicles registered/de-registered from their register**, including the motives of vehicle de-registration. To facilitate the exchange between EU Member States of vehicle registration information needed for the future legislation on ELV and 3R type-approval, the new legislation would foresee that this exchange takes place digitally.

[120] More information available at: https://ec.europa.eu/info/law/better-regulation/have-your-say/initiatives/13132-Vehicle-safety-revising-the-EUs-roadworthiness-package_en

This regulatory change will allow the authorities of one Member State to retrieve information on a vehicle present on its territory and check what its status is in another Member State. This would also increase traceability of vehicles which are moved in large number between Member States during their use phase and sometimes for the purpose of their dismantling at their end-of-life phase. This is key for the purpose of reducing the number of "missing vehicles", but also for the functioning of "extended producer responsibility schemes" whereby car manufacturers would assume additional obligations to those already in force today, for instance for the dismantling of end-of-life vehicles, including where these ELVs are treated in a Member State different from the one where the vehicle was first put on the market. Exchange of information should be made possible through the use of the Vehicle Identification Number (VIN) and provide information on the brands of the vehicles concerned.

The changes proposed above are in line with the stakeholder views. 87% or 180 of all stakeholders who participated in the open public consultation agreed that better traceability should be established between the EU Member States' registration systems on a legal status of a vehicle until its final deregistration.

For a consistent implementation, the new legislation will contain definitions linked to the de-registration of vehicles which is aligned with the Directive 1999/37/EC on registration documents (which is part of the "Roadworthiness package")[121].

These provisions would apply 5 years after the entry into force of this revision.

PO4C: Under this option, new provisions would be established with regard to the export of used vehicles outside the EU. First, exporters would be required to make available the **vehicle identification number (VIN)** and the information on the roadworthiness status of used vehicles to customs authoritiesM19c). Secondly, only used vehicles which are verified as **roadworthy would be authorised to be exported to non-EU countries.** An exporter would be required to make available to customs authorities the information on the roadworthiness status of the vehicle. In addition, the future legislation would foresee a possibility to develop a risk-based control mechanism to check how the EU vehicles exported, comply with the specific requirements imposed by third countries regarding the environment and road safety. (M21).

PO4C contains the following Measures 19, 21 (M19c-M21):

- **M19c – Making information on vehicle identification (VIN) and roadworthiness available to customs authorities**

To improve traceability on the export of used vehicles from the EU to third countries, exporters of used vehicles would have the obligation to make available the information on the Vehicle Identification Number (VIN) and roadworthiness status of each used vehicle to customs and other relevant authorities. The presence of the necessary information will be made mandatory through new TARIC measures.

These provisions would apply 3 years after the adoption of the implementing acts, 7 years after the entry into force of this Regulation.

[121] For example, the current ELV Directive 2000/53/EC refers to the undefined term "deregistration" which should be aligned with the definitions in the roadworthiness legislation.

- **M21 - Export requirements for used vehicles linked to roadworthiness status**

This measure would set out a requirement that the export of a used vehicle to third countries will only be authorised the vehicle concerned is roadworthy. The measure would apply to the vehicle categories (M1 and N1) that are falling within the current scope of the ELV Directive. The exporters placing used vehicles under the export procedure would make available to customs authorities the vehicle identification number (VIN), the information on the validity of the roadworthiness of the vehicle concerned, and the information on the Member State where the vehicle concerned was last registered .

To enable automated searching of vehicle registration data (e.g. VIN number, a Member States where the vehicle was last registered, date of first registration of vehicle, content of the roadworthiness certificate) between Member States competent authorities and customs authorities, the Commission will explore the possibility to establish the necessary digital tools to ensure that customs authorities have access to these data through the EU Single Window Environment for Customs, for example through an interconnection with the MOVE-HUB web based application, an information system which different range of functionalities have already been applied for the purpose of electronic exchange of information between the EU Member States[122].

The measure would prevent the export outside the EU of vehicles which are not roadworthy, thereby avoiding risks that they would generate in importing countries for road safety and environmental pollution.

This requirement for the exporters shall apply 3 years after the adoption of the necessary implementing act, 7 years after the entry into force of this Regulation. Full enforcement by customs authorities will become possible only upon full interconnection with EU Single Window System; in the meantime, customs enforcement may be limited in view of the manual workload, but mitigating measures will be possible (e.g. as the VIN will be made available to customs authorities, customs will be in a position to provide on a regular basis all exports of vehicles to competent authorities through the customs Surveillance system thereby allowing competent authorities to carry out ex-post checks and possibly other follow-up actions).

In support of the measures above, a vehicle would be subject to the risk management control by the customs authorities whether a vehicle is compliant with the with the specific conditions adopted by importing countries for import of used vehicles, such as limitations based on age or compliance with air emissions like Euro emissions standards, when this information is officially communicated to the Commission by the third countries concerned.

This implementation of this requirement will be facilitated with the making available of the relevant information in the EU Single Window Environment for Customs. It shall not prevent Member States from taking implementation actions earlier on, e.g. when drawing their national risk plans. In addition, the Commission will support the Member States in providing

[122] Such examples include interconnection of electronic registers of driver cards as regulated under the Commission Implementing Regulation (EU) 2016/68 of 21 January 2016 on common procedures and specifications necessary for the interconnection of electronic registers of driver cards, information exchange on road transport undertakings (OJ L 15, 22.1.2016, p. 51) as well as on roadside checks under the Commission Implementing Regulation (EU) 2016/480 of 1 April 2016 establishing common rules concerning the interconnection of national electronic registers on road transport undertakings and repealing Regulation (EU) No 1213/2010 (OJ L 87, 2.4.2016, p. 4)

profiling the countries of risk though engaging in dialogues with third countries at risk though bilateral and international cooperation, with the objective to reduce their level of risk.

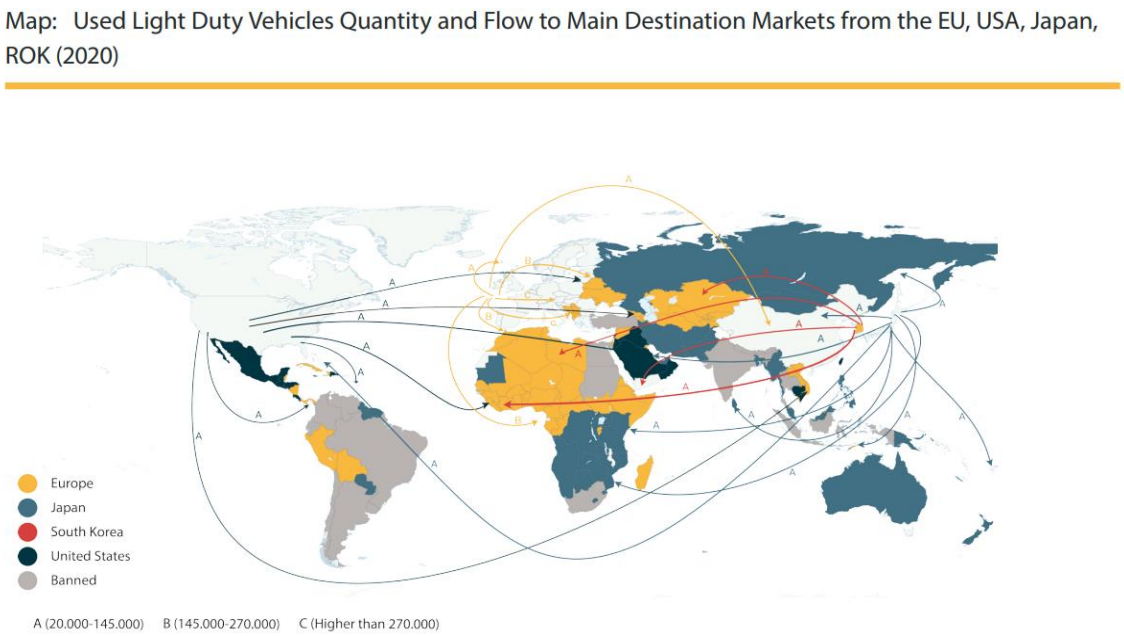
Background information:

The measures on export are based on the fact that an increasing number of third countries importing used vehicles from the EU are introducing regulations to limit such imports by age and emission standard in order to avoid negative impacts of these imported vehicles on air quality, road safety and pollution from improper disposal. For instance, the Economic Community of West African States (ECOWAS[123]) adopted in September 2020 a Directive to limit the import to those vehicles with a minimum Euro 4/IV emission standard and established an age limit of 5 years for light duty vehicles respectively 10 years for heavy-duty vehicles. Several other receiving countries have similar restrictions in place and, with the support of the United Nations Environment Program (UNEP), more harmonized legislation is expected between importing countries in the near future. It is important that the EU, as a major exporter of used vehicles, takes action to support these countries in implementing these requirements. Alongside this, efforts would be made at international level (global, regional and bilateral) by the EU to support the development of international commitments and rules on the global trade in used vehicles, building on the work of UNEP and Resolution 5/11 on the circular economy, adopted by the United Nations Environment Assembly in March 2022[124].

Therefore, the measure addresses the ongoing international developments in making sure that used vehicles which are imported by third countries are not contributing to high pollution levels and safety risks in these receiving countries. It enables the developing countries to receive only those vehicles from the EU that are first of all safe and authorized to be on the EU roads. Moreover, the EU national authorities will need to be more vigilant of the rules set by third countries regarding imports of used vehicles.

[123] Members of ECOWAS: Benin, Burkina Faso, Cabo Verde, Côte d'Ivoire, The Gambia, Ghana, guinea, Guinea Bissau, Liberia, Mali, Niger, Nigeria, Senegal, Sierra Leone, Togo.
[124] UNEP/EA.5/Res.11

Figure 7.9 Map of main flows of used light duty vehicles



The majority of African countries, which are the main destination of the EU export of used vehicles, rely on imports of used vehicles to grow their fleets due to limited local vehicle production capacities. However, the lack of minimum standards and/or insufficient enforcement of adopted standards compromises the quality of used vehicles imported into the region, resulting in negative consequences on the environment, health, and road safety, as well as additional costs. Therefore, many countries have introduced, or are considering introducing, quality standards for the import of used vehicles.

In Kenya, more than 99% of vehicles added to the fleet are used vehicles, with most imported from Japan and the UK. Used vehicles must comply with Kenya Bureau of Standards (KEBS) requirements[125], including being less than 8 years old, passing a roadworthiness inspection, and being right-hand drive. In Kenya, policies were implemented that mandate a pre-export verification of conformity inspection for vehicles. This inspection is carried out at the export point to confirm compliance with Kenyan regulations. By ensuring that used vehicles meet Kenyan standards, this policy also enhances the quality of second-hand vehicles. Despite the introduction of an age limit in 2005, the growth of imported vehicles continued. However, the age limit did impact the type of used vehicles imported, with a shift towards younger and smaller vehicles that are cleaner, more efficient, and safer.

In Ivory Coast, used vehicles are mostly imported from Europe and must comply with the maximum age limits set by Decree n°2017-793[126]. The age limits vary by vehicle type, ranging from five years for passenger vehicles to ten years for coaches and trucks over 10 tonnes. Ivory Coast also played a key role in getting other West African countries to adopt harmonized fuels and vehicles regulations that require minimum EURO emissions standards for used and new vehicles.

Mauritius has implemented stricter import regulations, with used vehicles required to be less than 4 year-old and meet Euro 4 emission standards. Prior to export, each car must undergo a roadworthiness inspection, which is carried out by Bureau Veritas[127]. Upon arrival the vehicle is taken to the Vehicle Examination Station where a Particulars of Motor Vehicle Form is issued. Additionally to the import requirements, the initiatives have also been taken to encourage the adoption of electric and hybrid vehicles by reducing customs duty and registration tax on these vehicles.

The case study of New Zealand highlights the success of their "Clean Car Discount" policy[128], which provides discounts on new vehicles based on their emissions rating, while also increasing levies on high-emissions used vehicles. This policy has led to an increase in the import of low-emissions vehicles and a decrease in the import of high-emissions vehicles.

In Mozambique, used vehicles are commonly imported from Japan, with no age restriction on the vehicles. Only right-hand drive vehicles are permitted, with exceptions for special vehicles such as ambulances. All vehicles require a road worthiness inspection prior to export or face a fine. Importers must obtain an Importer License number from JEVIC[129], which has been awarded the contract to inspect vehicles and prevent substandard or prohibited goods from entering Mozambique.

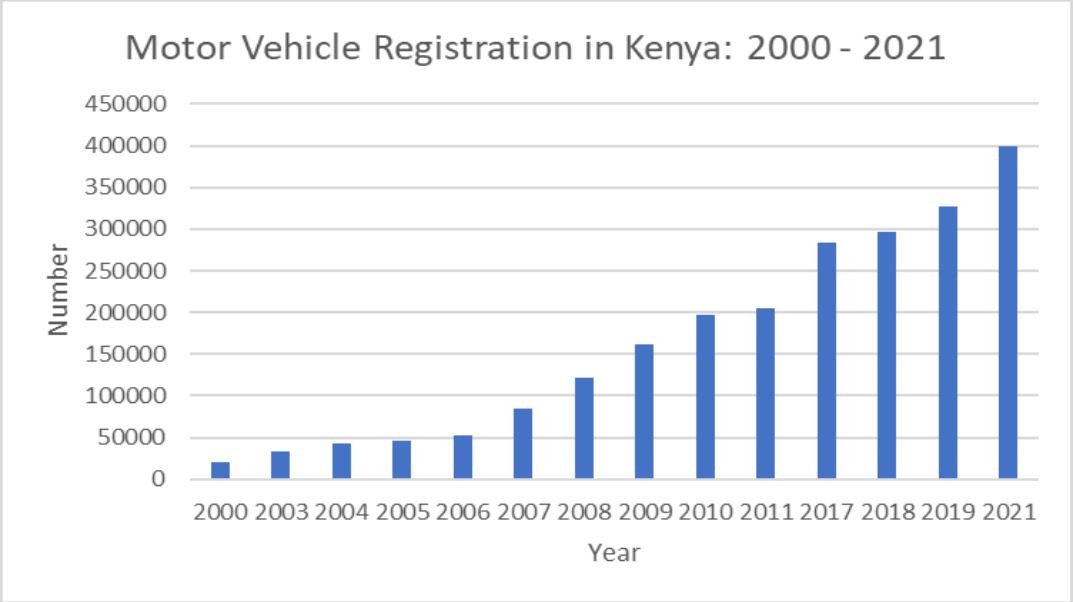
In Ethiopia, a new tax policy for vehicle imports was introduced in mid-2020, with older vehicles subject to higher taxes. The government implemented a new taxation policy concerning the import of vehicles intended for personal use. A proportional tax rate for vehicles manufactured over 7 years ago was applied, with a 500% excise tax rate imposed on vehicles exceeding 7 years of age. Consequently, most of the imported vehicles comprised of relatively recent models, including EVs. Later the import tax rate for EVs has been adjusted to 15%, without any additional taxes being levied. Currently, the automobile market is dominated by an extensive range of Chinese-manufactured vehicles, alongside a limited number of vehicles produced in South Korea, Japan. There are no existing regulations for emission standards, and no studies have been conducted to evaluate the actual impact on costs, trade, or other associated aspects.

Export of used vehicles: expected scale of impacts to the third countries

The collected evidence suggest that implementation of the export requirements would not lead to adverse long-term impacts in the receiving countries due to the expected decrease of used vehicles being exported outside the EU. These impacts to large extent could be comparable to those occurred in the receiving countries following the adoption of the import restrictions.

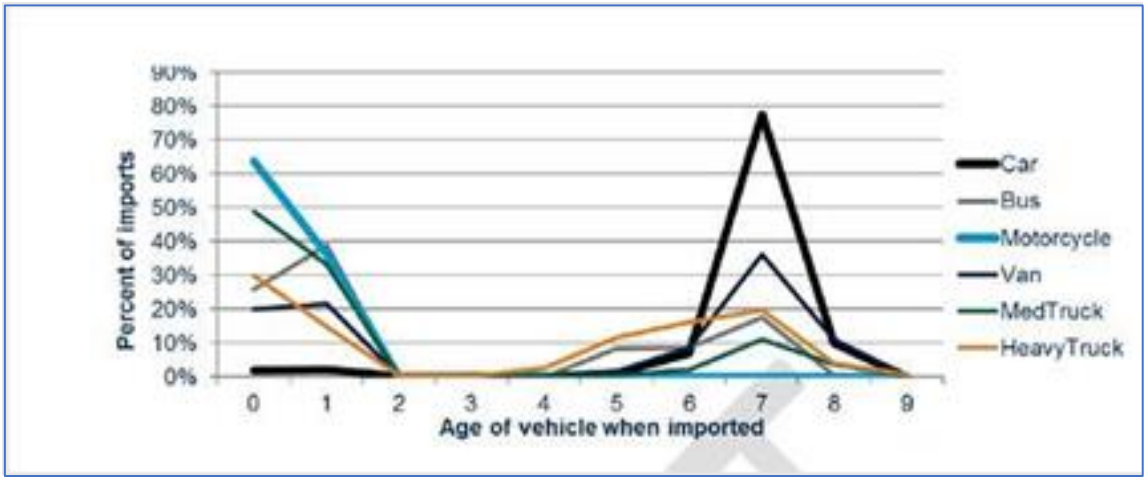
For instance, in Kenya, the age limit introduced as part of the import restrictions has incentivized the import of smaller used vehicles. As a result, the used vehicles being imported are newer and smaller, leading to a significant improvement in their efficiency and safety. The illustration below shows the number of light duty vehicles registrations in Kenya. As less than 1% of added vehicles in Kenya are new vehicles, this graph represents the trend of import of used light duty vehicles into the country from 2000 to 2021.

Figure 7.10 Motor vehicle registrations in Kenya 2000 – 2021



In 2005, Kenya introduced an eight-year age limit for import of used vehicles. The graph indicates that the policy had a minor effect on the import of used vehicles, as the growth rate of imported vehicles decreased slightly in the year after its introduction, but then picked up again after 2006. In general, the policy had a minimal impact on reducing the total number of imported used vehicles, and the import rate continued to grow after the introduction of the age limit. However, in terms of quality change, the impact on the type of used vehicles imported into Kenya was significant. Prior to the introduction of age restrictions, the vehicles imported into Kenya were generally older, with an average age of 15 to 18 years. However, with the new regulations, the maximum age limit for imported vehicles was reduced to eight years, and this has led to a significant shift in the age profile of imported vehicles. Today, the largest group of vehicles imported into Kenya has on average seven years, which is significantly younger than the vehicles imported before the introduction of the age limit. This shift towards younger vehicles has had a positive impact on the environment, as newer vehicles tend to be more fuel-efficient and emit less pollution than older vehicles.

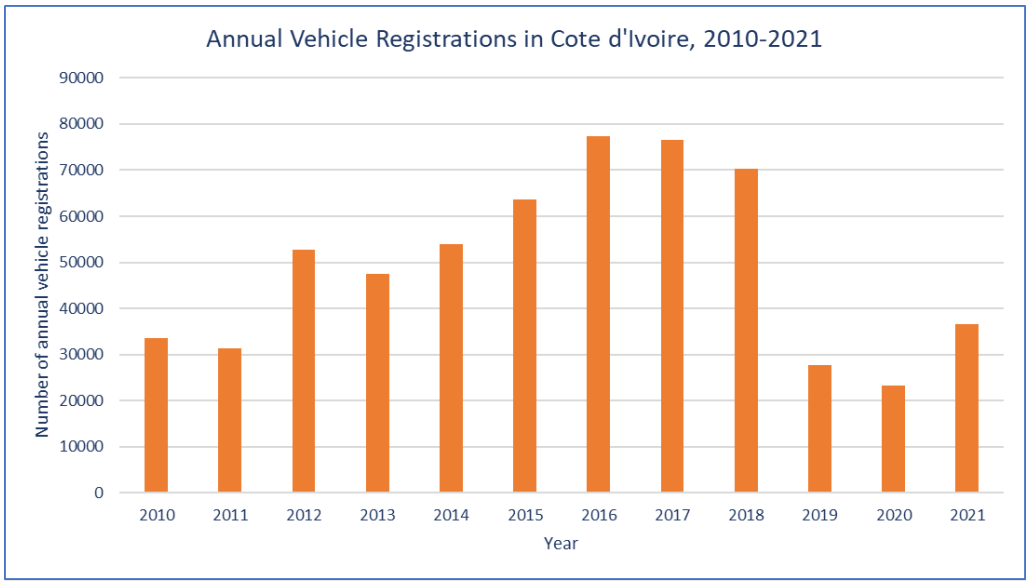
Figure 7.11. Age of imported vehicles in Kenya (UNEP)



The import of vehicles underwent a transformation, as the policy introduced an age limit that incentivized the importation of smaller, used vehicles. It is apparent that newer used vehicles carry a higher price value compared to older used vehicles. Consequently, the vehicles imported into Kenya following the implementation of the policy are not only younger and smaller, but also notably cleaner, more efficient, and safer.

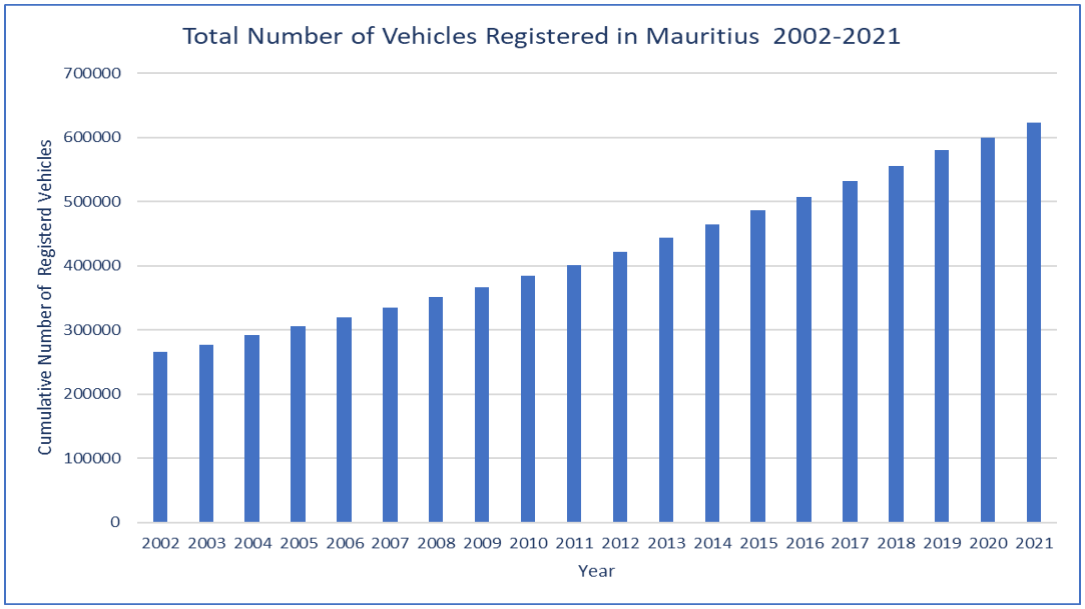
Similar developments have been observed in other countries. In Ivory Coast the quality of used vehicles has also significantly improved since the introduction of policies. In 2017-2018, the used vehicles imported into Ivory Coast were between 11 and 20 years old. Following the introduction of the restrictions, there was a notable decrease in the importation of used vehicles. Nonetheless, two important factors contributed to this trend. Firstly, the sales of pre-owned vehicles observed a surge. Secondly, the COVID-19 pandemic had a significant impact on the importation of both new and used vehicles globally, with a notable drop in demand during the initial years of the pandemic. However, as of 2021, the import of used vehicles has started to grow once again, and early indications suggest that this trend is continuing. As a result, a trend similar to what was observed in Kenya, where after the policy changes, the quality of used vehicles imported has improved, resulting in a cleaner and safer fleet.

Figure 7.12. Annual vehicle registrations Ivory Coast 2010 - 2021



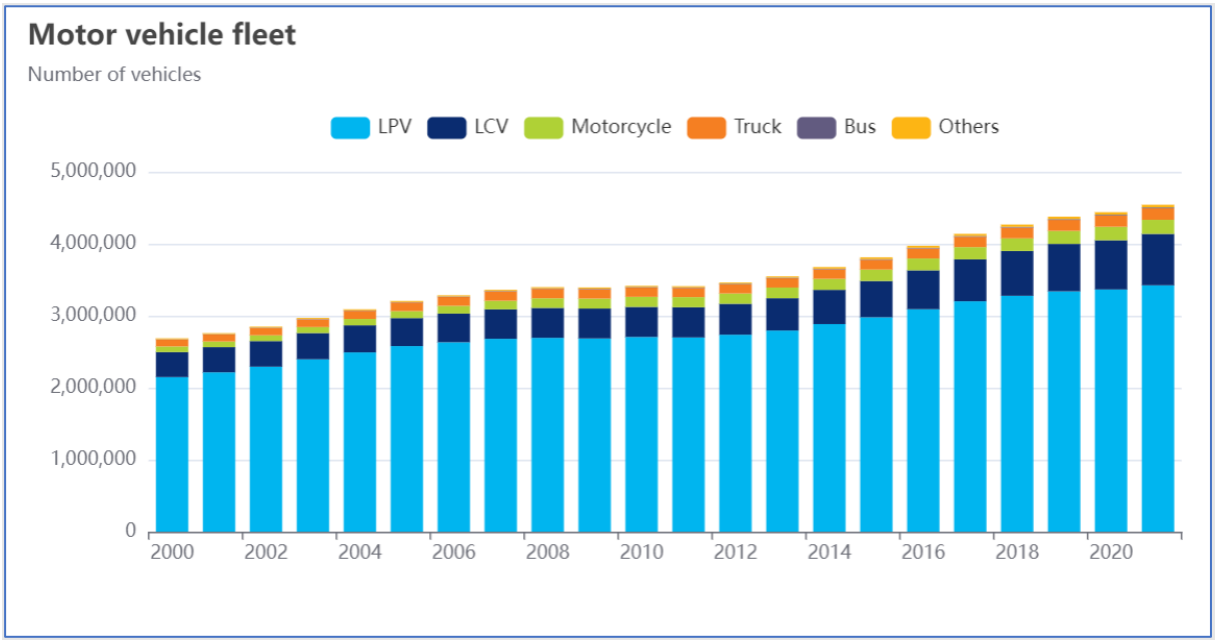
In Mauritius, the introduced measures did not impact the quantity of used vehicles imported into the country. Instead, vehicle registrations continued to rise, indicating that the policies did not have a negative impact on the number of vehicles being imported.

Figure 7.13. Total vehicle registrations in Mauritius 2002 - 2021



Similarly, in New Zealand, the policies have resulted in the import of newer and cleaner used vehicles, without a significant impact on the number of vehicles being imported. While there was a small impact visible between 2009 and 2012, imports quickly restored again, indicating that the policies did not have a long-term reducing effect on the overall number of vehicles being imported. The illustration shows the imports of new and used vehicles in New Zealand.

Figure 7.14. Motor vehicle registrations in New Zealand 2000 - 2021



In conclusion, the policy changes have not negatively impacted the number of vehicles being imported. Instead, they have resulted in a shift towards newer used vehicles, which are significantly cleaner, more efficient, and safer. Therefore, restrictive policies towards used vehicles were beneficial for the promotion of cleaner and safer transportation, which accordingly resulted in a renewed fleet with a higher economic value.

It suggests that the enforcement of EU roadworthiness requirement for the used vehicles, is expected to shift towards higher quality exports, that will continue meeting demand in third countries, without causing a long-term trade diversion. This implies that the EU would remain an important player in the global trade in used vehicles while ensuring that third countries have access to a more efficient and environmentally friendly used vehicles.

The experience of the importing countries also demonstrates that setting standards in the importing countries and imposing EU standards on the export of vehicles are not mutually exclusive.

As a result, export related measures proposed would be mutually reinforcing to address the quality of used vehicles in both types of countries where the import standards are established and those where import of used vehicles is currently not regulated. In this regard, by setting a roadworthiness requirement for the used vehicles, the EU would be able to ensure that vehicles sent to more vulnerable third countries, such as Africa, which is the key destination for the used vehicles being exported from the EU, meet the necessary safety, environmental, thereby reducing the costs and environmental impacts of not admitting, scrapping or re-export elsewhere.

In this regard the mandatory requirements on the export of used vehicles would also contribute to the implementation of the **"waste hierarchy"**, the core principle governing management of waste at the EU, by prioritising the management ways in an order reflecting their environmental impact. Avoidance of export of non- -roadworthy vehicles would respect the waste hierarchy in a sense that non-driving vehicles, which are at the end of their useful life, would be prevented from being disposed in the receiving countries where often substandard treatment of ELVs causes environmental damages, such as oil spillage, unsound treatment of refrigerants or improper removal of hazardous substances and of components for higher quality of recycling. Remaining in the EU, these non-authorised vehicles, meeting ELV requirements, would be instead directed to the final treatment operations at the EU, prioritising treatment operations which are higher up waste hierarchy and contribute to circular economy objectives.

Additionally, EU climate change policy towards to reducing CO_2 emissions from vehicles shall also be taken into account while considering the long-term changes to the EU overall fleet[130]. It suggests future EU vehicles will have lower emission level and eventually will replace and renew the share of the fleet that is currently directed for the export to third countries[131]. As new vehicles become available in the EU, the supply for export would inevitably increase, which will automatically decrease in the demand and export of older, less efficient vehicles. Implementation of the preferred option in this context, would allow to further tackle the primary concern to ensure that used vehicles traded are road-worthy and non-polluting, without undermining the importance of strengthening a mutual responsibility of the exporting and importing countries, which is essential.

Such approach is aligned with the continuous EU efforts and commitment to support international partnerships, in achieving common sustainability objectives, through different formats of global activities. One of the platforms is the Global Gateway, where the EU is

[130] https://climate.ec.europa.eu/eu-action/transport-emissions/road-transport-reducing-co2-emissions-vehicles/co2-emission-performance-standards-cars-and-vans_en

[131] According to ACEA, average new car emissions are 116.3g CO2/km, which shows 16.6% decrease since 2010: https://www.acea.auto/fact/fact-sheet-cars/

working towards promoting the worldwide infrastructure investments that create sustainable, smart, resilient, inclusive and safe networks in all modes of transport. One of the ambitions of GG Ambition, Europe Investment Package for Africa, is by 2030 is to integrate the African and European multimodal transport networks in line with the regional and continental frameworks and tailor these networks to the economic potential of an African Continental Free Trade Area[132].

PO4D: Under this option, **all** measures (M17 to M21, see descriptions before) from PO4A, PO4B and PO4C are combined to most effectively achieve the objective **'Collect more'**. The timeline is the same as expressed in the section before in the description of the measures. The combination thus includes incentives and / or penalties to make use of CoDs, improvement of registration and deregistration procedures, better statistics / monitoring on vehicle stock and import / export and the fight against illegal export of ELVs and environment, health and safety related problems in the receiving countries. Some overlapping elements like the reporting under M17a and synergies between these measures are taken into account.

7.2.5 7.2.5 Policy Options 5A, 5B and 5C Provide appropriate financial and organisational incentives to increase circularity in the automotive sector and improve the collection of ELV (related to specific objectives 1 to 4)

PO5A, **PO5B** and **PO5C** aim at establishing economic incentives and organisational arrangements contributing to meeting the first four specific objectives of the initiative to ensure proper implementation. They are cumulative.

- **PO5A** requires **Member States to establish specific Extended Producer Responsibility (EPR) schemes for vehicles[133], aligned with the minimum requirements applicable to other sectoral waste streams, as specified in the Waste Framework Directive**[134]. This means that Member States would require vehicles manufacturers to bear financial and organisational responsibility for the management of the waste stage of the vehicle life cycle, including sorting and treatment operations, in addition to the costs of collection which are already included in the EPR under the current ELV Directive. The F4F opinion in particular recommended to focus on proper implementation of polluter pays principle through addressing the mandatory treatment operations that are not economically viable[135]. Member States would have to establish such schemes, or extend the scope of existing ones, to ensure that vehicle manufacturers provide for advanced measures to guarantee that legal requirements for collection and treatment of ELVs are achieved (M22). When it comes to collection of ELVs, this would include **digitalisation of reporting of ELVs collected and treated in ATFs and shredders**, and **dedicated awareness-raising campaigns** designed to improving the collection of ELVs. When it comes to treatment, **vehicle manufacturers will be made responsible for the costs** related to the difference between revenues generated by the sale of

[132] https://international-partnerships.ec.europa.eu/policies/global-gateway/transport_en
[133] There are already provisions on cost coverage of delivery/take-back of an ELV by producers (Article 5(4) ELVD). Although not a fully-fledged EPR scheme, the basics of cost coverage already exist and are explicitly referred to in the WFD (article 8a(4)). This means that PO5 would not necessarily entail starting up completely new EPR schemes
[134] See Articles 8 and 8a of the Waste Framework Directive (Directive (EU) 2018/851).
[135] For more information see Suggestion 7 at https://cor.europa.eu/en/our-work/Pages/Fit-for-Future-opinion-on-End-of-life-vehicles-and-3R-type-approval.aspx;

parts/components/materials resulting from the dismantling/recycling processes and the costs linked to their **mandatory dismantling and recycling** and other treatment requirements that are net cost negative. (M23).

PO5A contains the following Measures 22-23 (M22-M23):

- **M22 – Requirement for the Member States to establish collective or individual national EPR schemes, including monitoring compliance costs and minimum financial obligations**

The measure would address to the objective to ensure a fair allocation of ELV treatment related costs, by specifying the obligations of the vehicles producers to contribute organisationally and financially to all necessary operations relevant to collection, treatment and recycling of ELVs.

The ELV Directive already contains provisions concerning financial responsibility of the vehicle producers for the end-of-life stage of their vehicles, regarding mainly the coverage of costs of setting collection schemes for ELVs. However, the Directive does not take into account the general minimum requirements for EPR established in Articles 8 and 8a of the Waste Framework Directive and does not directly oblige vehicle producers to cover costs of the treatment of ELVs.

This measure would oblige all Member States to establish national EPR schemes on the ELV in compliance with the specification of the general minimum requirements established in Articles 8 and 8a of the Waste Framework Directive in order to fully effectuate the polluter pays principle in the automotive sector. Producer responsibility may be organised collectively or individually, while setting uniform conditions for the modulation of the financial contributions to avoid distortion of the internal market and to limit administrative burden, where necessary.

These obligations for the manufacturers would cover the following costs:

- costs of the recycling sector, linked to requirements for higher amount and/or quality of recycling. These would cover the costs linked to the difference between revenues generated by the sale of these materials and costs linked to the attainment of the mandatory ELV treatment targets established in the new legislation.
- costs for communication/awareness-raising campaigns designed to improve the collection of ELVs;
- establishment of a notification/ reporting system for ELVs, CoD and final cancellation of the registration;
- reporting, via digital means, on the attainment of the recycling/reuse targets set out in EU legislation.

The measure introduces the obligation for the Member States to appoint an independent competent authority ("clearing house") to monitor compliance of the producers with the mandatory requirements on the end-of-life treatment of ELV. The new legislation will set the mechanism for the calculation of the fees that producers would have to pay to compensate for the costs linked to the implementation of necessary (minimum) ELV treatment obligations, notably on the collection, depollution, dismantling and recycling of ELVs. Member States will be requested to lay down the details on the organisation and operation, including the administrative and procedural rules to ensure: i) registration of producers; ii) authorisation of producers and producer responsibility organisations; iii) oversight of implementation of

extended producer responsibility obligations; iv) collection and publication of data, including public awareness campaigns.

In addition to alignment with the general criteria set out in the provisions of Articles 8 and 8a of the Waste Framework Directive[136], the Regulation will set minimum requirements for the governance of the EPR ensuring that the interests of all the stakeholders are duly and evenly represented in the decision-making bodies of EPR. In addition, the designated independent competent authority will have to monitor the average costs for the obligatory compliance operations and the revenues from these obligatory compliance operations and to define, as necessary, financial compensation of compliance operation to ATFs and moderate the implementation of the fee modulation.

On this basis, Member States shall monitor the costs for collection, recycling infrastructure, depollution, dismantling, and reuse in relation to revenues from these obligatory operations and set out necessary minimum financial contribution of producers to ATFs. The producers will have to offset compliance cost if these costs are not recovered by the result of the distinct operation. The decision on the required level of the offset shall be discussed in close cooperation with the stakeholders. The national competent authority / clearing house shall establish procedures for the cooperation, moderate this cooperation and take and publish regular decisions on the level of the offset for different compliance operations.

Analysing the feedback received during the open public consultation, the majority of stakeholders agreed that in order to ensure a high quality of recycling, it is necessary to compensate the ATFs for their dismantling efforts, which are not economically viable under the current conditions. Such position was shared by all environmental NGOs and the majority of waste management operators (80%), public authorities (73%) and citizens, other (55%) and consumer organisations (52%). Out of 18 individual respondents who identified themselves as vehicle producers, suppliers or importers, 8 individuals disagreed with such approach.

The measure will set a delegated power to the Commission to develop a secondary legislation specifying the (uniform) requirements for the EPR.

These requirements shall apply 3 years after the entry into force of a new legislation.

- **M23 – Reporting obligations for producers**

The measure introduces an obligation for the individual producers and PROs to report to a competent authority on the performance of the producer responsibility tasks. These annual reports shall contain the information on the financial and organisational responsibility taken in achieving mandatory targets (e.g. recycling) and the end-of-life treatment operations (e.g. depollution, removal of components, recycling and information campaigns).

Based on the monitoring of material flows of end-of-life treatment operations, producers will be responsible to demonstrate compliance with targets on recyclability, reusability and recoverability of a vehicle as provided in the type-approval documentation. This evidence shall be obtained and documented through the interface with the ATFs.

[136] Directive 2008/98/EC of the European Parliament and of the Council of 19 November 2008 on waste and repealing certain Directives (OJ L 312 22.11.2008, p. 3).

Under this measure, producers shall also be engaged into support of monitoring and reporting on illegal activities in the sector to responsible authorities (i.e., police and environmental inspectorate) by providing the reporting data and any necessary documentation concerned.

These requirements shall apply 3 years after the entry into force of a new legislation.

PO5B: Policy option 5B complements the obligation for Member States to establish EPR schemes for ELV with harmonised requirements designed to ensure a uniform and fair implementation across the EU single market. To avoid that Member States apply diverging methodologies relating to the responsibilities of the vehicle manufacturers, **harmonised criteria for the modulation of fees to be paid by vehicle manufacturers would be set, based on circularity features,** such as the weight of a vehicle, the dismantling time for key parts/components like batteries, the expected level of recyclability/re-usability and the level of recycled content (M24). These elements comply with the recommendations of the F4F recalling that including recyclability and durability criteria in vehicle design can facilitate dismantling and lift implementation burden from ATFs[137]. Taking into account the large volume of used cars shipped between EU Member States and the need for fair cost allocation intra-EU, **specific requirements are put in place to make sure that vehicle manufacturers contribute to the costs of dismantling and recycling of vehicles which become ELVs in a Member State different from the Member State where it was first registered ("cross-border EPR")** (M25).

PO5B contains the following Measures 24-25 (M24-M25):

- **M24 – harmonised modulation of EPR fees**

This measure establishes the conditions to create economic incentives for the manufacturers that take additional efforts to advance the reusability, remanufacturing, and recyclability of a vehicle compared to the standard vehicles placed on the market. For this purpose, the new EU legislation will introduce harmonised fee modulation for collective EPR schemes based on the specific criteria of a vehicle, taking into account the following:

- Weight of a vehicle (the production of a heavier vehicle requires the use of more primary resources than the production of a lighter one),
- Dismantling time of parts which need to be removed prior to shredding under the new legislation to allow for re-use, remanufacturing or recycling of a vehicle,
- The expected level of recyclability/ re-usability of materials and components, based on the 3R type-approval declarations,
- Share of materials preventing high-quality recycling process,
- Share of recycled content (metal, plastics, CRMs, other),
- Presence and location of hazardous substances.
- Type of vehicles (combustion engine vehicles, BEV, HEV, PHEV, FCEV, others),

Producers would be requested to provide the national competent authority, i.e., a clearing house, with data relevant for the fee modulation. Based on this data, the national competent authority (clearing house) shall propose/ publish criteria for the fee modulation in close and transparent cooperation with the producers and the stakeholders of the dismantling and recycling sector. The producers shall provide this information together with the information

[137] Ibid.

document they provide on reusability and recyclability in the context of the European Union vehicle 3R-type approval. For vehicles type-approved before these provisions entered into force, the producers shall provide these data for all type-approved vehicles within 5 years after this obligation entered into force.

- **M25 – Transfer of the EPR fees and financial guarantee between Member States (cross-border EPR)**

The measure addresses the differences in allocating the fees between Member States and to establish a level playing field between the authorised ELV operators in complying the with the EU level ELV treatment requirements. To ensure a fair attribution of costs between the economic operators established in different EU Member States, it is suggested to introduce a transfer of the information and EPR fees together with a cost settling mechanism in country of final destination and countries of origin.

With a view to ensure equal functioning conditions at the EU, the Commission will be empowered to develop criteria to ensure cross-border cooperation concerning extended producer responsibility schemes for ELVs in accordance with Article 8(5) of the WFD. This mechanism will help to ensure that (individual or collective) EPR schemes properly cover the end-of-life treatment costs of a vehicle in a Member State which is different from the Member State where it where it was first registered.

These requirements shall apply 3 years after the entry into force of a new legislation.

PO5C includes **advanced economic incentives** to increase the collection of ELVs and promote the market for vehicles manufactured in a circular manner. It gives the discretion for the Member States to establish **"deposit return schemes"** based on the common EU wide criteria, whereby a lump sum of money is given to the last owner of an ELV upon its delivery to an ATFs (M26). This measure reflects the suggestion of F4F platform[138]. The second component of this option is the possibility to establish harmonised **Green Public Procurement (GPP) criteria for the purchase of all vehicles,** based on circularity criteria described for PO5B, and consistent with the Clean Vehicles Directive[139](M27).

PO5C contains the following Measures 26-27 (M26-M27):

- **M26 – Establishment of national deposit refund schemes**

The measure aims to introduce the Deposit Refund Schemes (DRS), as a complementary instrument, either managed by public authorities or as a part of the mechanism relevant with the extended producer responsibilities.

The vehicle owners would pay a deposit fee to the government upon the first registration of a vehicle. Member States will bear a discretion to define the conditions for the functioning of the DRS, including the level of deposit fees for the owners and premium to be granted in return/exchange of a vehicle.

[138] For more information see Suggestion 5 at https://cor.europa.eu/en/our-work/Pages/Fit-for-Future-opinion-on-End-of-life-vehicles-and-3R-type-approval.aspx; RegHub consultation on the implementation of the end-of-life vehicle Directive, 2022;
[139] 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 (OJ L 188, 12.7.2019, p. 116–130). A review of this Directive is foreseen by the end of 2027.

The Commission will be empowered to develop harmonised criteria for the functioning of the DRS within 5 years after entry into force of a new legislation.

Member States will be required to report to the Commission on the efficiency of the DRS, including the level of premiums applied.

- **M27 – Introduction of minimum mandatory green public procurement criteria**

The measure aims to empower the Commission to establish minimum harmonised mandatory green public procurement criteria regarding vehicles' circularity as under the Clean Vehicle's Directive[140], that is to be revised in 2027.

These criteria would consider the eco-design of a vehicle, notably the recyclability, reusability and recoverability (i.e. circularity characteristics, including the aspects being assessed under the modulation of EPR fees, as described in Measure 24 (e.g. weight, dismantling time of parts). Following the establishment of mandatory criteria, the contracting authorities would be obliged to apply these requirements when procuring the vehicles. The fulfilment of those criteria shall be included in technical specifications and award criteria of the tender.

The measure aims to ensure that during the public procurement, the vehicle chosen among other vehicles represents the significantly lower environmental impacts and considerably highest compliance with the eco-design (circularity) criteria of vehicle.

Interlinkages between the new Regulation replacing ELV and 3R type-approval Directives and the Clean Vehicles Directive is described in detail in Annex 10.

7.2.6 7.2.6 Policy Options 6A, 6B and 6C (related to specific objective 5 'cover all vehicles')

PO6A, PO6B and PO6C target the specific objective 6 **'Cover more vehicles'** with an increasing level of ambition. These options are cumulative.

PO6A includes a **limited extension of the scope** of the new legislation to additional categories of vehicles including L3e-L7e-category vehicles, lorries, buses and trailers[141]. The manufacturers of these vehicles would be required to **provide information** on the vehicles placed on the market, collected and treated and compositional information **to dismantlers and recyclers**, through existing or new platforms, **to facilitate depollution, dismantling and recycling** of these vehicles including CRMs. This shall include at the minimum information on the location of substances of concern as well as instructions on dismantling (M28). These requirements **would not be applicable to special-purpose vehicles, multistage and vehicles produced in small series**.

PO6A contains the following Measure (M28).

- **M28 – Provision of information to dismantlers and recyclers**

This measure extends the basic information provision requirements (as described in Measure 3) for manufacturers of L3e-L7e-category vehicles as defined in Article 4(1) and (2) of

[140] 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 (OJ L 188, 12.7.2019, p. 116–130).
[141] Respective vehicle categories L including e.g., microcars, M2, M3, N2, N3.

Regulation (EU) No 168/2013[142] and lorries, buses and trailers falling under the categories M2, M3, N2, N3 and O, as defined in Article 3 point 15 of Regulation (EU) 2018/858[143].

The new provisions would list the elements and harmonise the format in which data is to be provided, including the instructions on depollution, location of components that are worth dismantling for reuse or separate collection and recycling. Concrete requirements would be detailed in a delegated act. OEMs would maintain the right to decide how the information is to be provided to waste operators (e.g., elaboration of IDIS, access upon request to systems that currently use other stakeholders (IMDS, RMI) or development and access to new systems).

The requirement shall apply within 5 years after the entry into force of the Regulation.

PO6B consists of a **broader extension of the scope of the new legislation.** In addition to the requirements set out in PO6A, it includes a **mandatory requirement that end-of-life L-category vehicles (which includes motorcycles), lorries, buses and trailers are treated in an ATF**, with their dismantling accompanied by a CoD similar to PO4A (M30a). To complement this measure and ensure traceability of used vehicles, used **lorries and buses** should be subject to similar requirements than passenger cars **with regard export related requirement based on roadworthiness** (M30b). **Manufacturers of lorries, buses and L vehicle categories should also be requested to assume the responsibility for the collection and reporting obligations set for these vehicles (basic EPR scheme)** (M31). Finally, a review close for a phased-in future scope extension is included when more information is available (M32).

PO6B contains the following Measures 30-34 (M29b-M32):

- **M30a – Mandatory treatment of end-of-life L category vehicles (L3e-L7e), lorries (N2,N3) and buses (M2, M3) and trailers (O) at ATFs + CoD**

The measure extends the current Article 5(2) of the ELV Directive obliging the Member States to take the necessary measures to ensure that all end-of-life vehicles are transferred to authorised treatment facilities. The requirement to deliver and treat all end-of-vehicles would be extended to L-category vehicles[144], lorries, buses and trailers.

Authorised treatment facilities will have to treat these vehicles in accordance with the mandatory requirements, such as depollution, removal and storage of parts and components prior further treatment. Member States will have to take necessary measures ensuring that any establishment or undertaking carrying out treatment operations obtains a permit, defining general technical, safety requirements.

Authorised treatment facilities shall issue a CoD proving that end-of-life L-category vehicles, lorries, buses and trailers have been treated in compliance with the requirements set out in the

[142] Regulation (EU) No 168/2013 of the European Parliament and of the Council of 15 January 2013 on the approval and market surveillance of two- or three-wheel vehicles and quadricycles (OJ L 60, 2.3.2013, p. 52).
[143] Regulation (EU) 2018/858 of the European Parliament and of the Council of 30 May 2018 on the approval and market surveillance of motor vehicles and their trailers, and of systems, components and separate technical units intended for such vehicles, amending Regulations (EC) No 715/2007 and (EC) No 595/2009 and repealing Directive 2007/46/EC (OJ L 151, 14.6.2018, p. 1).
[144] L-category vehicles include light 2-wheel powered vehicles (category L1) , three-wheel mopeds (L2), two-wheel motorcycles (L3), two-wheel motorcycles with sidecars (L4), powered tricycles (L5), light quadricycles (L6) and heavy quadricycles (L7).

new legislation. The measure also includes new provisions on reporting on the registration and de-registration of L-category vehicles, lorries, buses and trailers based on the issue of certificate of destruction (CoD). This certificate shall be issued to the holder and/or owner when the end-of-life vehicle is transferred to a treatment facility. The new legislation will oblige the owner of a vehicle to request the national vehicle registration authority to de-register a vehicle by presenting a CoD.

ATFs will have to report to the competent authority on the number of CoDs issued per year. A CoD must include a VIN code of a vehicle delivered to an ATF.

- **M30b – Export requirements for lorries (N2, N3) and buses (M2,M3) and trailers (O) linked to roadworthiness**

The measure extends the requirements described in PO4 (M19c, M21) to buses. Lorries and trailers. New provisions will be foreseen, by obliging the actors exporting the used buses and lorries from the EU to third countries to make available to customs authorities the information on a vehicle status via electronic system. To ensure traceability of used vehicles, the Vehicle Identification Number (VIN) and the information on the Member State where the vehicle was last registered should be made available to customs authorities. Only those lorries and buses which are roadworthy will be authorised to be exported to non-EU countries. To facilitate the distinction between waste vehicles and used vehicles, a special list of mandatory legal criteria will be introduced into the new legislation, based on the Waste Shipment Correspondents' Guidelines No 9 on Shipments of Waste Vehicles[145]. Under this improved definition, a vehicle that is considered an economic total loss (in the country of last registration) will be considered as an ELV. The consequence would be that such vehicles should be delivered to ATFs and the Waste Shipment Regulation would apply to cross-border shipments of such vehicles.

These requirements shall apply within 5 years after entry into force of a new legislation.

- **M31 – Minimum EPR requirements for end-of-life L-category vehicles (L3e-L7e), lorries (N2, N3) and buses (M2,M3) and trailers (O)**

The measure foresees a basic application of the extended producer requirements to L-category vehicles, lorries, buses and trailers. These would namely include requirements for the Member States to establish collective or individual national EPR schemes in alignment with Articles 8 and 8a of the WFD, as described in M22 and M23. The requirement shall apply within 5 years after the entry into force of the Regulation.

- **M32– review clause on the regulatory extension of scope to new vehicles**

Based on evaluation of the reported data on the implementation of the measures listed under the PO6A and PO6B, the Commission shall provide an evaluation report on the possibility to fully include L-category vehicles, buses and lorries in the scope of the new legislation. This would also include the application of the relevant type-approval procedures on circularity requirements in those vehicles. The report shall be prepared within 7 years after entry into force of the Regulation, accompanied, if appropriate, by a legislative proposal.

[145] https://ec.europa.eu/environment/pdf/waste/shipments/correspondents_guidelines9_en.pdf

PO6C: Policy sub-Option 6C includes a full scope extension, with all requirements for M1 and N1 vehicles equally applying to the additional vehicles categories as well in the medium term. This implies full application of the modernised 3R type approval procedure and requirements on reusability, recyclability and recoverability as specified in PO1A-C, the recycled content requirements of PO2A-C, the advanced waste treatment requirements of PO3A-C (M33) and finally, the **establishment of EPR schemes**, including compliance cost offsetting and the other minimum EPR requirements as under PO5A-C, for motorcycles, lorries, buses and trailers (M34).

PO6C contains the following Measures 31 - 33 (M31c M33):

- **M31c - Full application of the extended producer responsibility (EPR) and advanced economic incentives of PO5**

The measure foresees a full application of the extended producer requirements to L-category vehicles, lorries, buses and trailers. In addition to the obligation for the Member States to establish collective or individual national EPR schemes in alignment with Articles 8 and 8a of the WFD, there would be additional requirements foreseen, namely, modulation and transfer of EPR fees from one Member State to another Member State, harmonized criteria for GPP and national Deposit Refund Schemes.

These requirements would not be applicable to special purpose vehicles, multistage and vehicles produced in small series.

These requirements shall apply after 7 years after entry into force of a new Regulation.

- **M33 – Full scope application of the new 3R type-approval and end-of-life treatment requirements to additional vehicle categories**

i) application of the 3R type-approval requirements from PO1

This measure extends the new design, production and end-of-life requirements to L-category vehicles, lorries and buses under the type-approval procedure. It means that only those L-category vehicles, lorries, buses and trailers which comply with the revised circularity related standards (as currently applied to M1 and N1 vehicle categories, including reusability, recyclability, recoverability and recycled content) shall be placed on the EU market.

For the purpose of calculating the compliance with reusability, recoverability, recyclability, a specific calculation methodology to be developed by the Commission within 3 years following the adoption of a Regulation, would be applied to the extended scope of vehicles. This methodology will instruct the vehicle manufacturers how they should demonstrate compliance with the recyclability and reusability of new vehicles, while taking into account the ongoing technological progress of the 'proven technologies' that exist at the moment of vehicle placement into the market.

The manufacturers of the extended vehicles would also be obliged to implement the information requirements, i.e., to provide information on dismantling and composition of vehicles.

The 3R type-approval procedures would enter into force after 7 years after adoption of the Regulation.

ii) full application of the recycled content targets from PO2

Mandatory recycled content targets would be extended to L-category vehicles, lorries, buses and trailers, as described in M9.

The requirements would enter into force after 7 years after adoption of the Regulation.

iii) full application of the reuse, recovery and recycling targets from PO3

The measure extends a mandatory 30% of recycling target for plastic to L-category vehicles, lorries, buses and trailers, based on the revised definition of "recycling" as aligned with the Waste Framework Directive. As in the case of M1 and N1 vehicle categories, it would be implemented in a combination with the additional requirements of the mandatory removal prior to shredding/PST (M13b), disposal ban of light-weighted automotive fractions (M16a), regulation of shredder/ post-shredder facilities (M16b, c).

The measure also introduces a new requirement for the Member States to collect and report data on the type and share of used or remanufactured automotive components of extended vehicle categories(14a). Such reporting obligation will allow to monitor the total level of reuse and remanufacturing at both national and the EU level per year. To ensure harmonized monitoring conditions, the new legislation will set out reporting requirements for ATFs, which will be obliged to provide information on all parts and components that were 1) dismantled and reused or 2) dismantled and remanufactured. Complementary provisions on the market support for the use of spare parts would be also foreseen (14b).

These requirements shall apply 5 years after entry into force of a new Regulation.

iv) full application of the collection, export and vehicle registration requirements of PO4

The measure extends the obligation for the Member States to annually report on the national vehicle stock and detailed changes to additional vehicle categories. The reporting elements will include the following data: i) total number of L-category vehicles, lorries and buses registered; ii) new registrations; iii) imports and exports of used L-category vehicles, lorries, buses and trailers; iv) temporary de-registrations, and v) permanent de-registrations.

The measure includes additional requirements for the export to non-EU countries, as well as full procedural requirements regarding the notification and share of information on the status of vehicles between Member States competent authorities, as provided in PO4C.

These requirements shall apply 5 years after entry into force of a new Regulation.

7.3 Description of discarded measures per policy option

7.3.1 7.3.1 Measures discarded for Policy Options 1: Strengthen the type-approval framework and reduce hazardous substances in vehicles

- **M34 - Voluntary pledges campaign to increase circularity**

This measure aims to motivate producers to increase circularity of their produced vehicles through voluntary commitments related to eco-design. To facilitate the exchange of information, the Commission would establish a platform for holding campaigns by targeting different areas where the circularity of vehicles can be addressed. In cooperation with the automotive sector (producers, waste management), sectoral targets would be set for each of these areas with a concrete timeline.

At the initial phase, a survey would be carried to collect information on the current state of play. Individual operators (producers, suppliers, waste operators) will be asked to participate

by submitting relevant information, including the confidential data. This data will be aggregated to assess the current status of existing circular practices with a view to set targets for a mid-term timeline. On this basis, campaigns will be held on the platform, inviting car manufacturers and suppliers to commit (i.e., to pledge) to achieving a certain share of the mutual target within the five-year timeframe.

The following areas are to be targeted in this manner:

Increase the rate of materials used in new vehicles, which are easy to re-use and recycle: In this respect, materials are to be targeted that increase the durability of parts (i.e., increasing potential for reuse) and/or that can be recycled at high efficiency and with no or minimum loss in quality (i.e., no downcycling) with the current capacities of the ELV waste management value chain. The ELV waste operators shall be consulted for this purpose in the identification of relevant materials and in the consideration of targets together with representatives of the automotive manufacturing sector that can be achieved in the mid-term.

Apply composite or materials for which no recycling/re-use is currently possible only when justified from a life cycle perspective: Materials which have a negative impact on the achievability of the ELV recycling targets shall be identified in cooperation with the automotive producers and the respective waste management sector. For such materials, the sector shall pledge to investigate impacts along the life cycle, use such materials only where use benefits set-off end-of-life costs and to provide funding for developing recycling capacities within a mid-term timeframe.

Increase the rate of recycled materials used in new vehicles: Together with the automotive manufacturing sector the current amounts of recycled materials used in the vehicle sector shall be established for e.g., steel, aluminium, copper, REE magnets, plastic (specific polymers), glass, rubber. For each of these materials, targets (sector amounts) for the mid-term shall be considered and set for increasing the amount of recycled content in vehicles.

Develop remanufacturing as part of their production process: vehicle manufacturers and their suppliers would be asked to report on the current level of use of remanufactured parts in the production of new vehicles and of "as good as new" spare parts. A target shall be set to increase the use of remanufactured parts, identifying specific components where the potential for remanufacturing is high and mainly depends on the level of demand. Manufacturers and their suppliers will commit to apply a larger share of remanufactured parts instead of new parts for repair but also in the assembly of new vehicles.

At the end of the five years, economic operators that have participated in the campaign would be asked to report on the implementation results. Based on the collected data, it will be monitored to what degree the set targets were achieved. In areas where the campaigns do not lead to significant results, the Commission would consider possibility to introduce the obligatory measures.

This measure has been discarded, as it is not deemed to be efficient as it will create extensive administrative burden for the vehicle producers and suppliers while still remaining non-mandatory obligation. It leaves uncertainty how many producers would be participating in the campaigns and to which extent the collected data would be comparable. Therefore, this measure is considered to be disproportionate and ineffective in terms of the results to be achieved.

- **M35 – Preparation of non-binding guidelines to improve circularity of vehicles**

Under this measure, the Commission would prepare the non-binding guidelines with recommendations for improving circular design and production of vehicles. The document shall be developed based on consultation with frontrunners of the sector explaining the relevant actions, their expected achievements, expected relation of costs and benefits of the action, potential cross-media affects to be avoided, benchmarks, etc. The guidelines would focus on the following aspects:

Design practices that support dismantling (by shortening dismantling time, increasing dismantlability with common ATF tools, avoiding of damage to component removed or environment),

Design practices that support high quality recycling (by promoting use or avoidance of certain materials or the mass of materials used in parts that are commonly removed prior to shredding),

Environmental management practices that encourage exchange of information between designers and dismantling facilities.

The preparation of the guidelines would be supported by dedicated studies (e.g. JRC[146]).

This measure was discarded due to its non-binding nature, also taking into account that similar guidance documents like EMAS exist for other sectors. The measure is disproportionate in terms as the development of the guidelines would create intensive administrative burden, although its effectiveness of the practical implementation cannot be proved.

- **M36 - Obligatory due diligence requirements for materials used in vehicles**

The measure aims to introduce specific due diligence obligations for the raw and secondary materials used in manufacturing a vehicle and its components. These requirements would apply to vehicle manufacturers and suppliers.

This regulatory framework addresses the global nature of the automotive supply chain where the materials constituting a vehicle are sourced from diverse non-EU countries. It is not always known to which extent local governing conditions and/or the level of performance of mining and processing facilities comply with the protection of human rights, public health, labour safety requirements. High dependency on material sourcing from such countries contributes to adverse impacts on society and on human health and the environmental. To prevent it, vehicle manufacturers and suppliers would be requested to perform due diligence when sourcing materials from high-risk countries. That include raw materials sourced from conflict-affected or high-risk areas and secondary materials from countries not complying with a minimum level of environmental performance and minimum social working conditions. Manufacturers and suppliers would be obliged, as part of the type-approval process[147], to provide declarations, including third party verification proof, demonstrating that materials present in a manufactured vehicle are sourced diligently. A list of materials to be covered under the due diligence requirements would be included in a dedicated annex to the

[146] JRC Report (2020): Sustainable use of Materials through Automotive Remanufacturing to boost resource efficiency in the road Transport system (SMART); JRC /2917) report: Best Environmental Management Practice for the Car Manufacturing Sector

[147] Documentation should also be provided to the Member States inspections.

Regulation, including the thresholds for the total amount of the materials above which the due diligence obligation would comply. The annex would be updated on a regular basis.

Following the preliminary assessment, the potential measure has been discarded as the due diligence requirements for the automotive sector are applied through other the EU legislations:

i) In relation to the sourcing of minerals from conflict-affected or high-risk areas, Regulation 2017/821/EU[148] already lays down supply chain due diligence obligations for the EU importers of tin, tantalum and tungsten, their ores, and gold originating from such areas. Therefore, sourcing of e.g., tin, tungsten, tantalum, niobium and gold minerals and metals for vehicle manufacture are already addressed through this Regulation, making the new obligation redundant. In parallel, the European Commission is planning to review the current Regulation 2017/821/EU, which eventually lead to adaptations in both future due diligence requirements as well as in the materials for which such requirements are necessary.

ii) The Commission proposal for a Directive on corporate sustainability due diligence[149] cover the companies and operations relevant for the manufacturing of vehicles. The core elements of this duty are identifying, bringing to an end, preventing, mitigating and accounting for negative human rights and environmental impacts in the company's own operations, their subsidiaries and their value chains. The new rules aim to ensure that businesses address adverse impacts of their actions, including in their value chains inside and outside Europe. Therefore, additional due diligence requirements for the automotive industry are considered to be redundant.

Description of other measures corresponding to the voluntary activities of vehicle manufacturers and their suppliers to promote the circularity in vehicles, including reused and remanufactured components, are provided in the supporting study of the impact assessment.

7.3.2 7.3.2 Measures discarded for Policy Options 2: Increase the use of recycled materials in new vehicles

- **M37 - Higher than 30% of recycled content target for plastics in 2030**

The description of measure builds on the same content elements as in those presented under PO2A-C. The level of targets is deemed to be too far reaching. Therefore, the measure is discarded, as it creates high risk of supply – demand misbalances and disproportionate additional costs to the sector.

- **M38 - Recycled content targets for copper**

With targeted measures for copper separation for improving the quality of steel and aluminium scrap, once removed, there is sufficient intrinsic value and thus no remaining secondary raw material market failures to be addressed to ensure better uptake of copper fractions and thus no need for a recycled content type of target.

[148] Regulation (EU) 2017/821 of the European Parliament and of the Council of 17 May 2017 laying down supply chain due diligence obligations for Union importers of tin, tantalum and tungsten, their ores, and gold originating from conflict-affected and high-risk areas (OJ L 130, 19.5.2017, p. 1).
[149] Proposal for a DIRECTIVE OF THE EUROPEAN PARLIAMENT AND OF THE COUNCIL on Corporate Sustainability Due Diligence and amending Directive (EU) 2019/1937 (COM/2022/71 final)

- **M39 - Recycled content targets for glass**

Due to high specifications for automotive glass, using recycled content is not foreseen to be technically feasible. Removing window glass from the vehicles under **PO3A** removal obligations is selected as the best type of measure: A relatively clean fraction is obtained for further use in container glass or in the ceramics industry without the need for further economic support. In addition, with improving the recycling definition, backfilling of ASR and the landfill ban as well as high landfill costs will steer these glass fractions to recycling processes. Removal of windows further supports less maintenance for shredders/ PST operators. The measure introduces a requirement to use a minimum share of recycled materials (glass) in newly designed and type-approved vehicles. Requirements for a recycled content target to be would need to be reached within a given timeframe in compliance with additional parameters specifying the origin of secondary materials (e.g., pre-consumer vs. post-consumer; ELVs vs. other end-of-life product streams).

Therefore, the possible measure to set a recycled content target for glass is discarded, as other more effective measures are proposed to promote high quality recycling of automotive glass (e.g., excluding backfilling form recycling, obligations for ATFs to dismantle glass prior to shredding operations, recycling target for glass). Furthermore, setting a material specific recycled content target for glass under this PO2 is not regarded as the right type of measure and excluded from further considerations.

- **M40 - Recycled content targets for rubber/ tyres**

To ensure a coherence between sectoral legislation, possibility to set a recycled content for rubber will be examined under the Ecodesign for Sustainable Product Regulation (ESPR), together with other potential design-related requirements for tyres, e.g. recyclability. Therefore, this measure is discarded in the context of this review.

Aspects to be taken into account: there is significant improvement potential in the case of rubber recycling from tyres and (chlorinated) rubber from ELV fractions originating from for instance seals and hoses. Key focus for rubber is to ensure higher quantity and quality of recycling of ELT (End-of-life Tyres) products in various applications like use as artificial turf, infills in road construction products, devulcanization processes, chemical recycling and energy recovery processes like use in cement production, etc. For the 'higher quality' routes there is a need to take into account adequate measures to avoid the release of PAHs (Polycyclic aromatic hydrocarbons) and microplastics from recycled products[150].

7.3.3 7.3.3 Measures discarded for Policy Options 3: Increase the quantity and quality of materials re-used, remanufactured and recycled from ELVs

- **M41 – setting specific recycling targets for metals**

Following a preliminary assessment of economic, social and environmental impacts, measures are considering material-specific recycling targets for metals have been discarded:

- Steel: concerns focus more on the quality of ELV steels,

[150] Mechanical Tyre Recycling Fact Sheet – EuRIC, 2022

- Copper: high administrative burden, complicated sampling and other measures expected to be much more efficient (mandatory removal and quality requirements).
- Aluminium: a general recycling targets is discarded for the same reasons as for copper.

- **M42 – setting specific recycling targets for non-metal materials**

For other materials, certain specific recycling and reuse measures are discarded due to other approaches being assessed more effective in reaching similar or better results:

- Electronics: Aiming at improved recovery of electronic components via setting PST treatment requirements is discarded as other measures related to copper removal and manual dismantling are more effective.

Voluntary activities of vehicle manufacturers and their suppliers to promote the application of reused and remanufactured components is discarded because improving the conditions for the use of spare parts is expected to be more effective.

7.3.4 7.3.4 Measures discarded for Policy Options 4: Increase the collection of ELVs in the EU

A range of voluntary measures have been discarded due to low expectation on their effectiveness, important feasibility challenges, subsidiarity reasons or legal obstacles. These measures include the following:

- **M43 - Establish a mandatory collection target of ELVs based on the reporting obligations on the national vehicle market**

The measure is based on Article 5 (2) of the current ELV Directive stipulating that "Member States shall also take the necessary measures to ensure that all end-of life vehicles are transferred to authorised treatment facilities." This implies, 100% of the generated ELVs should be collected. Therefore, this measure would expressively set this level mandatory collection target.

Implementation of this target would require a detailed reporting by the Member States on the national fleet, including precise traceability of export and import per year. Due to the lack of the comparable reporting mechanism at national level and data for intra EU trade, it is not possible to assess the feasibility to achieve 100% collection target. Therefore, setting a mandatory collection target for ELVs is considered to be premature.

- **M44 - Voluntary campaigns on export of ELVs with a focus on the current waste shipment correspondents' guidelines No9 on distinction between ELVs and second-hand vehicles**

The Waste Shipment Correspondents developed the Specific guidelines No 9[151] to assist enforcement and customs officials in implementing the rules on the export of ELVs, and especially to distinguish between ELVs and used cars. According to these guidelines, the distinction between waste vehicles and used vehicles, first of all, depends on the answer to the question whether the holder of the vehicle intended to discard it or not. In practice, as the

[151] Correspondents' Guidelines No 9 on shipment of waste vehicles: https://ec.europa.eu/environment/waste/shipments/pdf/correspondents_guidelines9_en.pdf

guidelines are not legally binding and contain advice rather than straightforward criteria to distinguish between waste and non-waste, they are not applied consistently across the Union. Furthermore, the guidelines refer to a case-by-case approach according to a number of characteristics.

To support the enforcement of these Guidelines, the measure introduces voluntary campaigns to be performed by the Member States authorities[152]. These campaigns should be helpful in detecting illegal cases and failure in recognizing the status of a vehicle. Implementation scale of the campaigns depends on additional funding and allocation of additional human resources by the Member States. Taking into account that this measure would be based on a voluntary model, its effectiveness would remain negligible as it would not establish a systemic effect across the EU. Therefore, the measure has been discarded. Instead, minimum inspection requirements accompanied with the mandatory criteria distinguishing ELV from an used vehicle are proposed for the future Regulation.

- **M45 – Establishing a central EU vehicle registration database, including a conclusive list of conditions for permanent cancellation of the registration and management of temporary deregistration, establishment of a notification system for ELV, CoD and a conclusive list of conditions for permanent cancellation of the registration**

The measure foresees the establishment of a central EU vehicle registration database, which would enable an electronic notification procedure between Member States when a CoD is issued for a vehicle last registered in another Member State. The Member States where the CoD is issued but the vehicle was not registered (respectively not registered the last) is obliged to inform the Member State where the vehicle was last registered. Member States shall jointly establish a data exchange, making it possible to submit such information and to search by VIN for a vehicle, when the last owner (respectively country where the vehicle is been registered last), cannot be detected from accompanying (respectively missing) registration documents.

The measure has been discarded as unproportionate and unfeasible to implement.

- **M46 - Exchange of Member States on the implementation of incentives supporting effectiveness of the Certificate of Destruction (CoD)**

Under this measure, the future Regulation would require the Member States to report on the implementation of minimum one of the economic incentives listed in the revised legislation to encourage the last owner of an end-of-life vehicle to deliver it to an ATF and receive a CoD in return. Tree alternative options might apply for such incentives:

[152] Today only few Member States are known to perform special campaigns on the illegal export of ELVs: A study commissioned by the German UBA in 2006 titled "Improving precious metal cycles: analysis of export flows of used cars and electrical (electronic) equipment at the Port of Hamburg" Verbesserung der Edelmetallkreisläufe: Analyse der Exportströme von gebraucht-Pkw und –Elektro(nik)geräten am Hamburger Hafen; Used vehicles exported to Africa: A study on the quality of used export vehicles (2020). Netherlands Human Environment and Transport Inspectorate, Ministry of Infrastructure and Water Management. available at: https://www.ilent.nl/binaries/ilt/documenten/rapporten/2020/10/26/rapport--used-vehicles-exported-to-africa/RAPPORT-+Used+vehicles+exported+to+Africa.pdf.

1. Link the (end of the) payment of insurance[153] schemes to provision of CoD;
2. Link the end of administrative fees to provision of CoD;
3. Member States set up other financial incentives (premium / pay out) for last owners to hand over ELVs to ATFs, possibly as part of EPR scheme

There is a risk that implementation of this measure might raise the subsidiarity concerns. Moreover, it would be difficult to ensure a proper implementation control of the actions and prevent the illegal activities. There are cases when the fraudulent contracts are presented to the insurance companies and the vehicle is instead delivered to an illegal dismantler at a higher profit than if offered to an ATF.[154] This demonstrates that this measure would not be sufficient to reach the desired effect. Therefore, the measure is discarded as disproportionate and inefficient.

- **M47 - Support / software interfaces to international notification system**

The measure aims to establish an internationally operating notification system for vehicles, where all the relevant registration information, including CoD and final cancellation would be available. The governance role and operating costs of the system would be attributed to the producers. Following the preliminary assessment, the implementation of the measure may raise subsidiarity concerns as processing of data related to the vehicle registration falls under the competence of national registration authorities. The producers shall not interfere in the cooperation of the national registration systems. Furthermore, it is technically challenging to shift this obligation to producers. As a result, the measure has been discarded.

Description of other measures contributing to the collection of ELVs in the EU is provided in the supporting study of the impact assessment. These measures include the following: exchange on Member State best-practice on national implementation and enforcement; enforcement actions by Member States through EU funding and EU enforcement actions against environmental crime; promote international non-binding actions at the international level (through UN Environmental and road safety programmes).

- **M47a – Setting maximum threshold for age and minimum level of emissions for the export of all used vehicles from the EU to third countries**

As an alternative to the requirement for the exporters to non-EU countries to provide the information on the roadworthiness status of the used vehicles (M19c), another measure was considered, according to which a maximum age of the vehicle or a minimum EU emission standard would be established for export of all the EU used vehicles to third countries. However, this measure was considered to have a disproportionate effect of banning all the export of used vehicles in manner which would not allow to take into account the specific import requirements for the used vehicles, when these are applied and communicated by the import countries. Instead, it was suggested to apply a phase-in approach. First, all vehicles which are exported from the EU to third countries would need to be 'roadworthy' in

[153] Directive 2009/103/EC of the European Parliament and of the Council of 16 September 2009 relating to insurance against civil liability in respect of the use of motor vehicles, and the enforcement of the obligation to insure against such liability
[154] Such cases are known in the Netherlands where the assumption is that around 30 000 ELVs are reportedly exported but remain in the Netherlands and are treated in substandard treatment facilities. More information is available: Janet Kes & Pieter Kuiper (2016): De-registration and monitoring of ELV's in NL; Presentation at the stakeholder workshop organised by the EC: assessment of the implementation of directive Directive 2000/53/EU on end-of-life vehicles with emphasis on the end-of-life vehicles of unknown whereabouts; Date: 21 November 2016

accordance with Directive 2014/45/EU[155]. This would ensure that these vehicles comply with the EU stringent environmental and safety standards. Moreover, such approach would ensure that the vehicles which are exported with the aim to continue their service in third countries, are not of lower quality than those which are authorised to be on the EU public roads. Furthermore, the future legislation would foresee a possibility to develop a control mechanism to check how the EU vehicles exported under these procedures, comply with the specific requirements imposed by third countries regarding the environment and road safety. Such control approach would be subject a follow up communication between the EU and the third countries on the import requirements that adopted and enforced in the destination countries.

Measures discarded for Policy Options 5: Provide appropriate financial and organisational incentives to increase circularity in the automotive sector and improve the collection of ELV

- **M48 - establishment of the EU wide scheme on the extended producer responsibility**

The measure aims to establish a single EU-wide EPR scheme for ELVs. This approach would replace national EPR systems.

Despite the existence of comprehensive EU legislation and the responsibility being directed to producers under EPR schemes, the governance of waste management (including ELVs) is organised at national level by each Member State, leaving them the discretion to choose how to regulate and arrange the relationship between waste operators and producers of specific products. This is notably due to the fact that the functioning of EPR schemes is dependent on a combination of market factors, e.g. level of labour costs, distribution/territorial coverage of waste treatment infrastructure or prices for spare parts or recyclates, which are variable throughout the EU.

While there could in principle be merits in considering the adoption of EPR scheme at the EU scale for ELV, in view of the integration of the EU market for the automotive sector and important movements of used vehicles between EU Member States, this would represent considerable changes compared to the current organisation for such schemes. This would first deprive Member States of their ability and freedom to organise the relations with the various actors in the waste sector. This would also require that this organisation and the scrutiny on how the EPR scheme operate and comply with the EU requirements is done at the EU level through a new EU body. This would have financial and resources implications, which are not factored in in the current Multi-Annual Financial Framework. Leaving the governance of EPR for ELV at the national level (where Member States often already have a department in their Ministries or Agencies dealing with EPR issues) would on the other hand build on their expertise and experience and respect the subsidiarity principle.

The proposed measure is therefore not considered further. It should be stressed that the cross-border dimension of EPR schemes for ELV is addressed through measure 25, allowing national EPR scheme to take account of the EU dimension of the problem. In addition, measure 22 clarifies that producers would be entitled to develop individual schemes at national level, if they so wish.

[155] Directive 2014/45/EU of the European Parliament and of the Council of 3 April 2014 on periodic roadworthiness tests for motor vehicles and their trailers and repealing Directive 2009/40/EC (OJ L 127, 29.4.2014, p. 51)

- **M49 - European-wide deposit refund scheme for vehicles supervised by a single European body**

Under this measure, Member States or vehicle producers would be obliged to pay into a European fund a minor amount per year for each new vehicle placed on the market in the EU. An EU level authority would be assigned to supervise the EPR funds. The European fund would pay out a fixed amount to the last owner of a vehicle when it becomes an ELV and a CoD is issued. Preliminary assessment concluded that such European-wide approach would be more beneficial for the Member States importing a high share of used vehicles. Upon it, all vehicle drivers would pay the same fee and get the same pay out as the last owners. However, this measure does not address the differences across the EU Member States of the ELV treatment costs and could lead to cases of fraudulent issuance of CoDs, e.g. for vehicles that are actually exported to non-EU countries. The approach requires strictly harmonized rules for registration and deregistration vehicles, as well dissuasive penalties, which are currently lacking. Taking all these aspects into account, the measure is discarded as premature and disproportionate to the expected results.

- **M50 - Collection of vehicles at holder's premises and abandoned vehicles free of charge for the last holder**

The measure sets an obligation for producers to collect vehicles at holder's premises and abandoned vehicles free of charge for the last holder. The measure extends the current legal provision where the last holder is obliged to deliver the vehicle to an ATF or collection point. Producers are responsible to offer ATFs/ collection points sufficiently close coverage. Following the preliminary assessment, it is considered that the implementation of this measure might lead to inefficient cost. Moreover, such regulatory approach might influence an undesirable behavioural pattern of last holders by discouraging them to deliver a vehicle to an ATF and instead abandon it. Consequently, this measure has been discarded.

7.3.5 7.3.5 Measures discarded for Policy Options 6: Encourage the transition to a circular economy in sectors which are currently outside the scope of the ELV and 3R type-approval legislation

- **M51 - Extension of new requirements to special purpose, multistage vehicles and vehicles produced in small series**

Under this measure, additional vehicles would be phased-into the Regulation through an extension of the vehicle category scope, namely type-approved vehicles of categories Le1-Le7 (motorcycles), M2 and M3 (buses), N2 and N3 (lorries) and O1-O4 (trailers and semi-trailers). Special-purpose vehicles[156] and multi-stage built[157] vehicles of category M2, M3, N2, N3, and O (considered not relevant for L-category vehicles) or such vehicles built in

[156] According to Regulation 2018/858/EU: 'special purpose vehicle' means a vehicle of category M, N or O having specific technical features that enable it to perform a function that requires special arrangements or equipment, and characterised through Regulation 2018/585/ EU, Annex 1, Part A, point 5.

[157] as referred to in Regulation 2018/858/EU. The multi-stage procedure (described in article 22(1) of the mentioned Regulation) is a procedure where "one or more approval authorities certify that […] an incomplete or completed type of vehicle satisfies the relevant administrative provisions and technical requirements" (Regulation 2018/858/EU, article 3(8)).

small series[158] which are currently not covered would subsequently be covered. There is a lack of information that would allow the quantification of the costs and benefits for their inclusion.

Taking into consideration findings of the impact assessment, including the stakeholder comments, the measure has been discarded as disproportionate and premature. It is thus concluded to completely exclude small series, special purpose vehicles and multi-stage built vehicles from the requirements related to the 3R type-approval and end-of-life treatment.

- **M52 – A full regulatory 3RTA scope extension to all vehicle categories**

The measure foresees a full scope application of 3R type-approval and end-of-life treatment requirements to all vehicle categories which are currently excluded from the regulatory scope. These vehicles also include ships, planes and trains, agricultural and mobile machinery, military and space vehicles, and non-type approved (electric) bicycles. These vehicles are regulated by other EU legislation. Their type-approval procedure is separate from that of road vehicles and does not address objectives of the 3R. Potential changes to the current provisions of 3R type-approval regulation will not impact the increase of circularity of these vehicle categories, as ISO:22628 standard applies only for road vehicles. It is questionable whether the new Regulation would be the most efficient to regulate other vehicle categories, notably non-road vehicles. Similar concerns are identified with regard to end-of-life treatment requirements. There is no data available to prove to which extent all vehicles contribute to the problems defined in the impact assessment and what EU level intervention is needed to address them. As a result, this measure is discarded as disproportionate and premature.

Table 7.3 Additional information on non-road vehicles

Additional information on non-road vehicles:

- *Non-type approved e-bikes are regulated under Directive 2011/65/EU on the restriction of the use of certain hazardous substances in electrical and electronic equipment (RoHS) and Directive 2012/19/EU of the European Parliament and of the Council of 4 July 2012 on waste electrical and electronic equipment (WEEE), and its batteries to be regulated by the Battery Regulation.*
- *Ships: The end of life of ships is covered by Regulation (EU) No 1257/2013 on Ship Recycling;*
- *Planes: they are not disposed of in the EU; a lot of parts are leased so there is a huge remanufacturing scene/market; high shares of composites, GLARE[159], titanium and specific alloys (corrosion resistant, high strength, low weight like Al-Li, etc.)*
- *Trains are few, e.g., there are ~300 operating long-distance trains in Germany that run for 40 years approximately. That is considerably less than the annual limits of the definition in the type approval of what are small series, which are specially exempted. Generally, there is little waste, and a high recyclable fraction is expected*
- *Agricultural and non-road mobile machinery (NRMM): These are low volume, high variety vehicles, meaning that it is typical for such vehicles to be produced in small series and in a wide range of models for specific purposes. Vehicles are for the most part heavy duty with long service life. These are difficult to address with "general", overarching measures, Vehicles used in agricultural and forestry activities such as*

[158] In the Regulation 2018/858, the general type-approval regulation in force today, the annual limits per Member State are 500 units for O1, O2, and 250 for M1, M2, M3, N1, N2, N3, O3, O4. The EU-wide annual limits are 1 500 for M1, N1, N2, N3, and 0 for other categories.

[159] glass-reinforced aluminium laminate

all-terrain vehicles (ATVs) and Side-by-sides (SbS) belong to the so called "T-category" and are subject to a specific type-approval regulation (Regulation (EU) No 167/2013);

- *Military purposes & space: Directive 2011/65/EU on the restriction of the use of certain hazardous substances in electrical and electronic equipment (RoHS) and Regulation (EC) 1907/2006 on REACH do not apply to applications designed solely for military purposes and/or for space.*

ANNEX 8: OVERVIEW OF IMPACTS OF POLICY OPTIONS AND MEASURES

In the next sections, the impacts are presented for 2030, 2035 and 2040. Data for 2025 is not provided with most measures not expected to be (fully) implemented. The main year for comparison is 2035 as around that time the measures with long timelines are expected to be fully implemented.

8.1 Environmental impacts

7.3.6 8.1.1 Design circular: Improve reusability, recyclability and recoverability, 3R type-approval

For PO1 only a qualitative assessment was possible. The actual benefits are of a long term and preventative nature which is materialising when the vehicles become waste many years later. It is therefore difficult to quantify the exact environmental benefits and value for the long-term future. Nonetheless, the value of the measures can be compared qualitatively against the current baseline, where past design choices frequently hinder nowadays recycling attempts.

The general reusability and recyclability of vehicles placed on the market following the **PO1A - improved 3R type-approval compliance verification** requirements are expected to improve the level of reuse and recycling rates with around 5%. Reuse and recycling rates could increase further in the long term due to requirements on the use of digital keys and interchangeable components and/or from the dismantling tests that OEMs will need to perform and submit documentation for. The qualitative analysis due to its long-term prevention character only generates results many years later when vehicles become waste. The **PO1B - Circularity Strategy** will have more immediate effects. The design for dismantling requirements and increased cooperation with recyclers, will jointly enhance recycling of increasing shares of lightweight non-recyclable materials in the medium-term (within 7 years after initial type approval). The **PO1C – Digital Product Passport** provides necessary reuse and dismantling information to address existing information gaps to match supply and demand for spare parts in particular. The additional mandatory declaration on the use of recycled content for all materials provides better substantiation of such claims to the consumer and verifiable information to the decarbonisation achievements of manufacturers in comparison.

Table 8.1 Summary qualitative assessment of the environmental impacts for policy options 1.

Environmental impacts (2035, compared to baseline)	**PO1A**	**PO1B**	**PO1C**
3R type-approval - Circularity	(+)	(++)	(+++)
Hazardous substances (see Annex 9)	(++)	(++)	(++)

The analysis for hazardous substances is conducted qualitatively as well. For the provisions on the four substances currently restricted under the ELV Directive, it can be concluded that, under the current ELV Directive, significant environmental benefits have been achieved: An ex-post analysis on the four heavy metals shows environmental benefits of past restrictions:

lifecycle emission reductions between 2000 – 2005 for Pb were estimated at 99,6%, for Cd at 96% and for CrVI at 99,99%[160]. Remaining exemptions without an expiry date[161] still require future reviews. No significant difference in environmental impacts is expected for each of the suboptions under PO1. The options 'restriction under REACH and other existing legislation' and the 'hybrid approach', for restricting new hazardous substances, their efficiency and effectiveness in addressing the environmental impacts of the substances concerned is expected to be broadly similar to that of the enhanced assessment defined in the measure 'maintain under ELV', given in all cases risk and socio-economic assessments, as well as analysis of alternatives is enhanced, as compared to current provisions under the ELV Directive, and the assessment is carried out with the support of ECHA. More detailed assessment and impacts information can be found in Annex 9.

7.3.7 8.1.2 Increase the use of recycled content – plastics and steel

PO2A – plastic recycled content targets[162] of 10% in 2035 based on the **fleet level** create a final demand for recyclates in the automotive industry of 240 ktons in 2035[163]. **PO2B – targets** of 25%[164] starting in 2030 **for newly type-approved** vehicles correspond to an additional demand of recyclates of 713 ktons for 2035. This should boost the recycling of plastics from ELVs, as this means that 53% of ELV plastics recyclates would have to be reintroduced in the automotive sector. **PO2C – targets** of 30% in 2035 correspond to a demand of recyclates of 872 ktons in 2035[165]. The target would represent an effective recycling rate of available ELV plastics of 64% which poses a supply – demand imbalance risk. The GHG savings linked to **PO2B** would be 314 ktons of $CO_{2\text{-eq}}$, and 376 ktons of $CO_{2\text{-eq}}$ for **PO2C**.

The summary of the main environmental impacts for the PO1 and PO2 affecting the design and production stages are visualised in Table 8.2.

Table 8.2 Summary environmental impacts for the plastic recycled content targets

Environmental impacts (2030, 2035,2040, compared to baseline)	**Baseline**	**PO1A**	**PO1B**	**PO1C**	**Preferred**
Design and production stage					
3R type-approval - Circularity		(+)	(++)	(+++)	(+++)
Vehicles placed on market (N1,M1)		15,024,844			
JRC report scenario nr		JRC3a 10% in 'fleet' 2035	JRC4b 25% of newly TA from 2030	JRC 4c 30% of newly TA from 2030	JRC4b 25% of newly TA from 2030
2030					

[160] Baron, Y.; Kosińska-Terrade, I.; Loew, C.; Köhler, A.; Moch, K.; Sutter, J.; Graulich, K.; Adjei, F.; Mehlhart, G.: Study to support the impact assessment for the review of Directive 2000/53/EC on End-of-Life Vehicles by Oeko-Institut, June 2023

[161] The lead in alloy exemptions 1(a), 2(c)(i), 2(c)(ii) and 3 and special exemptions for lead in solders such as 8e and lead in glass or ceramic materials (exemption 10(a) and 10(b))

[162] Maury, T., Tazi, N., Torres De Matos, C., Nessi, S., Antonopoulos, I., Pierri, E., Baldassarre, B., Garbarino, E., Gaudillat, P. and Mathieux, F., Towards recycled plastic content targets in new passenger cars, EUR 31047 EN, Publications Office of the European Union, Luxembourg, 2022, ISBN 978-92-76-51784-9 (online), doi:10.2838/834615 (online), JRC129008

[163] Corresponds with the scenario JRC3a of the JRC study (JRC129008).

[164] Corresponds with the scenario JRC4b in the Annex of the study (JRC129008).

[165] Corresponds with the scenario JRC4c in the Annex of the study (JRC129008).

Recycled content plastics (kton)	**92**	+111	+505	+608	+505
Reduced decease incidence PM	1.6	+1.8	+8.1	+9.7	+8.1
Energy savings (GWh)	868	+1,067	+4,854	+5,844	+4,854
BOE (million Barrel of Oil equivalent)	0.5	+0.6	+2.9	+3.5	+2.9
CO2 savings (kton) (allocated, plastics)	35	+48	+250	+295	+250
2035					
Recycled content plastics (kton)	**123**	+240	+713	+873	+713
Reduced decease incidence PM	2.1	+4.1	+13	+16	+13
Energy savings (GWh)	1,161	+2,264	+7,283	+8,740	+7,283
BOE (million Barrel of Oil equivalent)	0.7	+1.4	+4.5	+5.4	+4.5
CO2 savings (kton) (allocated, plastics)	46	+90	+314	+376	+314
2040					
Recycled content plastics (kton)	**123**	+240	+713	+873	+713
Reduced decease incidence PM	2.1	+4.1	+13	+16	+13
Energy savings (GWh)	1,161	+2,264	+7,283	+8,740	+7,283
BOE (million Barrel of Oil equivalent)	1	+1.4	+4.5	+5.4	+4.5
CO2 savings (kton) (allocated, plastics)	46	+90	+314	+376	+314

PO2: The level of confidence in the analysis of plastics – recycled content targets is high due to the substantial quantification effort and depth of the technical analysis by the JRC. The stocks and flows assessment and underlying assumptions are extensively tested and validated by stakeholders[166]. The forward-looking analysis of supply and demand of automotive plastics is of a lower confidence as dependent on future market fluctuations. The original study focused on the application of the measures to the entire vehicle fleet placed on market represented by the JRC 'scenarios 3' and did not include the smaller subsection of light commercial vehicles (N1). The later choice for the target applying to newly type approved vehicles is represented with the JRC 'scenarios 4' in below Figure 8.1.

[166] Maury, T., Tazi, N., Torres De Matos, C., Nessi, S., Antonopoulos, I., Pierri, E., Baldassarre, B., Garbarino, E., Gaudillat, P. and Mathieux, F., Towards recycled plastic content targets in new passenger cars, EUR 31047 EN, Publications Office of the European Union, Luxembourg, 2022, ISBN 978-92-76-51784-9 (online), doi:10.2838/834615 (online), JRC129008

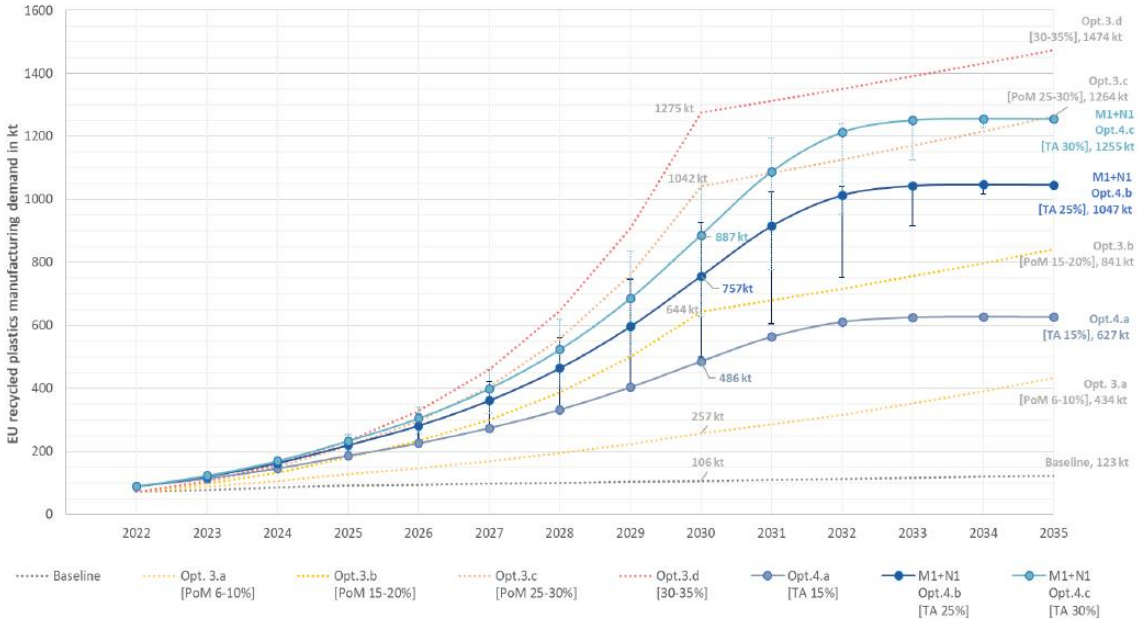


Figure 8.1 Comparison of plastics recycled content volumes in the JRC study until 2035

The increase of the demand regarding recycling plastics is plotted in Figure 8.1 for each of the scenarios 4 and then compared to the previous options 3. As anticipated, **the demand growth is more progressive in the case of the newly type approved targets** compared to the scenario 3 fleet requirements originally computed. Late and early adoption scenarios are depicted in Figure 8.1 with the uncertainty bars for options 4.b and 4.c. **Overall, option 4 series postpone the final level of the demand for recycled plastics by around 5 to 6 years**, i.e., 2035 instead of 2030 in case of an application date in 2030. In the best case (early adoption), it will delay the demand by only one year. As expected, the previous option 3.c (25 % in 2030 and 30% in 2035) corresponds in terms of ambition to the option 4.c (TA 30% in 2030) with a demand raising to 873 kton for the share placed on the EU market in 2035. **Option 4b** (TA 25% in 2030) **is more ambitious than the previous option 3.b**, with a demand of 713 kton in 2035.

Compared to previous options analysed (options 3 series), the new policy options developed according to the **TA procedure (options 4) postpone by around 5 to 6 years the demand for recycled plastics.** This is modelled through an S-curve depicting the penetration of newly TA vehicles in the fleet of newly registered vehicles (for more information see figure A5.2 in the JRC study[167]). In the best case (early adoption), it will delay the demand by only one year (see Figure A5.3 Option 4.c upper bound in 2031 compared to Option 3.c in the JRC study).

Regarding **recyclates production from ELV sources**, the revised fleet model including M1 and N1 forecasts a more limited growth of vehicles manufactured and registered in Europe while anticipating a higher ELV collection rate, which will allow recyclers to produce more recycled plastics from ELV sources. This has some implications favouring the supply/demand

[167] Maury, T., Tazi, N., Torres De Matos, C., Nessi, S., Antonopoulos, I., Pierri, E., Baldassarre, B., Garbarino, E., Gaudillat, P. and Mathieux, F., Towards recycled plastic content targets in new passenger cars, EUR 31047 EN, Publications Office of the European Union, Luxembourg, 2022, ISBN 978-92-76-51784-9 (online), doi:10.2838/834615 (online), JRC129008

balance by lowering the demand and maintaining approximately the same level of recycled plastics produced (e.g., same estimation regarding the amount of recyclates produced for 2030).

The balance between demand coming from the closed loop criteria (25% of the demand) and the production capacity does not seems at risk for option 4.c and 4.d when sufficient recycling yields for PP, PE and ABS are achieved (i.e., total recycling rate >25%). It should be noted that several front-runners already achieve a 25% recycling rate in 2022 based on PP, PE and ABS recycling. The plastics recycled content options here are flanked by measures under PO3B, where a mandatory plastics recycling rate is proposed of 40% recycling ensuring the balance would be even more favourable.

Table 8.3: Summary table of the JRC scenarios 3.b, 3.c. and 4.b, 4.c for 2030 and 2035. The numbers with a (*) have been estimated from previous assessment related to option 3 series.

	2022	**2030**				**2035**			
Criteria	**Baseline**	**3.b**	**3.c**	**4.b**	**4.c**	**3.b**	**3.c**	**4.b**	**4.c**
Rec. content targets	**-**	**15%**	**25%**	**25% (TA)**	**30% (TA)**	**20%**	**30%**	**-**	**-**
1) Annual growth rate of recycled plastics content	3%	29%	37%	26%	28%	6%	4%	-	-
2) Demand of recycled plastics (kt) *	89	644*	1042*	**757***	**887***	841*	1264*	**1047***	**1255***
3) Demand compared to CPA 10 Mtonnes (%) *	1%	6%	10%	**8%**	**9%**	8%	13%	**10%**	**13%**
4) Maximum consumption of ELV recyclates to fulfil the demand (% for FRS sc.)	10%	43%	69%	**50%**	**59%**	43%	64%	**53%**	**64%**
5) Estimated maximum open-loop demand (kt)	67	483	782	**568**	**665**	631	948	**785**	**942**
6) Estimated CO2 savings (kg C02 eq., per car)	0	-14	-26	**-19***	**-22***	-19	-31	**-26***	**-31***
7) Estimated recyclers additional profitability (M€)	0	+250	+402	**+310**	**+374**	+296	+425	**+318**	**+393**
8) Estimated extra-cost per vehicle manufactured (€)	*0*	*+18*	*+34*	***+24****	***+34****	*+24*	*+49*	***+34****	***+49****

Source: JRC own elaboration

* The numbers are for all vehicles produced in Europe (19.7 million), the impact assessment allocates the relative share to the vehicles placed on the EU market (15.0 million).

Option 4.c seems to perform the best and allows the car manufacturers a more progressive uptake in term of recycled plastics compared to 3.c. However, it appears crucial to combine the recycled content targets measure with complementary provisions such as better implementation of the design for recycling, wider deployment of the PST, minimum recycling rate for ELV plastics or reduction of unknown whereabouts flows. The additional costs per

vehicle is also slightly higher in the case of a 4.c compared to, e.g., 4.b. The investment needed in R&D could be compensated by economic incentives mechanisms such as EPR modulation fees. The option 4.b might be easier to implement because of the slightly lower ambition in the mandatory recycled content level.

In both cases, a transition period thanks to an early deployment of option 2.a (mandatory declaration coupled with EPR fee modulation) is suitable to boost the recycled content demand and prepare the automotive supply chains in anticipation of the application date, i.e., in 2030 for all newly type approved vehicles.

Table 8.4 Performances of policy options regarding each field investigated in the impact assessment Option 2.a, option 3.b, 4.b, 3.c and 4.d. of the JRC study

Policy options	**Option 3.b**	**Option 4.b**	**Option 3.c**	**Option 4.c**
	Ambitious level targets (15-20%)	**Ambitious level aligned with TA (25%)**	**Very ambitious level (25-30%)**	**Very ambitious level aligned with TA (25%)**
Uptakes of recyclates (also considering supply capacities)	Good performance	High performance	Very high performance, conditional with the combination of other ELVD provisions.	Very high performance, conditional with the combination of other ELVD provisions
Environmental assessment	Intermediate performance	High performance	Very high performance	Very high performance
Economic assessment (profit for recyclers)	Good performance	Good performance	Very good performance	Very good performance
Economic assessment (additional manufacturing costs)	Limited additional costs	Moderate additional cost	Medium additional costs	Medium additional costs

Recycled content for steel

Following the approach specified in Annex 4.8, the following quantities are used from the modelling in the main impact assessment study.

Table 8.5: Estimated steel volumes available for recycled content, 2035

Supply and demand for steel recycled content targets (in ktons, except for nr. of vehicles)						
2035	**Baseline**	**PO2A**	**PO2B**	**PO2C**	**Preferred**	**Combined +EPR**
DEMAND new vehicles	15.2 M vehicles					
All Steel	11,779	11,779	11,779	11,779	11,779	11,779
Flat Steel	9,255	9,255	9,255	9,255	9,255	9,255
Long Steel	2,524	2,524	2,524	2,524	2,524	2,524
Long - Post Consumer	1,515	2,356	3,534	4,712	3,534	3,534
Long - Closed Loop	106	353	530	942	530	530

Supply ELVs	9.6 M	9.7M	10.1M	10.7M	11.3M	11.7M
All ELV steel	6,199	6,273	6,522	6,894	7,308	7,556
Flat products ELV	4,871	4,929	5,124	5,417	5,742	5,937
Long products ELV	1,328	1,344	1,398	1,477	1,566	1,619
Flat (Export reduction potential)	1,876	2,726	3,925	5,262	5,982	4,518
Flat (Dismantled Pre-Shredder)	108	431	807	1,076	807	968
All mixed in E40	18,784	19,010	19,763	20,892	22,146	22,898
Long + Flat products (Shredded)	14,432	13,630	13,082	13,154	14,955	15,059
Long products in E40	4,025	4,074	4,235	4,477	4,746	4,907

Uncertainty in setting an appropriate target level for steel

The analysis revealed a number of uncertainties in setting an appropriate target level that significantly increases the uptake of post-consumer steel fractions. These main uncertainties are:

1. An uncertain share of long products in (future) EVs. Current ELVs have a relative stable content of around 20% of long products for which the copper tolerances and thus the scrap utilisation rates can be higher[168]. For new EVs it is not entirely clear which share of long versus flat products including more advanced high strength steels can be expected.
2. Uncertainty in possible uptake levels of post-consumer scrap in flat production, both for BF and EAF routes. Various studies available provide different views on current and future scrap utilisation rates[169].
3. Uncertainty about the share of pre-consumer versus post-consumer in current scrap use rates which is very relevant for future carbon pricing under ETS/CBAM. Here, current declarations of manufacturers are difficult to compare due to varying definitions of recycled content and lacking classifications to distinguish post- versus pre-consumer scrap, and finally;
4. Uncertainty on the economic effect of automotive recycled content demand on the availability and pricing of scrap to other sectors. For the EU, there is a net-export of scrap to non-EU member. It is however not entirely clear what the shares of low versus high quality scraps are in relation to higher EAF shares in the production mix outside the EU in the case of Turkey and the US for example. This may affect the availability and affordability of both low and high value scrap and this the estimates for the costs and revenues between recyclers and steel producers in particular.

For the purpose of PO2C, in below table, a check on the supply and demand balance is performed to ensure the targets do not create a supply-demand balance resulting in insufficient secondary supply to meet the closed loop percentage in particular. The first row is a minimum availability scenario where solely long products are accounted to achieve the targets. The second row is regarded as the most realistic scenario where in time at least a certain amount of ELV flat products is available for use in EAFs. In above table (row Flat-dismantled pre-shredder) it should be noted that from the impact assessment report, an

[168] Arcelor Mittal, New steels driving the circular economy, innovative solutions for future mobility, International Automotive Recycling Conference, Vienna, 14-03-2018, slide 6

[169] R. Su and A.Assous, Starting from scrap - The key role of circular steel in meeting climate goals, Sandbag, June 2022;

additional amount of removed flat products with lower copper content is available from the removal requirements of **PO3** are implemented, providing possible 400 to 1,000 tons of pre-shredder flat parts. The last row indicates future upwards potential where more ELV flat products find their way as recycled content with effectively a net reduction of low value scrap to non-EU countries. The supply/ demand balance in that case clearly significant upwards potential for higher uptake levels beyond 40% in the future. For all routes, it should be noted that the calculation and verification methodology will have to take into account that EAFs can be batch loaded more flexibly in time allowing for a mass-balance approach, whereas BF/BOF routes are more continuous operation with more diverse mixing of various primary and scrap inputs.

Table 8.6: Supply/ demand check for the proposed targets

RC TARGET SUPPLY/DEMAND BALANCE to check availability	**Baseline**	**PO2A**	**PO2B**	**PO2C**	**Preferred** individual	**Preferred** + EPR
Covered by long products only	33%		42%	53%	37%	36%
Covered by long and dismantled flat products	32%		36%	44%	32%	31%
Covered by long, dismantled flat and % of remaining flat steels	22%		20%	22%	15%	17%

For steel, a recycled content target under **PO2B** and **PO2C** provide an additional push to integrate higher quality scrap into new vehicles, with roughly 585 tons of GHG savings in comparison to the baseline for 2035 and 900 ktons towards 2040 for **PO2B** and 1,400 ktons for **PO2C**. In addition, a shift in energy demand is relevant, including 260 GWh extra electricity demand for Electric Arc Furnaces in 2035 by 2035 while reducing the demand for natural gas (15 million m3 less), hydrogen (3,000 ton less) and in particular coal (170 kton less) and iron ore (600 kton less) as displayed in Table 1 for **PO2B** in 2035. These values are obviously increasing for **PO2C** and for later years as the target would be fully implemented between 2035 and 2040 with the 7 years introduction after entry into force.

Table 8.5 Summary environmental impacts for the steel recycled content targets, 2035 and 2040

Environmental impacts (2035, compared to baseline)	**Baseline**	**PO2A**	**PO2B**	**PO2C**	**Preferred** (individually)
Vehicles placed on market (million units)	15,025,000				
Recycled content steel	**PO2**	**PO2A**	**PO2B**	**PO2C**	**Preferred** (individually)
2035					
Recycled content steel (kton)	1,515		+505	+1,212	
CO2 savings (kton CO2-eq., steel RC)	1,754		+585	+1,404	
Electricity extra use (GWh)	-776		-259	-621	
Natural gas savings (million m3)	45		+15	+36	
Hydrogen savings (ton H2)	9,185		+3,062	+7,348	
Coal savings (kton)	500		+167	+400	
Iron ore savings (kton)	1,808		+603	+1,446	
Energy savings (coal, nat.gas, H2, in GWh)	2,006		+669	+1,605	
2040					
Recycled content steel (kton)	1,515		+841	+2,019	

CO2 savings (kton CO2-eq., steel RC)	1,603	+891	+2,138
Electricity extra use (GWh)	-778	-432	-1,037
Natural gas savings (million m3)	52	+29	+69
Hydrogen savings (ton H2)	11,299	+6,277	+15,065
Coal savings (kton)	434	+241	+579
Iron ore savings (kton)	1,807	+1,004	+2,409
Energy savings (coal, nat.gas, H2, in GWh)	1,988	+1,105	+2,651

7.3.8 8.1.3 Improve treatment quality and quantity

PO3: There is a significant number of measures for improving reuse and recycling (see Annex 7). To avoid double counting of potentially overlapping effects, the impact assessment model[170] is carefully designed to determine both the impacts of the individual measures as well as in combination. The detailed quantification efforts reflecting the depth of the technical analysis provide a high confidence in the results. The analysis of the separation of electronics is conducted for few parts only and therefore partly incomplete. Nevertheless, the analysis sufficiently illustrates the potential from better separation in such cases.

All three suboptions under **PO3** bring significant environmental benefits from higher quantities and qualities of recycling. For **PO3A**, the effect of better implementation of the current Annex I of the ELV Directive has a significant positive effect of about 1 million tons of materials recovered at higher quality, corresponding with 1.5 million tons of CO_2 savings compared to the baseline. In order of magnitude of GHG savings, improved aluminium and steel recycling contributes the most, followed by the environmental benefits of improved plastics recycling[171]. **PO3B** and **PO3C** bring even higher benefits. The increased separation of (cast) aluminium components provides significant gains for **PO3B** of around 3.7 million tons of $CO_{2\text{-eq}}$ saved, primarily due to reuse and corresponding aluminium production avoided. Initial assessment for the e-drive motors mandatory removal prior to shredding shows that circa 1 million ELV in 2030 and 5 million ELVs in 2040 will be affected by this provision. It should result in an increased quantity of high-quality secondary steel and aluminium by 15% and 20% in 2030 and 18% and 22% in 2040[172], respectively, compared to baseline scenario. Copper recovery would increase by 97% from e-drive motors and would decrease contamination of secondary base metals, hence increasing quality. The mandatory removal and separate recycling of e-drive motors would also thrive the permanent magnet recycling value chain and generate new flows of CRMs for further recycling, along with innovative solutions entering the future markets. Vice versa it might stimulate the development of better non-PM motors. It is estimated circa 4.2 kt of permanent magnets to be available in 2040 for high quality recycling from future EU ELVs. For **PO3C**, the advanced quality targets provide savings equivalent to 2.9 million tons of $CO_{2\text{-eq}}$. The update of the recycling, reuse and remanufacturing definitions proposed in the revision would exclude some recycling processes that yield very-low quality recyclates. The more consequent definition of recycling in particular provides an incentive for the improved recycling of plastics and glass

[170] Baron, Y.; Kosińska-Terrade, I.; Loew, C.; Köhler, A.; Moch, K.; Sutter, J.; Graulich, K.; Adjei, F.; Mehlhart, G.: Study to support the impact assessment for the review of Directive 2000/53/EC on End-of-Life Vehicles by Oeko-Institut, June 2023

[171] Recycling quality improvements of PO3 are not overlapping with the allocation of plastics recycling benefits of PO2 to avoid double counting.

[172] These values are not included in Table 2 as the JRC CRM study is still work in progress.

contributing to 600 kton and 200 kton of annual GHG savings respectively. The results are excluding the effect of increased collection from PO4 but already includes the PO5 effect of EPR measures in the last column of Table 2. See Annex 8.3 for the methodological approach, the main assumptions and details per material and other years.

*Table 8.6 Summary environmental impacts for the recycling and reuse policy options 3 in **2030***

Environmental impacts (2030, compared to baseline)	**Baseline**	**PO3A**	**PO3B**	**PO3C**	**Preferred** (individually)	**Preferred** (combined)
ELVs treated EU (units, legal & illegal)	**9,283,014**					**+1,799,859**
Recycling stage (values in kton)			(values in addition to baseline)			
Steel (reused)	559	+447	+447	+447	+447	+559
Steel (recycled, pre-shredder)	98	+295	+640	+886	+640	+800
Steel (recycled post shredder	4,287	-682	-1,023	-1,266	-1,023	-1,279
Aluminium (reused)	105	+53	+84	+84	+84	+105
Aluminium (recycled pre-shredder)	7	+28	+204	+81	+204	+255
Aluminium (recycled post-shredder)	755	-66	-241	-137	-241	-301
Copper (reused)	1	+8	+9	+9	+9	+11
Copper (recycled pre-shredder)	7	+13	+53	+33	+53	+66
Copper (recycled post-shredder)	79	-16	-51	-39	-51	-64
Glass (recycled pre-shredder, high quality)	20	+4	+121	+121	+121	+151
Glass (recycled post-shredder, low quality)	111	-4	-121	-121	-121	-151
Plastics (reused)	66	+0	+66	+66	+66	+83
Plastics (recycled pre-shredder, high quality)	12	+0	+50	+62	+50	+63
Plastics (recycled post-shredder)	98	+0	+71	+86	+71	+89
EEE (inverter only) - recycled pre-shredder (higher quality) mix of materials	0	+0.8	+4.0	+7.2	+4.0	+4.0
CRMs (permanent magnet materials)	0	+0	+0	+0	+00	+0
Recycling stage (CO_2 savings in kton)			(values in addition to baseline)			
Steel	6,091	+521	+531	+539	+531	+664
Aluminium	12,114	+574	+1,597	+1,072	+1,597	+1,996
Copper	250	+52	+102	+48	+102	+128
Glass	12	+4	+116	+116	+116	+145
Plastics recycling	859	+0	+751	+660	+751	+939
EEE (invertor only)	35	+3.8	+7	+9	+7	+8
CO2 savings **recycling** (ktons CO2eq., excl. steel and aluminium)	**19,361**	+1,155	+3,104	+2,444	+3,104	+3,879
Recycling rate (improved definition)	70.6%	76.1%	78.8%	77.8%	78.8%	78.8%
Recovery rate (improved definition)	80.4%	81.9%	87.2%	86.7%	87.2%	87.2%
Recycling rate (current definition)	89.6%	90.5%	93.2%	92.2%	93.2%	93.2%
Recovery rate (current definition)	95.1%	92.0%	97.3%	96.8%	97.3%	97.3%
Improving **reuse** (ktons)	**731**	**508**	**606**	**606**	**606**	**758**
Improving **recycling quality** (ktons)	**144**	**340**	**1,068**	**1,183**	**1,068**	**1,335**
Recycling of lesser quality (ktons)	**5,330**	**-768**	**-1,365**	**-1,477**	**-1,365**	**-1,706**
Total amounts **reused or recycled**	**6,205**	**80**	**309**	**312**	**309**	**386**

*Table 8.7 Summary environmental impacts for the recycling and reuse policy options 3 in **2035***

Environmental impacts **(2035, compared to baseline)**	**Baseline**	**PO3A**	**PO3B**	**PO3C**	**Preferred** (individually)	**Preferred** (combined)

ELVs treated EU (units, legal & illegal)			**9,620,640**			**+2,106,924**
Recycling stage (values in kton)			(values in addition to baseline)			
Steel (reused)	611	+489	+489	+489	+489	+601
Steel (recycled, pre-shredder)	108	+323	+699	+968	+699	+860
Steel (recycled post shredder	4,687	-746	-1,118	-1,385	-1,118	-1,375
Aluminium (reused)	124	+62	+99	+99	+99	+122
Aluminium (recycled pre-shredder)	9	+37	+266	+105	+266	+327
Aluminium (recycled post-shredder)	889	-81	-306	-169	-306	-376
Copper (reused)	2	+10	+12	+12	+12	+15
Copper (recycled pre-shredder)	9	+17	+67	+42	+67	+82
Copper (recycled post-shredder)	99	-21	-65	-40	-65	-80
Glass (recycled pre-shredder, high quality)	22	+4	+131	+131	+131	+161
Glass (recycled post-shredder, low quality)	120	-5	-131	-131	-131	-161
Plastics (reused)	71	+0	+71	+71	+71	+87
Plastics (recycled pre-shredder, high quality)	13	+0	+54	+67	+54	+66
Plastics (recycled post-shredder)	106	+0	+76	+93	+76	+93
EEE (inverter only, recycled pre-shredder)	0	+0.8	+4.0	+7.2	+4.0	+0.0
CRMs (permanent magnet materials)	0	+0.4	+0.4	+0.4	+0.4	+0.4
Recycling stage (CO2 savings in kton)			(values in addition to baseline)			
Steel	6,662	+597	+641	+672	+641	+788
Aluminium	14,270	+693	+1,994	+1,309	+1,994	+2,453
Copper	318	+69	+143	+76	+143	+176
Glass	13	+4	+126	+126	+126	+155
Plastics recycling	929	+0	+758	+661	+758	+932
EEE (invertor only)	139	+15	+26	+36	+26	+31
CO2 savings **recycling** (ktons CO2eq., excl. steel and aluminium)	**22,331**	+1,378	+3,688	+2,880	+3,688	+4,536
Recycling rate (improved definition)	70.6%	73.1%	75.9%	74.9%	75.9%	75.9%
Recovery rate (improved definition)	80.0%	79.0%	84.3%	83.8%	84.3%	84.3%
Recycling rate (current definition)	89.6%	90.5%	93.2%	92.2%	93.2%	93.2%
Recovery rate (current definition)	95.1%	92.0%	97.3%	96.8%	97.3%	97.3%
Improving **reuse** (ktons)	**808**	**+561**	**+671**	**+671**	**+671**	**+825**
Improving **recycling quality** (ktons)	**161**	**+381**	**+1,217**	**+1,313**	**+1,217**	**+1,497**
Recycling of lesser quality (ktons)	**5,901**	**-853**	**-1,544**	**-1,632**	**-1,544**	**-1,899**
Total amounts **reused or recycled**	**6,870**	**+89**	**+344**	**+352**	**+344**	**+423**

*Table 8.8 Summary environmental impacts for the recycling and reuse policy options 3 in **2040***

Environmental impacts (2040, compared to baseline)	**Baseline**	**PO3A**	**PO3B**	**PO3C**	**Preferred** (individually)	**Preferred** (combined)
ELVs treated EU (units, legal & illegal)			**10,324,577**			**+2,313,146**
Recycling stage (values in kton)			(values in addition to baseline)			
Steel (reused)	703	+562	+562	+562	+562	+658
Steel (recycled, pre-shredder)	124	+371	+804	+1,113	+804	+941

Steel (recycled post shredder	5,388	-857	-1,286	-1,592	-1,286	-1,505
Aluminium (reused)	167	+83	+134	+134	+134	+157
Aluminium (recycled pre-shredder)	15	+60	+437	+173	+437	+511
Aluminium (recycled post-shredder)	1,194	-118	-479	-255	-479	-560
Copper (reused)	3	+17	+20	+20	+20	+23
Copper (recycled pre-shredder)	15	+28	+113	+71	+113	+132
Copper (recycled post-shredder)	167	-35	-109	-80	-109	-128
Glass (recycled pre-shredder, high quality)	25	+5	+153	+153	+153	+179
Glass (recycled post-shredder, low quality)	139	-5	-152	-152	-152	-178
Plastics (reused)	82	+0	+82	+82	+82	+96
Plastics (recycled pre-shredder, high quality)	16	+0	+62	+78	+62	+73
Plastics (recycled post-shredder)	122	+0	+88	+107	+88	+103
EEE (inverter only) - recycled pre-shredder	0	+2	+12	+22	+12	+14
CRMs (permanent magnet materials)	0	+1.5	+1.5	+1.5	+1.5	+1.5
Recycling stage (CO2 savings in kton)		(values in addition to baseline)				
Steel	7,656	+655	+668	+677	+668	+782
Aluminium	19,220	+983	+3,022	+1,900	+3,022	+3,536
Copper	532	+110	+218	+151	+218	+255
Glass	15	+5	+147	+147	+147	+172
Plastics recycling	1,075	+0	+775	+662	+775	+907
EEE (invertor only)	420	+46	+78	+110	+78	+91
CO2 savings **recycling** (ktons CO2eq., excl. steel and aluminium)	**28,918**	+1,799	+4,908	+3,647	+4,908	+5,742
Recycling rate (improved definition)	70.6%	76.5%	79.4%	77.8%	79.4%	79.4%
Recovery rate (improved definition)	80.4%	82.5%	88.4%	87.4%	88.4%	88.4%
Recycling rate (current definition)	89.6%	90.5%	93.4%	91.8%	93.4%	93.4%
Recovery rate (current definition)	95.1%	91.5%	97.4%	96.3%	97.4%	97.4%
Improving **reuse** (ktons)	955	662	798	798	798	934
Improving **recycling quality** (ktons)	195	464	1,569	1,588	1,569	1,836
Recycling of lesser quality (ktons)	7,010	-1,015	-1,938	-1,972	-1,938	-2,267
Total amounts **reused or recycled**	8,160	111	429	414	429	502

7.3.9 8.1.4 Improve collection quality and quantity

PO4: For the measures on collection, the confidence is high. The individual categories of vehicles collected (or not) and reported (or not) and the role of informal/ illegal sector activities is tracked by carefully determined split factor changes representing the effect of the individual measures considered.

The shift from illegal (or unreported) treatment within Europe to ATFs has the following main environmental effect: Illegal treatment might not treat all refrigerants from the air conditioning system and all waste oil. If the ELVs are shifted to ATFs less losses of refrigerants from the air conditioning system can occur. Today, standard dismantling and shredding is in most countries completely self-managed by the recycling sector, without contribution / funding of the EPR systems. It is expected that the illegal ELV treatment is sending the same amounts of steel, aluminium and catalytic converter to recycling and applies

the same effort for separation of spare parts. In consequence no change for the case that more ELVs are shifted from illegal (or unreported) treatment within Europe to ATFs.

Additional information on the export of used vehicles

The impact assessment study[173] considers for the baseline in 2019 and for the scenarios in 2025 – 2040 (legal and illegal) exports in the order of 25% of vehicles leaving the fleet. For the preferred consolidated option (including EPR from PO5B), the share of exports in fleet exit is significantly lower in 2035 with 8.7% of the fleet exit. The table below displays the impacts for the export in total figures, considering the general increase of the fleet and fleet exits. Impacts for 2025 are not included as many of the collection measures will take effect after 2025. For 2025 one can actually expect for preferred Policy Option (+EPR), before the export limitations are fully enforced), one-off "last minutes" exports. It is estimated this could increase the exports to 33% of the vehicles leaving the fleet. Therefore, there is a likelihood that the export of these vehicles may increase for a short term, before the situation stabilises as a result of full enforcement of the requirements.

The illegal exports are much reduced by the combination of the different measures but possibly cannot avoided by 100%. Some of the illegal might be even shifted, by better administrative compliance of the exporters, to the legal sector. The legal export is reduced too, due to the limitation of exports to those vehicles which have are roadworthy. As demonstrated by a Dutch study[174], currently only a minority (possibly 30%) of the vehicles officially exported via the Dutch harbour have a valid roadworthiness certificate (see the figure below). And even much less vehicles would comply with the import requirements e.g. of the ECOWAS Region: *ECOWAS[175] adopted on 5 Sept 2020 a Directive[176], limiting the import of used vehicles to those with a minimum Euro 4/IV emission standard. The age limit for importing vehicles into the ECOWAS region is 5 years for light duty vehicles, two-wheel motor vehicles, tricycles and quadricycles and 10 years for heavy-duty vehicles. A period of 10 years is granted to countries that have not yet adopted these age limits to gradually comply.*

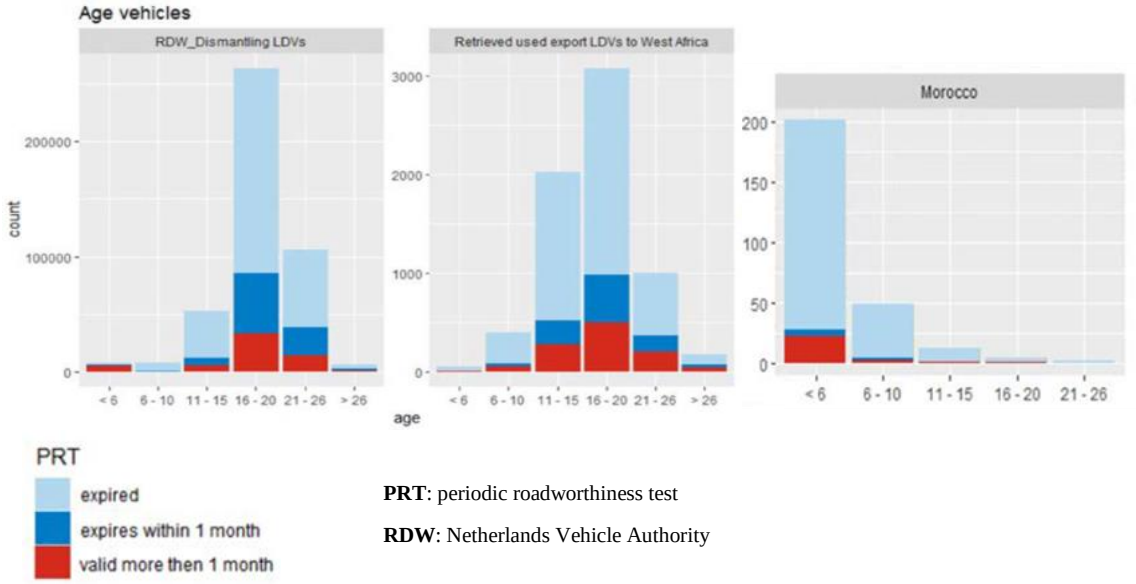
[173] Baron, Y.; Kosińska-Terrade, I.; Loew, C.; Köhler, A.; Moch, K.; Sutter, J.; Graulich, K.; Adjei, F.; Mehlhart, G.: Study to support the impact assessment for the review of Directive 2000/53/EC on End-of-Life Vehicles by Oeko-Institut, June 2023

[174] Netherlands Human Environment and Transport Inspectorate, Ministry of Infrastructure and Water Management (2020): Used vehicles exported to Africa: A study on the quality of used export vehicles

[175] Members of ECOWAS: BENIN, BURKINA FASO, CABO VERDE, CÔTE D'IVOIRE, The GAMBIA, GHANA, GUINEA, GUINEA BISSAU, LIBERIA, MALI, NIGER, NIGERIA, SENEGAL, SIERRA LEONE, TOGO

[176] Directive C/Dir.2/09/20 relating to the harmonization of the limits of gas and exhaust particle emission for light and heavy vehicles, two wheel vehicles, tricycles and quadricycles within the ECOWAS region.

Figure 8.2 Age and roadworthiness upon export of vehicles extra-EU



PRT: periodic roadworthiness test

RDW: Netherlands Vehicle Authority

As mentioned by UNEP and UNECE during the stakeholder interviews: It is difficult to the receiving countries to enforce the import limitations as it is (most) likely that each imported vehicle will find its market in the receiving countries. Thus, cooperation and support by the exporting countries is required to support import limits. According to UNEP report[177], Africa and Eastern Europe, the Caucasus, Central Asia, and Middle East are the main destination for the EU 27 Export, representing 91% of the total exported used vehicles.
As demonstrated in the tables below at least 82% of the total exported used vehicles from the EU are exported to 59 countries which have import limitations. This export represents in 2020 2.3 billion € with an average value of each exported used vehicle of 3 279 €.

Table 8.9 Share of used vehicles exported in 2020 from EU-27 to differently regulated countries[178]

	Countries mentioned as destination	Share of the total number of EU-27 export
Total export to Africa and Eastern Europe, the Caucasus, Central Asia, and Middle East	82	91%
Ban of import of used vehicles	5	0.4%
Good, very good regulated or the import of used vehicles is banned (UNEP 2020)	29	29%
Good, very good regulated or the import of used vehicles is banned (UNEP 2020) + ECOWAS Countries	43	55%
At least any regulation for the import of used vehicles by age or emission class (including ECOWAS Countries)	59	82%

Table 8.10: Value of used vehicles exported in 2020 from EU-27 to differently regulated countries[179]

[177] https://www.unep.org/resources/report/global-trade-used-vehicles-report
[178] Source: UNEP 2020; Eurostat: COMEXT (download 27.1.2022

	Total value of the EU-27 Export (Million €)	Average value of the EU-27 Export (€ per vehicle)
Total export to Africa and Eastern Europe, the Caucasus, and Central Asia and Middle East	2 558	3 226
Ban of import of used vehicles	46	13 684
Good, very good regulated or the import of used vehicles is banned (UNEP 2020)	1 371	5 462
Good, very good regulated or the import of used vehicles is banned (UNEP 2020) + ECOWAS Countries*	1 703	3 553
At least any regulation for the import of used vehicles by age or emission class (including ECOWAS Countries*)	2 340	3 279

** Regulations not enforced yet for all ECOWAS countries for the displayed year 2020.*

The shift of extra EU export of ELVs and (old) used vehicles to treatment in the EU creates more resources available for recycling if treated in the EU. The related LCA credits are granted for recycling directed to treatment plants in Europe. In addition, there is less hazardous waste in receiving countries (not assessed quantitatively). The resulting environmental impacts summary provides an increasing level of additional material recovery and corresponding CO2 savings. **For PO4B** with improved enforcement and **harmonised national registers** significantly reduces the unknown whereabouts, adding to 1.5 million tonnes of CO2 savings. This is increasing to 3.2 million tonnes of CO_{2eq} for **PO4C** including its more advanced **export restriction** measures.

Air pollution: quantitative assessment of external costs associated with the export of used vehicles from the EU to third countries

The export of non-roadworthy vehicles to third countries has a significant impact on air pollution and human health. This is due to the fact that many of these vehicles are older, less fuel-efficient, and emit higher levels of pollutants. All these factors can be translated into damage costs to environment which are external costs of transport referring to the costs that are not directly borne by the users of the transportation system, but are instead imposed on society as a whole. As explained in the methodology provided in the Handbook on the external costs of transport[180], air pollution can have significant impacts on human health, including respiratory and cardiovascular problems. It can also damage crops, forests, and ecosystems. In the EU, vehicle emissions are regulated by the Euro standards, which set limits on the amount of pollutants that can be emitted by new vehicles. However, non-roadworthy used vehicles that are exported to third countries may not meet these standards and can therefore contribute to higher levels of air pollution accompanied with damage costs. The external costs associated with air pollution must be factored in when considering the true cost of these exports, including the other types of damage, going beyond the air pollution, such as noise pollution, accidents, and congestion.

It is expected that by eliminating the non-roadworthy used vehicles from the exporting market will have a significant impact on improving the air quality in the receiving countries. The

[179] Source: UNEP 2020; Eurostat: COMEXT (download 27.1.2022);
[180] https://cedelft.eu/publications/handbook-on-the-external-costs-of-transport-version-2019/

scale of positive impact cannot be quantified as the damage caused by non-roadworthy used vehicles being exported from the EU to third countries would depend on a variety of factors, including the number and type of vehicles exported, the condition of the vehicles, and the air quality in the receiving countries. Nevertheless, by eliminating the export of non-roadworthy used vehicles, the EU will reduce the negative impact of these vehicles on the environment and public health in receiving countries. In return, this can also support the development of a more sustainable and efficient transport system in these countries by encouraging the use of newer, more fuel-efficient, and environmentally friendly vehicles, as demonstrated in cases of those third countries[181] which established import restrictions of the used vehicles referring to their age and emission level. Instead, by promoting the export of roadworthy used vehicles that meet the environmental and safety standards, the EU is expected to create a level playing field for the automotive industry in receiving countries and support the transition to cleaner and more sustainable transportation.

*Table 8.11 Summary environmental impacts for the collection policy options 4 in **2030***

Environmental impacts (2030, compared to baseline)	**Baseline**	**PO4A**	**PO4B**	**PO4C**	**Preferred PO4D**	**Preferred** (combined + EPR
Collection stage (values in kton)		(values in addition to baseline)				
ELVs treated EU (legal & illegal)	9,283,014	+62,064	+310,320	+806,833	+1,303,346	+1,799,859
to ATFs and CoD reported	7,347,797	+111,715	+484,100	+980,613	+2,221,894	+2,470,151
treated in the EU (non-reported)	1,935,217	-49,651	-173,780	-173,780	-918,548	-670,292
Export of used vehicles	3,129,803	-62,064	-310,320	-+806,833	-1,303,346	-1,799,859
Used vehicles export reduction		2.0%	10%	26%	42%	58%
Steel/ cast iron (ktons)	6,893	+46	+230	+599	+968	+1,336
Aluminium (ktons)	987	+7	+33	+86	+139	+191
Copper/Brass (ktons)	123	+1	+4	+11	+17	+24
Average Plastic (ktons)	261	+2	+9	+23	+37	+51
Platinum (tons)	30	+0	+1	+3	+4	+6
Materials recovered (ktons)	**8,264**	**+55**	**+276**	**+718**	**+1,160**	**+1,602**
GHG savings collection (ktons CO_2eq.)		**+323**	**+1,400**	**+3,015**	**+4,810**	**+5,886**
GHG savings refrigerants (ktons CO_2eq)		**+6**	**+27**	**+57**	**+57**	**+278**

*Table 8.12 Summary environmental impacts for the collection policy options 4 in **2035***

Environmental impacts (2030, compared to baseline)	**Baseline**	**PO4A**	**PO4B**	**PO4C**	**Preferred PO4D**	**Preferred** (combined) + PO5 EPR
Collection stage (values in kton)		(values in addition to baseline)				
ELVs treated EU (legal & illegal)	9,620,640	+115,624	+501,037	+1,079,156	+1,721,511	+2,106,924
to ATFs and CoD reported	7,630,563	+218,401	+796,520	+1,374,639	+2,916,291	+3,237,468
treated in the EU (non-reported)	1,990,077	-102,777	-295,483	-295,483	-1,194,780	-1,130,544
Export of used vehicles	3,226,456	-115,624	-501,037	-1,079,156	-1,721,511	-2,106,924

[181] For more information see M21 in the Annex 7.

Used vehicles export reduction		3.6%	16%	33%	53%	65%
Steel/ cast iron (ktons)	7,084	+85	+369	+795	+1,268	+1,552
Aluminium (ktons)	1,074	+13	+56	+121	+192	+235
Copper/Brass (ktons)	142	+2	+7	+16	+25	+31
Average Plastic (ktons)	268	+3	+14	+30	+48	+59
Platinum (tons)	30	+0	+2	+3	+5	+7
Materials recovered (ktons)	8,568	+103	+446	+961	+1,533	+1,876
GHG savings collection (ktons CO_2eq.)	**27,850**	**+353**	**+1,513**	**+3,222**	**+5,218**	**+6,350**
GHG savings refrigerants (ktons CO_2eq)	**969**	**+30**	**+113**	**+207**	**+408**	**+464**

*Table 8.13 Summary environmental impacts for the collection policy options 4 in **2040***

Environmental impacts (2030, compared to baseline)	**Baseline**	**PO4A**	**PO4B**	**PO4C**	**Preferred PO4D**	**Preferred** (combined) + PO5 EPR
Collection stage (values in kton)		(values in addition to baseline)				
ELVs treated EU (legal & illegal)	10,324,577	+234,068	+729,742	+1,418,179	+1,968,928	+2,313,146
to ATFs and CoD reported	8,205,505	+454,368	+1,170,342	+1,721,091	+3,511,025	+3,924,087
treated in the EU (non-reported)	2,119,072	-220,300	-440,600	-302,912	-1,542,097	-1,610,941
Export of used vehicles	3,444,148	-234,068	-729,742	-1,418,179	-1,968,928	-2,313,146
Used vehicles export reduction		6.8%	21%	41%	57%	67%
Steel/ cast iron (ktons)	7,387	+167	+522	+1,015	+1,409	+1,655
Aluminium (ktons)	1,304	+30	+92	+179	+249	+292
Copper/Brass (ktons)	196	+4	+14	+27	+37	+44
Average Plastic (ktons)	287	+7	+20	+39	+55	+64
Platinum (tons)	27	+1	+2	+4	+5	+6
Materials recovered (ktons)	**9,175**	**+208**	**+648**	**+1,260**	**+1,750**	**+2,055**
GHG savings collection (ktons CO_2eq.)	**0**	**+329**	**+1,427**	**+3,072**	**+4,867**	**+6,164**
GHG savings refrigerants (ktons CO_2eq)	**0**	**+6**	**+27**	**+57**	**+57**	**+278**

7.3.10 8.1.5 Improve governance and economic conditions

PO5: The assessment of the EPR and economic incentives related measures is assessed as based on their amplifying effect on the measures under **PO3** for recycling and **PO4** on collection.

Extended Producer Responsibility Schemes are not an objective by itself compared to the reduction of "missing vehicles" or the more advanced "circularity". Instead, EPR is developed to ensure that producers become both financially and organisationally responsible for the end-of-life management of their products. This affects the compliance level for the end-of-life management. Therefore, the economic, environmental and social impacts are not elaborated in the same methodology as for the other sectors as these impact relay more on the defined level of compliance under "circularity" and "missing vehicles" and less on the structure of the EPR.

Therefore, the effect of EPR on the collection volume is calculated in particular in above Tables 8.11 to 8.13 for 2035 and shows an additional 6% reduction, or 385,000 vehicles

exported less plus an extra 320,000 units brought to ATFs for intra-EU. The combined effect is an additional 340 ktons of materials and 1,2 million tonnes of CO2 savings.

Table 8.14 Summary amplification of environmental impacts for collection in 2030,2035 and 2040

Environmental impacts (Amplification of EPR compared to baseline)	**2030**	**2035**	**2040**
At the waste stage -collection +EPR	(values in addition to baseline)		
ELVs treated in the EU (legal & illegal)	+496,513	+385,413	344,218
to ATFs and CoD reported	+248,257	+321,177	413,062
treated in the EU (non-reported)	-422,036	-359,719	-234,068
Export of used vehicles	-496,513	-385,413	-344,218
Steel/ cast iron (ktons)	+52	+43	+43
Aluminium (ktons)	+7	+6	+7
Copper/Brass (ktons)	+14	+11	+9
Average Plastic (ktons)	+2	+1	+1
Platinum (tons)	+0.4	+0.3	+0.3
Materials recovered (ktons)	+442	+343	+305
GHG savings collection (ktons CO_2eq.)	+1,076	+1,132	+1,297
GHG savings refrigerants (ktons CO_2eq.)	+56	+56	+56

7.3.11 8.1.6 Extend the vehicle category scope

PO6: The level of confidence in the assessment of quantitative impacts for the measures related to the scope extension is based on assumptions as lack of comprehensive data for vehicles remained a persistent problem in the impact assessment. However, the setting of basic measures to improve the information availability and to ensure minimum treatment performance enabling a later phased-in approach are well justified.

Table 8.15 Summary environmental impacts for the scope extension, 2030

Environmental impacts (2030, compared to baseline)	**Baseline**	**PO6A**	**PO6B**	**PO6C**	**Preferred** (individually)	**Preferred** (combined)
Scope extension (values in million units)			(values in addition to baseline)			
ELVs (motorcycles, L3e-L7e)	1,557,104					
ELVs (buses, M2,M3)	31,359					
ELVs (lorries and trailers, N2,N3,O)	264,382					
ELVs to ATFs (L3e-L7e)	0		+233,566	+326,992	+233,566	+233,566
ELVs to ATFs (M2,M3)	20,697		+1,008	+1,411	+1,008	+1,008
ELVs to ATFs (N2,N3,O)	68,739		+16,141	+22,597	+16,141	+16,141
ELVs non-reported to ATFs (L3e-L7e)	0		+0	+0	+0	+0
ELV+ used export reduction (M2,M3)	10,662		+0	+0	+0	+0
ELV+ used export reduction (N2,N3,O)	195,643		+0	+0	+0	+0
Materials recovered (ktons of materials)			(values in addition to baseline)			

Additional reuse (L3e-L7e, ktons)	288		+0	+0	+0	+0
Additional reuse (M2,M3, ktons)	89		+13	+19	+13	+13
Additional reuse (N2,N3,O, ktons)	504		+76	+106	+76	+76
Additional recycling (L3e-L7e, ktons)	183		+27	+38	+27	+27
Additional recycling (M2,M3, ktons)	109		+16	+23	+16	+16
Additional recycling (N2,N3,O, ktons)	657		+99	+138	+99	+99
Total materials recovered (ktons)	1,830		+231	+324	+231	+231
GHG savings (ktons of CO2eq.)			(values in addition to baseline)			
GHG savings (L3e-L7e, ktons CO2eq.)	2,529		+61	+85	+61	+61
GHG savings (M2,M3, ktons CO2eq.)	1,060		+65	+80	+65	+65
GHG savings (N2,N3,O, ktons CO2eq.)	1,874		+384	+537	+384	+384
Total GHG savings (ktons of CO2eq.)	5,463		+510	+702	+510	+510

Table 8.16 Summary environmental impacts for the scope extension, 2035

Environmental impacts (2035, compared to baseline)	**Baseline**	**PO6A**	**PO6B**	**PO6C**	**Preferred** (individually)	**Preferred** (combined)
Scope extension (values in million units)			(values in addition to baseline)			
ELVs (motorcycles, L3e-L7e)	1,624,242					
ELVs (buses, M2,M3)	32,972					
ELVs (lorries and trailers, N2,N3,O)	289,992					
ELVs to ATFs (L3e-L7e)	0		+487,273	+633,454	+487,273	+487,273
ELVs to ATFs (M2,M3)	21,762		+2,119	+2,754	+2,119	+2,119
ELVs to ATFs (N2,N3,O)	75,398		+35,408	+46,030	+35,408	+35,408
ELVs non-reported to ATFs (L3e-L7e)	0		+0	+0	+0	+0
ELV+ used export reduction (M2,M3)	11,211		+0	+0	+0	+0
ELV+ used export reduction (N2,N3,O)	214,594		+0	+0	+0	+0
Materials recovered (ktons of materials)			(values in addition to baseline)			
Additional reuse (L3e-L7e, ktons)	301		+0	+0	+0	+0
Additional reuse (M2,M3, ktons)	104		+31	+40	+31	+31
Additional reuse (N2,N3,O, ktons)	553		+166	+216	+166	+166
Additional recycling (L3e-L7e, ktons)	191		+57	+75	+57	+57
Additional recycling (M2,M3, ktons)	127		+38	+49	+38	+38
Additional recycling (N2,N3,O, ktons)	720		+216	+281	+216	+216
Total materials recovered (ktons)	1,995		+508	+661	+508	+508
GHG savings (ktons of CO2eq.)			(values in addition to baseline)			
GHG savings (L3e-L7e, ktons CO2eq.)	2,639		+126	+164	+126	+126
GHG savings (M2,M3, ktons CO2eq.)	1,235		+152	+178	+152	+152
GHG savings (N2,N3,O, ktons CO2eq.)	2,055		+841	+1,094	+841	+841
Total GHG savings (ktons of CO2eq.)	5,929		+1,120	+1,436	+1,120	+1,120

Table 8.17 Summary environmental impacts for the scope extension, 2040

Environmental impacts (2040, compared to baseline)	**Baseline**	**PO6A**	**PO6B**	**PO6C**	**Preferred** (individually)	**Preferred** (combined)
Scope extension (values in million units)			(values in addition to baseline)			
ELVs (motorcycles, L3e-L7e)	1,701,058					
ELVs (buses, M2,M3)	35,057					
ELVs (lorries and trailers, N2,N3,O)	310,292					
ELVs to ATFs (L3e-L7e)	0		+637,897	+663,413	+637,897	+637,897
ELVs to ATFs (M2,M3)	23,138		+2,816	+3,492	+2,816	+2,816
ELVs to ATFs (N2,N3,O)	80,676		+58,724	+58,724	+58,724	+58,724
ELVs non-reported to ATFs (L3e-L7e)	0		+0	+0	+0	+0
ELV+ used export reduction (M2,M3)	11,919		+0	+0	+0	+0
ELV+ used export reduction (N2,N3,O)	229,616		+0	+0	+0	+0
Materials recovered (ktons of materials)			(values in addition to baseline)			
Additional reuse (L3e-L7e, ktons)	315		+0	+0	+0	+0
Additional reuse (M2,M3, ktons)	104		+39	+48	+39	+39
Additional reuse (N2,N3,O, ktons)	591		+222	+275	+222	+222
Additional recycling (L3e-L7e, ktons)	200		+75	+93	+75	+75
Additional recycling (M2,M3, ktons)	127		+48	+59	+48	+48
Additional recycling (N2,N3,O, ktons)	771		+289	+358	+289	+289
Total materials recovered (ktons)	2,108		+672	+834	+672	+672
GHG savings (ktons of CO2eq.)			(values in addition to baseline)			
GHG savings (L3e-L7e, ktons CO2eq.)	2,763		+426	+528	+426	+426
GHG savings (M2,M3, ktons CO2eq.)	1,235		+190	+216	+190	+190
GHG savings (N2,N3,O, ktons CO2eq.)	2,199		+1,125	+1,396	+1,125	+1,125
Total GHG savings (ktons of CO2eq.)	6,197		+1,742	+2,139	+1,742	+1,742

Currently, negative impacts on the environment are associated with some of the identified problems: Because the potential to contribute to the circular economy of a large share of vehicles is not exploited yet, because there is no incentive to design for circularity. Because of the expected increase of the total amount of vehicles, vehicles designed and treated currently may cause environmental harm. Due to the lack of information, the calculated environmental benefits of **PO6C** covering the export and EPR effects but not a full scope extension might thus be even underestimated. The available information suggests also clear environmental benefits for **PO6B** with its mandatory treatment by ATFs as well as export restrictions of HDVs and buses which are not roadworthy**..**

8.2 Economic impacts

7.3.12 8.2.1 Design Circular: Improve reusability, recyclability and recoverability at design

The estimated operational costs for modernising the 3R type-approval framework of **PO1A**, excluding administrative costs, are rather limited and assessed qualitatively. The revisions to

the 3R-type-approval calculation will make the process somewhat more complex for OEMs and type-approval authorities. Possible sanctions for non-compliance are not included in these estimates. The expected increase in the rate of reuse of certain components means suppliers of new replacement parts see a loss of business, while ATFs and remanufacturers will see an increase. Vehicle owners shall benefit from increased supply of spare parts from improved digital marketplaces and less digital keys hampering repair. With a large number of different parts and values, these revenues are not quantified.

The costs of improving recyclability of difficult-to-recycle materials and R&D related to the circularity strategies in **PO1B** are not assessed in detail, but the envisaged cooperation between recyclers and manufacturers is an important improvement, frequently mentioned by a range of stakeholders.

The introduction of a digital Circularity Vehicle Passport[182] as a single entry for treatment operators **under PO1C** is consistent with the corresponding provisions in the proposal for Battery Regulation, the ESPR proposal and the proposal for the Euro 7 standard (Environmental Vehicle Passport), where the digital implementation of a Circularity Vehicle Passport acts as a data carrier for environmentally relevant information pertaining to the vehicle. As dismantling and recycling information is already being shared between vehicle manufacturers and recyclers via industry-supported databases (like IDIS (dismantling) and GADLS, IMDS (chemical content)). The Circularity Vehicle Passport would act as a 'data carrier' that would make access to such information easier. The Circularity Vehicle Passport could fulfil that role by providing a permanent link[183] to the relevant documents hosted outside of the vehicle (e.g., in a dedicated website). This would make it unnecessary to reserve costly data storage space in the vehicle and enable updates to the documents as necessary. The additional costs per vehicle associated to extending the Circularity Vehicle Passport to end-of-life information would be negligible. It overlaps with existing and new digital platforms that manufacturers are further expanding. Thus, development costs are already assumed for the baseline.

For substances of concern, the suboptions 'restriction under REACH and other existing legislation' and the 'hybrid approach' will have overall similar impacts, with a slightly higher impact in terms of administrative burden given the need for automotive operators to familiarise with REACH and its restriction procedures. They hybrid approach is assessed to be that resulting in the highest ease of implementation. Detailed administrative costs are presented in Annex 8.3.

More information can be found in Annex 9. Member States will have lower administrative burden by dealing with the technical and socio-economic assessment of the proposals under one single common assessment framework, provided by ECHA according to the methodologies developed for chemical risk management under REACH. This is consistent with the "one-substance, one assessment" approach put forward in the upcoming Chemical Strategy for Sustainability. Industry may benefit from the high standards and procedural guarantees in carrying-out chemical risk assessments as defined under REACH managed by ECHA. The preferred option 5c provides the best balance in terms of ease of implementation, administrative burden, legal coherence and efficiency given it relies on ECHA support for all

[182] containing information provided by the manufacturer on the composition of vehicles and its components, relevant for repair, maintenance, dismantling, re-use, remanufacturing and recycling

[183] e.g., via a QR code displayable in the infotainment system of the vehicle)

assessment but allows for simple implementation by maintaining existing restrictions and their exemptions under the ELV legislation and clarifies that all new substance restrictions, for reasons concerning primarily of chemical risk, will carried out under REACH, or as applicable under the new Batteries Regulation (as *lex specialis*) or for Persistent Organic Pollutants, covered under the POPs Regulation.

Table 8.18 Summary qualitative assessment of the economic impacts for policy options 1.

Economic impacts (2035, compared to baseline, excl. admin costs)	**PO1A**	**PO1B**	**PO1C**
Vehicles placed on market (million units)	15,025,000		
Design stage	(values in addition to baseline)		
Operational costs 3R type-approval (qualitative)	(-)	(--)	(--)
Hazardous substance declaration (qualitative)	(o)	(o)	(+)

7.3.13 8.2.2 Increase the use of recycled content - plastics

The costs for the options for plastics recycled content are provided in the Annex 4 of the JRC study[184]. The presented economic impact assessment is based on the assumption that the produced recyclates are of high quality and comply with the technical specifications, as required by manufacturers. This would require a range of investments though. the additional costs range approximately from 15 to 49 €/vehicle in 2035 and will be relatively high in the short term as manufacturers and suppliers will adapt manufacturing lines, carry out the necessary R&D, testing and validation of the new blends and secure supplies with recyclers. For the high targets of **PO2B**[185] and the very high targets of **PO2C**[186], in 2035, the measures would cost 740 respectively 1,170 million EUR but generate a net profit for recyclers of 600 resp. 735 million EUR at the same time and thus an important incentive for secondary markets for raw materials. The quantities for 2040 are assumed to be similar to 2035, however, the investment costs are mainly transitional until 2035 to scale-up and are assumed to become negligible and are thus excluded from the costs after 2035.

Table 8.19 Summary economic impacts for the plastic recycled content targets, 2030, 2035 and 2040

Economic impacts (Compared to baseline, excl. admin costs)	**PO2**	**PO2A**	**PO2B**	**PO2C**	**Preferred** (individually)
Vehicles placed on market (million units)	**Baseline**	15,025,000			
Recycled content plastics (JRC study)	**PO2**	**10% in 'fleet' 2035**	**25% of newly TA from 2030**	**30% of newly TA from 2030**	**25% of newly TA from 2030**
2030					
Recycled content plastics (kton)	92	+111	+505	+608	+505
Manufacturer and supplier costs	0	-135	-360	-511	-360
Recycler investments	-2	-14	-49	-57	-49

[184] Maury, T., Tazi, N., Torres De Matos, C., Nessi, S., Antonopoulos, I., Pierri, E., Baldassarre, B., Garbarino, E., Gaudillat, P. and Mathieux, F., Towards recycled plastic content targets in new passenger cars, EUR 31047 EN, Publications Office of the European Union, Luxembourg, 2022, ISBN 978-92-76-51784-9 (online), doi:10.2838/834615 (online), JRC129008
[185] Corresponds with scenario 4b in the JRC study.
[186] Corresponds with scenario 4c in the JRC study.

Plastics (processing costs)	-34	-47	-203	-244	-203
Plastics (revenues recyclers)	83	+112	+491	+590	+491
Total costs/ revenues (M EUR)	47	-84	-120	-222	-120
2035					
Recycled content plastics (kton)	123	+240	+713	+873	+713
Manufacturer and supplier costs	0	-204	-389	-735	-389
Recycler investments	-4	-20	-69	-83	-69
Plastics (processing costs)	-53	-101	-284	-349	-284
Plastics (revenues recyclers)	112	+215	+599	+735	+599
Total costs/ revenues (M EUR)	54	-109	-144	-432	-144
2040					
Recycled content plastics (kton)	123	+713	+873	+713	+240
Manufacturer and supplier costs	-204	-389	-735	-389	-204
Recycler investments	+0	+0	+0	+0	+0
Plastics (processing costs)	-101	-284	-349	-284	-101
Plastics (revenues recyclers)	+215	+599	+735	+599	+215
Total costs/ revenues (M EUR)	54	-89	-75	-348	-75

For the recycled content target for steel, the necessary shredder costs for improving ELV steel scrap sampling to ensure quality requirements are estimated at 7 million EUR for **PO2B** and 16 million EUR for **PO2C**. Further costs for improving quality of treatment, including a ban on mixed treatment and the removal obligations of components are allocated to **PO3**. On the revenues side, the revenue potential is estimated at 66 million EUR, assumed to be split equally between the steel industry and automotive manufacturers. These revenues do present an increasing purchasing cost for steel producers, which could be covered by lower ETS[187] costs, estimated conservatively at 132 EUR resp. 156 EUR/ton CO_{2eq} according to the low scenario of the DG MOVE handbook[188]. For 2040 the avoided carbon costs would increase towards 132 million EUR for **PO2B** and 316 million EUR for **PO2C**.

Table 8.20 Summary economic impacts for the steel recycled content targets

Economic impacts (2035, compared to baseline, excl. admin costs)	**PO2**	**PO2A**	**PO2B**	**PO2C**	**Preferred** (individually)
Vehicles placed on market (million units)	**Baseline**	15,025,000			
Production - Recycled content steel					
2035					
Recycled content quality steel (kton)	1,515	+0	+505	+1,212	+0
Shredder and sampling costs (HQ steel, excl PO3)		+0	-4	-10	+0
Steel industry (cost HQ scrap)		0	-33	-80	0

[187] https://climate.ec.europa.eu/eu-action/eu-emissions-trading-system-eu-ets_en
[188] European Commission, Directorate-General for Mobility and Transport, Essen, H., Fiorello, D., El Beyrouty, K., et al., Handbook on the external costs of transport: version 2019 – 1.1, Publications Office, 2020

Manufacturers (premium RC steel)		+0	-33	-80	+0
Shredders (revenues HQ scrap)		+0	+33	+80	+0
Steel industry (reduced processing costs)		+0	+33	+80	+0
2040					
Recycled content quality steel (kton)	1,515	+0	+841	+2,019	+0
Shredder and sampling costs (HQ steel, excl PO3)		+0	-7	-16	+0
Steel industry (cost HQ scrap)		0	-66	-158	0
Manufacturers (premium RC steel)		+0	-66	-158	+0
Shredders (revenues HQ scrap)		+0	+66	+158	+0
Steel industry (reduced processing costs)		+0	+66	+158	+0

7.3.14 8.2.3 Improve treatment quality and quantity

The results of the impact assessment for PO3 are displayed below. The majority of the costs are for the dismantlers and linked to the requirements on removal of parts prior to shredding in **PO3A** and **PO3B** (around 350 million EUR), partially compensated by additional revenues from removed materials. Similarly, the recycling definition improvement and ban on the landfilling of the residues from shredding operations of **PO3A** come with a cost. The cost-effectiveness of dismantling smaller components under **PO3C** is much lower compared to **PO3A** and **PO3B**. The ban on mixed treatment of ELV with other scrap types (**PO3B**) at the same time reduces shredder capacity flexibility leading to extra costs, at the same time, it improves quality of recycling and noticeably the value of ELV steel and aluminium fractions in return. Since this is difficult to quantify and very shredder and Member State specific, the net result is assumed to be cost neutral. It should be noted that the modelling approach focused on manual dismantling[189] **does not allow to quantitatively assess the less costly mechanical recycling** scenario, for the **PO3B** and **PO3C** in those countries that have sufficient PST capacity. The **PO3C** costs in particular are to be regarded 'worst-case'.

There is a substantial shift in costs and revenues between stakeholders for all three policy options. The value of removed materials minus dismantling costs will not be a direct net profit to the ATFs, as shredder companies will pay less for dismantled hulks where significant material value is already removed and subsequent lower treatment costs due to for instance the prior removal of glass. In Section 8.2 and in Annex 8.3, these 'propagations' of reduced costs and revenues are made explicit for each stakeholder, material, component and for other years.

*Table 8.21 Summary economic impacts for the recycling and reuse policy options 3 in **2030***

Economic impacts (2030, compared to baseline)	**PO3**	**PO3A**	**PO3B**	**PO3C**	**Preferred** (individually)	**Preferred** (combined)
Recycling stage (values in million EUR, + = revenue, - = cost)						
ATFs	**Baseline**	(values in addition to baseline)				
Steel (dismantling+other costs)	18	+55	+120	+166	+120	+150
Steel (additional revenues)	-21	-7.0	-42.0	-25.0	-42.0	-52.5

[189] Baron, Y.; Kosińska-Terrade, I.; Loew, C.; Köhler, A.; Moch, K.; Sutter, J.; Graulich, K.; Adjei, F.; Mehlhart, G.: Study to support the impact assessment for the review of Directive 2000/53/EC on End-of-Life Vehicles by Oeko-Institut, June 2023

Aluminium (dismantling+other costs)	8	+33	+237	+94	+237	+296
Aluminium (additional revenues)	-9	0	-94	-88	-94	-118
Copper (dismantling+other costs)	44	+82	+334	+208	+334	+418
Copper (additional revenues)	-14	-1	-21	-21	-21	-26
Glass (dismantling+other costs)	0	+0	+1	+1	+1	+2
Glass (additional revenues)	-1	0.0	-4.0	-5.0	-4.0	-5.0
Plastics (dismantling+other costs)	18	+55	+120	+166	+120	+150
Plastics (additional revenues)		Cannot be quantified				
EEE (invertor only, dismantling+other costs)		-23	-30	-37	-30	-38
EEE (additional revenues)		+23	+23	+23	+23	+29
CRMs (dismantling costs)	0	-26	-26	-26	-26	-26
CRMs (additional revenues)	22	22	22	22	22	22
Total dismantling costs selected	-73	-64	-233	-201	-233	-291
Reduced revenues dismantled hulks	933	-194	-644	-443	-644	-805
Total additional revenues	96	22	72	49	72	89
Shredders/PST (excl plastics RC)						
Steel (change in revenues)	802	-128	-191	-237	-191	-239
Aluminium (change in revenues)	731	-64	-234	-132	-234	-293
Copper (change in revenues)	494	-102	-322	-198	-322	-403
Glass (change in revenue)	1.2	0.3	-0.9	-0.9	-0.9	-1.1
Plastics (additional revenues)	11	0	-+8	-+9	-+8	-+10
Total costs	0	-294	-756	-577	-756	-945
Reduced costs for dismantled hulks		177	644	443	644	805
Total additional revenues	2,039	177	644	443	644	805
Recycling/ End-processing		(+)	(+)	(++)		
Steel (change in revenues)	820	-72	-72	-71	-72	-90
Aluminium (change in revenues)	739	-31	+4	-38	+4	+5
Copper (change in revenues)	538	-20	+13	+10	+13	+16
Glass (change in revenues)	0.4	0.1	2.2	2.2	2.2	+3
Plastics (compounding costs)	-33	+0	-3	-11	-3	-4
Plastics (change in revenues)	44	+0	+48	+59	+48	+60
CRMs (additional revenues)	26	+67	+67	+67	+67	+67
Total costs	-33	-123	-75	-120	-75	-94
Total additional revenues	2,151	+19	+87	+91	+87	+103
Total costs (all stakeholders)	-106	-481	-1,064	-899	-1,064	-1,330
Total revenues (all stakeholders)	4,286	235	802	583	802	997

*Table 8.22 Summary economic impacts for the recycling and reuse policy options 3 in **2035***

Economic impacts (2035, compared to baseline)	**PO3**	**PO3A**	**PO3B**	**PO3C**	**Preferred** (individually)	**Preferred** (combined)
Recycling stage (values in million EUR, + = revenue, - = cost)						
ATFs	**Baseline**	(values in addition to baseline)				

Steel (dismantling+other costs)	-21	-7.1	-48	-31	-48	-58
Steel (additional revenues)	20	+60	+131	+181	+131	+161
Aluminium (dismantling+other costs)	-21	-7.0	-48	-31	-48	-59
Aluminium (additional revenues)	11	+43	+309	+122	+309	+380
Copper (dismantling+other costs)	-9	0	-104	-98	-104	-128
Copper (additional revenues)	56	+104	+424	+264	+424	+522
Glass (dismantling+other costs)	-15	-1	-23	-23	-23	-28
Glass (additional revenues)	+0	+0	+1	+1	+1	+2
Plastics (dismantling+other costs)	-1	0.0	-4.3	-5.4	-4.3	-5.3
Plastics (additional revenues)		Cannot be quantified				
EEE (invertor only, dismantling+other costs)		-93	-120	-147	-120	-148
EEE (additional revenues)		+38	+38	+38	+38	+47
CRMs (dismantling costs)	0	-65	-65	-65	-65	-65
CRMs (additional revenues)	61	+98	+98	+98	+98	+98
Total dismantling costs selected	-67	-173	-412	-401	-412	-491
Reduced revenues dismantled hulks	840	-309	-902	-634	-902	-1,089
Total additional revenues	113	+34	+100	+70	+100	+121
Shredders/PST (excl plastics rec.)		(values in addition to baseline)				
Steel (change in revenues)	877	-140	-209	-259	-209	-257
Aluminium (change in revenues)	860	-78	-296	-164	-296	-364
Copper (change in revenues)	625	-129	-408	-252	-408	-502
Glass (change in revenue)	1	0	-1	-1	-1	-1
Plastics (additional revenues)	12	+0	-84	-10	-84	-103
Total costs	0	-347	-998	-686	-998	-1,228
Reduced costs for dismantled hulks	-840	309	902	634	902	1,089
Total additional revenues	2,375	309	902	634	902	1,089
Recycling/ End-processing		(values in addition to baseline)				
Steel (change in revenues)	897	-79	-79	-79	-79	-79
Aluminium (change in revenues)	870	-36	+13	-41	+13	+16
Copper (change in revenues)	681	-25	+16	+12	+16	+20
Glass (change in revenues)	0	+0	+2	+2	+2	+3
Plastics (compounding costs)	-36	+0	-3	-12	-3	-4
Plastics (change in revenues)	48	+0	+52	+64	+52	+64
CRMs (additional revenues)	26	68	68	68	68	68
Total costs	-36	-140	-82	-132	-82	-83
Total additional revenues	2,522	68	152	146	152	171
Total costs (all stakeholders)	-103	-660	-1,492	-1,219	-1,492	-1,802
Total revenues (all stakeholders)	5,010	412	1,153	851	1,153	1,380

*Table 8.23 Summary economic impacts for the recycling and reuse policy options 3 in **2040***

Economic impacts (2040, compared to baseline)	**PO3**	**PO3A**	**PO3B**	**PO3C**	**Preferred** (individually)	**Preferred** (combined)
Recycling stage (values in million EUR, + = revenue, - = cost)						
ATFs	**Baseline**	(values in addition to baseline)				
Steel (dismantling+other costs)	-21	-7.1	-48	-31	-48	-56
Steel (additional revenues)	20	+60	+131	+181	+131	+153
Aluminium (dismantling+other costs)	-21	-7.0	-48	-31	-48	-56
Aluminium (additional revenues)	11	+43	+309	+122	+309	+362
Copper (dismantling+other costs)	-9	0	-104	-98	-104	-122
Copper (additional revenues)	56	+104	+424	+264	+424	+496
Glass (dismantling+other costs)	-15	-0.76	23	23	23	27
Glass (additional revenues)	0	+0.04	+1.3	+1.3	+1.3	+1.5
Plastics (dismantling+other costs)	-1	0.0	-4.3	-5.4	-4.3	-5.0
Plastics (additional revenues)		Cannot be quantified				
EEE (invertor only, dismantling+other costs)	-78	-279	-362	-444	-362	-423
EEE (additional revenues)	78	+279	+279	+279	+279	+326
CRMs (dismantling costs)	0	-125	-125	-125	-125	-125
CRMs (additional revenues)	136	214	214	214	214	214
Total dismantling costs selected	-145	-294	-542	-587	-542	-634
Reduced revenues dismantled hulks	840	-630	-1,223	-956	-1,223	-1,398
Total additional revenues	113	70	136	106	136	155
Shredders/PST (excl plastics rec.)		(values in addition to baseline)				
Steel (change in revenues)	1,008	-160	-241	-298	-241	-282
Aluminium (change in revenues)	1,155	-114	-463	-246	-463	-542
Copper (change in revenues)	1,051	-217	-686	-503	-686	-803
Glass (change in revenue)	1.5	0.3	-1.1	-1.1	-1.1	-1.3
Plastics (additional revenues)	13	0	-97	-12	-97	-113
Total costs	0	-491	-1,488	-1,060	-1,488	-1,741
Reduced costs for dismantled hulks		630	1,223	956	1,223	1,398
Total additional revenues	3,229	631	1,223	956	1,223	1,398
Recycling/ End-processing		(values in addition to baseline)				
Steel (change in revenues)	1,031	-91	-90	-90	-90	-105
Aluminium (change in revenues)	1,172	-44	+44	-45	+44	+51
Copper (change in revenues)	1,145	-42	+27	-59	+27	+32
Glass (change in revenues)	0.5	0.1	2.8	2.8	2.8	+3
Plastics (compounding costs)	-41	+0	-4	-14	-4	-5
Plastics (change in revenues)	55	+0	+60	+74	+60	+71
CRMs (additional revenues)	57	+181	+181	+181	+181	+181
Total costs	-41	-177	-94	-208	-94	-110
Total additional revenues	3,461	+181	+315	+258	+315	+338
Total costs (all stakeholders)	-186	-962	-2,124	-1,855	-2,124	-2,485

Total revenues (all stakeholders)	6,802	882	1,674	1,320	1,674	1,892

Above tables should be treated with caution, as the calculation does not include all revenues from components sold for reuse/remanufacturing, since they vary significantly among the components and their age. The introduced calculation is based on the materials recovered and not on the wide range of all possible individual components. Moreover, not all the benefits of higher quality of scrap from PO3C is taken into account as these prices vary significantly over time and depend on the specific qualities and alloy types for aluminium for example.

7.3.15 8.2.4 Improve collection quality and quantity

ATFs will be affected under PO4 by more ELVs directed to ATFs and also by new restrictions regards the export of (old) used vehicles. ATFs and specialised dealers selling/ exporting such (old) used vehicles would incur losses in turnover. At the same time, it is expected that ATFs as a whole would benefit from more ELVs directed to ATFs. In 2035, for **PO4A - enhanced reporting,** ATFs would net benefit for 24 million EUR more profits , increasing to 82 million EUR for **PO4B** – interoperable registers and 125 million EUR when **PO4C - export measures** would be implemented. For **PO4D**, the combination of the before mentioned policy options, the additional profits for ATFs is estimated to 308 million EUR. Shredders will also have additional turnovers and profits if more ELVs are treated in Europe. Shredder plants and recycling industry will experience an increase in turnover, however as the profit per tonne depolluted and dismantled vehicle is limited, the total effects are close to marginal at EU level.

Used car dealer with a focus on extra EU export (and not involved in the ELV management) will experience losses of profits due to the limitations of the exports of between 27 to 414 million Euro per year in 2035 for the **PO4A** to **PO4D**. Most of this loss in revenues will lead to lower compensation for vehicle owners when selling/ turning in their old vehicles.

*Table 8.24 Summary economic impacts for the collection policy options 4 in **2030, 2035 and 2040***

Economic impacts (2035, compared to baseline)	**Baseline**	**PO4A**	**PO4B**	**PO4C**	**PO4D Preferred** (individually)	**Preferred** (combined)
Collection stage (values in million EUR, + = revenue, - = cost)		(values in addition to baseline)				
2030	**Baseline**					
Consumers	0	+0	+0	-134	-134	-134
Car dealers (export requirements)	939	-15	-77	-213	-312	-461
ATF profits	1,783	+12	+49	+87	+236	+236
Shredder profits	130	+1	+4	+11	+18	+25
Total costs	0	-19	-93	-376	-525	-674
Total additional revenues	2,851	+17	+70	+127	+332	+339
Total	**2,851**	**-2**	**-23**	**-249**	**-193**	**-335**
2035	**Baseline**					
Consumers	0	+0	+0	-134	-142	-151
Car dealers (export requirements)	968	-27	-123	-282	-414	-523
ATF profits	1,849	+24	+82	+125	+308	+328
Shredder profits	135	+2	+7	+15	+24	+29
Total costs		-27	-123	-416	-556	-673

Total additional revenues	2,952	+26	+89	+140	+332	+357
Total	**2,952**	-1	-34	-276	-223	-316
2040	**Baseline**					
Consumers	0	+0	+0	-134	-134	-134
Car dealers (export requirements)	1,033	-53	-179	-375	-464	-556
ATF profits	1,986	+51	+121	+152	+379	+415
Shredder profits	145	+3	+10	+20	+28	+32
Total costs	0	-70	-219	-559	-725	-828
Total additional revenues	3,163	+77	+171	+222	+533	+586
Total	**3,163**	**+1**	**-48**	**-337**	**-192**	**-242**

7.3.16 8.2.5 Improve governance and economic conditions

PO5: The assessment of the EPR and economic incentives related measures is assessed as based on their amplifying effect on the measures under **PO1, PO3** and **PO4**.

The economic and governance elements of **PO5A – ELV specific EPR** will particularly support more advanced designs for recycling of **PO1** in the long term and reduce costs for obligatory dismantling. The positive impacts are difficult to quantify due to the long time before a new vehicle turns into an ELV.

In the mid- to long-term, the data provided by manufacturers to ATFs could become more fit-for-purpose through its harmonisation and tests. This will reduce costs for obligatory dismantling and in turn lead to a decline in dismantling costs under **PO3**, in particular when harmonised EPR fee modulation under **PO5B – Harmonised EPR** requirements would be implemented.

Depending on the level of EPR requirements ensuring high-quality recycling, but which are not economical for dismantlers and shredders, EPR schemes and producers (and subsequently consumers) will be exposed to higher cost compliance compensation levels to materialise the environmental benefits of **PO3** improving treatment. The reduced export of old vehicles under PO4 will increase the demand for compliance cost to be compensated by producers. The 385,000 vehicles exported less are leading to an addition 200 million EUR in revenues for ATFs and 14 million EUR for shredders. Vice-versa, the value of vehicles exported less for car dealers is expected to be reduced with 95 million EUR.

The implementation of measures envisaged in this revision, aimed at improving high quality recycling and a higher recovery of CRMs, is likely to increase the operating and investment costs of dismantlers and shredding operators. When these costs offset the revenues for these operators, EPR schemes would require that vehicle manufacturers compensate them via appropriate financial support. These calculations would have to be done at regular intervals to adjust the contributions required by the manufacturers, as is already common practice in sectors already covered by EPR schemes. The costs are estimated at EU level. Setting a fixed amount of EPR fees or a threshold for such fees at EU level is not feasible for the scope of this impact assessment, as the costs of these operations:

- Differ between Member States, notably those which have already advanced EPR schemes (like the Netherlands, where producers paid a fee of 22.5€/vehicle in 2023 and 30€ in

2022 to the competent PRO) and those for which have not set up any particular EPR mechanism, and

- Depend on market conditions (notably the prices of secondary materials, the availability post-shredder technology and labour costs) which change over time.

Based on the study accompanying the impact assessment, projections have been made in this impact assessment that the additional costs for manufacturers generated by the "EPR-related" measure. The costs would depend on the evolution of prices of components and spare parts removed by ATFs for re-use or recycling, the evolution of prices of recyclates (notably compared to virgin products), the value of the remaining hulk of ELVs sent by ATFs to shredders, as well as economies of scale realised by ATFs, shredders and recyclers. Based on these projections, the assessment is that the costs linked to EPR for manufacturers would be in a range of 5 to 41€/vehicle (see table below). These costs are additional to the baseline scenario. They are of course accounted for when all costs for operators are calculated with regard to all measures contained in the preferred option.

*Table 8.25 Sensitivity analysis compliance cost offsetting levels for policy option 5 in **2035** for the EU*

Scenarios compliance cost offsetting for treatment operators	
Highest EPR fee scenario, extra collection value 0% for ATFs, revenues of plastics and steel RC **not** to treatment operators	-€ 33.36
High EPR fee scenario, extra collection value 0% to ATFs, default allocation of treatment costs	-€ 21.37
Default scenario	-€13.74
Low EPR fee scenario, extra collection value 100% for ATFs, default treatment costs	-€12.23
Lowest case EPR fee scenario, collection value 100% for ATFs, all removal revenues to treatment operators	-€2.71

7.3.17 8.2.6 Extend the vehicle category scope

Lack of comprehensive data for vehicles remained a persistent problem in the impact assessment. As a result, the economic impacts of the measures can only be qualified as illustrated below for **PO6A – Information requirements** and **PO6B – Mandatory treatment**. For **PO6C – Full scope extension**, a qualitative assessment is incomplete, but expected to be significantly more costly compared to PO6B. For **PO6A – Information requirements** it is assumed that the required provision of dismantling information will not change the current market structure of ATFs and recyclers; it might result in a minor reduction of dismantling times due to better information, however, this is not calculated separately.

*Table 8.26 Summary economic impacts for the scope extension PO 6 in **2030***

Economic impacts (2030, compared to baseline)	**Baseline**	**PO6A**	**PO6B**	**PO6C**	**Preferred** (individually)	**Preferred** (combined)
Scope extension (million units)			(qualitative assessment only)			
ELVs (motorcycles, L3e-L7e)	1,557,104					
ELVs (buses, M2,M3)	31,359					

ELVs (lorries and trailers, N2,N3,O)	264,382					
ELVs non-reported to ATFs (L3e-L7e)	0	not assessed	15%	15%	15%	15%
ELV+ used export reduction (M2,M3)	10,662		9%	9%	9%	9%
ELV+ used export reduction (N2,N3,O)	195,643		8%	8%	8%	8%
Lost revenues exporters (M EUR)			(values in addition to baseline)			
Costs (lost revenue L3e-L7e; M EUR)						
Costs (lost revenue M2,M3; M EUR)			-2.5	-4.4	-2.5	-3
Costs (lost revenue N2,N3,O; M EUR)			-48	-84	-48.3	-48
Total costs			-51	-88	-51	-51
ATFs (M EUR)			(values in addition to baseline)			
Costs (L3e-L7e; M EUR)		not assessed	-8	-11	-8	-8
Costs (M2,M3; M EUR)			-1	-2	-1	-1
Costs (N2,N3,O; M EUR)			-9	-13	-9	-9
Revenues (L3e-L7e; M EUR)			+0	+0	+0	+0
Revenues (M2,M3; M EUR)			+2	+3	+2	+2
Revenues (N2,N3,O; M EUR)			+17	+24	+17	+17
Costs ATFs			-18	-27	-18	-18
Revenues ATFs			+19	+27	+19	+19
Recyclers (M EUR)			(values in addition to baseline)			
Costs (L3e-L7e; M EUR)		not assessed				
Costs (M2,M3; M EUR)						
Costs (N2,N3,O; M EUR)						
Revenues (L3e-L7e; M EUR)						
Revenues (M2,M3; M EUR)			+2	+3	+2	+2
Revenues (N2,N3,O; M EUR)			+15	+22	+15	+15
Revenues recyclers			+18	+25	+18	+18
Total costs (scope extension, M EUR)			-69	-115	-69	-69
Total revenues (scope extension, M EUR)			+37	+51	+37	+37
Cost - revenues scope extension			**-32**	**-63**	**-32**	**-32**
Monetised GHG savings (M EUR)			(values in addition to baseline)			
Monetised GHG savings (L3e-L7e)	467	not assessed	+11	+11	+11	+11
Monetised GHG savings (M2,M3)	196		+12	+12	+12	+12
Monetised GHG savings (N2,N3,O)	346		+71	+71	+71	+71
Monetised GHG savings (M EUR)	**+1,008**		**+94**	**+94**	**+94**	**+94**

*Table 8.27 Summary economic impacts for the scope extension PO 6 in **2035***

Economic impacts (2035, compared to baseline)	**Baseline**	**PO6A**	**PO6B**	**PO6C**	**Preferred** (individually)	**Preferred** (combined)
Scope extension (million units)			(qualitative assessment only)			
ELVs (motorcycles, L3e-L7e)	1,624,242					
ELVs (buses, M2,M3)	32,972					
ELVs (lorries and trailers, N2,N3,O)	289,992					

ELVs non-reported to ATFs (L3e-L7e)	0	not assessed	30%	39%	30%	30%
ELV+ used export reduction (M2,M3)	11,211		19%	25%	19%	19%
ELV+ used export reduction (N2,N3,O)	214,594		17%	21%	17%	17%
Lost revenues exporters (M EUR)			(values in addition to baseline)			
Costs (lost revenue L3e-L7e; M EUR)						
Costs (lost revenue M2,M3; M EUR)			-2.5	-4.4	-2.5	-3
Costs (lost revenue N2,N3,O; M EUR)			-48	-84	-48.3	-48
Total costs			-51	-88	-51	-51
ATFs (M EUR)			(values in addition to baseline)			
Costs (L3e-L7e; M EUR)		not assessed	-17	-22	-17	-17
Costs (M2,M3; M EUR)			-2	-4	-2	-2
Costs (N2,N3,O; M EUR)			-20	-27	-20	-20
Revenues (L3e-L7e; M EUR)			+0	+0	+0	+0
Revenues (M2,M3; M EUR)			+5	+6	+5	+5
Revenues (N2,N3,O; M EUR)			+38	+49	+38	+38
Costs ATFs			-39	-53	-39	-39
Revenues ATFs			+42	+55	+42	+42
Recyclers (M EUR)			(values in addition to baseline)			
Costs (L3e-L7e; M EUR)		not assessed				
Costs (M2,M3; M EUR)						
Costs (N2,N3,O; M EUR)						
Revenues (L3e-L7e; M EUR)			+5	+7	+5	+5
Revenues (M2,M3; M EUR)			+34	+44	+34	+34
Revenues (N2,N3,O; M EUR)			+39	+50	+39	+39
Revenues recyclers			+39	+50	+39	+39
Total costs (scope extension, M EUR)			-90	-141	-90	-90
Total revenues (scope extension, M EUR)			+81	+105	+81	+81
Cost - revenues scope extension			**-9**	**-36**	**-9**	**-9**
Monetised GHG savings (M EUR)			(values in addition to baseline)			
Monetised GHG savings (L3e-L7e)	598	not assessed	+17	+37	+29	+29
Monetised GHG savings (M2,M3)	280		+35	+40	+35	+35
Monetised GHG savings (N2,N3,O)	466		+191	+248	+191	+191
Monetised GHG savings (M EUR)	**+1,344**		**+242**	**+326**	**+254**	**+254**

*Table 8.28 Summary economic impacts for the scope extension PO 6 in **2040***

Economic impacts (2040, compared to baseline)	**Baseline**	**PO6A**	**PO6B**	**PO6C**	**Preferred** (individually)	**Preferred** (combined)
Scope extension (million units)		(qualitative assessment only)				
ELVs (motorcycles, L3e-L7e)	1,701,058					
ELVs (buses, M2,M3)	35,057					
ELVs (lorries and trailers, N2,N3,O)	310,292					
ELVs non-reported to ATFs (L3e-	0	not	38%	39%	38%	38%

L7e)		assessed				
ELV+ used export reduction (M2,M3)	11,211		24%	24%	24%	24%
ELV+ used export reduction (N2,N3,O)	214,594		26%	26%	26%	26%
Lost revenues exporters (M EUR)			(values in addition to baseline)			
Costs (lost revenue L3e-L7e; M EUR)						
Costs (lost revenue M2,M3; M EUR)			-2.5	-4.4	-2.5	-3
Costs (lost revenue N2,N3,O; M EUR)			-48	-84	-48.3	-48
Total costs			-51	-88	-51	-51
ATFs (M EUR)			(values in addition to baseline)			
Costs (L3e-L7e; M EUR)			-17	-22	-17	-17
Costs (M2,M3; M EUR)			-2	-4	-2	-2
Costs (N2,N3,O; M EUR)			-20	-27	-20	-20
Revenues (L3e-L7e; M EUR)		not assessed	+0	+0	+0	+0
Revenues (M2,M3; M EUR)			+5	+6	+5	+5
Revenues (N2,N3,O; M EUR)			+38	+49	+38	+38
Costs ATFs			-39	-53	-39	-39
Revenues ATFs			+42	+55	+42	+42
Recyclers (M EUR)			(values in addition to baseline)			
Costs (L3e-L7e; M EUR)						
Costs (M2,M3; M EUR)						
Costs (N2,N3,O; M EUR)						
Revenues (L3e-L7e; M EUR)		not assessed	+5	+7	+5	+5
Revenues (M2,M3; M EUR)			+34	+44	+34	+34
Revenues (N2,N3,O; M EUR)			+39	+50	+39	+39
Revenues recyclers			+39	+50	+39	+39
Total costs (scope extension, M EUR)			-90	-141	-90	-90
Total revenues (scope extension, M EUR)			+81	+105	+81	+81
Cost - revenues scope extension			**-9**	**-36**	**-9**	**-9**
Monetised GHG savings (M EUR)			(values in addition to baseline)			
Monetised GHG savings (L3e-L7e)	743	not assessed	+115	+142	+115	+115
Monetised GHG savings (M2,M3)	332		+51	+58	+51	+51
Monetised GHG savings (N2,N3,O)	592		+303	+375	+303	+303
Monetised GHG savings (M EUR)	**+1,667**		**+468**	**+575**	**+468**	**+468**

In **PO6B – Mandatory treatment**, the additional numbers of HDVs and buses to be treated in ATFs due to the proposed requirement on export restriction of unroadworthy vehicles will cause lost revenues for exporters and additional dismantling costs at ATFs. However, it is expected that there will also be additional revenues for ATFs from removed materials which will compensate their costs. For the situation of shredders, no information was available to calculate their additional costs or revenues.

For the recyclers, no information was available on the costs of the measures, however, due to the additional material of the new vehicle types of the extended scope, the revenues of the recyclers will increase accordingly.

For **PO6C – Full scope extension**, the quantitative assessment is not complete with the impacts of Measure 33 omitting. Nevertheless, the export reduction impacts are presented. As a result, the entirety of the PO6C impacts are underestimated and expected to be significantly more costly compared to **PO6B** when the costs for a full regulatory scope would be determined**.**

8.3 Administrative burden

Data for the administrative costs are derived from the Oeko-Institut support study[190], the JRC study on plastics recycled content[191] and preliminary measures for CRMs[192]. The data is fully aligned with the EU Standard Cost Model[193] and presented in detail in the following Tables 8.29 – 8.33. The administrative burden for the policy options 1 and 2 relate to vehicles placed-on-the-market as new ones. The costs for the policy options 3-6 are related to ELVs (with varying collection numbers). In below summary statements in Table 8.34 and further, for comparison the costs per vehicles, the latter absolute costs for collection and treatment are divided by the total number of vehicles placed on the market which is lower than the collection volumes.

[190] Baron, Y.; Kosińska-Terrade, I.; Loew, C.; Köhler, A.; Moch, K.; Sutter, J.; Graulich, K.; Adjei, F.; Mehlhart, G.: Study to support the impact assessment for the review of Directive 2000/53/EC on End-of-Life Vehicles by Oeko-Institut, June 2023

[191] Based on the JRC study, see Maury, T., Tazi, N., Torres De Matos, C., Nessi, S., Antonopoulos, I., Pierri, E., Baldassarre, B., Garbarino, E., Gaudillat, P. and Mathieux, F., Towards recycled plastic content targets in new passenger cars, EUR 31047 EN, Publications Office of the European Union, Luxembourg, 2022, ISBN 978-92-76-51784-9 (online), doi:10.2838/834615 (online), JRC129008

[192] N. Tazi, M. Orefice, C. Marmy, Y. Baron, M Ljunggren, P Wäger, F. Mathieux, Initial analysis of selected measures to improve the circularity of Critical Raw Materials and other materials in passenger cars, EUR 31468 EN, Publications Office of the European Union, Luxembourg, 2023, ISBN 978-92-68-01625-1, doi: 10.2760/207541, JRC132821.

[193] See Tool#58 of the Better Regulation Guidance – November 2021.

Table 8.29 Detailed recurrent administrative costs, businesses (PO1-PO3) under the OIOO approach

		New administrative obligations					Price (€per action)	Freq (per year)	Override cost per entity used	Number of entities	Override costs where P*Q not used	Equipment costs (€per entity	Total Administrative Costs	Business As Usual Costs	Total Administrative Burdens
Measure	PO	No.	Type of obligation (see below for typology)	Description of required action(s)	Target group	SMEs affected (Y/N)									
						Businesses									
M8	PO1C	2	Submission of (recurring) reports	Producing new data	Manufacturers	N	0	1	175,000	10	1,750,000		1,750,000	0%	1,750,000
M23	PO1BC	3	Non labelling information for third parties	Other	Manufacturers	N	0	1	6,000,000	1	6,000,000		6,000,000	50%	3,000,000
M9	PO2ABC	4	Submission of (recurring) reports	Producing new data	Manufacturers	N	0	0	120,000	1	120,000		120,000	0%	120,000
M10	PO2ABC	5	Submission of (recurring) reports	Producing new data	Manufacturers	N	0	0	120,000	1	120,000		120,000	0%	120,000
M12	PO3ABC	7	Submission of (recurring) reports	Filing forms and tables	ATFs	Y	206	1	0	12,000	0		2,467,200	95%	123,360
M14a	PO3ABC	8	Submission of (recurring) reports	Filing forms and tables	ATFs	Y	411	1	0	12,000	0		4,934,400	60%	1,973,760
M14b	PO3BC	9	Submission of (recurring) reports	Submitting the information (sending it to the designated recipient)	Dismantlers	Y	77	52	0	270,000	0		1,082,484,000	100%	-
M13a	PO3ABC	10	Submission of (recurring) reports	Submitting the information (sending it to the designated recipient)	ATFs	Y	411	1	0	12,000	0		4,934,400	70%	1,480,320
M16a	PO3ABC	11	Submission of (recurring) reports	Submitting the information (sending it to the designated recipient)	Shredders/ PST operators	Y	411	1	0	140	0		57,568	0%	57,568
M16a	PO3ABC	13	Submission of (recurring) reports	Submitting the information (sending it to the designated recipient)	Shredders/ PST operators	Y	411	1	0	140	0		57,568	0%	57,568
M12	PO3ABC	14	Submission of (recurring) reports	Submitting the information (sending it to the designated recipient)	Shredders/ PST operators	Y	1,028	1	0	200	0		205,600	10%	185,040
M12,M13	PO3ABC	15	Submission of (recurring) reports	Submitting the information (sending it to the designated recipient)	ATFs	Y	0	1	2.50	6,310,435	15,776,087		15,776,087	20%	12,620,869
M12,M13	PO3ABC	16	Submission of (recurring) reports	Submitting the information (sending it to the designated recipient)	Shredders	Y	0	1	2.50	6,310,435	15,776,087		15,776,087	20%	12,620,869
M12,M13	PO3ABC	17	Submission of (recurring) reports	Submitting the information (sending it to the designated recipient)	Recyclers	Y	0	1	1.00	15,776,087	3,155,217		3,155,217	20%	2,524,174

No.	Comments
2	Once the format for the digital Circularity Vehicle Passport (digital CVP) is established, the OEMs have to fill and maintain the database with existing information to support the CVP. Total effort requires 1 person-year (equivalent to 125,000 €) per OEM plus 50,000 € in overhead costs.
3	Under the current EPR obligations OEMs must inter alia provide easy access to harmonised information, The current cost (e.g. for IDIS) are estimated by ACEA at 3 M€/yr. The effort for additional support in monitoring and reporting on compliance (currently a shared responsibility of ATFs and public authorities) and the task to provide easier accessible information in a harmonised manner (e.g. via photo of VIN number, directly digitally accessible) and more information (not obligatory dismantling only, but on valuable components for reuse, remanufacturing, recycling as well) will possibly double the effort might double. Similar tasks are provided by ARN in the NL and cost can be derived from this example too.
4	Source: JRC plastics recycling report, certification costs, Figure 42, sum for all manufacturers.
5	Assumed to be similar to plastics recycling costs, JRC study page 42, sum for all manufacturers.
7	ATFs need to spend more effort to assess the effective recycling rate “at the point of calculation” when the recycling definition is aligned with the WFD. As ATFs have a reporting obligation under the current legislation too. The effort shall not change significantly, but more documentation will need to be provide evidence.
8	ATFs shall monitor and report on reuse in more details as currently.
9	Not to be included: Considered to be part of the baseline as operational costs as the revenues that are not precisely quantified certainly will outweigh the reporting costs. Support reuse market, Repair shops. We know that in some cases repair shops already apply reused parts, anyway the obligation could lead to an increase in such activities.
10	Obligatory dismantling, ATF Reporting to MS authority on mandatory dismantled parts/components either for reuse/remanufacturing or for recycling, ATFs already today report but will have additional effort to provide data on weight and kind of dismantled components for reuse/remanufacturing and recycling. It is assumed that ATFs will dismantle more, thus higher effort.
11	We assume that the OEMs will report on post shredder treatment (PST) capacities via (collective / multiple competitive / individual) PROs.
13	Disposal ban (PST plastic), Reporting obligation on the quality of residues (POP content), We assume that the OEMs will report on post shredder treatment (PST) activities via (collective / multiple competitive / individual) PROs. The aspect is currently not reported
14	Mutual RRR targets, Waste operators/PROs to report on treated ELVs to MS authorities considering the "calculation point", The effort of waste operators will depend on how the reporting is determined. The calculation assumes involvement of all parties in the value chain (conservative). The assessment also covers any burden for reporting related to material specific targets
15	Monitoring of material flows and compliance with RRR targets. Based on indication from Belgium (Febelauto), Netherlands (ARN) and Ireland (ELVES) we conclude that the effort for this task is between less than 1 € and in maximum 5 € per new and used car first registered; here considered the share of the ATFs
16	Monitoring of material flows and compliance with RRR targets. Based on indication from Belgium (Febelauto), Netherlands (ARN) and Ireland (ELVES) we conclude that the effort for this task is between less than 1 € and in maximum 5 € per new and used car first registered; here considered the share for the shredders
17	Monitoring of material flows and compliance with 3R targets, based on indication from Belgium (Febelauto), Netherlands (ARN), Ireland (ELVES): the effort for this task is between < 1 € and maximum 5 € per new or used car first registered; reflects share of recyclers/ end-processors.

Table 8.30 Detailed recurrent administrative costs, businesses, continued and citizens (PO4-PO6) under the OIOO approach

		New administrative obligations					Price (€per action)	Freq (per year)	Override cost per entity used	Number of entities	Override costs where P*Q not used	Equipment costs (€per entity	Total Administrative Costs	Business As Usual Costs	Total Administrative Burdens
Measure	**PO**	**No.**	**Type of obligation (see below for typology)**	**Description of required action(s)**	**Target group**	**SMEs affected (Y/N)**									
Businesses															
M17	PO4ABC	18	Submission of (recurring) reports	Submitting the information (sending it to the designated recipient)	OEMs, car producers, PRO	N	9	1	0	1,000	0		8,912	0%	8,912
M22	PO4ABC	19	Other	Other	OEMs, car producers, PRO	N	0	1	1.50	15,024,844	22,537,267		22,537,267	80%	4,507,453
M22	PO4ABC	20	Non labelling information for third parties	Filing the information	OEMs, car producers, PRO	N	0	1	0.80	15,776,087	12,620,869		12,620,869	10%	11,358,782
M22	PO4ABC	21	Non labelling information for third parties	Other	OEMs, car producers, PRO	N	0	0	1	15,024,844	15,024,844		15,024,844	0%	15,024,844
M24	PO4BC	22	Other	Other	OEMs, car producers, PRO	N	43,002	0	0		0		1,161,063	0%	1,161,063
M28	PO6ABC	23	Submission of (recurring) reports	Filling forms and tables	HDV manufacturers and their suppliers	N	206	0	0	14	0		0	100%	-
M28	PO6ABC	24	Submission of (recurring) reports	Filling forms and tables	L-cat manufacturers	N	206	3	0	16	0		9,869	0%	9,869
M31a	PO6ABC	25	Submission of (recurring) reports	Filling forms and tables	ATFs / dismantlers	Y	206	1	0	4,500	0		925,200	0%	925,200
M28	PO6ABC	26	Notification of (specific) activities or events	Retrieving relevant information from existing data	HDV manufacturers and their suppliers	N	206	1	0	14	0		2,878	0%	2,878
M28	PO6ABC	27	Notification of (specific) activities or events	Retrieving relevant information from existing data	L-cat manufacturers	N	206	1	0	16	0		3,290	0%	3,290
M30a	PO6BC	28	Certification of products or processes	Filling forms and tables	ATFs	Y	822	1	0	4,500	0		3,700,800	0%	3,700,800
M30a	PO6BC	29	Notification of (specific) activities or events	Submitting the information (sending it to the designated recipient)	Business owners	Y	2	1	0	400,000	0		856,667	33%	573,967
M30a	PO6BC	30	Notification of (specific) activities or events	Submitting the information (sending it to the designated recipient)	ATFs	Y	4	1	0	2,024,242	0		8,670,504	33%	5,809,237
Citizens															
M30a	PO6BC	31	Notification of (specific) activities or events	Submitting the information (sending it to the designated recipient)	Citizen owners	N	2	1	0	1,624,242	0		3,478,585	33%	2,330,652

No.	Comments
18	Monitoring and reporting on illegal activities in the sector: As the PRO / producer must activate notifications, forwarding the information to the responsible authorities only, the effort to establish and maintain this functionality is marginal.
19	Obligation for all MS to establish national EPR schemes: Administrative effort of OEMs to demonstrate a "zero cost network" is (as demonstrated for existing PROs) about 1 to 3 € per new vehicle placed on the market (see section 6.7.2 in Annex I in the support study). Calculation with the number of new registrations for passenger cars in 2019 (Eurostat). While not all countries require a formal implementation of EPR schemes and PRO(s), almost all MS consider the current obligation to demonstrate the take back at zero cost with a sufficient take back network as an EPR obligation and OEMs spent already today effort to demonstrate this towards the authorities.
20	Awareness raising of last holder to deliver ELVs to ATFs, In Ireland the PRO conducted comprehensive effort for awareness raising. Annual report 2021 ELVES: total expenditures 1.9 M€; 11% on advertising, marketing, PR = 0.2 M€, Considering 250,000 new and used cars registered for the first time in Ireland around 0.8 € per new and used car first registered; Calculation with new registrations for passenger cars in 2019 (Eurostat) + 5% import of used vehicles.
21	Training for staff of ATFs (and shredders) in particular for the for the handling of (traction) batteries: Considering that each of the 12,000 ATFs will sooner or later need training in handling of high-voltage batteries, such training, including missed work time, easily costs ATFs more than €5,000, which would add up to € 60 million for the entire EU. Considering that such training needs to be completed in a period of 5 years and taking into account 63 million new passenger cars registered in the previous 5-year period (2017 – 2021) this would account for around 1 € per each new vehicle in that period. Other trainings to be added.
22	EPR Fee modulation: The effort for the stakeholders (producers, dismantlers, shredders) associated with the fee adjustment is the negotiation process to adjust the modulation (including studies to prove one's own position) and the effort for the (public) clearinghouse to moderate this process. The fee modulation will not change the total fee.
24	Information to waste operators, 16 L3e-L7e manufacturers according to ACEM interview.
25	Reporting on treated ELVs to MS authority: Taking into account that 15% (per unit) of vehicles are not in scope today and assuming the identical additional share for ATFs might be required for the dismantling of PTW, lorries, buses and (semi-)trailers, this results in a number 4.500 ATFs being required for vehicles other than M1 and N1 (~ 30,000)
26	Contribution to the development of vehicle specific Annex II of ELVD
27	Contribution to the development of vehicle specific Annex II of ELVD
28	Authorisation process; for nr of ATFs, see no. 25
29	Vehicle owners to receive and store CoD documents, 0,4 Mio = sum of expected waste lorries, buses and trailers; Business owners assuming that in 1/3 of the EU MS CoD requirements exist in the national legislation
30	ATFs to print and provide CoD to vehicle owners & notify vehicle registers; for nr of ATFs, see no. 25
	Costs for citizens
31	Vehicle owners to receive and store CoD documents, 1.62 Mio = sum of expected waste L-cat; Citizen ownerships assuming in 1/3 of the EU MS CoD requirements exist in national legislation

Table 8.31 Detailed recurrent administrative costs, authorities (PO1-PO4, top), (PO5-PO6, middle) and non-preferred options (bottom)

		New administrative obligations					Price (€per action)	Freq (per year)	Override cost per entity used	Number of entities	Override costs where P*Q not used	Equipment costs (€per entity	Total Administrative Costs	Business As Usual Costs	Total Administrative Burdens
Measure	PO	No.	Type of obligation (see below for typology)	Description of required action(s)	Target group	SMEs affected (Y/N)									
Businesses															
Public authorities															
M1	PO1ABC	32	Inspection on behalf of public authorities	Inspecting and checking (including assistance to inspection by public authorities)	MS Type approval authorities	N	1,028	1	0	14	0		13,878	0%	13,878
M1	PO1ABC	33	Inspection on behalf of public authorities	Inspecting and checking (including assistance to inspection by public authorities)	MS market surveillance authorities	N	617	1	0	5	0	30,000	165,331	0%	165,331
M1	PO1ABC	34	Inspection on behalf of public authorities	Inspecting and checking (including assistance to inspection by public authorities)	MS market surveillance authorities	N	206	1	0	22	0	1,000	26,041	0%	26,041
M1	PO1ABC	35	Inspection on behalf of public authorities	Inspecting and checking (including assistance to inspection by public authorities)	EEA/ National registration auth.	N	2,056	5	0	1	0	150,000	160,280	0%	160,280
M12	PO3ABC	36	Submission of (recurring) reports	Filing forms and tables	MS competent authorities waste	N	206	1	0	27	0		5,551	100%	0
M14a	PO3ABC	37	Submission of (recurring) reports	Filing forms and tables	MS competent authorities waste	N	206	1	0	27	0		5,551	60%	2,220
M14b	PO3BC	38	Submission of (recurring) reports	Filing forms and tables	MS competent authorities waste	N	308	3	0	27	0		24,980	0%	24,980
M13a	PO3ABC	39	Submission of (recurring) reports	Filing forms and tables	MS competent authorities waste	N	206	1	0	27	0		5,551	70%	1,665
M16b	PO3BC	40	Submission of (recurring) reports	Filing forms and tables	MS competent authorities waste	N	411	1	0	27	0		11,102	0%	11,102
M12	PO3ABC	43	Submission of (recurring) reports	Filing forms and tables	MS competent authorities waste	N	129	1	0	27	0		3,470	10%	3,123
M17	PO4ABC	44	Inspection on behalf of public authorities	Inspecting and checking (including assistance to inspection by public authorities)	Authorities for waste/ inspections	N	695	1	0	3,600	0		2,500,294	0%	2,500,294
M20	PO4BC	45	Other	MS registration systems interoperable with the systems of other MS	National registration authorities	N	0	7,512,422	0	1	0		1,608,910	0%	1,608,910
M22	PO4ABC	46	Notification of (specific) activities or events	Filing forms and tables	Ministry	N	1,911	1	0		0		51,603	0%	51,603
M22	PO4ABC	47	Other	Other	Ministry or specialised EPR agency	N	43,002	0	0		0		1,161,063	0%	1,161,063
M20/M25	PO4BC	48	Registration	Other	Registration authority	N	0	1	1	15,024,844	15,024,844		15,024,844	0%	15,024,844
M24	PO4BC	49	Other	Other	Ministry or specialised EPR agency	N	43,002	0	0		0		1,161,063	0%	1,161,063
M20/M25	PO4BC	50	Other	Other	EC	N	0	1	350,000	1	350,000		350,000	0%	350,000

continued, PO5-PO6, non-preferred options and costs not falling under the OIOO approach

		New administrative obligations					Price (€per action)	Freq (per year)	Override cost per entity used	Number of entities	Override costs where P*Q not used	Equipment costs (€per entity	Total Administrative Costs	Business As Usual Costs	Total Administrative Burdens
Measure	**PO**	**No.**	**Type of obligation (see below for typology)**	**Description of required action(s)**	**Target group**	**SMEs affected (Y/N)**									
Public authorities															
M31a	PO6ABC	53	Submission of (recurring) reports	Filling forms and tables	Member States-waste authorities	N	411	1	0	27	0		11,102	75%	2,776
M30a	PO6BC	54	Inspection on behalf of public authorities	Inspecting and checking (including assistance to inspection by public authorities)	Member States-waste authorities	N	617	0.1	0	4,500	0		277,560	0%	277,560

		New administrative obligations					Price (€per action)	Freq (per year)	Override cost per entity used	Number of entities	Override costs where P*Q not used	Equipment costs (€per entity	Total Administrative Costs	Business As Usual Costs	Total Administrative Burdens
Measure	**PO**	**No.**	**Type of obligation (see below for typology)**	**Description of required action(s)**	**Target group**	**SMEs affected (Y/N)**									
Businesses															
M1	PO1ABC	1	Submission of (recurring) reports	Inspecting and checking (including assistance to inspection by public authorities)	Manufacturers	N	3,084	5	0	10	0	30,000	454,200	0%	454,200
M11	PO2C	6	Submission of (recurring) reports	Inspecting and checking (including assistance to inspection by public authorities)	Manufacturers	N	0	0	90,000	1	90,000		90,000	0%	90,000
M16c	PO3C	12	Submission of (recurring) reports	Submitting the information (sending it to the designated recipient)	Steel recyclers	Y	206	12	0	200	0		493,440	75%	123,360
Public authorities															
M16c	PO3C	41	Submission of (recurring) reports	Filing forms and tables	MS competent authorities waste	N	411	1	0	27	0		11,102	0%	11,102
M16c	PO3C	42	Submission of (recurring) reports	Filing forms and tables	MS competent authorities waste	N	308	1	0	27	0		8,327	0%	8,327
M26	PO4C	51	Other	Other	EC	N	0	1	250,000	1	250,000		250,000	0%	250,000
M27	PO4C	52	Other	Other	EC	N	0	1	250,000	1	250,000		250,000	0%	250,000

No.	Comments
	Costs for authorities, not in OIOO scope
32	3R Type approval submissions: Assumed to only affect some MS
33	3R Type approval market surveillance: Represents market surveillance costs for MS performing surveillance at vehicle level
34	3R Type approval market surveillance: Represents market surveillance costs for MS performing surveillance at component level
35	3R dismantling tests: Represents dismantling costs for 5 vehicles
36	Aligning recycling definition with WFD, MS Reporting on treated ELVs to Eurostat, MS already report on M1 and N1 ELVs, the format will not change from the baseline but only what values are reported under which part, all costs occur in the baseline.
37	Monitoring reuse, MS Reporting on treated ELVs to Eurostat, MS already report on M1 and N1 ELVs, the format will change from the baseline but still MS just need to compile the data they get from ATFs and validate it.
38	Support reuse market, MS Reporting on treated ELVs to Eurostat. To implement enforcement against illegal sales of reused components, MS would need to inspect online sale platforms to ensure no illegal activities.
39	Obligatory dismantling, MS Reporting on treated ELVs to Eurostat, MSs already report and will use same format, however those not yet reporting. It is assumed that ATFs will dismantle more, thus higher effort.
40	PST - general, MS Reporting on treated ELVs to Eurostat. There is currently no reporting on PST capacities
43	Mutual RRR targets, MS Reporting on treated ELVS to Eurostat ("calculation point"), MS will have higher costs as the reporting format will need to be updated based on the calculation point principal and is expected to be slightly more specific.
44	Considering 12,000 ATFs in the EU and taking into account that not only ATFs shall be included in the inspection we consider a total of 36,000 installations / sites targeted for inspections, thereof 10% shall be physically assessed each year. We assume an average effort of 24 hours for each visit / report per site.
45	As a first indication the envisaged budget on interconnection with the EU central information system (e.g.. Move-Hub) for national vehicle registration and roadworthiness authorities for the year 2022 might serve as a first proxy which is around 1.6 million € for all the different services provided to its members. The cost is charged separately for different services to the individual vehicle registration authorities. Considering these cost and the cost at national level and considering full digitalisation we take 0.5 minutes into consideration and that around 50% of the used vehicles cross borders during their life. in result the admin burden is around 0.1 Euro per new vehicle. The detailed impact would be assessed as part of the impact assessment for the "roadworthiness package" which is under preparation by the European Commission , as one aim of this package is to move to a full digitalisation of the registration documents and improve the exchange of information between Member States on their registers.
46	Obligation for all MS to establish national EPR schemes. While currently not all MS require a formal implementation of EPR schemes and PRO(s), all MS task OEMs to demonstrate the take back at zero cost with a sufficient take back network and must establish some evaluation means effort. Insofar 100% is covered with BAU.
47	MS to establish an independent competent authority (clearing house) Advanced MS and also smaller MS establish "cover authorities" for more than on EPR only. Under such roof the effort should be limited to 1/2 FTE per MS. Additional one-off cost occur during negotiation of compliance cost compensation or fee modulation.
48	Establishment of a notification system for ELV, CoD and final cancellation. Registration authorities must establish adjusted procedures. Based on indication from Belgium

No.	Comments
	Costs for authorities, not in OIOO scope
	(Febelauto), Netherlands (ARN) and Ireland (ELVES) the effort for this task is less than 1 € per new and used car first registered.
49	EPR Fee modulation. The effort for the stakeholders (producers, dismantlers, shredders) associated with the fee adjustment is the negotiation process to adjust the modulation (including studies to prove one's own position) and the effort for the (public) clearinghouse to moderate this process. The fee modulation will not change the total fee.
50	EPR schemes for intra EU trade (delegated / implementing act). So far cost for EC occur for staff and support study for (if any) delegated / implementing act (~ € 350,000) in total.
53	Reporting on treated ELVS to Eurostat, MS already report on M1 and N1 ELVs, the format can be the same for other vehicles, thus, 75% of the costs occur in the baseline
54	Authorisation of dismantling facilities, assuming 10% of the ATFs being checked per year for number of ATFs, see above.
	Costs for businesses, preferred option, not in OIOO scope
1	The cost for the OEMs are to carry out 3R dismantling tests. Estimation represents costs for the OEM when the tests are carried out by third companies. Testing costs not in OIOO scope.
	Costs for businesses, non-preferred options
6	These costs are about declaration costs for other materials, sum for all manufacturers
12	Recyclers to monitor and report on PST - copper level. Recyclers reporting on quality of smelted steel batches. Assumingly recyclers will report over time about the changing level of copper in steel smelted batches. Cost reflect the need to compile and submit the data.
	Costs for authorities, non-preferred options
41	PST - copper level and quality of steel fractions, MS Reporting quality of steel recyclates to MS. Newly introduced reporting based on recycler submitted data
42	Disposal ban (PST plastic). MS Reporting on treated ELVs to Eurostat. There is currently no reporting on the quality of PST residues
51	European EPR for the EU market/ cross border EPR implementation (support study). Cost for EC for staff and support study to prepare the feasibility study (~€ 250,000) in total.
52	Green Public Procurement. Estimated cost for EC occur for staff and study occur to prepare the feasibility study (~ 250,000) in total.

Table 8.32 Detailed one-off administrative costs for businesses (PO1-PO6)

		New administrative obligations creating one-off administrative costs					Total initial cost (€	Assumed lifetime over	Discount rate (%)	Total annualised one-off
Measure	PO	No.	Type of obligation (see below for typology)	Description of required action(s)	Target group	SMEs affected (Y/N)				
Businesses										
M8	PO1C	55	Certification of products or processes	Inspecting and checking (including assistance to inspection by public authorities)	Manufacturers	N	370,000	10	3.0	43,375.29
M8	PO1C	56	Certification of products or processes	Submitting the information (sending it to the designated recipient)	Manufacturers	N	2,000,000	10	3.0	234,46101
M28	PO6ABC	57	Submission of (recurring) reports	Buying (IT) equipment & supplies	L-cat manufacturers	N	25,940	10	3.0	3,040.98
M28	PO6ABC	58	Application for general authorisation or exemption	Retrieving relevant information from existing data	HDV manufacturers and their suppliers	N	25,940	10	3.0	3,040.98
M28	PO6ABC	59	Application for general authorisation or exemption	Retrieving relevant information from existing data	L-cat manufacturers	N	29,646	10	3.0	3,475.41

No.	Comments
55	3 person years for developing the structure and requirements of the digital product passport / Circularity Vehicle Passport (DPP/CVP), total for all OEMS for preparation and discussion
56	Adaptation of existing industry databases to digital product passport / Circularity Vehicle Passport (DPP/CVP) requirements
57	Maintenance of online platform for information sharing, one-off development costs; assumption that no additional costs will arise for HDV manufacturers as the documents will probably be provided on their current websites
58	Provision of substances information, one-off costs; 3x 1440 mins, frequency =3, a reporting format for lorries, trailers, one for buses; 8 lorry manufacturers + 6 “others” (assumed for trailers and buses)
59	Provision of substances information, one-off costs; 3x 1440 mins, frequency = 3; a reporting format for L-cat vehicles; 16 L-cat manufacturers

Table 8.33 Detailed one-off administrative costs for authorities (PO1-PO6), not in OIOO scope

		New administrative obligations creating one-off administrative costs					Total initial cost (€	Assumed lifetime over	Discount rate (%)	Total annualised one-off
Measure	PO	No.	Type of obligation (see below for typology)	Description of required action(s)	Target group	SMEs affected (Y/N)				
Public authorities										
M8	PO1C	60	Certification of products or processes	Other	EC/ ECHA	N	200,000.00	10	3.0	23,446
M22	PO4ABC	61	Certification of products or processes	Other	Competent authorities for waste	N	540,000	10	3.0	63,304
M17	PO4ABC	62	Certification of products or processes	Filing forms and tables	Competent authorities for waste	N	810,000	10	3.0	94,957

No.	Comments
60	European Commission: management of the discussion to establish the requirements (content) and the format for the digital product passport / Circularity Vehicle Passport (DPP/CVP). Support study: 100,000 €; plus one person year (+100,000 EUR)
61	Obligation for all MS to establish national EPR schemes, changes for national legislation
62	MS to report on implementation and enforcement regards EPR: Two reports in year + 3 and +5 required. Limited one-off effort demonstrating implementation. No explicit data collection but focussing on legal implementation.

Administrative burden per policy option is included in Section 7.1 in the comparison of options in Tables 9 to 13. An overview of the administrative burden for 2035 per economic operator are provided in Annex 3 per stakeholder affected and here in much more detail for each operator per policy option. For **PO1A**, the 3R calculation and required declaration generally follows existing procedures, with some one-off transition costs. For plastics recycled content, the certification costs are estimated to be limited to 0.35 million EUR in 2035 for **PO2C** and relatively marginal compared to processing costs. A similar value is expected for the steel recycled content target, following the same approach. The highest costs related to for **PO3B** and **PO3C** where ATFs are required to improve reporting over depollution and mandatory removal (roughly 3 EUR/vehicle). The costs related to EPR in setting up PROs PO5 are around 32 million EUR and 56 million EUR in total for PO4 and PO5 combined (6 EUR/ vehicle); the costs for competent authorities for waste and for adapting the vehicle registration systems are 22 million EUR (less than 2 EUR/vehicle). In total, including some administrative costs for the scope extension of PO6, the total administrative costs range between 7 and 11 EUR per vehicle. Below Tables 8.34 and 8.35 provide an overview of the administrative burden for all policy options for 2035.

*Table 8.34 Administrative burden per economic operator in detail, in **2035***

Administrative burden (2035, compared to baseline)	**PO1A-PO6A**	**PO1B-PO6B**	**PO1C-PO6C**	**Preferred** (individually)	**Preferred** (combined)
At the production stage (3R type-approval), in Million EUR (+ = revenue, - = cost) **(PO1)**					
Manufacturers M1,N1 (to service provider)	-0.454	-3.454	-5.204	-5.204	-5.204
Type approval authorities	-0.014	-0.014	-0.014	-0.014	-0.014
Market surveillance authorities	-0.191	-0.191	-0.191	-0.191	-0.191
SMEs: ATFs	-0.160	-0.160	-0.160	-0.160	-0.160
EC/ ECHA - (one off)	0.000	0.000	-0.200	-0.200	-0.200
Manufacturers M1,N1 (one-off)	0.000	0.000	-2.370	-2.370	-2.370
Subtotal (recurring)	-0.82	-3.82	-5.57	-5.57	-5.57
Subtotal (one-off)	0.00	0.00	-2.57	-2.57	-2.57
Total (annualised)	**-0.82**	**-3.82**	**-5.87**	**-5.87**	**-5.87**
At the production stage (steel+plastics RC), in Million EUR (+ = revenue, - = cost) **(PO2)**					
Manufacturers (certification costs)	-0.240	-0.240	-0.330	-0.240	-0.240
Type approval authorities	0.000	0.000	0.000	0.000	0.000
Market surveillance authorities	0.000	0.000	0.000	0.000	0.000
Subtotal (recurring)	**-0.24**	**-0.24**	**-0.33**	**-0.24**	**-0.24**
At the production stage (hazardous substances), in Million EUR (+ = revenue, - = cost) **(PO1)**					
Manufacturers (hazardous substances)	(o)	(o)	(+)	(+)	(+)
EC/ECHA/MS (hazardous substances)	(-)	(-)	(++)	(++)	(++)
Recycling, in Million EUR (+ = revenue, - = cost) **(PO3)**					
SME - ATFs	-16.198	-16.198	-16.198	-16.198	-16.198
SME - Shredders/PST operators	-12.921	-12.921	-12.921	-12.921	-12.921
Recyclers	-2.524	-2.524	-2.648	-2.524	-2.524
MS competent authorities waste	-0.007	-0.043	-0.063	-0.043	-0.043
Subtotal (recurring)	**-31.65**	**-31.69**	**-31.83**	**-31.69**	**-31.69**

Collection + EPR, in Million EUR (+ = revenue, - = cost) **(PO4+PO5)**					
ATFs and shredders	0.000	0.000	0.000	0.000	0.000
MS competent authorities waste	-3.713	-4.874	-4.874	-4.874	-4.874
MS national vehicle registration	0.000	-16.634	-16.634	-16.634	-16.634
Manufacturer/ PRO	-30.900	-32.061	-32.061	-32.061	-32.061
European Commission/ ECHA	0.000	-0.350	-0.850	-0.850	-0.850
MS authorities waste (one-off)	-1.35	-1.35	-1.35	-1.35	-1.35
Subtotal (recurring)	-34.61	-53.92	-54.42	-54.42	-54.42
Subtotal (one-off)	-1.35	-1.35	-1.35	-1.35	-1.35
Total (annualised)	**-34.77**	**-54.08**	**-54.58**	**-54.58**	**-54.58**
Scope extension, in Million EUR (+ = revenue, - = cost) **(PO6)**					
Manufacturers (L-cat, recurrent)	-0.013	-0.013	-0.013	-0.013	-0.013
Manufacturers (HDV, recurrent)	-0.003	-0.003	-0.029	-0.003	-0.003
ATFs	-4.626	-10.435	-10.435	-10.435	-10.435
MS waste authorities	-0.003	-0.280	-0.280	-0.280	-0.280
Professional vehicle owners	0.000	-0.574	-0.574	-0.574	-0.574
Private vehicle owners	0.000	-2.331	-2.331	-2.331	-2.331
Manufacturers (L-cat, one-off)	-0.056	-0.056	-0.056	-0.056	-0.056
Manufacturers (HDV, one-off)	-0.026	-0.026	-0.026	-0.026	-0.026
Subtotal (recurrent)	-4.64	-13.64	-13.66	-13.64	-13.64
Subtotal (one-off)	-0.08	-0.08	-0.08	-0.08	-0.08
Total (annualised)	-4.65	-13.65	-13.67	-13.65	-13.65
Total (PO1-PO6, recurrent)	-71.97	-103.30	-105.81	-105.55	-105.55
Total (PO1-PO6, one-off - annualised)	-0.17	-0.17	-0.47	-0.47	-0.47
Total (PO1-PO6, recurrent+annualised)	**-72.14**	**-103.47**	**-106.28**	**-106.02**	**-106.02**

*Table 8.35 Administrative burden summarised per economic operator and policy option, in **2035***

Administrative burden (2035, compared to baseline)	**PO1A-PO6A**	**PO1B-PO6B**	**PO1C-PO6C**	**Preferred** (individually)	**Preferred** (combined)	**Preferred** (N1,M1 only)
Summary of administrative burden per economic operator, in Million EUR (+ = revenue, - = cost)						
Consumers/ vehicle owners	+0.000	-2.905	-2.905	-2.905	-2.905	-2.331
Manufacturers/ PROs	-31.610	-35.771	-37.637	-37.521	-37.521	-37.424
ATFs	-20.985	-26.794	-26.794	-26.794	-26.794	-16.359
Shredder/PST operators	-12.921	-12.921	-12.921	-12.921	-12.921	-12.921
Recyclers	-2.524	-2.524	-2.648	-2.524	-2.524	-2.524
MS type approval authorities	-0.014	-0.014	-0.014	-0.014	-0.014	-0.014
MS market surveillance	-0.191	-0.191	-0.191	-0.191	-0.191	-0.191
MS competent authorities waste	-3.723	-5.197	-5.217	-5.197	-5.197	-4.917
MS national vehicle registration	+0.000	-16.634	-16.634	-16.634	-16.634	-16.634
European Commission/ ECHA	+0.000	-0.350	-0.850	-0.850	-0.850	-0.850
Subtotal (recurrent)	-71.97	-103.30	-105.81	-105.55	-105.55	-91.92
Summary of administrative burden per policy option, in Million EUR (+ = revenue, - = cost)						

3R type-approval (PO1)	-0.820	-3.820	-5.570	-5.570	-5.570	-5.570
Recycled content (PO2)	-0.240	-0.240	-0.330	-0.240	-0.240	-0.240
Reuse and recycling (PO3)	-31.651	-31.687	-31.829	-31.687	-31.687	-31.687
Collection and EPR (PO4+PO5)	-34.613	-53.919	-54.419	-54.419	-54.419	-54.419
Scope extension (PO6)	-4.645	-13.636	-13.662	-13.636	-13.636	+0.000
Subtotal (recurring)	-71.97	-103.30	-105.81	-105.55	-105.55	-91.92
plus one-off costs:						
EC/ ECHA - (one off)	0.000	0.000	-0.200	-0.200	-0.200	-0.200
Manufacturers M1,N1 (one-off)	0.000	0.000	-2.370	-2.370	-2.370	-2.370
MS authorities waste (one-off)	-1.350	-1.350	-1.350	-1.350	-1.350	-1.350
Manufacturers (L-cat, one-off)	-0.056	-0.056	-0.056	-0.056	-0.056	
Manufacturers (HDV, one-off)	-0.026	-0.026	-0.026	-0.026	-0.026	
Subtotal (one-off)	-1.432	-1.432	-4.002	-4.002	-4.002	-3.920
Subtotal (one-off annualised)	-0.168	-0.168	-0.469	-0.469	-0.469	-0.460
Total (PO1-PO6, recurrent+annualised)	**-72.14**	**-103.47**	**-106.28**	**-106.02**	**-106.02**	**-92.37**

8.4 Social impacts (job creation)

An overview of the social impacts is provided in Table 8.36. The highest contribution to the creation of total jobs relates to the plastics recycled content option with respectively 1,600, 3,200 and 6,500 jobs for the options PO2A-PO2C for both manufacturers and shredder/PST operators. Second in contribution are the additional jobs related to mandatory removal of components, ranging for 930 jobs for PO3A to over 6,500 jobs for PO3C due to high dismantling times of smaller components.

*Table 8.36 Social impacts – job creation per economic operator and policy option, in **2035***

Social impacts (2035, compared to baseline)	**PO1A-PO6A**	**PO1B-PO6B**	**PO1C-PO6C**	**Preferred** (individually)	**Preferred** (combined)
Social impacts, job creation (in FTE)	(Values in addition to baseline)				
Manufacturers 3R type-approval (PO1)	+5	+5	+5	+5	+5
Manufacturers (Plastics RC, PO2)	+1,642	+3,264	+6,529	+6,529	+6,529
Manufacturers (PO1,2)	+1,647	+3,269	+6,534	+6,534	+6,534
SMEs: ATFs, shredders (PO2)	+598	+1,196	+1,794	+1,794	+1,794
ATFs (PO3)	+934	+6,224	+6,504	+6,224	+7,593
Steel	+86	+582	+383	+582	+716
Copper	+0	+1,196	+1,196	+1,196	+1,471
Aluminium	+86	+582	+383	+582	+716
Glass	+19	+644	+644	+644	+792
Plastics (dismantling/recycling)	+0	+1,795	+1,795	+1,795	+2,208
Plastics (recycled content)	+7	+18	+29	+18	+22
EEC - invertor	+466	+1,134	+1,801	+1,134	+1,394
Hazardous substances	+0	+3	+3	+3	+4
CRMs	+270	+270	+270	+270	+270
SMEs: ATFs, shredders, (PO4)	+328	+1,195	+2,062	+4,374	+4,856

Manufacturers/ PROs (PO5)	+512	+512	+512	+512	+630
Scope extension (PO6)	+0	+701	+829	+701	+701
Total job creation (in FTE), of which:	+4,019	+13,097	+18,235	+20,139	+22,108
Manufacturers	+2,159	+3,781	+7,046	+7,046	+7,164
SME's: ATFs and shredders	+1,860	+8,615	+10,360	+12,392	+14,243

8.5 How do the options compare?

8.5.1 8.5.1 Summary of impacts and costs/ benefits

Below tables provide an overview of the main costs and benefits, with the CO2 savings monetised as displayed in Table 8.37 based on the DG MOVE handbook monetising these external costs. For the avoided ETS compliance costs for the recycled content targets for steel which will fully reside under ETS by 2035, the 'Low Scenario' is used as a conservative estimate of the 'revenue' potential of higher quality scrap. Note that the current ETS price is 94 EUR/ton of CO_2 (per 31.01.2023). Other environmental impacts as fossil fuel savings, reduced decease incidences and other emissions are not monetised.

Table 8.37 External costs of CO_2 emissions used for the cost-benefit analysis

	2025	2030	2035	2040
Low	84	108	132	156
Medium (default for cost/ benefit analysis)	142	185	227*	269
High	266	344	421	498
Source:	European Commission, Directorate-General for Mobility and Transport, H. Essen, D., Fiorello, K. El Beyrouty, et al., Handbook on the external costs of transport: version 2019 – 1.1, Publications Office, 2020, https://data.europa.eu/doi/10.2832/51388			

Table 8.38 Comparison of options, environmental impacts per PO, 2030

PO	Environmental impacts (2030, compared to baseline)	PO1A-PO6A	PO1B-PO6B	PO1C-PO6C	Preferred (individually)	Preferred (combined + EPR PO5)
All life-cycle stages (in kton of materials)		(values in addition to baseline)				
2	Steel recycled content	+0	+0	+0	+0	+0
2	Plastics recycled content	+111	+505	+505	+505	+505
3	Materials at higher quality (recycling)	+848	+1,674	+1,789	+1,674	+2,093
4	Materials recovered (collection + export)	+55	+276	+718	+1,160	+1,602
6	Materials arriving at EoL (scope extension)	n.a	+231	n.a	+231	+231
PO1-6	**Total materials recycled at HQ** (kton)	**+1,014**	**+2,686**	**+3,012**	**+3,570**	**+4,431**
1-6	**GHG savings** (ktons of CO2-eq)	(values in addition to baseline)				
2	GHG savings steel recycled content	+0	+0	+0	+0	+0
2	GHG savings plastics recycled content	+48	+250	+295	+250	+250
3	GHG savings recycling	+1,155	+3,104	+2,444	+3,104	+3,879
4	GHG savings collection + export	+329	+1,427	+3,072	+4,867	+6,164
6	GHG savings scope extension	n.a	+510	n.a	+510	+510

PO1-6	**Total GHG savings** (kton CO2 eq)	**+1,531**	**+5,290**	**+5,811**	**+8,730**	**+10,803**

Table 8.39 Comparison of options, economic impacts per PO, 2030

PO	**Economic impacts** (2030, compared to baseline, excl. admin)	PO1A-PO6A	PO1B-PO6B	PO1C-PO6C	Preferred (individually)	Preferred (combined + EPR PO5)
All life-cycle stages (M EUR, + = revenue, - = cost)		(values in addition to baseline)				
2	Costs steel recycled content	+0	+0	+0	+0	+0
2	Costs plastics recycled content	-197	-614	-815	-614	-614
3	Costs recycling	-481	-1,064	-899	-1,064	-1,330
4	Costs collection + export	-19	-93	-376	-525	-674
6	Costs scope extension	+0	-69	-115	-69	-69
PO1-6	**Total costs** (M EUR)	**-696**	**-1,840**	**-2,204**	**-2,272**	**-2,687**
PO1-6	**Total administrative burden**	**-72**	**-103**	**-106**	**-106**	**-106**
PO1-6	**Total costs + admin burden**	**-768**	**-1,943**	**-2,311**	**-2,378**	**-2,793**
2	Revenues steel recycled content	n.a	+0	n.a	+0	+0
2	Revenues plastics recycled content	+113	+494	+593	+494	+494
3	Revenues higher quality (recycling)	+235	+802	+583	+802	+997
4	Revenues collected + export	+17	+70	+127	+332	+339
6	Revenues scope extension	n.a	+37	n.a	+37	+37
PO1-6	**Total revenues** (million EUR)	**+365**	**+1,403**	**+1,303**	**+1,665**	**+1,867**
PO1-6	**Total costs - revenues** (excl admin)	**-332**	**-437**	**-902**	**-607**	**-819**
PO1-6	**Total costs - revenues** (incl. admin)	**-404**	**-541**	**-1,008**	**-713**	**-925**
2	CO2 credits steel recycled content	+0	+0	+0	+0	+0
2	CO2 credits plastics recycled content	+9	+46	+54	+46	+46
3	CO2 credits at higher quality recycling	+213	+573	+451	+573	+716
4	CO2 credits collected + export	+61	+263	+567	+898	+1,137
6	CO2 credits scope extension	n.a	+94	n.a	+94	+94
PO1-6	**Total CO2 credits** (M EUR)	**+283**	**+976**	**+1,072**	**+1,611**	**+1,993**
PO1-6	**Total costs - revenues** (+CO2 credits)	**-121**	**+435**	**+64**	**+898**	**+1,068**

Table 8.40 Comparison of options, environmental impacts per PO, 2035

PO	**Environmental impacts** (2035, compared to baseline)	PO1A-PO6A	PO1B-PO6B	PO1C-PO6C	Preferred (individually)	Preferred (combined + EPR PO5)
All life-cycle stages (in kton of materials)		(values in addition to baseline)				
2	Steel recycled content	+0	+505	+1,212	+0	+0
2	Plastics recycled content	+240	+713	+873	+713	+713
3	Materials at higher quality (recycling)	+942	+1,888	+1,984	+1,888	+2,322
4	Materials recovered (collection + export)	+103	+446	+961	+1,533	+1,876
6	Materials arriving at EoL (scope extension)	n.a	+508	n.a	+508	+508

PO1-6	**Total materials recycled at HQ** (kton)	**+1,285**	**+4,060**	**+5,030**	**+4,642**	**+5,420**
1-6	**GHG savings** (ktons of CO2-eq)	(values in addition to baseline)				
2	GHG savings steel recycled content	+0	+585	+1,404	+0	+0
2	GHG savings plastics recycled content	+90	+314	+376	+314	+314
3	GHG savings recycling	+1,378	+3,688	+2,880	+3,688	+4,536
4	GHG savings collection + export	+353	+1,513	+3,222	+5,218	+6,350
6	GHG savings scope extension	n.a	+1,120	n.a	+1,120	+1,120
PO1-6	**Total GHG savings** (kton CO2 eq)	**+1,821**	**+7,220**	**+7,881**	**+10,340**	**+12,320**

Table 8.41 Comparison of options, economic impacts per PO, 2035

PO	**Economic impacts** (2035, compared to baseline, excl. admin)	PO1A-PO6A	PO1B-PO6B	PO1C-PO6C	Preferred (individually)	Preferred (combined +EPR PO5)
All life-cycle stages (M EUR, + = revenue, - = cost)		(values in addition to baseline)				
2	Costs steel recycled content	+0	-71	-170	+0	+0
2	Costs plastics recycled content	-326	-745	-1,171	-745	-745
3	Costs recycling	-660	-1,492	-1,219	-1,492	-1,802
4	Costs collection + export	-27	-123	-416	-556	-673
6	Costs scope extension	n.a	-90	n.a	-90	-90
PO1-6	**Total costs** (M EUR,+=revenue, -=cost)	**-1,012**	**-2,521**	**-2,975**	**-2,883**	**-3,311**
PO1-6	**Total administrative burden**	**-72**	**-103**	**-106**	**-106**	**-106**
PO1-6	**Total costs + admin burden**	**-1,084**	**-2,625**	**-3,082**	**-2,989**	**-3,417**
2	Revenues steel recycled content	+0	+67	+160	+0	+0
2	Revenues plastics recycled content	+216	+602	+739	+602	+602
3	Revenues higher quality recycling	+412	+1,153	+851	+1,153	+1,380
4	Revenues collected + export	+26	+89	+140	+332	+357
6	Revenues scope extension	n.a	+81	n.a	+81	+81
PO1-6	**Total revenues** (million EUR)	**+654**	**+1,991**	**+1,890**	**+2,168**	**+2,420**
PO1-6	**Total costs - revenues** (excl admin)	**-358**	**-530**	**-1,085**	**-715**	**-891**
PO1-6	**Total costs - revenues** (incl. admin)	**-430**	**-633**	**-1,191**	**-821**	**-997**
2	CO2 credits steel recycled content	+0	+133	+318	+0	+0
2	CO2 credits plastics recycled content	+20	+71	+85	+71	+71
3	CO2 credits at higher quality recycling	+312	+836	+653	+836	+1,028
4	CO2 credits collected + export	+80	+343	+731	+1,183	+1,440
6	CO2 credits scope extension	n.a	+254	n.a	+254	+254
PO1-6	**Total CO2 credits** (M EUR)	**+413**	**+1,637**	**+1,787**	**+2,345**	**+2,793**
PO1-6	**Total costs - revenues** (+CO2 credits)	**-18**	**+1,004**	**+596**	**+1,524**	**+1,796**

Table 8.42 Comparison of options, environmental impacts per PO, 2040

PO	Environmental impacts (2040, compared to baseline)	PO1A-PO6A	PO1B-PO6B	PO1C-PO6C	Preferred (individually)	Preferred (combined + ERP PO5)
All life-cycle stages (in kton of materials)		(values in addition to baseline)				
2	Steel recycled content	+0	+841	+2,019	+0	+0
2	Plastics recycled content	+240	+713	+873	+713	+713
3	Materials at higher quality (recycling)	+1,126	+2,367	+2,386	+2,367	+2,769
4	Materials recovered (collection + export)	+208	+648	+1,260	+1,750	+2,055
6	Materials arriving at EoL (scope extension)	n.a	+672	n.a	+672	+672
PO1-6	**Total materials recycled at HQ** (kton)	**+1,574**	**+5,241**	**+6,539**	**+5,502**	**+6,209**
1-6	**GHG savings** (ktons of CO2-eq)	(values in addition to baseline)				
2	GHG savings steel recycled content	+0	+891	+2,138	+0	+0
2	GHG savings plastics recycled content	+90	+314	+376	+314	+314
3	GHG savings recycling	+1,799	+4,908	+3,647	+4,908	+5,742
4	GHG savings collection + export	+329	+1,427	+3,072	+4,867	+6,164
6	GHG savings scope extension	n.a	+1,742	n.a	+1,742	+1,742
PO1-6	**Total GHG savings** (kton CO2 eq)	**+2,218**	**+9,281**	**+9,233**	**+11,831**	**+13,962**

Table 8.43 Comparison of options, economic impacts per PO, 2040

PO	Economic impacts (2040, compared to baseline, excl. admin)	PO1A-PO6A	PO1B-PO6B	PO1C-PO6C	Preferred (individually)	Preferred (combined +EPR PO5)
All life-cycle stages (M EUR, + = revenue, - = cost)		(values in addition to baseline)				
2	Costs steel recycled content	+0	-138	-331	+0	+0
2	Costs plastics recycled content	-306	-676	-1,087	-676	-676
3	Costs recycling	-962	-2,124	-1,855	-2,124	-2,485
4	Costs collection + export	-70	-219	-559	-725	-828
6	Costs scope extension	n.a	-90	n.a	-90	-90
PO1-6	**Total costs** (M EUR,+=revenue, -=cost)	**-1,338**	**-3,248**	**-3,833**	**-3,615**	**-4,080**
PO1-6	**Total administrative burden**	**-72**	**-103**	**-106**	**-106**	**-106**
PO1-6	**Total costs + admin burden**	**-1,410**	**-3,351**	**-3,939**	**-3,721**	**-4,186**
2	Revenues steel recycled content	+0	+131	+315	+0	+0
2	Revenues plastics recycled content	+216	+602	+739	+602	+602
3	Revenues higher quality recycling	+882	+1,674	+1,320	+1,674	+1,892
4	Revenues collected + export	+71	+171	+222	+53	+533
6	Revenues scope extension	n.a	+81	n.a	+81	+81
PO1-6	**Total revenues** (million EUR)	**+1,169**	**+2,659**	**+2,596**	**+2,410**	**+3,107**
PO1-6	**Total costs - revenues** (excl admin)	**-169**	**-588**	**-1,236**	**-1,205**	**-973**
PO1-6	**Total costs - revenues** (incl. admin)	**-241**	**-692**	**-1,343**	**-1,311**	**-1,079**
2	CO2 credits steel recycled content	+0	+240	+575	+0	+0
2	CO2 credits plastics recycled content	+24	+84	+101	+84	+84

3	CO2 credits at higher quality recycling	+484	+1,320	+981	+1,320	+1,545
4	CO2 credits collected + export	+89	+384	+826	+1,309	+1,658
6	CO2 credits scope extension	n.a	+468	n.a	+468	+468
PO1-6	**Total CO2 credits** (M EUR)	**+597**	**+2,497**	**+2,484**	**+3,183**	**+3,756**
PO1-6	**Total costs - revenues** (+CO2 credits)	**+356**	**+1,805**	**+1,141**	**+1,871**	**+2,677**

8.5.2 8.5.2 Comparison of options

Benefit - cost ratios

To compare the various costs and benefits, the benefit costs ratios (BCR) are presented in Table 8.44, based on the previous Tables 8.38 – 8.43. A BCR ratio above 1 indicates that the (monetised) benefits basically outweigh the costs. The higher the ratio, the higher the 'return on investment'. All individual costs for each of the economic operators as well as the revenues from more collection, higher recycling quality are included as well as the monetised GHG savings as displayed in the bottom parts of above tables. Neither other environmental and health benefits as well as reduced raw material dependencies beyond its intrinsic value are included, but the recurring administrative costs are. A quantified and comparable analysis of the benefit/ cost ratios are not provided for **PO1** for the 3RTA elements as well as for **PO6A** and **PO6C** due to the qualitative nature of the assessment in these cases.

Assumptions:

In the case of steel and plastics, the policy options 2 and 3 are obviously closely related as recycling effort is needed to enable the uptake of recycled content. Here, specific allocations are applied for a fair and comparable benchmark of the combined effect for these material specific options. So far, in all of the assessments, the costs and revenues related to obtaining (improved quality) dismantling and shredder fractions are included under PO3, whereas the costs for further upgrading and incorporating plastic and steel fractions into new production are included under PO2. In the case of steel, this leads to a kind of an inflated BCR as the majority of combined costs are made under PO3 and all of the GHG savings are allocated to PO2. Therefore, the removal costs of steel parts that directly contribute to higher quality fractions are allotted to PO2 (48 million EUR for *1 in below table for PO2B for 2035). Costs for additional copper removal could be considered likewise as this is contributing to improved treatment quality as well. In this case however, since it is a different target material and would complicate the revenues allocation to each of the individual materials, this is not applied. In the case of plastics recycling, since the supporting JRC study follows the PEF rules[194] (see Section 2.1 of the JRC plastics recycled content study), the monetised value of avoided GHG emissions from plastics incineration is not included in PO2 but taken into account in the Oeko-Institut IA support study for the entirety of the impacts for plastics send less to landfill and energy recovery. This makes the plastics recycled content BCR difficult to compare with the steel one. Therefore, the actual revenues of plastics recycling realised under PO2 are complemented with the monetised CO_2 credits of avoiding incineration for that volume of plastics from PO3 to PO2. The affected volume for 2035 is 240, 713 and 873 ktons of plastics

[194] European Commission. (2012). Product Environmental Footprint (PEF) Guide.

corresponding with 336, 999 and 1,224 ktons of CO_2 and 76, 226 and 277 million EUR of credits respectively for PO2A, PO2B and PO2C. This is based on the assumption of 1.73 ton of CO_2 per ton of plastics diverted with 81% as the share of incineration with energy recovery for the ELV plastic types involved[195].

With these allocations, all costs and benefits to **directly** enable the establishment of the recycled content targets are more fairly allocated at the production stage of (PO2) and deducted from the treatment stage (PO3) to make the BCRs for plastics and steel comparable. Note that this does not affect the overall BCR of the package as the sum of costs and revenues are zero.

Table 8.44 Benefit – costs ratios (BCR) per policy option, 2035

Benefit / Cost ratios (2035, compared to baseline, including recurrent administrative burden)	**Policy options**			***Preferred*** *(individually)*	***Preferred*** *(combined + EPR)*
Benefit/ Costs ratio including CO_2 credits	(values in addition to baseline)				
PO1 3RTA	**PO1A**	**PO1B**	**PO1C**		
B/C ratio 3RTA	Not assessed quantitatively				
PO2 Steel recycled content	**PO2A**	**PO2B**	**PO2C**		
B/C ratio, steel RC *1	N.A.	1.69	2.38	*N.A.*	*N.A.*
PO2 Plastics recycled content	**PO2A**	**PO2B**	**PO2C**		
B/C ratio plastics RC *2	0.96	1.21	0.94	1.21	1.21
PO3 Recycling	**PO3A**	**PO3B**	**PO3C**		
B/C ratio recycling *3	0.99	1.22	1.03	1.22	1.24
PO4 Collection	**PO4A**	**PO4B**	**PO4C**	**PO4D**	
B/C ratio collection (incl. export)	3.97	3.51	2.09	2.73	2.67
PO6 Scope extension	**PO6A**	**PO6B**	**PO6C**		
B/C ratio scope extension	n.a.	3.72	n.a.	3.72	3.72
Benefit / costs ratio				**1.57**	**1.57**

**1 This includes the costs for removal of steel parts at ATFs originally allocated to PO3*

**2 This includes the avoided emissions now from plastics incineration originally allocated to PO3*

**3 This excludes the costs and avoided emissions allocated to PO2*

For **PO2B** and **PO2B** for the steel recycled content, the BCR lies significantly above 1 indicating relevant monetised CO_2 savings in comparison to the related expenses for dismantling, sampling and sorting. For plastics, the BCR is lower, with relatively speaking higher investments to realise the monetised CO_2 credits in this case. Only **PO2B** has an acceptable BCR of 1.21. In the case of **PO2A**, the BCR slightly below 1 is due to relatively high investment costs for a smaller volume of plastics. The opposite counts for the **PO2C**, where the more constrained supply-demand balances and higher quality constraints to meet the closed loop share, results in higher estimated costs of recyclates compared to the more optimal balance for **PO2B**.

[195] Tenhunen – Lunkka et al, Greenhouse Gas Emission Reduction Potential of European Union's Circularity Related Targets for Plastics, Circular Economy and Sustainability, Jan. 2022, https://doi.org/10.1007/s43615-022-00192-8

For the recycling policy options, **PO3B** shows the most attractive benefit/ costs ratio where the material revenues from improved separation (1.1 billion EUR) plus monetised CO_2 savings (0.8 billion EUR) together outweigh the significant costs (1.5 billion EUR) to achieve the improved treatment quality. Both **PO3A** as **PO3C** show a BCR value close or below 1 due to lower monetised CO_2 savings (**PO3A)** and relatively higher dismantling costs for relatively lower material recovery amounts (**PO3C**).

All three collection options have a high BCR ranging from above 7 for **PO4A** to above 2 for **PO4C.** Here, it should be noted that in absolute terms, **PO4D** is the most effective option with a net monetised result of +1,120 million EUR over +80 million EUR for **PO4A**.

PO6B has a comparable BCR to the PO4 options of 3.7, reflecting the relatively high environmental benefits and increased revenues vs limited costs, linked to the additional treatment of lorries, buses and L3e-L7e category vehicles.

Cost – efficiency: cost per ton of CO_2 avoided

To further compare the costs of the reduced GHG savings as the most common benefit of the policy options, in Table 8.45, the costs per ton of CO_2eq avoided are presented for the policy options as well as the combined effect for the preferred options. While PO4A has the lowest cost per ton of CO_2 avoided, it does not realise the full potential in terms of absolute amounts of CO_2 avoided (PO4A: 353 kt CO_2 savings; PO4D: 5,218 kt CO_2 savings, see Table 8.40 before). PO4D, with a cost of €43 per ton of CO_2 avoided, still has a low cost for CO_2 savings and at the same time makes the best use of the absolute potential. This is followed by the **PO2B** recycled steel. Here the assessment is based on the combination of impacts including the costs for the **PO3B** recycling improvement options. The results for steel are thus indicative as the costs of creating higher purity scrap allocated to **PO3B** are related to both the removal of steel parts as well as copper parts. To provide an indication of the overall costs/benefits ratio, the costs for removing steel parts are included in the cost comparison for the steel recycled content, but excluding the related costs for removing copper being a different target material. For the steel recycled content, the costs of **PO2B** and **PO2C** are respectively 88 EUR and 29 EUR per ton. It has to be noted that there is uncertainty about the future availability of post-consumer steel scrap and the closed-loop percentage for the latter.

Similarly for plastics, the assessment of the policy options for recycled content are production related as again the preceding recycling efforts are quantified under policy options 3. For a fair comparison of the recycled content targets: all material specific costs and benefits to establish the targets are allocated at production stage of (PO2) and deducted from the treatment stage (PO3). Specifically: For plastic recycled content there **additional GHG savings from avoiding incineration of non-recycled plastics at the end-of-life stage that are to be accounted for** as the combined effort of the production and recycling stage. Without this, the costs per ton of CO_2 avoided would be 'artificially' made more attractive for the policy option 3 compared to the policy options 2. When applying this, **PO2B** for plastics, with a costs of 109 EUR per ton of CO_2 avoided, is more efficient compared **PO2A** with relatively high investment costs for a relatively low amount of plastics, resulting in over 200 EUR per ton of CO_2eq. For the higher volumes of **PO2C**, the opposite effect is observed with a cost of 270 EUR per ton of CO_2eq: Due to more constrained supply-demand balances and higher quality constraints to meet the closed loop share, the costs of recyclates are much higher compared to **PO2B**. It should be noted that there are additional environmental benefits

like the fossil-fuel savings of 4.5 billion Barrels of Oil equivalent, reduced plastic waste volume and health benefits.

Table 8.45 Cost per ton of GHG reduction for the various policy options, 2035

Costs per ton of CO2 avoided (2035, compared to baseline, including recurring administrative burden)	**Policy options**			***Preferred*** *(individually)*	***Preferred*** *(combined + EPR)*
EUR per ton of CO2 reduction	(values in addition to baseline)				
PO1 3RTA	**PO1A**	**PO1B**	**PO1C**		
Production (3RTA)	Not assessed quantitatively				
PO2 Steel recycled content	**PO2A**	**PO2B**	**PO2C**		
Production **+ recycling** (steel RC) *1	N.A.	€ 88	€ 29	N.A.	N.A.
PO2 Plastics recycled content	**PO2A**	**PO2B**	**PO2C**		
Production **+ recycling** (plastics RC) *2	€ 257	€ 109	€ 270	€ 109	€ 109
PO3 Recycling	**PO3A**	**PO3B**	**PO3C**		
Recycling (excl. costs plastics/steel) *3	€ 231	€ 108	€ 203	€ 108	€ 103
PO4 Collection	**PO4A**	**PO4B**	**PO4C**	**PO4D**	
Collection + export	< 0	€ 23	€ 86	€ 43	€ 50
PO6 Scope extension	**PO6A**	**PO6B**	**PO6C**		
Scope extension (L+HDV)	n.a.	€ 8	n.a.	€ 8	€ 8
				€ 69	**€ 72**

**1 This includes the costs for removal of steel parts at ATFs originally allocated to PO3*

**2 This includes the avoided emissions now from plastics incineration originally allocated to PO3*

**3 This excludes the costs and avoided emissions now allocated to PO2*

Effectiveness, efficiency, coherence and proportionality

Below Table 8.46 provides a summary of the comparison of the options based on the two key elements of the general objectives: First on the functioning of the internal market for both the automotive and recycling sectors (first row per policy option) and second, the sustainability impacts (second row per policy option). In addition, the qualitative comparison for the criteria effectiveness, efficiency, coherence and proportionality are provided.

Table 8.46 Overview of the results from the impact assessment study.

PO1. Design Circular	**PO1A**	**PO1B**	**PO1C**
Effectiveness	(++)	(++)	(+++)
Efficiency	(++)	(++)	(+++)
Coherence	(+)	(++)	(+++)
Proportionality	(++)	(+++)	(+++)
PO2. Steel Recycled Content	**PO2A**	**PO2B**	**PO2C**
Effectiveness	(o)	(+)	(++)
- incl. GHG savings (kton CO_{2eq})	0	+585	+1,404
Efficiency	(o)	(++)	(++)
- Benefit Cost Ratio (BCR)	N.A.	1.7*	2.4*
Coherence	(o)	(+++)	(++)
Proportionality	(o)	n.a.	n.a.

PO2. Plastics Recycled Content	PO2A	PO2B	PO2C
Effectiveness	(+)	(++)	(++)
- incl. GHG savings (kton CO_{2eq})	+426*	+1,313*	+1,599*
Efficiency	(-)	(+)	(-)
- Benefit Cost Ratio (BCR)	0.96*	1.2*	0.94*
Coherence	(+)	(+++)	(++)
Proportionality	(o)	(+)	(--)
PO3. Treat Better	**PO3A**	**PO3B**	**PO3C**
Effectiveness	(++)	(+++)	(++)
- incl. GHG savings (kton CO_{2eq})	+1,042*	+2,689*	+1,656*
Efficiency	(-)	(+)	(o)
- Benefit Cost Ratio (BCR)	0.99*	1.22*	1.03*
Coherence	(++)	(+++)	(+)
Proportionality	(+)	(+++)	(-)
PO4. Collect More	**PO4A**	**PO4B**	**PO4C**	**PO4D**
Effectiveness	(+)	(++)	(+++)	(+++)
- incl. GHG savings (kton CO_{2eq})	+353	+1,513	+3,222	+5,218
Efficiency	(+++)	(+++)	(++)	(++)
- Benefit Cost Ratio (BCR)	4.0	3.5	2.1	2.7
Coherence	(+)	(+)	(++)	(++)
Proportionality	(++)	(++)	(+)	(++)
PO5. EPR	**PO5A**	**PO5B**	**PO5C**
Effectiveness	(++)	(+++)	(+)
Efficiency	(+)	(++)	(+)
Coherence	(++)	(+++)	(++)
Proportionality	(+)	(+++)	(++)
PO6. Cover more vehicles	**PO6A**	**PO6B**	**PO6C**
Effectiveness	(-)	(++)	(++)
- incl. GHG savings (kton CO_{2eq})	n.a.	+1,120	n.a.
Efficiency	(+)	(+++)	(-)
- Benefit Cost Ratio (BCR)	n.a.	3.7	n.a.
Coherence	(+)	(++)	(+++)
Proportionality	(+)	(++)	(--)

(+++)	(+++) highly positive
(++)	(++) moderately positive
(+)	(+) slightly positive
(o)	(o) neutral/ baseline
(-)	(-) slightly negative
(--)	(--) moderately negative
(---)	(---) highly negative
n.a.	not assessed

The analysis reveals a range of consistent performances for almost all criteria for **PO1C** including the modernisation of the 3R type-approval methodology, the circularity strategy and Circularity Vehicle Passport policy options[196]. It complies with the proportionality principle in ensuring that vehicles placed on the market achieve 3R targets and that data is sufficiently available to ATFs. The requirement to adopt a vehicle circularity strategy further complements to the circularity ambition in a proportionate manner proving the coherence with the CEAP and provides the highest potential to encourage high-quality recycling, including

[196] Baron, Y.; Kosińska-Terrade, I.; Loew, C.; Köhler, A.; Moch, K.; Sutter, J.; Graulich, K.; Adjei, F.; Mehlhart, G.: Study to support the impact assessment for the review of Directive 2000/53/EC on End-of-Life Vehicles by Oeko-Institut, June 2023: See chapter 6.4.1, Table 6-20 "Initial assessment of measures to identify discarded and short-listed measures; and chapter 7.4 Evaluation results of the effectiveness of the 3R Directive and its relation to the ELVD

the non-recyclable materials. As regards the effectiveness, costs are expected to increase proportionally to the benefits, as **PO1C** contains a mix of short-term obligations.

For the recycled content targets for plastics[197] and steel[198], some contradicting scores are identified: **PO2C** for recycled content of plastics creates a lower score for proportionality due to lower availability of automotive plastics of sufficient quality related to the closed loop requirement and thus higher costs for recyclates, whereas for **PO2A** the investment cost in mechanical recycling of plastics are relatively for the volume of plastics at stake. **PO2C targets** of 30% in 2035 correspond to a demand of recyclates of 872 ktons in 2035[199]. The target would represent an effective recycling rate of available ELV plastics of 64% which poses a supply – demand imbalance risk. For **PO2C** for steel, the 15% closed loop element to the target may constrain flexibility in sourcing of higher value scrap and the target level of 30% might be too high in case the demand for long products reduces over time due to electrification of the vehicles. Therefore, **PO2B** level 25 % recycled content for plastic with the same percentage share of closed-loop and the 20% open -loop recycled content target for steel provide the best-cost-benefit balance, avoids excessive costs and risks of supply shortage, and offers most certainty for manufacturing planning. For these aspects it is considered to be most effective and efficient, without creating an unproportionate burden or competition between the relevant sectors.

For quality of treatment[200], the effectiveness of **PO3A** is regarded insufficient, whereas the proportionality of **PO3C** is a concern due to very high removal costs for the more advanced list of components targeted for Annex I of the ELV Directive. While in terms of cost effectiveness, **PO3C** requires higher costs than **PO3A** or **PO3B**, but it also results in the best outcomes in providing high quality secondary materials (steel, aluminium, copper, plastic etc.) subject to the mandatory removal obligations prior-shredding. In return, this option provides the optimum level of potential for the circular use of materials in the automotive sector, including the closed-loop potential. Therefore, it is seen to have the high positive impacts on the EU internal market, competitiveness as well as generating environmental impacts through integrating sustainability aspects. Measures dedicated to support the reuse of spare parts also contribute to higher availability of these parts on the market, benefiting ATFs and indirectly repair shops and consumers. The obligatory dismantling of components will support ELV treatment options higher up waste hierarchy, in particular, effectively contributing to the reuse. As a result, that will have a positive effect on the circular business models, where consumers would benefit from reduced costs for repairs of their vehicles. Measures under the **PO3C** build a strong coherence with CEAP and the EU climate policy, as the advanced quality targets for **PO3C** provide savings equivalent to 2.9 million tons of CO_2-eq.

[197] Maury, T., Tazi, N., Torres De Matos, C., Nessi, S., Antonopoulos, I., Pierri, E., Baldassarre, B., Garbarino, E., Gaudillat, P. and Mathieux, F., Towards recycled plastic content targets in new passenger cars, EUR 31047 EN, Publications Office of the European Union, Luxembourg, 2022, ISBN 978-92-76-51784-9 (online), doi:10.2838/834615 (online), JRC129008

[198] Baron, Y.; Kosińska-Terrade, I.; Loew, C.; Köhler, A.; Moch, K.; Sutter, J.; Graulich, K.; Adjei, F.; Mehlhart, G.: Study to support the impact assessment for the review of Directive 2000/53/EC on End-of-Life Vehicles by Oeko-Institut, June 2023: See chapter 3.1.5.5 "Comparison of scenarios for steel"

[199] Corresponds to the scenario JRC4c in the Annex of the study (JRC129008).

[200] Baron, Y.; Kosińska-Terrade, I.; Loew, C.; Köhler, A.; Moch, K.; Sutter, J.; Graulich, K.; Adjei, F.; Mehlhart, G.: Study to support the impact assessment for the review of Directive 2000/53/EC on End-of-Life Vehicles by Oeko-Institut, June 2023: See chapter 3.1.10.1.4 "Comparison of scenarios for EEC"

PO4D combining the elements of PO4A to PO4C and thus including the roadworthiness requirement upon export is the most effective option, but has a significant impact on specialised car dealers exporting (low quality) used vehicles. Analysing the differences between **PO4A, PO4B** and **PO4C** the measures under these policy options are designed to be coherent. A closer look shows that the measures under PO4A, PO4B and PO4C are not sufficient to solve the problem of export of (very) old used vehicles[201] and the problem of "missing vehicles" (a mixture of unregistered extra-EU export and illegal treatment within the EU). **PO4D**, on the other hand, achieves that, compared to the baseline, more than 2.9 million ELVs are sent to ATFs, which is more than twice as much as the next best **PO4C** (see Table 8.12, referring to the support study accordingly[202]. Therefore, the option **PO4D** is considered the most effective as it also has the highest positive impact in terms of streamlining vehicle traceability at the EU internal market, while at the same time efficiently contributing to the fight against illegal treatment and illegal export of ELVs and reducing the EU external pollution footprint.

For EPR, it is important to note that, if ATFs were subject to additional burdens related to circular economy (PO3) without adequate compensation, this would clearly challenge the legal sector. In consequence the illegal sector (which avoids circular economy obligations, unprofitable to the dismantlers) would be expected to increase. Such a combination (higher burden on ATFs / no compensation for compliance costs) would clearly jeopardize the goal of reducing the number of missing vehicles and worsen the current situation[203]. In this context **PO5B** is regarded the most effective, coherent and proportional choice in comparison, whereas some elements of **PO5C** are left as voluntary elements for the Member States, as it gives the discretion for the Member States to establish “deposit return schemes” based on the common EU wide criteria, whereby a lump sum of money is given to the last owner of an ELV upon its delivery to an ATFs. Although **PO5A** is considered effective, efficient, proportionate and coherent, its impacts are not reaching enough to substantially contribute to achieving the specific objectives, as it is essentially limited to the basic requirement for Member States to establish specific Extended Producer Responsibility (EPR) schemes for vehicles, aligned with the minimum requirements applicable to other sectoral waste streams, as specified in the Waste Framework Directive therefore. **PO5B** already steps further and introduces additional elements such as modulation of fees and cross-border functionality of EPR, which significantly contributes to better streamlining of the producer responsibility across the EU. Such regulatory option positively affects coherence and the efficiency of measures through ensuring a fair allocation of costs and creating a level playing field between ELV operators across in a proportionate manner.

[201] Export of low quality used vehicles to third non-EU countries often lack necessary ELV treatment infrastructure in place and environmental and safety risks in the receiving countries. (see Baron, Y.; Kosińska-Terrade, I.; Loew, C.; Köhler, A.; Moch, K.; Sutter, J.; Graulich, K.; Adjei, F.; Mehlhart, G.: Study to support the impact assessment for the review of Directive 2000/53/EC on End-of-Life Vehicles by Oeko-Institut, June 2023: See chapter 6.5.1 Facts on extra EU Export

[202] Baron, Y.; Kosińska-Terrade, I.; Loew, C.; Köhler, A.; Moch, K.; Sutter, J.; Graulich, K.; Adjei, F.; Mehlhart, G.: Study to support the impact assessment for the review of Directive 2000/53/EC on End-of-Life Vehicles by Oeko-Institut, June 2023: See chapter “6.6.2.4 Results of the scenario calculations regards the shift of number of whereabouts between categories”, Table “Change in categories of whereabouts for the different scenarios”

[203] Dito: chapter: 3.2.9.3 Interrelations with preferred option regards the circularity

PO6A is assessed as ineffective[204], whereas there is insufficient information available to substantiate the full-scope extension of **PO6C**. Therefore, the **PO6B** is considered as a preferred option which best presents the balance between overall benefits and costs in a most proportionate and coherent manner. Direct positive impacts mostly relate to increased environmental performance at the end-of-life stage, as the additional categories of vehicles will have to be treated in authorized treatment facilities, so minimizing environmental and health related risks, e.g. exhaust gas emissions or leakage of hazardous liquids into environment. These measures will have an additional medium economic burden, i.e., costs for management and authorization of dismantling facilities. This option also includes the information requirements for which economic burden in the form of administrative costs can be expected. However, these aspects are not inflicting the efficiency, effectiveness or proportionality. On the opposite, it is expected to have a positive impact for introducing common minimum requirements for these vehicles and therefore harmonizing different Member States approaches which currently pose a risk to fragmentation of the EU internal market. but benefits are expected from heavy metal restrictions and formalized treatment. Even if the measures considered for "design for circularity" are not implemented for new vehicles in scope in the mid- to long-term, it could be expected that the circularity of "new vehicles in scope" shall increase, as some manufacturers of M1 an N1 vehicles also manufacture other categories of vehicles. These would be expected at least in some cases to apply similar practices to the design of "new vehicles in scope". In terms of the coherence of the options with overarching objectives of EU policies, **PO6A** and **PO6B** contribute to the goals set out in the CEAP, however, **PO6B** has a more influential effect due to minimum mandatory requirements for the ELV treatment as well as export related measures. **PO6C** is regarded as disproportionate, it was identified, that measures cause high costs, which are not quantifiable, and bringing unclear benefits which cannot be assessed due to the lack of substantiated data.

8.5.3 8.5.3 Preferred options

Design circular:

PO1C is the preferred option. It anchors the circularity requirements as an important element of the type-approval of new vehicle types. It contains a mix of short term obligations (requirement for vehicle manufacturers to make available detailed and user-friendly dismantling and recycling information, including the use and location of CRMs in vehicles and on the share of recycled content used in new vehicles; follow-up on manufacturers' obligation to ensure recyclability and re-usability of type-approved vehicles) and actions on a medium term (revision of the methodology to calculate recyclability and re-usability of new vehicles at type-approval stage and the development of an Circularity Vehicle Passport. This provides an ambitious, cost-effective and proportionate package to improve the circularity in the design of vehicles. For the substances in vehicles, the preferred option is to address all new restrictions of substances in vehicles under REACH, the Union's core chemicals legislation, with the exception of substances in batteries, which would be addressed under the new Batteries Regulation. Existing restrictions on four heavy metals would remain restricted

[204] Baron, Y.; Kosińska-Terrade, I.; Loew, C.; Köhler, A.; Moch, K.; Sutter, J.; Graulich, K.; Adjei, F.; Mehlhart, G.: Study to support the impact assessment for the review of Directive 2000/53/EC on End-of-Life Vehicles by Oeko-Institut, June 2023: See chapter 3.4.4.6

under the Regulation and the remaining active exemptions, currently in Annex II of the ELV Directive, would be reviewed with the support of the European Chemicals Agency (ECHA) under an enhanced assessment regime.

Use recycled content:

PO2B is the preferred option for plastics with recycled content targets of 25% applicable to newly type approved vehicles by 2030, of which 25% closed-loop. It provides a significant increase to the recycling of plastics from ELVs and lower the carbon footprint linked to the use of plastics in new vehicles. The PO2B level provides the best-cost-benefit balance, avoids excessive costs and risks of supply shortage, and offers most certainty for manufacturing planning.

For steel recycled content, all options can provide significant GHG savings and an important 'pull effect' to better utilise ELV steel scraps in the future, but to a different degree and in different stages. They complement the 'push effect' for increased quality of steel scrap defined under **PO3B** and enhance cooperation between manufacturers, steel industry and recyclers. The ambition level of **PO2A** (M10a) takes best into account the need to further address the uncertainty related to the ability of the automotive producers to increase the incorporation of steel scrap, in particular post-consumer scrap, in new electric vehicles[205]. The advantages of **PO2B** would be that creating a pull to increase scrap utilisation in steel production can achieve faster decarbonisation of production compared to other, more long-term technology conversions and it reduces the need for natural gas, coal and iron-ore in steel production more short-term, provided high quality scraps are made available. **However, the uncertainty in setting an appropriate target level directly in the future legislation is too high.** This is due to uncertainties about (i) the future share of long products (more likely to be able to include recycled steel) in EVs; (ii) current uptake levels of post-consumer scrap in flat production; (iii) the share of pre-consumer versus post-consumer in current scrap utilisation rates and finally about (iv) the impact of such target on the availability and prices of scrap for other steel-demanding sectors. In that regard, the establishment of a steel recycled content target under **PO2B**, M10b, presents the risk to define the target level too low with the consequence that it would not form an actual incentive to higher post-consumer scrap uptake levels. **PO2C,** M10c with the higher target and closed loop percentage may reduce flexibility in the sourcing of post-consumer scrap and is therefore not selected. **PO2A**, M10a is **the preferred option** in the case of steel.

Other recycled content targets for materials like aluminium and other CRMs like magnesium and REE permanent magnet materials cannot yet be substantiated as automotive designs are changing fast and recycling markets are very dynamic with significant progress in sorting technologies. The case of aluminium in inherently more complex with a range of alloy types involved and more complicated economies of scale thresholds when alloy sorting would be implemented. For these materials, the combination of the mandatory recycled content declaration under **PO1C** and the treatment requirements of **PO3B** are regarded adequate for the short term, but an empowerment for the Commission to come forward with recycled content targets for additional materials (such as CRMs, and aluminium) is foreseen within

[205] Notably linked to the future share of steel long products in electric vehicles, which are the best candidates for such incorporation

five years after the entry into force of the new legislation, if this proves necessary in the future (**PO2C**, M11).

Treat better: PO3B is the preferred option, as it most effectively addresses the complexity of improving recycling quantity and quality for a wide variety of different materials present in ELVs. The GHG savings are higher and the costs are lower for **PO3B** in comparison to **PO3C**. The stricter definition of "recycling" and restrictions on landfilling will ensure that residues from shredding are effectively recycled or recovered, rather than backfilled or landfilled. This option also contains specific and cost-effective measures for each of the materials and different types. The removal obligations prior to shredding of **PO3B** allow for substantial progress to recover and recycle batteries and electric drive motors from EVs and other parts/components containing plastics, precious metals and CRMs, which are associated with the electrification of the fleet and the wide use of electronics in new vehicles (M13a, M13b). To remain technology-neutral, a derogation from this obligation would apply when recyclers provide verifiable evidence that separation leads to recyclates of at least similar high quality as via manual dismantling. The **PO3B** ban on mixed treatment and mandatory removal and separate recycling of e-drive motors would thrive the permanent magnet recycling value chain and generate new flows of CRMs for further recycling. It is estimated respectively circa 2.4 kton and 4.2 kton of permanent magnet flows to be available in 2035 and 2040 for high quality recycling from future EU ELVs. The separate sorting and recycling of e-drive motors will have a positive impact on innovation and R&D in the EU. The available e-drive motors thanks to this option would thrive research, innovation and the development of new recycling technologies to increase the recovery of SRM, especially CRMs. It would further decrease copper contamination in steel and aluminium scraps from ELVs.

Collect more: The additive combination of **PO4A**, **PO4B** and **PO4C** in the form of **PO4D** is most effective as it increases collection of ELVs most efficiently. It sets out a range of complementary measures, which is indispensable to address the problem of "missing vehicles". The traceability of used vehicles and ELVs would be improved through (i) a clearer allocation of responsibility for the issuing and reporting of the certificate of destruction (CoD) among economic operators and competent authorities and (ii) the integration of additional information in national vehicle registration systems and their interoperability between Member States. To address the illegal export of ELVs and reduce export of non-roadworthy vehicles, binding criteria for the distinction between used vehicles and ELVs would be established as well as (M19b) a requirement that the export of used vehicles is only authorised upon verification of the roadworthiness status of the vehicle concerned. (M21). New provisions on enforcement would also help addressing illegal treatment and export of ELVs. The impact of these measures should be significant in terms of bringing additional ELVs for treatment to legal ATFs in the EU.

Ensure compliance: PO5B is the preferred option, providing substantial incentives for a better functioning recycling market via the establishment of an obligation for producers to increase collection of ELVs and cover costs of dismantling efforts that cannot be offset by the trade in used parts. This will also help reducing illegal practices[206]. To ensure harmonisation

[206] Umweltbundesamt,(2022), Illegal treatment of end of-life vehicles - Assessment of the environmental, micro- and macroeconomic effects, texte 130/20 22

on how fees are calculated across the EU and further create design incentives leading to lower future recycling costs, this option sets out criteria on how EPR fees are to be modulated, such as the weight of the vehicle, the time to dismantle components such as the battery and amount of recycled content. In addition, it sets out a mechanism to ensure that fees by vehicle manufacturers are paid to recyclers, in the case where the vehicle is treated as an ELV in an EU Member State different than the one where it was placed on the market ("cross-border" EPR mechanism).

Cover all vehicles: PO6B is selected as the preferred option for the scope extension to L-category vehicles, lorries, buses and trailers, via basic requirements and provision of information on composition of these vehicles as well as a declaration on the presence of substances of concern. The preferred option is a set of basic measures that enable a more ambitious 'phased-in approach' in the long term. At the same time, basic environmental protection and minimum recycling quality is ensured via the requirement that lorries and buses (but excluding motorbikes) reaching end-of-life shall only be treated in authorised treatment facilities (ATFs).

8.5.4 8.5.4 Combined impacts

The most attractive cost-benefit ratios (Table 8.39) and the highest environmental and economic gains are realised by increasing collection under **PO4C**. The collection effects are further amplified by the incentives of **PO5B.** The 'EPR amplification' effect are shown separately in Sections 6.2.4 and 6.3.4. The combined effects are calculated and provided in detail in Annex 8.1.4, 8.2.4 and summarised in Annex 8.5.1 in the Tables 8.33 – 8.38. The results show an additional volume of materials collected of 1.9 million tonnes equalling 6.4 million tonnes of CO_{2eq} in GHG savings against 'only' 300 million EUR of net costs. Since the highest ambition level for collection is both attractive, as well as an important basis for the realisation of the other policy options, there is not much choice for alternative combinations other than **PO4C** and **PO5B** forming the heart of the preferred option package.

The synergies between other options are carefully assessed because they are mutually supportive. This is particularly the case for the recycled content options (**PO2A** for steel and **PO2B** for plastics) which target the economic deficiencies in the markets for secondary raw materials and strongly complement the mere technical side to realise higher waste treatment quality (**PO3B**). An alternative choice for the more ambitious **PO3C** would not significantly improve the required treatment quality of steel fractions (**PO2A**) nor improve the quantity of plastics recycling (**PO2B**) and would have a benefit – ratio close to 1 when monetising the environmental gains as demonstrated in Table 14 in the main Staff Working Document. The effects of the highest ambition level of **PO1C** residing under type-approval are expected to facilitate the long-term achievement by design improvements in all other options and are relatively inexpensive.

The elements contained in section 7 of the SWD on the comparison of options provide an assessment of each option and allow to perform calculations for a large number of combinations of options, which could be alternative to the preferred package. This impact assessment report does not provide for the assessment of the impacts of such alternative combinations of options, as it demonstrates that the preferred package is the best able to meet the objectives of this initiative; such additional calculations would not be proportionate and are not required under the Commission better regulation guidelines. However, the information

provided in section 7 is sufficiently comprehensive and transparent to allow stakeholders and policy-makers to perform such assessment, for example if they consider than one objective should be given higher importance compared to another one. As explained in the present report, the preferred package of options takes into consideration the interlinkages between problems and options and is based on a careful balance in that respect, so that, from the Commission's perspective, privileging one objective against another one would jeopardise the overall architecture of the initiative.

The combined impacts of the preferred policy package are presented in Table 8.47 – 8.49. They are respectively calculated for 2030, 2035 and 2040 and compared to the baseline scenario. Compared to the impacts presented per policy option in Section 6, there are significant synergies when applied in combination.

The total cost for the preferred option ranges from 2.7 billion EUR (2030) to 3.4 billion EUR (2035) to 4.01 billion EUR (2040) against respectively 1.8, 2.3 and 3.0 billion EUR in revenues for 2030, 2035 and 2040. The overall environmental benefits are assessed as an **annual reduction of 10.8 (2030), 12.8 (2035) and 14.0 (2040) million tons of CO_2-eq**, key for the decarbonisation of the automotive industry. The GHG savings represent an **additional 2.0, 2.9 and 3.7 billion EUR when monetised for 2030, 2035 and 2040.** This is linked notably to a **better valorisation of resp. 4.4, 5.4 and 6.2 million tons of materials** (plastics, steel, aluminium, copper, CRMs) which would be either recycled at higher quality or re-used, as well as to the fact that **3.8 million additional ELVs** (3.2 million for M1,N1) **would be collected and treated** extra in the EU. **350 tons of rare earth** permanent magnet materials would be separately collected for reuse and recycling in 2035 (and 1,500 tons in 2040), which would **contribute greatly to the EU efforts for strategic autonomy for CRMs. The cost of the preferred option is estimated to reach 66 EUR per vehicle put on the market in 2035.**

The estimated potential levels of compliance cost offsetting to be covered by manufacturers are ranging between 3 and 33 EUR per ELV. While there will be short to medium-term costs for the EU automotive industry, the improved resource efficiency of the preferred option reduces EU energy and raw material dependencies for materials sourced in third countries. It strengthens resilience of automotive supply chains. It will also be ready to successfully embrace the transition to electrification on the basis of a robust and sustainable business model.

Table 8.47 Total environmental and economic impacts, preferred options, 2030

	Environmental impacts (2030, compared to baseline)	**Preferred option**	**Economic impacts** (2035, vs. baseline, incl. admin burden)	**Preferred option**
PO	**All life-cycle stages** (in kton of materials)		**Design, production** (M EUR, - = cost, + =revenue)	
2	Steel recycled content	+0	Manufacturers (incl. admin burden)	-€ 400
2	Plastics recycled content	+505	Admin burden authorities	-€ 23
3	Materials at higher quality (recycling)	+2,093	**Collection,recycling** (M EUR, - = cost, +=revenue)	
4	Materials recovered (collection + export)	+1,602	Consumers, vehicle owners	-€ 137
6	Materials recovered (scope extension)	+231	Car dealers (export requirements)	-€ 512
	Total materials recycled at HQ (kton)	**+4,431**	ATFs	€ 34
ELVs collected, treated +reported (M units)		**7.6**	Shredders/PST operators	-€ 115
4,5,6	Extra ELVs to ATFs and CoD reported	+2.7	Recyclers (incl. plastics, steel RC)	€ 270

4,5,6	Non-reported treatment	-0.3	Admin burden treatment	-€ 42
4,5,6	Export of ELVs/used vehicles	-1.8	**Collection,recycling** (M EUR, - =cost, + =revenue)	
GHG savings (ktons of CO2-eq)			Total costs (all)	-€ 2,714
1,2	GHG savings production (steel RC)	+0	Total revenues (all)	€ 1,789
2	GHG savings production (plastics RC)	+250	**Total** (M EUR, excl CO2 credits)	-€ 925
3	GHG savings recycling (N1,M1)	+3,879	**Total** (M EUR, incl CO2 credits)	€ 1,068
4	GHG savings collection + export (N1,M1)	+6,164	**Total** (EUR/ vehicle, excl. CO2 credits)*	**-€ 61.57**
6	GHG savings scope extension (L+HDV)	+510	**Total** (EUR/ vehicle, incl. CO2 credits)*	**€ 71.09**
	GHG savings (ktons of CO2-eq)	**+10,803**	Average cost GHG savings (EUR/ton)	**-€ 85.63**

** Represents all costs and benefits allocated to all new vehicles, including the scope extension and recurring administrative burden; The net costs per new N1,M1 vehicle, e.g. excluding the scope extension, is 58.69 EUR,*

Table 8.48 Total environmental and economic impacts, preferred options, 2035

	Environmental impacts (2035, compared to baseline)	**Preferred option**	**Economic impacts** (2035, vs. baseline, incl. admin burden)	**Preferred option**
PO	**All life-cycle stages** (in kton of materials)		**Design, production** (M EUR, - = cost, + =revenue)	
2	Steel recycled content	+0	Manufacturers (incl. admin burden)	-430
2	Plastics recycled content	+713	Admin burden authorities	-23
3	Materials at higher quality (recycling)	+2,322	**Collection,recycling** (M EUR, - = cost, +=revenue)	
4	Materials recovered (collection + export)	+1,876	Consumers, vehicle owners	-153
6	Materials recovered (scope extension)	+508	Car dealers (export requirements)	-574
	Total materials recycled at HQ (kton)	**+5,420**	ATFs	-40
ELVs collected, treated +reported (M units)		**8.2**	Shredders/PST operators	-110
4,5,6	Extra ELVs to ATFs and CoD reported	+3.8	Recyclers (incl. plastics, steel RC)	+375
4,5,6	Non-reported treatment	-1.7	Admin burden treatment	-42
4,5,6	Export of ELVs/used vehicles	-2.1	**Collection,recycling** (M EUR, - =cost, + =revenue)	
GHG savings (ktons of CO2-eq)			Total costs (all)	-€ 3,417
1,2	GHG savings production (steel RC)	+0	Total revenues (all)	€ 2,420
2	GHG savings production (plastics RC)	+314	**Total** (M EUR, excl CO2 credits)	-€ 997
3	GHG savings recycling (N1,M1)	+4,536	**Total** (M EUR, incl CO2 credits)	€ 1,797
4	GHG savings collection + export (N1,M1)	+6,350	**Total** (EUR/ vehicle, excl. CO2 credits)*	**-€ 66.34**
6	GHG savings scope extension (L+HDV)	+1,120	**Total** (EUR/ vehicle, incl. CO2 credits)*	**€ 119.58**
	GHG savings (ktons of CO2-eq)	**+12,320**	Average cost GHG savings (EUR/ton)	**-€ 80.91**

** Represents all costs and benefits allocated to all new vehicles, including the scope extension and recurring administrative burden; The net costs per new N1,M1 vehicle, e.g. excluding the scope extension, is 65.01 EUR,*

Table 8.49 Total environmental and economic impacts, preferred options, 2040

	Environmental impacts (2040, compared to baseline)	**Preferred option**	**Economic impacts** (2040, vs. baseline, incl. admin burden)	**Preferred option**
PO	**All life-cycle stages** (in kton of materials)		**Design,production** (M EUR, - = cost, + =revenue)	
2	Steel recycled content	+0	Manufacturers (incl. admin burden)	-€ 430
2	Plastics recycled content	+713	Admin burden authorities	-€ 23
3	Materials at higher quality (recycling)	+2,769	**Collection,recycling** (M EUR, - = cost, +=revenue)	
4	Materials recovered (collection + export)	+2,055	Consumers, vehicle owners	-€ 137

6	Materials recovered (scope extension)	+672	Car dealers (export requirements)	-€ 606
	Total materials recycled at HQ (kton)	**+6,209**	ATFs	-€ 61
ELVs collected, treated +reported (M units)		**8.9**	Shredders/PST operators	-€ 311
4,5,6	Extra ELVs to ATFs and CoD reported	+4.6	Recyclers (incl. plastics, steel RC)	€ 585
4,5,6	Non-reported treatment	-0.7	Admin burden treatment	-€ 42
4,5,6	Export of ELVs/used vehicles	-2.3	**Collection,recycling** (M EUR, - =cost, + =revenue)	
GHG savings (ktons of CO2-eq)			Total costs (all)	-€ 4,047
1,2	GHG savings production (steel RC)	+0	Total revenues (all)	€ 3,022
2	GHG savings production (plastics RC)	+314	**Total** (M EUR, excl CO2 credits)	-€ 1,025
3	GHG savings recycling (N1,M1)	+5,742	**Total** (M EUR, incl CO2 credits)	€ 2,731
4	GHG savings collection + export (N1,M1)	+6,164	**Total** (EUR/ vehicle, excl. CO2 credits)*	**-€ 68.23**
6	GHG savings scope extension (L+HDV)	+1,742	**Total** (EUR/ vehicle, incl. CO2 credits)*	**€ 181.74**
	GHG savings (ktons of CO2-eq)	**+13,962**	Average cost GHG savings (EUR/ton)	**-€ 73.43**

** Represents all costs and benefits allocated to all new vehicles, including the scope extension and recurring administrative burden; The net costs per new N1,M1 vehicle, e.g. excluding the scope extension, is 66.90 EUR*

Table 8.50 Detailed cost per vehicle (all categories), per new vehicle and per ELV (for M1,N1 only in last column), 2030

Economic impacts (2030, compared to baseline, incl. admin burden)	**Policy Options A**	**Policy Options B**	**Policy Options C**	**Preferred** (individually)	**Preferred** (combined + EPR)	**Preferred** (N1,M1*)
Design + production (EUR/new vehicle, - =cost, + =revenue)			(values in addition to baseline)			**Per new vehicle** (N1,M1)
N1,M1 vehicles POM (M units)					15.02	15.02
L3e-L7e vehicles POM (M units)					1.82	
N2,N3,M2,M3,O POM (M units)					0.37	
Manufacturers (plastics RC)	-€7.87	-€21.05	-€29.86	-€21.05	-€21.05	-€24.12
Manufacturers (steel RC)						
Manufacturers (admin. burden)	-€1.84	-€2.08	-€2.18	-€2.18	-€2.18	-€2.49
Admin burden authorities	-€0.23	-€1.30	-€1.33	-€1.33	-€1.33	-€1.50
Collection + recycling (EUR/ELV, - =cost, + =revenue)			(values in addition to baseline)			**Per ELV** (N1,M1)
ELVs treated (N1,M1; M units)	9.35	9.59	10.09	10.59	11.08	11.08
ELVs treated (L3e-L7e; M units)	0.00	0.26	0.26	0.26	0.26	
ELVs treated (HDV, in M units)	0.09	0.11	0.11	0.11	0.11	
Consumers	€-	-€0.29	-€13.08	-€12.49	-€11.95	-€12.35
Exporters	-€1.55	-€12.79	-€28.78	-€33.16	-€44.72	-€41.64
ATFs - costs	-€6.80	-€25.22	-€21.74	-€22.94	-€27.03	-€26.28
ATFs - revenues recycling	€3.56	€14.05	€15.54	€29.77	€30.04	€29.32
Shredders/PST operators - costs	-€31.16	-€75.84	-€55.15	-€68.97	-€82.47	-€85.23
Shredders/PST operators - revenues	€20.66	€65.03	€43.40	€60.41	€72.45	€74.87
Recyclers - costs (incl plastics RC)	-€19.63	-€33.07	-€40.69	-€29.05	-€21.96	-€16.74
Recyclers - revenues (incl plastics RC)	€14.01	€58.60	€65.65	€51.31	€43.12	€32.87

Admin burden treatment	-€3.86	-€4.24	-€4.05	-€3.85	-€3.69	-€2.87
All life-cycle stages (EUR/**new** vehicle, - =cost, + =revenue)	(values in addition to baseline)					
Total costs (all)	-€72.94	-€175.89	-€196.86	-€195.03	-€216.39	-€213.23
Total revenues (all)	€38.23	€137.69	€124.58	€141.49	€145.61	€137.06
Total per vehicle POM (excl CO2 credits)	**-€26.87**	**-€35.99**	**-€63.63**	**-€47.44**	**-€61.57**	**-€58.69**
Total per vehicle POM (incl. CO2 credits)	**-€8.07**	**€28.97**	**€7.73**	**€59.77**	**€71.09**	**€73.97**

** excludes all scope extension related costs*

Table 8.51 Detailed cost per vehicle (all categories), per new vehicle and per ELV (for M1,N1 only in last column), 2035

Economic impacts (2030, compared to baseline, incl. admin burden)	**Policy Options A**	**Policy Options B**	**Policy Options C**	**Preferred** (individually)	**Preferred** (combined + EPR)	**Preferred** (M1,N1*)
Design + production (EUR/new vehicle, - =cost, + =revenue)			(values in addition to baseline)			**Per new vehicle** (N1,M1)
N1,M1 vehicles POM (M units)					15.02	15.02
L3e-L7e vehicles POM (M units)					1.91	
N2,N3,M2,M3,O POM (M units)					0.37	
Manufacturers (plastics RC)	-€11.86	-€22.67	-€42.67	-€22.67	-€22.67	-€26.11
Manufacturers (steel RC)		-€1.92	-€4.62			
Manufacturers (admin. burden)	-€1.83	-€2.07	-€2.17	-€2.17	-€2.17	-€2.49
Admin burden authorities	-€0.23	-€1.29	-€1.32	-€1.32	-€1.32	-€1.50
Collection + recycling (EUR/ELV, - =cost, + =revenue)			(values in addition to baseline)			**Per ELV** (M1,N1)
ELVs treated (N1,M1; M units)	9.74	10.12	10.70	11.34	11.73	11.73
ELVs treated (L3e-L7e; M units)	0.00	0.29	0.29	0.29	0.29	
ELVs treated (HDV, in M units)	0.10	0.13	0.15	0.13	0.13	
Consumers	€-	-€0.28	-€12.29	-€12.32	-€12.63	-€13.09
Exporters	-€2.71	-€16.48	-€33.23	-€39.47	-€47.21	-€44.59
ATFs - costs	-€17.57	-€42.76	-€40.72	-€38.32	-€43.67	-€41.91
ATFs - revenues recycling	€5.94	€21.26	€22.51	€38.30	€40.38	€38.25
Shredders/PST operators - costs	-€35.29	-€95.01	-€62.49	-€84.81	-€101.01	-€104.67
Shredders/PST operators - revenues	€31.63	€89.31	€65.49	€78.66	€92.00	€95.33
Recyclers - costs (incl plastics RC)	-€26.65	-€44.78	-€58.35	-€37.27	-€29.05	-€23.50
Recyclers - revenues (incl plastics RC)	€29.00	€75.18	€87.23	€64.49	€49.51	€40.05
Admin burden treatment	-€3.70	-€4.01	-€3.80	-€3.59	-€3.48	-€2.71
All life-cycle stages (EUR/**new** vehicle, - =cost, + =revenue)			(values in addition to baseline)			
Total costs (all)	-€99.83	-€231.26	-€261.68	-€241.95	-€263.21	-€260.57
Total revenues (all)	€66.57	€185.74	€175.23	€181.45	€181.89	€173.62
Total per vehicle POM (excl CO2 credits)	**-€28.64**	**-€42.14**	**-€81.62**	**-€54.61**	**-€66.34**	**-€65.01**

Total per vehicle POM (incl. CO2 credits)	**-€1.16**	**€66.82**	**€37.32**	**€101.43**	**€119.58**	**€120.91**

** excludes all scope extension related costs*

Table 8.52 Detailed cost per vehicle (all categories), per new vehicle and per ELV (for M1,N1 only in last column), 2040

Economic impacts (2040, compared to baseline, incl. admin burden)	**Policy Options A**	**Policy Options B**	**Policy Options C**	**Preferred** (individually)	**Preferred** (combined + EPR)	**Preferred** (M1,N1*)
Design + production (EUR/new vehicle, - =cost, + =revenue)			(values in addition to baseline)			**Per new vehicle** (M1,N1)
N1,M1 vehicles POM (M units)					15.02	15.02
L3e-L7e vehicles POM (M units)					2.01	
N2,N3,M2,M3,O POM (M units)					0.38	
Manufacturers (plastics RC)	-€11.79	-€22.54	-€42.43	-€22.54	-€22.54	-€26.11
Manufacturers (steel RC)		-€3.77	-€9.05			
Manufacturers (admin. burden)	-€1.82	-€2.05	-€2.16	-€2.16	-€2.16	-€2.49
Admin burden authorities	-€0.23	-€1.29	-€1.32	-€1.31	-€1.31	-€1.50
Collection + recycling (EUR/ELV, - =cost, + =revenue)			(values in addition to baseline)			**Per ELV** (N1,M1)
ELVs treated (N1,M1; M units)	10.56	11.05	11.74	12.29	12.64	12.64
ELVs treated (L3e-L7e; M units)	0.00	0.31	0.31	0.31	0.31	
ELVs treated (HDV, in M units)	0.10	0.17	0.17	0.17	0.17	
Consumers	€-	-€0.25	-€11.20	-€10.72	-€10.44	-€10.83
Exporters	-€5.00	-€19.90	-€37.88	-€40.34	-€46.24	-€43.96
ATFs - costs	-€27.56	-€50.44	-€52.34	-€45.54	-€51.38	-€50.21
ATFs - revenues recycling	€11.32	€25.92	€25.61	€43.62	€46.71	€45.14
Shredders/PST operators - costs	-€46.05	-€129.65	-€88.06	-€116.54	-€132.77	-€137.77
Shredders/PST operators - revenues	€59.46	€112.64	€92.72	€97.93	€109.08	€113.18
Recyclers - costs (incl plastics RC)	-€26.21	-€38.81	-€59.16	-€29.87	-€21.65	-€18.89
Recyclers - revenues (incl plastics RC)	€37.47	€86.41	€95.36	€71.54	€45.88	€40.05
Admin burden treatment	-€3.42	-€3.66	-€3.47	-€3.31	-€3.22	-€2.52
All life-cycle stages (EUR/**new** vehicle, - =cost, + =revenue)			(values in addition to baseline)			
Total costs (all)	-€122.07	-€272.36	-€307.08	-€272.34	-€291.71	-€294.29
Total revenues (all)	€108.25	€224.97	€213.69	€213.09	€201.67	€198.37
Total per vehicle POM (excl CO2 credits)	**-€16.01**	**-€46.02**	**-€91.70**	**-€55.31**	**-€68.23**	**-€66.90**
Total per vehicle POM (incl. CO2 credits)	**€23.70**	**€120.15**	**€73.59**	**€156.50**	**€181.74**	**€183.07**

** excludes all scope extension related costs*

8.6. Feasibility and implementation

The choice for a Regulation is the most efficient choice in delivering economic, environmental and social improvements and allow for a coherent approach targeting both the design and end-of-life stages allows the transition to a low-carbon society and the retention of component and material value for a more circular economy. It supports improved harmonisation for both automotive manufacturers as well as recyclers operating in the single market. Key elements to ensure technical, economic and legislative feasibility are listed as follows:

- 3R type-approval: The modernised requirements related to the 3R type approval procedures follow similar procedures as currently in place. It may require a change in international agreements being the ISO 22628: 2002 standard and UN ECE Regulation No. 133. Both would have to be updated by for instance removing the battery from the recyclability assessment to avoid overlapping measures and double counting of recyclability achievements of embedded EV batteries. For the digital Circularity Vehicle Passport, the Commission would be tasked to develop the technical criteria for minimum information to be provided to end-users, treatment operators and competent authorities to ensure consistency with other similar initiatives like the ESPR framework and the Euro 7 Regulation.
- Recycled plastics content: The chosen target levels are technically feasible but do require immediate investments to timely ramp up production. Key to successful implementation will be appropriate monitoring and verification of the plastic volumes involved and the shares of post- *and* pre-consumer plus the closed loop contribution. For plastics and steel, it is recommended to include a review clause in order to adapt the recycled content target levels around 2030 given uncertainty in market dynamics related to varying automotive steel grades and the timing of ongoing capital-intensive conversions to e.g. EAF-DRI technologies on the supply side.
- For recycling, the preferred option requires investment in treatment capacity and quality to reduce backfilling of ASR fractions and contribute to higher quality of treatment across the EU. The ban on mixed treatment is technically feasible. Despite reduced flexibility in matching available ELV volumes to treatment capacity, in the long term the improved quality will become more economically attractive. The Commission should be entitled to update the list of parts/components concerned via secondary legislation. A review clause for these targets 8 years after entry into force of the new rules would also be introduced.
- For collection, the implementation largely dependents on the revision of the roadworthiness package and related registration document specifications with few additional fields to be added. DG MOVE considers this measure as part of the impact assessment for the legislative proposal on a new roadworthiness package. To support enforcement, information on the roadworthiness status of a vehicle is to be made available to customs authorities through the single window system and close cooperation with DG TAXUD on the matter. In support, reporting obligations by Member States are extended to the number vehicles registered, de-registered, treated as ELVs and shipped outside the Member State of registration (complementing Commission Decision 2005/293/EC).

- To ensure unambiguous financial allocations and proper governance levels, the harmonisation of the ELV requirements across Member States is indispensable. To allow for different approaches at the same time dependent on the Member State market conditions and size, this obligation can be met by car manufacturers individually (Individual Producer Responsibility) or collectively (through Producers Responsibility Organisations). A particular point of attention is to implement the "Polluter pays principle" in such a manner that there is sufficient coverage of costs of compliance for the existing and new requirements for legal operators to avoid giving a further advantage to informal or illegal practices (see Annex 8.1.5 and 8.2.5).
- Scope: Due to a **general lack of information** on the collection and treatment for the extended scope, a **phased-in approach** is deemed inevitable whereby the Commission provides an assessment of the possibility to fully include L-category vehicles, lorries and buses in the scope of the new legislation, if necessary, accompanied by a legislative proposal, 8 years after entry into force of the new legislation.

An overview of implementation timelines is presented in below Table 8.53.

Table 8.53 Implementation timelines of key requirements

EIF Option	EIF/+1 yr	+3 yrs	+ 5yrs	+7 yrs or later
PO1 – Design Circular	Alignment with type-approval framework (M1); restrictions of substances alignment with the Battery Regulation M5).	Calculation methodology for type-approval (M2), Provision of dismantling information (M3); Haz. substance declaration (M4a); Vehicle circularity strategy (M6);	Recycled content declaration under 3R type-approval (M4b,c); design for dismantling (M7).	Digital Vehicle Passport (M8); Hybrid restriction approach > 7 yrs (M5c)
PO2 Use recycled content	Definitions of recycled content (M9b)	Adoption of calculation and verification rules for recycled content, review of target levels for plastics (M9b), feasibility studies for steel RC targets (M10a) and for aluminium/ CRMs (M11)	Target applicable to plastics (M9b). Adoption of calculation and verification rules for recycled content for steel (M10a) and possibly aluminium and CRMs (M11)	Recycled content target applicable to steel (M10a) Recycled content applicable to aluminium and CRMs (M11)
PO3 Treat Better		Alignment of definitions with sectoral legislation (M12) Mandatory removal list (M13ab); Market support for the use of spare parts (M14b); Treatment targets for CRMs (M15b); Landfill ban ASR + ban mixed treatment (M16ab);	30% recycling target for plastic (M15b);	Review of target levels for recycling and removal lists (M13b,M15b)
PO4 Collect More	Definition of minimum requirements for sector inspections (M19a); Clearer definition of ELVs (M19b);	Reporting of established sanctions (M17b); Obligations for dismantlers /recyclers to report CoDs (M18); VIN be made available to customs authorities (M19c);	Interoperability between vehicle registries (M20); Export requirement based on roadworthiness status(M21).	
PO5 EPR		EPR schemes established at national level (M22); Reporting on the PRO tasks achieved (M23); Cross-border EPR mechanism (M25);	Harmonised EPR fee modulation (M24)	
PO6 Cover more vehicles			Information to dismantlers and recyclers (M28); Mandatory ATF treatment Reporting obligation, CoD, VIN (M30), minimum EPR requirements for additional vehicles (M31); Study on regulatory extension of scope (M32)	Review on the regulatory extension of scope to new vehicles (M32)

ANNEX 9: CHEMICALS IN VEHICLES

9.1 Introduction and baseline

A large variety of chemicals, some of them classified as hazardous, are used in vehicles to provide different functionalities to coatings, alloys, electrical and electronic components, lubricants, hydraulic fluids and rubber, plastic, composite and textile elements used in their different parts. Depending on their nature, use and location in the vehicle such hazardous substances can potentially pose a risk during vehicle manufacture and its subsequent service life and will remain once the vehicle reaches its end-of-life.

The presence of such substances in materials that result from the disassembly, shredding and subsequent processing of the different vehicle fractions can pose a risk to the operators involved in the recycling operations and, if they remain embedded in the recovered materials (e.g. recovered alloys, plastic, etc) may make them unsuitable for their use as secondary raw materials. This is due to risks in their subsequent processing and use and as a consequence of commercial and reputational risks that may make them unattractive to the market due to quality and legal constraints brought about by the presence of these substances.

The presence of hazardous substances, especially of substances of concern[207], in vehicles and in the materials subsequently recovered from them, can hinder the circularity of materials in vehicles, reducing their uptake into the economy and can potentially be a risk to human health and the environment during their whole life-cycle. In turn this can have clear consequences in terms of adverse human and environmental health effects (due to exposure / releases of substances) and reduce the amounts of materials recovered from vehicles, thereby putting greater stress on primary resources, requiring additional waste disposal capacities and increasing the overall amount of greenhouse gas emissions typically associated to the use of primary materials which have to be used if recycled materials cannot.

Examples of the presence of hazardous substances in vehicles and vehicle components, especially of substances of concern, have been documented, including:

- phthalate plasticisers and antimony trioxide[208] as a flame retardant in PVC synthetic leather, used massively in the interiors of cars (seats, door and instrument panels, sun visors, etc).
- platinum compounds in catalytic converters[209].
- Polybrominated diphenylethers (PBDEs)[210] [211] [212] listed as persistent organic pollutants under the Stockholm Convention in plastics and foams found in ELVs.

[207] As defined in Article 2(28) of the Commission proposal on a Regulation establishing a framework for setting ecodesign requirements for sustainable products. COM(2022) 142 final.
[208] Zattini, G. et al., (2019) Safer Plasticized Polyvinyl Chloride Synthetic Leathers for the Automotive Industry: Evaluation of Alternatives to Antimony Compounds as Flame Retardants. https://4spepublications.onlinelibrary.wiley.com/doi/abs/10.1002/pen.25121
[209] Mergfet, R., et al (2001).Evaluation of the health risk of platinum group metals emitted from automotive catalytic converters. https://pubmed.ncbi.nlm.nih.gov/11327390/
[210] Leslie. H.A., et al. (2016). Propelling plastics into the circular economy — weeding out the toxics first. https://www.sciencedirect.com/science/article/pii/S0160412016301854

- Metallic and other inorganic substances that can be released in the form of fine particles as wear debris from brake linings[213].
- Heavy metals[214] such as copper, zinc, lead, cadmium and nickel in automotive shredder residue[215] (ASR).
- Volatile Organic Compounds (VOCs) in interior materials of vehicles[216] [217]. VOCs such as decane, xylene, toluene, styrene and others have been detected in the indoor air of new vehicles as a result of their presence in hard plastics, elastomers, rubber, natural or synthetic leather, fabrics and fibres vehicles.

It is therefore necessary to have a better understanding about the presence of hazardous substances in vehicles and in components of vehicles and to better address the risks they may pose to human health and to the environment. In order to achieve this, and to further develop and provide legal clarity to the general minimisation provisions in Article 4(1)(a) of the current Directive, changes to the Directive would be required to:

- Update the definition of the term "hazardous substance" in Article 2(11) so as align it to that in Regulation (EC) No 1272/2008 (the CLP Regulation);
- Introduce a reference to the term "substance of concern" as defined in Article 2(28) of the Commission proposal for the Ecodesign for Sustainable Products Regulation (ESPR) as these hazardous substances are given particular priority under the chemicals strategy for sustainability and the ESPR;
- Expand the scope of the Directive to cover the impacts of substances in vehicles also to adverse effects on human health (and not only on the environment) and to ensure their full life cycle is considered, not focusing primary only on end-of-life and waste management stages
- Define and provide the means to restrict the presence of substances in vehicles, beyond the four substances[218] already regulated, including, if appropriate, substances which, for reasons other than their chemical risks, negatively affect the re-use and recycling of materials in the product in which they are present. At the same time, for legal certainty and continuity reasons, the existing four restrictions should remain and the existing exemptions to these be maintained and reviewed, as appropriate.

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[211] Leslie et al (2013): POP-BDE waste streams in the Netherlands: analysis and inventory, available at https://www.informea.org/en/pop-stream-pop-bde-waste-streams-netherlands-analysis-and-inventory
[212] Oeko Institute (2018): Effects on ELV waste management as a consequence of the decisions from the Stockholm Convention on decaBDE, available at https://www.oeko.de/fileadmin/oekodoc/ACEA-DecaBDE-final-report.pdf
[213] Kukutschová, J., et al. (2009). Wear mechanism in automotive brake materials, wear debris and its potential environmental impact. https://www.sciencedirect.com/science/article/pii/S004316480900163X
[214] As defined in the Annex of Decision 2000/532/EC.
[215] González-Fernández, O., et al (2008). Heavy metals' content of automotive shredder residues (ASR): Evaluation of environmental Risk. https://pubmed.ncbi.nlm.nih.gov/17881104/
[216] Faber, J., et al. (2014). Comparison of Air Pollution by VOCs Inside the Cabins of New Vehicles. https://www.researchgate.net/publication/274579827_Comparison_of_Air_Pollution_by_VOCs_Inside_the_Cabins_of_New_Vehicles
[217] Brodzik, K., et al. (2014). In-vehicle VOCs composition of unconditioned, newly produced cars. https://www.sciencedirect.com/science/article/pii/S1001074213604593
[218] Lead, cadmium, mercury and hexavalent chromium

9.1.1 9.1.1 Purpose of the measure

This measure complements the generic minimisation provision in Article 4(1) of the current Directive, which states that "*In order to promote the prevention of waste Member States shall encourage, in particular: (a) vehicle manufacturers, in liaison with material and equipment manufacturers, to limit the use of hazardous substances in vehicles and to reduce them as far as possible from the conception of the vehicle onwards, so as in particular to prevent their release into the environment, make recycling easier, and avoid the need to dispose of hazardous waste*".

Following further analysis and prioritisation of information about such substances present in vehicles, this measure provides a specific mechanism to impose restrictions on the placing on the market and use of specific hazardous substances, in particular substances of concern, in vehicles and parts of vehicles. These restrictions should address risks to human health and to the environment resulting from the presence of specific substances in vehicles and their parts. They could be envisaged to range from complete bans to specific limitations (e.g. of use in certain parts or materials in vehicles) or to define risk management measures (addressing containment of substances, limiting emissions, setting maximum concentration limit values, etc).

Baseline

The current baseline is defined, on one hand by the existing restriction on certain substances under the ELV Directive and on the other, by restrictions imposed on the use of substances under other legal instruments. More specifically:

9.1.2 9.1.2 Under ELV: Restrictions of substances under the ELV Regulation

- Article 4(b) of the ELV Directive requires Member States to ensure that four substances (lead, cadmium, mercury and hexavalent chromium) are not present in materials and components of vehicles placed on the market after 1 July 2003 other than in cases listed in Annex II under the conditions specified therein.
- Exemptions can be added to Annex II in cases where the use of one of these substances is not avoidable (and can be removed when it becomes avoidable (Article 4(2)(b)(ii – iii)). Annex II of the Directive currently contains **42 exemptions** to the prohibition on the four substances. Of these, **four exemptions for lead are still "active"**, with set review dates in 2024 and 2025 [2(c)(ii), 3, 8(e) and 8(g)(ii)]. In addition, there are **three specific exemptions relevant to batteries** in vehicles [5(a), 5(b) (lead) and 16 cadmium]. Exception 5(b) which refers to lead in batteries used in 12 V applications and in 24 V applications in special purpose vehicles has to be reviewed in 2025.
- All other exceptions in Annex II are "inactive" in the sense that they do not have a review date. They deal with exceptions which allow the use of the substance in spare parts for vehicles and in vehicles that where type-approved before a certain date (already elapsed).

- In addition, the current chapeau of Annex II provides an additional general exemption[219] for the four substances in vehicles which reads: "*a maximum concentration value up to 0,1 % by weight in homogeneous material for lead, hexavalent chromium and mercury and up to 0,01 % by weight in homogeneous material for cadmium shall be tolerated*".
- It should be noted that the prohibition on the four substances and their exemptions in Annex II apply to vehicles in scope of the ELV Directive, that is, any vehicle designated as category M1 or N1 defined in Annex IIA to Directive 70/156/EEC, and three-wheel motor vehicles as defined in Directive 92/61/EEC, but excluding motor tricycles. Other vehicles such as **lorries and motorcycles are not in the scope of the current Directive**.

9.1.3 9.1.3 Under REACH (or as applicable under the POPs Regulation220)

Title VIII of REACH contains the restriction provisions defined under the Union's umbrella chemicals legislation. Restrictions provide a legal instrument to prohibit or limit the manufacture, placing on the market or use of substances on their own, in mixtures or in articles (including vehicles and their parts). Restrictions adopted under REACH are listed in Annex XVII to the Regulation, which lists specific substances or groups of substances and where the text of each entry defines the specific scope and conditions of the restriction and any applicable exemptions.

Article 68(1) of REACH envisages the amendment of Annex XVII of REACH when there is an unacceptable risk to human health or the environment, arising from the manufacture, use or placing on the market of a substance, which needs to be addressed on a Union-wide basis. Articles 69 – 73 of REACH define a procedure according to which, starting from a restriction dossier prepared by a Member State, or by the European Chemicals Agency (ECHA) at the request of the Commission, the Agency assesses and issues an opinion to the Commission on the content and merits of the restriction proposed. If the requirements for a restriction are fulfilled, Article 73 requires the Commission to prepare an amendment of Annex XVII, which is decided upon via the regulatory procedure with scrutiny (*comitology*).

REACH establishes no limitation on the possibility to restrict substances in vehicles. Vehicles or the use of substances in vehicles or components of vehicles is not listed among the exclusions from the scope of REACH defined in its article 2(1). Similarly, Article 67(2) of REACH only exempts from the scope of the restriction title the use of substances in cosmetic products, as far as it concerns risks to human health. Annex XVII to REACH already contains some restrictions on substances of relevance to vehicles:

- Polycyclic-aromatic hydrocarbons (PAH) in tyres (entry 50)

[219] The origin to this note can be found in recital 7 of Decision 2002/525/EC which stated: "Since it is evident that a total avoidance of heavy metals is in some instances impossible to achieve, certain concentration values of lead, mercury, cadmium or hexavalent chromium in specific materials and components should be tolerated, provided that these hazardous substances are not intentionally introduced".

[220] Regulation (EU) 2019/1021 implements the Union's international commitments under the Stockholm Convention and is applicable for substances identified as POPs under the Convention. This includes limitations on the manufacture, placing on the market and use of POP substances, including, as applicable, to substances in vehicles.

- Phthalates (DEHP, DBP, BBP, DIBP) in a concentration equal to or greater than 0,1 % by weight of plasticised material in articles (entry 51). There is an exception for motor vehicles within the scope of Directive 2007/46/EC, placed on the market before 7 January 2024, or articles, whenever placed on the market, for use exclusively in the maintenance or repair of those vehicles, where the vehicles cannot function as intended without those articles.
- Decabromodiphenyl ether (decaBDE) (entry 67, now repealed) which banned the use and placing on the market of this substance on its own, in mixtures or in articles at a concentration above 0.1%. The restriction contained an exception that allowed the use of DecaBDE for the production of spare parts for motor vehicles as well as for agricultural and forestry vehicles. Following the listing under the Stockholm Convention of decaBDE this restriction was subsequently removed from REACH and introduced in Annex I to Regulation (EU) 2019/1021 (the POPs Regulation), specifying a limit of 500 mg/kg for the sum of listed PBDEs in articles with an exception to allow its use in the manufacture of spare parts for motor vehicles within the scope of Directive 2007/46/EC produced before 15 July 2019, either until 2036 or the end of service life of those motor vehicles, whichever date comes earlier.
- Formaldehyde: a proposal for a restriction on formaldehyde and formaldehyde-releasing substances has been developed under REACH to limit these substances in certain articles, covering road vehicles if the concentration of formaldehyde in the interior of those vehicles exceeds a certain limit value in air. It is envisaged that the restriction will be adopted in the first half of 2023.

- Additionally, Article 68(2) of REACH provides for a simplified restriction procedure for substances on their own, in a mixture or in an article which meet the criteria for classification in certain hazard classes (carcinogenicity, germ cell mutagenicity or reproductive toxicity, category 1A or 1B), if they could be used by consumers. In such cases a restriction to consumer use can be proposed by the Commission and Annex XVII can be amended by comitology, without the need to follow the process defined in Articles 69 to 73 (i.e. without the intervention of ECHA). Such a procedure has to date been used, for example, to restrict the presence of a large group of substances in clothing and related accessories, other textiles and footwear[221].

- Title VII of REACH provides another instrument to address the risks posed by chemicals by imposing specific authorisation requirements. More specifically, to ensure that risks from substances of very high concern (SVHCs) are properly controlled and that these substances are progressively replaced by suitable alternative substances or technologies where economically and technically viable. Under this instrument, all manufacturers, importers and downstream users applying for authorisations must analyse the availability of alternatives and consider their risks as well as the technical and economic feasibility of substitution.

[221] Commission Regulation (EU) 2018/1513. https://eur-lex.europa.eu/legal-content/EN/TXT/?toc=OJ:L:2018:256:TOC&uri=uriserv:OJ.L_.2018.256.01.0001.01.ENG

- A manufacturer, importer or downstream user cannot place a substance on the market for a use, or use it himself, if that substance is included in Annex XIV, unless the use(s) of that substance on its own or in a mixture or the incorporation of the substance into an article, for which the substance is placed on the market or for which he uses the substance himself, has been authorised. A number of substances relevant to vehicles, in particular specific chromium VI compounds such as chromium trioxide, are listed in Annex XIV and have resulted in applications for authorisation, for instance, for uses in chromium plating of vehicle components or for use of chromium VI in the cooling circuits of portable refrigerators for use in vehicles.
- It should be noted that the REACH Regulation is currently under revision and that it is envisaged that specific aspects of the functioning of the restriction and the authorisation processes may be subject to some changes.

9.1.4 9.1.4 Under the Batteries Regulation

(as per political agreement on the Commission's proposal achieved on 9 December 2022).

- On 10 December 2020 the Commission adopted a proposal on a Regulation on Batteries and Waste Batteries and repealing the previous Directive 2006/66/EC on batteries. A political agreement was reached on the proposal on 9 December 2022. It is envisaged that the new Regulation on Batteries will be adopted in the first half of 2023.
- Under the new Regulation, specifically its Articles 6 and 71, a procedure is introduced to restrict substances in batteries when there is an unacceptable risk to human health or the environment, arising from the use of a substance in the manufacture of batteries, or from the presence of a substance in the batteries when they are placed on the market, or during their subsequent life cycle stages, including during repurposing or during the treatment of waste batteries, that is not adequately controlled and needs to be addressed on a Union-wide basis.
- Under this upcoming regulation, which is *lex specialis* for substances in batteries, these can be restricted following a process which mimics that defined under REACH, with the support of the European Chemicals Agency (ECHA) and subsequently enacted via delegated acts under the Batteries Regulation. This is relevant to the current restrictions on lead and cadmium under the ELV Directive and particularly to its exceptions for use of lead and cadmium in batteries in vehicles.
- The current provisionally agreed text of the draft Regulation on Batteries states, in its recital 15 that "*Batteries used in vehicles which benefit from an exemption under Annex II to Directive 2000/53/EC of the European Parliament and of the Council should be excluded from the prohibition to contain cadmium*". In addition, Annex I of the draft regulation specifies that "*Portable batteries, whether or not incorporated into appliances, light means of transport or vehicles, shall not contain more than 0,002% of cadmium (expressed as cadmium metal) by weight*".

9.1.5 9.1.5 Objectives

The three measures analysed below intend to address the problems caused by the presence of hazardous substances, especially those that qualify as substances of concern, in vehicles and their component parts. The **objectives** are to:

- Eliminate or minimise the risks to human health and the environment, throughout the whole life cycle of vehicles and components of vehicles, brought about by hazardous substances, especially substances of concern, and;
- Ensure that recycled materials obtained from treatment of end-of-life vehicles are to the greatest extent possible free of toxic substances, safe and fit-for-purpose, thereby increasing the trust of producers and of consumers in secondary materials obtained from them, reducing the use of primary materials, and;
- Define an efficient, cost effective, evidence-based and reliable mechanism to assess the merits of introducing restrictions on the use or the presence of substances in vehicles or components of vehicles and to make such restrictions become law. In addition, the mechanism defined should allow amending existing restrictions on four substances and their exceptions, as appropriate, as well as any restrictions of new substances and their possible exemption.

9.2 Assessment of measure 5a – Restrictions of substances under the ELV Regulation

9.2.1 9.2.1 Description of the measure

This measure provides a mechanism for restricting substances used in vehicles and components of vehicles, relying on an assessment by the relevant committees[222] of the European Chemicals Agency (ECHA) of restriction dossiers prepared by ECHA at the request of the Commission, or by Member States on their own initiative. The process would be run under enhanced provisions in the ELV Regulation and any restrictions on new substances would be enacted via delegated acts under this regulation, based on opinions submitted by ECHA to the Commission. The main features of the measure are:

- Limitations on all vehicle-relevant chemicals remain in ELV[223].
- A mechanism is defined under ELV to introduce new restrictions for substances, via delegated acts, which would be listed in a new Annex to the Regulation, with the support of ECHA and subject to dedicated resource allocation (i.e. similar approach to that in the Batteries Regulation).
- The objectives and scope in Articles 1 and 4 are changed to cover impacts on human health and the environment across the full life cycle of vehicles (and not only focus on waste management).
- Existing restrictions on four substances and their exemptions are maintained under ELV and reviewed as appropriate, via delegated acts, with the support of ECHA (rather than using contractors to the Commission, as currently). Relevant active exemptions having a review date [Annex II points 2(c)(ii), 3, 8(e) and 8(g)(ii)] are maintained and reviewed under ELV, with the support of ECHA and subject to specific resource allocation for this task. Other exemptions that do not require a review are also maintained in ELV.

[222] Committee for Risk Assessment (RAC) and Committee for Socio-economic Analysis (SEAC) defined under article 76 of the REACH Regulation.

[223] It should be noted that the requirements under the Authorisation title of REACH for those substances of very high concern (SVHCs) listed in Annex XIV to REACH (such as certain chromium VI salts) apply, regardless of whether restriction provisions for substances in vehicles remain in ELV or are taken-up by REACH or sector / product-specific legislation.

- The scope of the assessment of exemptions is widened beyond the current description in Article 4(2) of the ELV Directive, which only takes into account whether "*the use of the substances is unavoidable*". A broader approach, similar to that used in assessing applications for authorisation under REACH, including an analysis of alternatives, a socio-economic analysis and a comparative analysis of the health and environmental impacts of alternatives (at least at the level of comparing the hazards of the different alternative substances) should be included.
- Exemptions from the use of lead and cadmium under the ELV Directive which are specific to batteries [Annex II points 5(a) and 5(b) (lead) and 16 (cadmium)] are, following a transition process, taken up by the Batteries Regulation (*lex specialis*) and removed from the scope of Annex II of the Regulation replacing ELV Directive, via delegated acts.
- The possibility to limit substances of concern in vehicles, for sustainability reasons that do not relate primarily to chemical risks, could be introduced, if required, in the Regulation replacing ELV Directive (similarly to what has been proposed in the Ecodesign Regulation and in the proposal of Regulation on Packaging and Packaging Waste (PPWR)).
- For any expansion in scope of new Regulation replacing ELV Directive to L-category vehicles, lorries and buses, a new dedicated restriction process would be run under the new Regulation, via delegated acts, with the support of ECHA and/or consultants.
- The definition of "hazardous" substance in the new Regulation is updated to be consistent with CLP Regulation. Similarly to the approach in the PPWR, reference to the definition of "substance of concern" is also to be included[224].

The current text of the Directive would also have to be modified in the new Regulation in order to clearly assign to ECHA this task together with having the required budgetary allocation, indicated in its financial fiche.

[224] The PPWR refers to Article 2(28) of proposal for a Regulation on Eco-design for Sustainable Products, according to which substances of concern means a substance that:

(a) meets the criteria laid down in Article 57 and is identified in accordance with Article 59(1) of Regulation (EC) No 1907/2006; or

(b) is classified in Part 3 of Annex VI to Regulation (EC) No 1272/2008 in one of the following hazard classes or hazard categories:

- carcinogenicity categories 1 and 2,
- germ cell mutagenicity categories 1 and 2,
- reproductive toxicity categories 1 and 2, [to be added in the course of the legislative procedure once Regulation (EC) No 1272/2008 contains these hazard classes: Persistent, Bioacumulative, Toxic (PBTs), very Persistent very Bioaccumulative (vPvBs); Persistent, Mobile and Toxic (PMT), very Persistent very Mobile (vPvM); Endocrine disruption],
- respiratory sensitisation category 1,
- skin sensitisation category 1,
- chronic hazard to the aquatic environment categories 1 to 4,
- hazardous to the ozone layer,
- specific target organ toxicity
- repeated exposure categories 1 and 2,
- specific target organ toxicity
- single exposure categories 1 and 2; or

(c) negatively affects the re-use and recycling of materials in the product in which it is present

Consequently, under this measure, the restriction procedure for substances in vehicles would be contained, as a self-standing process, under the new Regulation and would have to be specified via articles to be introduced in the amended legal proposal. This approach would mimic that followed in the Commission proposal for a Regulation concerning batteries and waste batteries[225] and, more specifically that contained in its Articles 6 and 71. As a modification to this approach, this measure would also grant Member States the right of initiative to propose restrictions. This change takes into account the provisional political agreement achieved between the European Parliament and the Council in the trilogue held on 9 December 2022.

9.2.2 9.2.2 Effectiveness / efficiency

This measure mimics the restriction dossier preparation and assessment processes under REACH, where ECHA (at the request of the Commission) or a Member State submits a restriction dossier documenting and justifying the restriction measure. Subsequently, the merits of a proposed restriction are assessed by the relevant Committees of ECHA which then delivers an opinion to the Commission. In terms of procedure, the difference lies in that the decision-making would in this case be done with the advice of a dedicated expert group established under the new Regulation and enacted via delegated acts under this new regulation (instead of under REACH).

From the point of view of the scope, the stand-alone mechanism proposed could overcome the limitation of REACH that excludes the possibility of imposing specific risk management measures on the handling of waste from end-of-life vehicles. This aspect, which was highly relevant and debated in the negotiations of the Commission's proposal for a Batteries Regulation, is deemed less important in the case of vehicles (see further analysis under *Conclusions*, below).

As regards the management and review of existing exemptions this measure maintains the *status quo* under ELV, with a well-established process that is known to stakeholders and would require no legal changes. The only difference with the baseline, in this regard, is that the Commission would be supported by ECHA, instead of by external consultants, thereby providing, potentially, a more homogeneous, stable and robust assessment of exemptions.

For the purpose of restricting **new substances** in vehicles and components of vehicles, this measure would have a similar effectiveness to that of measure 5b, with the caveat that procedural and technical experience to restrict substances under ELV is currently lacking, as no new substances have been restricted under this legislation and setting up the process, in cooperation with ECHA would likely have a steep initial learning curve (and therefore an initial somewhat lower efficiency). As regards **existing restrictions** and the maintenance of their derogations Measure 5a, which is very similar to the *status quo*, is not expected to bring about any significant changes in this regards.

From then point of view of effectiveness in protecting human health and the environment, extending the objectives and scope of the ELV Regulation to include human health among its protection targets, requiring a full-life cycle approach, updating the definition of "hazardous

[225] COM(2020) 798 final and 2020/0353 (COD). . https://eur-lex.europa.eu/legal-content/EN/ALL/?uri=CELEX%3A52020PC0798

substance" and introducing a reference to "substances of concern" is envisaged to be an improvement both in terms of protection coverage, legal clarity and alignment with current chemicals and product legislation and policy documents. This applies in an equal manner to Measures 5a, 5b and 5c.

By providing such legal certainty about the objectives of the reviewed ELV Regulation and the scope of substances for which minimisation of their use in vehicles is required, operators will be able to better identify and implement measures to substitute or minimise such use. This measure should therefore lead to the minimisation of the presence of substances of concern in vehicles by introducing legal certainty as to the substances in scope.

9.2.3 9.2.3 Coherence

The European Green Deal[226] requires the Commission to use better the EU's agencies and scientific bodies and to move towards a process of 'one substance – one assessment'. The Chemicals Strategy for Sustainability[227] further specifies that the Commission will rationalise the use of expertise and resources by proposing the reattribution of technical and scientific work on chemicals performed under the relevant pieces of legislation to European agencies. The proposal to rely on the support of ECHA to carry out the assessment of all new restrictions of substances relevant to vehicles, as well as for the maintenance of existing restrictions and exemptions, is coherent with this approach. On the other hand, the proposal for the Ecodesign for Sustainable Products Regulation[228] (ESPR), indicates in its Article 6(3) that "*Performance requirements based on the product parameter set out in Annex I, point (f), shall not restrict the presence of substances in products for reasons relating primarily to chemical safety*"[229].

This approach, according to which, all restrictions on chemicals due to primarily their chemical risk, should not be done under specific product legislation but rather under REACH, also followed in the Commission's recent proposal for a Regulation on Packaging and Packaging Waste[230], would not be respected under Measure 5a and therefore, would be somewhat incoherent with the general approach proposed under product policy.

9.2.4 9.2.4 Ease of implementation

Similar to measure 5b, implementation of this measure for the restriction of new substances in vehicles would be relatively simple as the approach relies largely on procedures run by ECHA and already put in place and functioning under the REACH. In this case a separate decision-making procedure would take place under the new Regulation replacing ELV Directive which would require the drafting and adoption of a Commission delegated act, with the support of a dedicated waste expert group dealing with ELVs. Given that this expert group already exists and that the efforts to discuss and negotiate a measure therein would be similar to those under REACH, in the REACH Committee, no additional workload or difficulties in the

[226] COM(2019) 640 final.
[227] COM(2020) 667 final.
[228] COM(2022) 142 final.
[229] This is further explained in recital 22 which states that "*This Regulation should not enable the restriction of substances based on chemical safety, as done under other Union legislation. Similarly, this Regulation should not enable the restriction of substances for reasons related to food safety*.".
[230] COM(2022) 677 final.

development of new substance restrictions, and their exemptions are envisaged, beyond those to ensure the availability of adequate chemicals risk management expertise, and the initial procedural learning, in the responsible Commission service.

As regards the **maintenance and review of exemptions to existing restrictions** on the four substances, this measure reflects the *status quo*, with some improvements in terms of the scope of the assessment of alternatives and in relying on ECHA for this assessment. From the point of view of implementation this is legally less problematic and procedurally simpler than a potential transfer of the existing ELV restrictions to REACH, which is currently not well suited for the systematic review of multiple exemptions to restrictions (heavy procedure).

From the practical point of view, and as a result of the distribution of responsibilities in the Commission, the procedure under such a dedicated instrument would most likely be lighter and potentially somewhat faster, given the absence of co-responsibility of DG ENV and DG GROW in the procedure under the new Regulation replacing ELV Directive, contrary to the situation under REACH. It is also likely that, under the specific procedure described in this measure, the prioritisation of restrictions of substances in vehicles, with respect to other substances, could be dealt with advantageously, benefiting from a dedicated budgetary allocation and legal mandate to ECHA (as opposed to dealing with all restriction priorities under the general REACH workflow and budget).

As regards the updated definition of scope in terms of definition of hazardous substances and substances of concern, protection of human health and full-life cycle approach, this should not pose a major difference in terms of implementation, given that having information about hazardous substances in vehicles (as defined originally under the Dangerous Substances Directive – 67/548/EEC[231]) was already required to meet the existing minimisation obligation defined in Article 4(1)(a) of the ELV Directive[232] ("*to limit the use of hazardous substances in vehicles and to reduce them as far as possible*").

Therefore, the proposed amended provisions does not change due-diligence obligation of manufacturers to undertake all reasonable efforts to know what substances are present in the vehicles and components of vehicles they place on the market. Information on the classification of substances can be found in Annex VI of the CLP Regulation (harmonised classifications) and in the C&L inventory[233] maintained by the European Chemicals Agency. Consequently, in this sense, no additional burdens are envisaged in terms of implementation.

9.2.5 9.2.5 Administrative burden

No additional administrative burden would be imposed upon the Commission or Member States by running new substance restrictions under the new Regulation as compared to the preparation and running of restriction proposals for new substances under REACH. As described above the only differences would be internal, in terms of the services responsible

[231] Council Directive 67/548/EEC of 27 June 1967 on the approximation of laws, regulations and administrative provisions relating to the classification, packaging and labelling of dangerous substances (OJ 196, 16.8.1967, p. 1), repealed by the CLP Regulation.
[232] Article 2(11) of the ELV Directive, as originally adopted in 18 September 2000, stated: "hazardous substance' means any substance which is considered to be dangerous under Directive 67/548/EEC"
[233] https://echa.europa.eu/information-on-chemicals/cl-inventory-database

for overseeing the restriction process, ensuring coordination with ECHA and drafting and negotiating the draft proposals.

Additional administrative burden is to be expected for stakeholders that would be affected by the scope of a new specific restriction on a substance used in vehicles. Such burden would translate into efforts to comply with the proposed restriction, including the implementation of required risk management measures or those required to substitute or reduce the use of the restricted substance.

For the review of **exemptions to existing restrictions** on the four substances, the burden of doing these assessments under Measure 5a and proposing amendments closely resembles the current baseline, with efforts by the responsible Commission services to coordinate with contractors to support the assessment, being shifted towards efforts to coordinate with ECHA (which would likely be somewhat smaller in the sense that tendering procedures by the Commission would not be necessary). Assessment work supporting the granting of exceptions currently done by contractors would be taken over by ECHA, with a level of dedication that, on a first assessment, could resemble that of assessing an application for authorisation under REACH (this effort being potentially lower for reviews of existing exemptions). Adequate resourcing of ECHA, to undertake this support task to the Commission would therefore have to be envisaged in the financial fiche for the new regulation proposal. Assessment of possible **exemptions from new restrictions to be developed in the future** would follow an equivalent path and would represent a similar, but additional effort, to that done to maintain existing exemptions.

As regards the updated definition of scope in terms of definition of hazardous substances and substances of concern, protection of human health and full-life cycle approach, no additional burden is expected for authorities as compared with the previous provision, with the exception of possible work under ELV to define substances of concern which may hinder recycling for reasons not primarily associated to chemical safety. This work would be the same under all options considered and cannot be anticipated at this time, given specific substances falling under this category remain to be identified. In both cases a general obligation regarding minimisation of hazardous substances is defined that can only be controlled via targeted market surveillance or inspection and audit of materials used in vehicle manufacturing.

No significant additional administrative burden beyond that related to substances of concern which may hinder recycling for reasons not primarily associated to chemical safety, is envisaged for producers of vehicles given the obligation to be informed about hazardous substances in materials used to manufacture vehicles, and the associated supply chain communication due diligence, already exist, in order to comply with the provision of Article 4(1)(a) of the ELV Directive. Furthermore, it is worth noting that supply chain communication obligations are defined in article 33 of REACH for "substances of very high concern" have applied for over a decade and that the automotive industry has in place an exhaustive system (IMDS) for managing information on substances in vehicles[234]. This provides a solid basis for the sector to handle information on hazardous substances in vehicles be it under the previous or the updated definition.

[234] In addition, the automotive sector has notified information on SVHCs in articles to the SCIP database, pursuant to Article 9 of the Waste Framework Directive, making this information available to the general public, supply chain actors and waste managers.

9.2.6 9.2.6 Economic impacts

Economic impacts resulting from restrictions fall to a large extent on the stakeholders that have an economic interest in the manufacture or use of the substance/s that are restricted. These are case-specific and, in the case of substances used in vehicles, can impact manufacturers/ importers of the substances or mixtures themselves as well as on the OEMs manufacturing components for vehicles or assembling the full vehicles.

These economic impacts can take the form of substitution costs, process adaptation costs, loss of revenue due to decreased sales of the chemicals concerned, etc. An analysis published by ECHA in 2021 of the costs and benefits of restrictions under REACH done between 2016 and 2020 indicate that the monetised health benefits to citizens, including reduced risk of cancers, sexual development disorders, sensitisation and occupational asthma are estimated to be around 2.1 billion EUR per year while the associated costs add up to 0.5 billion EUR [235].

Every restriction adopted under REACH has associated enforcement costs which are borne by the competent authorities of each Member State. By way of illustration of potential enforcement costs for authorities, ECHA has included, in a number of recent opinions[236] on restriction dossiers, an estimate of average enforcement costs across EU Member States which they have determined to be approximately EUR 55,600 per year (as total for all Member States). These costs are reported to be an order-of-magnitude estimate of administrative costs, are not specific to any individual restriction and do not include testing costs. This same figure is quoted in a recent restriction proposal by France[237]. It is expected that enforcement costs would be comparable for restrictions on substances in vehicles enacted under the new Regulation.

These costs are not negligible but seem well within the possibilities of national competent authorities, and in line with enforcement costs for purposes other than restriction of substances in vehicles, done under REACH.

From the point of view of costs to the Commission's budget it is estimated that two full-time equivalents per year, in term of human resources, would have to be allocated to ECHA in order to support the Commission to deal with new substance restrictions under ELV as well as with reviews of existing or new entries. Resources for ECHA associated with new restrictions on substances in batteries, or associated to reviewing the current lead and cadmium exceptions for batteries in vehicles defined under ELV-related legislation are already addressed in the financial fiche of the Batteries Regulation and therefore do not need further consideration here.

Resources, largely equivalent to those currently used in external contractors, amounting to approximately 60.000 EUR per contract and 0.1-0.2 FTE per year would have to be allocated

[235] Costs and benefits of REACH restrictions proposed between 2016-2020. ECHA (2021). https://echa.europa.eu/documents/10162/17228/costs_benefits_reach_restrictions_2020_en.pdf/a96dafc1-42bc-cb8c-8960-60af21808e2e?t=1613386316829

[236] Opinion on PFHxS restriction (June 2020). https://echa.europa.eu/documents/10162/fdaed5b0-b6e4-9a21-b45d-ca607c05f845 ; Opinion on PFNA, PFDA, PFUnDA, PFDoDA, PFTrDA, PFTDA; their salts and Precursors (September 2018) - https://echa.europa.eu/documents/10162/3336e40c-b52c-d9f6-3745-3b4caf61599e

[237] Annex XV restriction dossier for (certain) substances in single-use baby diapers (15 December 2020). https://echa.europa.eu/documents/10162/99f020fd-e8ae-1b66-4fe6-0ec40789db8a

to ECHA to support the Commission in reviewing the active exemptions that currently remain in the Directive. This is already factored in the estimation of 2 FTE indicated above.

9.2.7 9.2.7 Social impacts

A quantitative estimate of the **health benefits** that the restriction of further substances of concern in vehicles would bring about could not be developed in the context of this impact assessment and will certainly be very case and substance specific. The referred analysis published by ECHA in 2021 on the costs and benefits of restrictions[238] does however provide a clear indication of average benefits of restrictions under REACH and can be considered as an indication of the costs and benefits of restrictions on substances that could be developed under the new regulation replacing ELV Directive.

Health benefits, for instance, in terms of reduced risk of cancers, disorders in sexual development, sensitisation and occupational asthma were equivalent to over 2.1 billion EUR per year. These health benefits or reduced risks relate to all observed adverse health effects for more than 7 million consumers and workers per year. Since 2010, there have been 12 cases where the benefits of restriction could be monetised. For these cases, the annual benefits amounted to 2.1 billion EUR – four times higher than the associated costs of 0.5 billion EUR.

Under Measure 5a it would be possible to overcome the limitation in REACH which impedes imposing specific risk-management measures on activities which take place once vehicles become waste. From this point of view, Measure 5a could be seen to provide a somewhat more effective tool to ensure protection of human health, especially workers, from the substances of concern in vehicles, especially during waste management operations.

9.2.8 9.2.8 Environmental impacts

Similar to social / health impacts, a quantitative estimate of the environmental benefits that the restriction of substances of concern in vehicles would bring about could not be estimated in the context of this impact assessment and will certainly be very case and substance specific. The referred ECHA cost-benefit study on REACH restrictions indicated a reduction of 95,000 tonnes of environmental emissions of the regulated substances per year (although potentially only a fraction of this figure would be relevant to substances used in automotives). This leads to potential health benefits through a cleaner environment and reduced exposure to hazardous chemicals in water, food and air.

For the provisions on the four substances restricted in the ELV Directive, it can be concluded that the environmental benefits have been achieved. An ex-post analysis of the restriction on the four substances shows environmental benefits of past restrictions: lifecycle emission reductions between 2000 – 2005 for **lead** were estimated at 99.6%, for **cadmium** at 96% and for **Cr(VI)** at 99.99%[239].

Overall, environmental impacts are expected to be similar in the case of Measures 5a and 5b. Under Measure 5a it would be possible to overcome the limitation in REACH which impedes imposing specific risk-management measures on activities which take place once a material

[238] Ibid.
[239] Oeko-Institut 2010 on behalf of ACEA.

becomes waste[240] [241]. From this point of view measure 5a could be seen to provide a somewhat more effective tool to ensure protection of the environment from the substances of concern in vehicles, also during waste management operations.

9.2.9 9.2.9 Stakeholder views

Feedback obtained from the open public consultation (OPC) on whether the revised ELV Directive should ban hazardous substances in vehicles, taking into account that restrictions on hazardous substances are also specified in other pieces of EU legislation (notably REACH) indicates that:

- 66 of the responding stakeholders (32%) were of the view that all substances in vehicles should be regulated in the future under chemicals regulation.
- 32% of responding stakeholders indicated that substances currently prohibited under ELV legislation should remain there, but that future prohibitions should be addressed under chemical legislation. In practice this would mean that for all new substance prohibitions, 64% of stakeholders would prefer regulation under chemical legislation than under new legal instrument regulating the ELVs.
- Only 20% (41 individuals) were of the opinion that all substances in vehicles should continue to be regulated under ELV legislation.
- For waste management operators, public authorities, environmental NGOs and dealers and repair shops the distribution between these answers was similar.
- Automotive producers had a stronger tendency to support the options where chemical legislation would be used for future substance prohibitions (not for existing ones) as opposed to the ELV Directive.

9.3 *Assessment of measure 5b* – Restrictions of substances under REACH[242] and other existing legislation

9.3.1 9.3.1 Description of the measure

Under Measure 5b, the restriction of substances in vehicles and component parts of vehicles would be done under other existing legislation and, in particular REACH (the EU umbrella legislation on chemicals) and, as appropriate, under the Batteries Regulation[243] or the Regulation on Persistent Organic Pollutants (POPs)[244]. This would in particular mean that no dedicated restriction provisions would remain under the new Regulation replacing ELV Directive for substances to be restricted due to primarily, their chemical risks.

[240] Article 2(2) of REACH states that "*Waste as defined in Directive 2006/12/EC of the European Parliament and of the Council is not a substance, mixture or article within the meaning of Article 3 of this Regulation*"
[241] Recital 14a of the politically agreed text of the draft Batteries Regulation states: "*This Regulation should complement the REACH and CLP Regulations and allow the adoption of risk management measures related to substances including the waste phase*". See document 5469/23 dated 18 January 2023. https://eur-lex.europa.eu/legal-content/EN/TXT/PDF/?uri=CONSIL:ST_5469_2023_INIT&from=EN
[242] Registration, Evaluation, Authorisation and Restriction of Chemicals. Regulation (EC) No 1907/2006.
[243] COM(2020) 798 final and 2020/0353 (COD). Political agreement achieved in trilogue of 9 December 2022.
[244] Regulation (EU) 2019/1021 on Persistent Organic Pollutants.

The prohibitions and restrictions on substances regulated under the Stockholm Convention (such as some PBDEs), and any exemptions to these relevant to vehicles, would be addressed under Regulation (EU) 2019/1021 on Persistent Organic Pollutants (POPs)[245] as this is the EU instrument that implements the chemical prohibitions and restrictions agreed internationally under the Convention. For substances found in the batteries used in vehicles, the recently agreed Batteries Regulation (adoption pending) would be *lex specialis* for this purpose and would be used for adopting restrictions of chemicals relevant to batteries, preferentially over REACH.

The possibility to expand Directive 2011/65/EU (the RoHS Directive)[246] to address electronic components of vehicles was considered but not further analysed given that:

- RoHS Directive manages its exceptions in an "authorisation-like" system, where operators make requests for exceptions and for their renewal (this differs from the ELV Directive approach);
- Criteria for granting derogations under RoHS Directive are different from those in ELV Directive and, although similar, are developed in lesser detail than for restrictions under REACH. Given that REACH provides an exhaustive methodology to assess the impacts of restrictions on chemicals on human health on the environment through their entire life cycle, as well as of social and economic impacts, referral to REACH, which is the core EU legislation on chemicals, is considered more appropriate.
- RoHS Directive would only be relevant to two "active" exemptions laid down in ELV Directive Annex II with a review date [Annex II points 8€ and 8(g)(ii)]. The proportionality of introducing changes in RoHS Directive only for this purpose is questionable.
- Additionally, such changes in RoHS Directive would also have an impact on the scope of article types covered under the WEEE Directive and would require its amendment. The associated complexity and knock-down effects do not seem justified solely to deal with these ELV electronics-related exemptions under RoHS Directive.

Consequently, the new Regulation replacing ELV Directive would need to clarify that, unless there is lex specialis, all chemical risk related restrictions would be addressed under REACH. Where there is *lex specialis*, such as for batteries these would be addressed under the Batteries Regulation and, for the POP substances, under the POPs Regulation (to be clarified in the recitals of the measure). Current restriction provisions in the Directive as regards the four substances (cadmium, lead, mercury and hexavalent chromium) would be removed from the Regulation text and need to be taken up under REACH, following a transitional period, as appropriate.

The main elements of the proposed **Measure 5b** can be summarised into:

- Limitations due to chemical risks of all vehicle-relevant chemicals are removed from the ELV legislation[247] and are addressed under REACH (or as appropriate the Batteries

[245] Regulation (EU) 2019/1021 of the European Parliament and of the Council of 20 June 2019 on persistent organic pollutants (OJ L 169, 25.6.2019, p. 45–77).
[246] Directive 2011/65/EU of the European Parliament and of the Council of 8 June 2011 on the restriction of the use of certain hazardous substances in electrical and electronic equipment (OJ L 174, 1.7.2011, p. 88–110).
[247] It should be noted that the requirements under the Authorisation title of REACH for those substances of very high concern (SVHCs) listed in Annex XIV to REACH (such as certain chromium VI salts) applies, regardless of whether restriction

Regulation or covered by the POPs Regulation). This would be done under the existing REACH procedures and workstreams for restriction or, as appropriate as defined under the POPs Regulation or the Batteries Regulation. In the case of REACH such amendments (of Annex XVII) would be done via the regulatory procedure with scrutiny. The legal feasibility of this would need to be further examined given the different legal basis and objectives for introducing restrictions under REACH and under the ELV Regulation. Amendments of the POPs Regulation and the Batteries Regulation would take place via delegated acts.

- The objectives and scope in Articles 1 and 4 are changed to cover impacts of chemicals in vehicles on human health and the environment across the full life cycle of vehicles (and not only focus on waste management). These objectives would be fulfilled under the processes carried-out under REACH, POPs and the Batteries Regulation.
- Existing restrictions on the four substances and their exceptions are no longer maintained under ELV legislation. These restrictions and their exemptions (currently in Annex II of the ELV Directive) would require an "*ad hoc*" transfer to REACH Annex XVII (restrictions Annex) during co-decision.
- Relevant active exceptions having a review date [Annex II points 2(c)(ii), 3, 8(e) and 8(g)(ii)] would be maintained and reviewed under REACH via dedicated reviews of the corresponding restrictions introduced during co-decision. Other "inactive" exceptions that do not require a review would also be listed in Annex XVII of REACH or in a separate dedicated Appendix, that would have to be introduced in REACH.
- Exceptions for the use of lead and cadmium under ELV Directive which are specific to batteries [Annex II points 5(a) and 5(b) (lead) and 16 (cadmium)] are, following a transition process, taken up by the Batteries Regulation (*lex specialis*) and removed from the new Regulation replacing ELV Directive.
- The possibility to limit substances of concern in vehicles, for sustainability reasons that do not relate primarily to chemical risks could be introduced in the ELV legislation if necessary (similarly to what has been proposed in the Ecodesign Regulation and in the proposal of Regulation on Packaging and Packaging Waste (PPWR)).
- For any expansion in scope of ELV legislation to **L-category vehicles, lorries, buses and trailers**, restrictions on the four heavy metals, and possible exceptions, and any restrictions on new substances, would require the initiation of new restrictions under REACH.
- The definition of "hazardous substance" in ELV legislation is updated to be consistent with CLP Regulation. Similar to the approach in PPWR, reference to the definition of "substance of concern" is also to be included[248].

provisions for substances in vehicles remain in ELV legilslation or are transferred to REACH or sector / product-specific legislation.

[248] The PPWR refers to Article 2(28) of proposal for a Regulation on Eco-design for Sustainable Products.

Consequently, the text of the new Regulation replacing ELV Directive should clearly explain, most likely in recitals, the rationale of addressing all chemical-risk related restrictions under REACH or exceptionally, in other specific legislation such as the Batteries Regulation, as appropriate. It should also include provisions expanding its objectives and scope to address human health and environmental impacts of substances in vehicles throughout their full life cycle and also, to enable addressing within ELV legislation, the restriction of substances of concern for broader sustainability reasons, similarly to what is provided for in the Commission's proposals on Ecodesign and Packaging and Packaging Waste.

9.3.2 9.3.2 Effectiveness / efficiency

This procedure would use the effective and well-tested assessment and regulatory mechanisms under the REACH restriction title to restrict substances in vehicles for which there is an unacceptable risk to human health and/or the environment, and as applicable, under the generic risk management approach, relevant to substances in consumer articles as provided for under Article 68(2) of REACH.

Restriction dossiers would be prepared by ECHA, at the request of the Commission, or by Member States, which share the right of initiative in proposing restrictions under REACH. Following the assessment by ECHA's committees[249], the Agency would deliver an opinion to the Commission, which would then serve to prepare a proposal to amend Annex XVII of REACH so as to include a specific restriction on a substance, or group of substances in vehicles. Such a decision would be adopted according to the regulatory procedure with scrutiny which requires an opinion of the members of the REACH Committee.

This well-tested approach requires approximately three years to execute, counting from the beginning of drafting a restriction dossier to the adoption of the restriction. REACH restrictions have over the years proven to be an efficient and cost-effective approach[250] [251] to protect human health and the environment from the risks posed by hazardous chemicals.

As indicated under Measure 5a as regards the management and review of existing exceptions on four substances, Measure 5b would pose considerable legal implementation challenges, as compared to 5a, given it is uncertain that an *ad-hoc* transfer of existing restrictions and their exemptions to Annex XVII of REACH during the co-decision process would be acceptable to co-legislators or legally sound (given this would circumvent the established restriction process defined under REACH). Furthermore, dealing under REACH with multiple exemptions, some of which are time-limited, and potentially subject to multiple reviews, is complex under REACH given this requires the preparation of new restriction dossiers and running the full restriction process. This is a heavy procedure to review exemptions in currently in ELV Directive which, in most cases, are rather small and specific.

[249] Committee for Risk Assessment and Committee for Socio-economic Analysis
[250] Cost and benefit assessments in the REACH restriction dossiers. ECHA (2016). https://echa.europa.eu/documents/10162/17228/cost_benefit_assessment_en.pdf/b780a657-b4aa-4274-8c74-3a80bae8e883
[251] "*The restriction procedure is generally working, though further improvements in efficiency are needed*". Actions 8 to 10 include proposals to improve the restriction process, further enhance the involvement of Member States and better frame the application of the precautionary principle. Communication from the Commission to the European Parliament, the Council and the European Economic and Social Committee on Commission General Report on the operation of REACH and review of certain elements. Conclusions and Actions. https://eur-lex.europa.eu/legal-content/EN/TXT/PDF/?uri=CELEX:52018DC0116&from=EN

As regards the updated definition of scope in terms of definition of hazardous substances and substances of concern, protection of human health and full-life cycle approach, these provisions apply to the three sub-measures considered (5a, 5b and 5c) and therefore considerations to this respect mentioned under 5a, are equally valid for this measure.

9.3.3 9.3.3 Ease of implementation

Ease of implementation of this measure as regards the restriction of **new substances** in vehicles **would be high** as no additional legal or procedural instruments need to be put in place. Following the possible prioritisation of substances to be addressed in vehicles, the Commission (or a Member State) could request ECHA, under REACH, to assess a dossier for the restriction of relevant substances in vehicles.

As explained in Measure 5a, the take-up by REACH of existing restrictions on the four substances and the review of their exemptions is legally problematic and procedurally complex, given REACH is currently not well suited for the systematic review of multiple exemptions to restrictions (heavy procedure) and given the different legal bases and objectives for introducing restrictions under REACH and under ELV.

From the practical point of view, specific restrictions of substances in vehicles would be handled under the same budgetary allocation and as part of the same work-stream and prioritisation exercise as all other restrictions under REACH. This means that priority substances flagged for restriction due to vehicle-specific concerns would, in a way, compete for resources and "slot allocation" with restrictions backed by other priorities and motivations under REACH. Such coordination work would be ensured by the Commission, in cooperation with Member States, in future reviews of the "Restrictions roadmap"[252] elaborated under REACH.

As regards the updated definition of scope in terms of definition of hazardous substances and substances of concern, protection of human health and full-life cycle approach, these provisions apply to the three sub-measures considered (5a, 5b and 5c) and therefore considerations to this respect mentioned under 5a, are equally valid for this measure.

9.3.4 9.3.4 Coherence

As discussed under Measure 5a, Measure 5b, which also relies on ECHA to carry out the assessment of all restrictions of substances relevant to vehicles, as well as for the maintenance of existing restrictions and exemptions, is coherent with the "one substance, one assessment" approach. In this case, Measure 5b would also be coherent with the general approach under the Ecodesign for Sustainable Products Regulation, according to which all restrictions on chemicals due to primarily their chemical risk, should not be done under specific product legislation but rather under REACH.

9.3.5 9.3.5 Administrative burden

No additional administrative burden would be imposed upon the Commission or Member States as compared to the preparation and running of restriction proposals for **new**

[252] See SWD(2022) 128 final. Restrictions Roadmap under the Chemicals Strategy for Sustainability. 25.04.2022. https://ec.europa.eu/docsroom/documents/49734

substances, as this already happens under REACH. As described under Measure 5a the only differences would be internal, in terms of the services responsible for overseeing the restriction process, ensuring coordination with ECHA and drafting and negotiating the draft proposals. Restrictions on substances of concern, that could be potentially required for substances hindering recycling for broader sustainability reasons, not primarily related to chemical safety, would remain under ELV and constitute an additional effort. This work would be the same under all options considered and cannot be anticipated at this time, given specific substances falling under this category remain to be identified.

Additional administrative burden is to be expected for stakeholders that would be affected by the scope of a specific restriction on a substance used in vehicles. Such burden would translate into efforts to comply with the proposed restriction, including the implementation of required risk management measures or those to substitute or reduce the use of the restricted substance.

The administrative burden to transfer existing restrictions on four substances, and their exemptions, to REACH and to further review them under REACH is likely to be considerably higher than under Measure 5a, given that this review under REACH requires a new restriction and is a rather heavy process, not very suited to the multiple exemptions and reviews under ELV legislation. Although, conceivably, the remaining active exemptions under ELV legislation could be bundled in a single package for the purpose of assessment under REACH, this would be a rather *ad-hoc* and novel process under REACH and for ECHA, requiring involvement of a larger number of services (waste and chemicals units in DG ENV, REACH and automotive units in DG GROW) and therefore likely to be more burdensome, require more time and more resources.

As regards the updated definition of scope in terms of definition of hazardous substances and substances of concern, protection of human health and full-life cycle approach, these provisions apply to the three sub-measures considered (5a, 5b and 5c) and therefore considerations to this respect mentioned under 5a, are valid for this measure.

9.3.6 9.3.6 Economic impacts

The economic impacts of Measure 5b are expected to be similar to those of Measure 5a, as explained under that measure. From the point of view of costs to the Commission budget of Measure 5b, this would be addressed under the general REACH budget both of ECHA and of the Commission. Therefore, a specific budget allocation for dealing with vehicle relevant substances would not have to be considered in the financial fiche of the new Regulation replacing ELV Directive.

As in Measure 5a, resources for ECHA associated with new restrictions of substances in batteries or associated to reviewing the current lead and cadmium exemptions for batteries in vehicles under ELV, are already addressed in the financial fiche of the Batteries Regulation and therefore do not need further consideration here.

Further resources, largely equivalent to those currently used under ELV to pay the services of external contractors, would have to be additionally allocated to ECHA, under the REACH budget, to support the Commission in reviewing the remaining active exemptions (subject to uncertainties stated about the legal possibility of such “ad hoc” transfers of restrictions).

9.3.7 9.3.7 Social impacts

A quantitative estimate of the health benefits that the restriction of substances of concern in vehicles would bring about could not be estimated in the context of this impact assessment and will certainly be very case and substance specific. See the description of social impacts under Measure 5a, as these are estimated to be equivalent for Measure 5b.

9.3.8 9.3.8 Environmental impacts

Similar to social / health impacts, a quantitative estimate of the environmental benefits that the restriction of substances of concern in vehicles would bring about could not be estimated in the context of this impact assessment and will certainly be very case and substance specific. See the description of environmental impacts under Measure 5a, as these are estimated to be equivalent for Measure 5b.

A restriction of a substance adopted under REACH is capable of imposing prohibitions and risk management measures on all aspects related to the placing on the market and use of a substance during the product life-stage of vehicles. Addressing the use of a substance of concern in the manufacture of vehicles will also have a profound effect on the waste generated by such vehicle when it becomes waste at the end of its service life.

However, given that waste is not a substance, a mixture or an article (as per Article 2(2) of REACH), REACH is not the most suitable instrument to implement specific risk management measures on activities dealing with waste from vehicles (i.e. specific exposure control or emissions reduction measures during recycling or disposal).

9.3.9 9.3.9 Stakeholder views

See summary of stakeholder views provided under Measure 5a.

Although unrelated to the current impact assessment, a recent position paper by several industry associations[253], issued in the context of the discussions in co-decision of the Commission's proposal for a regulation on Batteries and Waste batteries[254], a clear preference was stated, in relation to procedures to restrict hazardous substances in batteries, to "*refer to the already existing REACH, OSH[255] and IED[256] processes and therefore benefit from existing horizontal legislation rather than to create additional product specific requirements*".

9.4 *Assessment of measure 5c* – Hybrid restrictions approach

9.4.1 9.4.1 Description of the measure

Measure 5c is a hybrid of Measures 5a and 5b, according to which restrictions on the four substances already existing in the ELV Directive and their exemptions are kept and maintained in the proposed new Regulation, under enhanced provisions. Future restrictions on

[253] Chemicals management in batteries. Position paper by EUROBAT, Eurometaux and RECHARGE. January 2022. https://www.eurobat.org/news-publications/position-papers/510-chemicals-management-in-batteries
[254] COM(2020) 798 final.
[255] Occupational Safety and Health.
[256] Industrial Emissions Directive.

other substances in vehicles, and their possible exemptions, would be primarily[257] developed, managed, enacted and maintained under REACH or, as appropriate covered by the POPs Regulation or the Batteries Regulation (as applicable to substances in batteries in vehicles).

Measure 5c presents the main advantages of Measures 5a and 5b, while avoiding the legal and practical challenges of a full transfer to REACH (Measure 5b). The possibility of full integration into REACH could be reassessed in the future, after the ongoing review of REACH has been concluded and sufficiently implemented, to assess its adequacy to a scenario such as that proposed under Measure 5b.

The main features of **Measure 5c** are:

- Limitations due to chemical risks of all vehicle-relevant **new substances** are addressed under REACH[258] (or as appropriate the POPs Regulation or the Batteries Regulation). This would be done under the existing REACH procedures and workstreams for restriction (via the regulatory procedure with scrutiny) or, as appropriate, as defined under the POPs Regulation or the Batteries Regulation (via delegated acts).
- The **objectives and scope** in Articles 1 and 4 of the ELV Directive are updated in the new Regulation replacing ELV Directive to cover impacts on human health and the environment across the full life cycle of vehicles (and not only focus on waste management).
- **Existing restrictions** on four substances and their **exemptions** are maintained under ELV legislation and reviewed via delegated acts with the support of ECHA (rather than using contractors, as currently). Relevant active exemptions having a review date [Annex II points 2(c)(ii), 3, 8(e) and 8(g)(ii)] are maintained and reviewed under ELV legislation, with the support of ECHA. Other exemptions that do not require a review are also maintained in ELV legislation. The possibility of a transfer of these restrictions, and any remaining exemptions, to REACH would be **reassessed** in the future once the ongoing REACH review is concluded and sufficient implementation time has elapsed to assess its functioning (potentially in 7 - 10 years).
- As an exception to the point above, **exemptions for the use of lead and cadmium** under ELV Directive which are **specific to batteries** [Annex II points 5(a) and 5(b) (lead) and 16 (cadmium)] are, following a transition process, taken up by the Batteries Regulation (*lex specialis*) and as appropriate removed from the Regulation replacing ELV Directive.
- The **scope of the assessment of the exemptions** remaining under ELV legislation is widened beyond the current description in Article 4(2) of the ELV Directive, which only takes into account whether the "*the use of the substances is unavoidable*". A broader approach, similar to that used in assessing applications for authorisation under REACH, including an analysis of alternatives, a socio-economic analysis and a comparative

[257] With the exception of substances in vehicle batteries, addressed under the Batteries Regulation, substances covered by the POPs Regulation and substances of concern that hinder recycling, that could be restricted for broader sustainability reasons not primarily related to their chemical risk (which would be restricted under ELV).
[258] It should be noted that the requirements under the Authorisation title of REACH for those substances of very high concern (SVHCs) listed in Annex XIV to REACH (such as certain chromium VI salts) applies, regardless of whether restriction provisions for substances in vehicles remain in ELV or are transferred to REACH or sector / product-specific legislation.

analysis of the health and environmental impacts of alternatives (at least at the level of comparing the hazards of the different alternative substances) should be included.

- For any **expansion in scope of ELV legislation to L-category vehicles, lorries, buses and trailers,** a new dedicated restriction process, implemented via delegated acts, would be run under the new Regulation replacing ELV Directive, with the support of ECHA and/or consultants within a given timeframe in case of restrictions regarding the four currently restricted substances or addressed as new restrictions under REACH in case of restrictions regarding other substances. The feasibility and appropriateness of addressing these under REACH would be decided once the ongoing REACH review is concluded and sufficient implementation time has elapsed to assess its functioning (potentially 7 – 10 years). The new Regulation should include the necessary empowerments to, in due time, be able to act according to either of these options.
- The definition of "hazardous substance" in ELV legislation is updated to be consistent with CLP Regulation. Similar to the approach in PPWR, reference to the definition of "substance of concern" is also to be included[259].

The text of the Regulation would have to clearly assign to ECHA a supporting role in the review of active exemptions that remain in the new Regulation as well as, as appropriate, in studies that could be carried out to scope and prepare relevant restriction actions on lead, cadmium, mercury and hexavalent chromium associated to a possible increase in scope of the ELV legislation to additional vehicle types. In addition, addressing all new substance restrictions under REACH[260] or, as appropriate the POPs Regulation or the Batteries Regulation would have to be explained in recitals. This will require a definition of tasks for ECHA under the Regulation replacing ELV Directive together with the required budgetary allocation, indicated in its financial fiche.

9.4.2 9.4.2 Effectiveness / efficiency

As regards the **restriction of new substances** in vehicles, this measure is identical to Measure 5b. This procedure would use the effective and well-tested assessment and regulatory mechanisms under the REACH restriction title to restrict substances in vehicles for which there is an unacceptable risk to human health and/or the environment, or as applicable, under a generic approach to risk management for substances in articles that may be used by consumers (as provided for under Article 68(2) of REACH).

As regards the existing restrictions on four substances and the **management and review of existing exemptions** this measure maintains the *status quo*, using an also well- established process that is known to stakeholders and would require no significant legal changes. The only difference with the baseline, in this regard, is that the Commission would be supported by ECHA, instead of by external consultants, thereby providing, potentially a more homogeneous, stable and robust assessment of exemptions. This approach poses fewer legal and practical implementation challenges than measure 5b, requires minimal legal changes and maintains consistency with current approach towards the management of exemptions.

[259] The PPWR refers to Article 2(28) of proposal for a Regulation on Eco-design for Sustainable Products.
[260] With the exception of substances of concern that hinder recycling, that would be restricted due to broader sustainability reasons, nor primarily related to chemical safety, under ELV.

As indicated, the possibility of addressing the restriction on the four heavy metals, and the review of their exceptions, under REACH, and any efficiency gains that could be gained from it, can be reassessed in the future, following the review of REACH and its implementation.

9.4.3 9.4.3 Coherence

As discussed under Measures 5a and 5b, Measure 5c also relies on ECHA to carry out the assessment of all restrictions of substances relevant to vehicles, as well as for the maintenance of existing restrictions and exemptions and therefore is coherent with the "one substance, one assessment" approach. Measure 5c would also be coherent with the general approach under the Ecodesign for Sustainable Products Regulation (by carrying out all new restrictions of substances in vehicles under REACH. This is coherent with the principle that all restrictions on chemicals due to primarily their chemical risk, should not be done under specific product legislation but rather under REACH (only the historical restrictions on the four heavy metals would remain under ELV legislation).

9.4.4 9.4.4 Ease of implementation

As indicated for **new substance restrictions** in Measure 5b (under REACH, POPs and Batteries Regulations) and for existing substance restrictions and the review of their exceptions under Measure 5a, implementation of each of these elements is envisaged to be relatively easy given in the first case this process already takes place smoothly under REACH (avoiding the additional complexity to implement this under an additional new instrument – ELV). As regards the four substances currently restricted under the ELV Directive the current, well-tested process under ELV Directive to review existing exemptions remains, but would be supported by ECHA for additional robustness, consistency and reliability. Therefore this hybrid approach would not require significant changes from the legal or methodological point of view in existing processes and therefore is expected to have lower implementation risks and higher acceptance by stakeholders than measures 5a and 5b.

As explained in Measure 5a, the "transfer" to REACH of existing restrictions on the four substances and the review of their exceptions is legally problematic and procedurally more complex given that REACH is currently not well suited for the systematic review of multiple exemptions to restrictions (heavy procedure) and given that the legal basis and objectives associated to introducing restrictions under REACH and under ELV are different. As regards substances present in batteries, these would be addressed under the new Batteries Regulation and therefore in this aspect measures 5a, 5b and 5c are equal.

9.4.5 9.4.5 Administrative burden

As explained under Measure 5b, no additional administrative burden would be imposed upon the Commission or Member States by the running of restriction proposals for new substances in vehicles under REACH. The same applies to substances restricted under the Batteries Regulation (using a REACH-like process). Similarly for the review of exemptions from the existing restrictions on four substances, which would be assessed with the support of ECHA, the process for the Commission and stakeholders is envisaged to be essentially the same in terms of burden, with additional optimisation and burden reduction for operators than can be achieved via the envisaged increase in consistency and structuring of the process and use of centralised IT tools brought about by the new role of ECHA in the process. Consequently, this

hybrid approach is considered to offer the best outcome, in terms of burden, as compared with Measures 5a and 5b.

For each new restriction, additional administrative burden is to be expected for stakeholders that would be affected by the scope of a specific restriction on a substance used in vehicles. Such burden would translate into efforts to comply with the proposed restriction, including the implementation of required risk management measures or those to substitute or reduce the use of the restricted substance. This is common to all three measures discussed.

9.4.6 9.4.6 Economic impacts

As indicated above, measures 5a and 5b are similar as regards the economic impact on operators in terms of compliance costs given that under both measures these have to implement and adjust to the limitations set on the use of substances in vehicles, including substitution costs, monitoring, process modifications, etc. This is independent to whether these limitations are imposed via the new Regulation replacing ELV Directive, REACH or other chemical-related legislation. Arguably having to follow and implement several sets of legislation introduces additional costs and complexity in terms of the process for operators, but this is already the case given currently both ELV legislation and REACH already apply to vehicle manufacturers and other OEMs. Consequently, being measure 5c a combination of elements in measures 5a and 5b, which themselves have estimated similar economic impacts, measure 5c should have similar economic impacts to 5a or 5b, potentially being slightly advantageous over these given in terms of process, it represents the approach requiring the least adaptation efforts by operators (in the sense that existing substance restrictions continue being addressed under ELV and new substance restrictions are primarily addressed under REACH[261], which is a well know process, that has already addressed vehicle-relevant substances).

9.4.7 9.4.7 Social impacts

A quantitative estimate of the health benefits that the restriction of substances of concern in vehicles would bring about could not be estimated in the context of this impact assessment and will certainly be very case and substance specific. See the description of social impacts under Measure 5a, as these are estimated to be equivalent for Measure 5c.

9.4.8 9.4.8 Environmental impacts

Similar to social / health impacts, a quantitative estimate of the environmental benefits that the restriction of substances of concern in vehicles would bring about could not be estimated in the context of this impact assessment and will certainly be very case and substance specific.

As described in Measure 5a, very significant reductions of emissions of lead, hexavalent chromium and cadmium have already been achieved via the existing restriction under ELV Directive. For new restrictions that could be adopted under REACH important reductions in emissions over the whole life cycle of vehicles are expected, as supported by studies on

[261] With the exception, as appropriate, of substances to be restricted in vehicle batteries, those covered by the POPs Regulation, or specific substances to be restricted for broader sustainability reasons not related primarily to their chemical risks.

reduction of emissions brought about by other REACH restrictions. Addressing the use of substances of concern in the manufacture of vehicles will also have a profound effect on the waste generated by such vehicle when it becomes waste at the end of its service life.

For further details see the description of environmental impacts under Measure 5a and 5b, as these are estimated to be equivalent for Measure 5c (which represents a combination of both).

9.4.9 9.4.9 Stakeholder views

See summary of stakeholder views provided under Measure 5a. There is clear support of a majority of stakeholders to address all new substance restrictions in vehicles under REACH as the central EU chemicals management legislation. A majority of stakeholders responding to the open public consultation also support that substances already regulated under ELV Directive should remain there (and thus also their exceptions).

This approach is consistent with what is proposed under this Measure 5c.

9.5 Summary and conclusion

As can be seen from the analysis above, measures 5a and 5b are similar in terms of effectiveness and efficiency given in both cases a system to restrict new substances in vehicles and vehicles components is established relying on the support and expertise of ECHA.

All three measures are coherent with the "one substance, one assessment" approach, as in all cases the assessments of the merits of restricting substances due to their chemical risks are carried out with the support of ECHA. However, in terms of their coherence with the general approach to address substances which pose a problem in products due to primarily their chemical risks, Measure 5a would deviate from this approach, whereas measures 5b and 5c would be consistent with it, given in both cases all new restrictions would be primarily done under REACH.

As regards implementation simplicity, both measures 5a and 5b, although in principle feasible, have some associated difficulties. In the case of measure 5a a new methodology to restrict new substances due to their chemical risks would have to be developed and implemented under ELV legislation, with support of ECHA. Although methodologically this would largely resemble REACH, the creation of new procedures under the new Regulation would unavoidably require additional efforts and adaptation both of operators as well as of ECHA and the responsible Commission services. On the other hand, to fully transfer all vehicle restrictions to REACH would require similar efforts for operators but offers serious doubts. They regard legal and practical possibilities to transfer the existing restrictions on the four substances, and their exemptions, to REACH and to subsequently maintain and review them under REACH, in its current form.

In this regard, measure 5c provides a hybrid solution which in terms of implementability appears clearly advantageous, also in terms of representing the least administrative burden for operators, given it maintains "old restrictions" and their exemptions under ELV legislation and all new substance restrictions under REACH (for which this process is already in place).

The overall economic, social and environmental impacts of the three measures are estimated to be largely equivalent, given in all cases restrictions on substances in vehicles would be

enacted resulting in the same positive impacts in terms of protection of human health and the environment and with equal associated costs to ensure compliance, adapt manufacturing processes, implement alternatives and, as appropriate, apply for exemptions. Small differences in costs and administrative burden may exist from the point of view of the Administrations (Commission and Member States) depending on the specific services involved, and their pattern of interaction, but these are estimated to be small as compared to costs to comply with restrictions.

As regards the views of stakeholders consulted, a majority of them shows a preference for new restrictions to be carried out under the REACH Regulation, with support also expressed to maintaining the *status quo* for existing restrictions on the four substances and their exemptions. This is best aligned with hybrid measure 5c with the exception of restrictions of lead and cadmium in vehicle batteries, which in all cases would be addressed under the new Batteries Regulation, as *lex specialis*. The preference of Member States to centralise to the extent possible new restrictions on chemicals in products under REACH, clearly expressed during the co-decision process of the Batteries Regulation, is also respected and largely aligned under Measure 5c.

A comparative summary of the three measures is provided in the table below:

Table 9.1 Comparative summary measures

	M5a (ELV)	**M5b (REACH + other existing)**	**M5c (hybrid)**
Effectiveness / efficiency	++	++	++
Coherence	+	++	++
Ease of implementation	++	+	+++
Administrative burden	-	-	- / +
Economic impacts	-	-	-
Social impacts	++	++	++
Environmental impacts	++	++	++
Stakeholder views	+	++	+++
Impact summary	**++**	**++**	**+++**

Finally, although as abundantly discussed in the co-decision process of the Batteries Regulation, restrictions carried-out under REACH are to some extent limited. They cannot specifically impose risk management measures in the waste phase, given waste is excluded from the scope of REACH. This does not imply that REACH restrictions cannot have an impact on the safety of waste management, given restrictions on the product phase will also limit the chemicals that are ultimately present in waste (i.e. if a ban or a content limitation in products is imposed).

The need introduce dedicated risk management measures to address risks resulting from the management of end-of-life vehicles, using a dedicated legal instrument to enact restrictions that would enable implementing such specific risk management measures to waste, e.g. during recycling operations (as would be possible under measure 5a) does not, contrary to the case of substances in batteries, have a strong justification.

In the case of batteries, hazardous substances such as lithium compounds, cobalt compounds, lead compounds, etc, are the core of the battery, which contains them in large quantities. The

importance placed on recovering these hazardous substances, some of which are critical raw materials, justifies having the possibility of imposing specific risk management measures[262], as appropriate and complementing existing provisions under existing environmental and worker protection legislation, on battery recovery / treatment operations. These are expected to largely increase in the EU[263] in the coming years.

In the case of end-of-life vehicles, although the presence of hazardous substances in waste is certainly a source of concern, these are not major constituents of the vehicle, nor the target substances for recovery. Therefore, in order to address possible risks occurring during waste management of ELVs, the downstream effects on waste of chemical restrictions imposed on the vehicles (e.g. via REACH), together with provisions in the applicable existing environmental (e.g. Industrial Emissions Directive) and worker protection legislation (Chemical Agents Directive, Carcinogens and Mutagens Directive), are considered sufficient to manage these risks.

Based on all the above, the hybrid restriction approach defined under **Measure 5c** is considered the preferred policy option.

[262] These considerations were very relevant in the negotiation of the Batteries Regulation and contributed to the agreement on a self-standing restriction mechanism under the Batteries Regulation.
[263] Resulting from provisions on recycling targets in of the Batteries Regulation and envisaged further promotion of recycling via the Raw Materials Act.