Circularity of vehicles: Design, production, end-of-life and waste management


This briefing provides an initial analysis of the strengths and weaknesses of the European Commission's impact assessment (IA) accompanying the above-mentioned proposal, submitted on 13 July 2023 and referred to the European Parliament’s Committee on the Environment, Public Health and Food Safety (ENVI).

The IA explains why the 'massive' green transformation of the automotive sector – a pillar of the EU economy – requires a revision both of the rules on the environmentally sustainable treatment of vehicles reaching their end of life (ELV) and of the rules on their reusable and recyclable design (IA, pp. 4-6). To this aim, the IA proposes to update and merge two existing directives into one regulation: the Directive on end-of-life vehicles ('ELV Directive') and the Directive on the type-approval of motor vehicles regarding their reusability, recyclability and recoverability ('3R TA Directive'), published in 2000 and 2005, respectively. The IA puts these revisions also in the context of reducing the EU's dependency on critical raw materials (CRMs), as these are particularly relevant in the resource-intensive automotive sector (IA, p. 4). Consequently, the IA consists of an integrated life cycle analysis of a very broad range of interlinked yet distinct policy areas, affecting all stakeholders involved in the entire life cycle of vehicles – from design, to production, to waste and end-of-life management, the latter including in addition the export of end-of-life vehicles to third countries.

The IA builds on the evaluations of the two existing directives. The review of the ELV Directive was decided by the co-legislators following the 2018 revision of the Waste Framework Directive. It was then announced in the EU action plans on the circular economy and zero pollution for air, water and soil, both linked to the 2021 new industrial strategy for Europe, designed to implement the European Green Deal, and to the Green Deal industrial plan for the Net-Zero Age, adopted 2023 in the wake of the Russian aggression on Ukraine. The ELV Directive's evaluation also considered some elements of the current 3R TA Directive that are relevant for reuse and recycling, and found its monitoring provisions unclear. To merge the two revisions into one initiative, the Commission decided to conduct a 'back to back' evaluation of the 3R TA Directive in parallel to this IA (Annex 11). The initiative is featured in the Commission’s work programme for 2023.

Problem definition

The IA defines four problem areas, caused by eight drivers resulting from market or regulatory failures (IA, pp.7-16). Both existing directives apply to cars and vans up to 3.5 tonnes, whereas vehicles such as motorcycles, buses and trucks are currently not subject to any EU legislation in terms of their design and end-of-life management. The problems' consequences can be deduced from the text, but could have been discussed more explicitly, to distinguish them from the drivers...
(most consequences are indicated in the IA’s comprehensive problem tree, but deriving health issues, for instance, are missing, IA, p. 16). The four problem areas and main drivers addressed in the IA are:

1. **The design and production of new vehicles do not contribute sufficiently to the ambitions of a climate-neutral, clean and circular EU economy** (because prices of primary materials do not factor in environmental externalities of extraction and processing, because current regulatory requirements focus on the use of vehicles, not the circulatory of their design, and because production and definitions for secondary raw materials are unclear);

2. **The reuse and recycling of end-of-life vehicles is insufficient both in quality and in quantity** (caused by multiple factors, e.g. current rules and technologies make recycling of ELVs, notably plastic, glass or electronic components, not profitable; scrap and shredder techniques lack quality; and definitions of ‘recycling’ and of financial responsibility in the context of dismantling, remanufacturing and reusing of materials are unclear);

3. **Around 32% of de-registered vehicles are ‘missing’, i.e. not collected, traceable or treated and thus cause pollution, notably in third countries following their export** (caused by economic incentives for insurance companies, dealers and private owners to sell ELVs online or directly to non-authorised treatment facilities or to export them; by the lack and/or unclear current EU provisions on registration and roadworthiness of vehicles; and by the absence of a requirement to export only roadworthy vehicles from the EU);

4. **There is no EU level playing field for the design, production and end-of-life treatment of lorries, buses and motorbikes** (i.e. 15% of registered vehicles; caused by the fact that these vehicles are not covered by the ELV and 3R TA Directives, and that no comprehensive information on these vehicles at their end-of-life exists).

The problem definition does not analyse consistently how the problems/drivers/consequences affect the main stakeholder groups, as advised by the Better Regulation Guidelines. The IA mentions some of them in general terms: vehicle manufacturers, dismantlers, recyclers and authorities. However, it specifies the groups of affected stakeholders only at the very end of this section (yet without connecting them to the respective problems, IA, pp. 7, 16). Some incoherence is due to slight changes of the four problem areas’ titles, and the lack of a clear classification of the drivers (which are simply listed one by one under each problem area) does not facilitate a structured overview of the wide-ranging problems and drivers. In this context, it is also confusing that the section on the initiative’s legal basis refers to ‘six problems related to the single market’ (IA, p. 17), probably owing to an adjustment of the text after choosing the single market perspective as legal basis instead of the circularity focus that structures the problem definition as indicated above (see next section).

These weaknesses notwithstanding, the nature and scope of the problems are clear and well substantiated, both in qualitative and quantitative terms. The IA explains that the EU automotive sector, which produced 12 million motor vehicles in 2021, provides 13.8 million direct and indirect jobs (IA, pp. 7-8). As the IA notes, this involves 19% of the demand of the EU’s steel industry, 10% of its overall plastic and 65% of its rubber consumption, while the energy required for the extraction and processing of primary materials such as coal, iron ore, bauxite, copper and oil entail high greenhouse gas (GHG) emissions and a high dependency on primary materials. All problems are expected to increase under the baseline (no action) scenario, as the electrification of the vehicle fleet to transform it towards climate-neutrality creates increasing needs of batteries and electronics, raw materials, plastics and a range of other potentially harmful materials. According to the IA, other factors, such as the steady rise in heavy sport utility vehicle (SUV) sales – around 40% of annual car sales in Europe in 2020 – would further worsen the problems in the future (IA, pp. 20-22).
As is the case for other sections of this IA, a considerable part of relevant information is given in the annexes. Annex 6 contains more details on the problem areas, and additional information on aspects such as the use of hazardous substances in vehicles, unclear definitions and inconsistencies between the ELV and 3R TA Directives (other parts of Annex 6 are identical with the main text).

The IA does not discuss whether all problems and drivers are equally relevant, nor does it analyse national/territorial divergences of the problems’ effects, such as those depending on the composition of vehicle fleets, on the location of waste operators in Member States or on varying national provisions, for instance for vehicle collection (these are mentioned later in the IA, in the context of extended producer responsibility (EPR) schemes).3

Subsidiarity / proportionality

The IA and the accompanying subsidiarity grid suggest Article 114 of the Treaty on the Functioning of the EU (TFEU) as sole legal basis of this proposal, thereby maintaining the legal basis of the 3R TA Directive and dropping that of the ELV Directive (Article 192 TFEU on preserving, protecting and improving the quality of the environment, IA, pp.16-17). The IA argues that it sees the functioning of the internal market as the common thread of the two directives to be merged into one regulation, and cites the application of the same approach to other recent proposals on circularity requirements covering the whole life cycle of products, such as the regulations for batteries, eco-design and packaging and packaging waste. It justifies the preference for Article 114 by stating that it ‘allows to build environmental-related requirements as the core elements of conditions on the type-approval’ (IA, p. 17).4 In the same vein, Annex 10 on the ‘legal environment’ underpins the rationale that the objective of increasing circularity of vehicles is incidental to the functioning of the internal market, referring to an array of other pieces of EU legislation ‘relevant for vehicles’ and interlinked with the ELV and 3R TA Directives, such as the Euro 7 standard, the Waste Shipment Regulation and the EU Waste Framework Directive (the latter two are, however, not based on Article 114 but on Article 192).

The IA justifies merging the ELV and 3R TA Directives into one regulation with the evaluations, which found the current provisions to be too general and not measurable, entailing ‘widespread’ divergent national implementation, which affects many of the often transnational activities in a vehicle’s life span (IA, p. 18). The IA considers the lack of synchronisation between the two ‘separate legal acts’ burdensome and inefficient, whereas it expects common rules under one regulation to have the added value of simpler and more ‘direct and harmonised application and enforcement’, notably harmonising reporting and monitoring and tackling the cross-border, illegal dismantling of ‘missing’ vehicles (IA, pp. 18-19 and subsidiarity grid, p. 6).

The IA takes the principle of proportionality into account when assessing the options, for instance by opting for the progressive extension of the legislation’s scope to new vehicles, and the gradual introduction of new requirements under the preferred option package (Annex 8 and subsidiarity grid, p. 5-6). According to the IA, the common approaches under the preferred options allow for economies of scale, while still giving the industry and the Member States the flexibility they need.

The subsidiarity deadline for national parliaments was 5 December 2023. Four national parliaments engaged in a political dialogue, without submitting reasoned opinions.5

Objectives of the initiative

The adjustment of the problem definition observed above (from the circularity focus to the internal market perspective) is also reflected in the IA’s definition of objectives. In the introduction, the aim of the ‘joint review’ of the ELV and the 3R TA Directives is to ‘boost the transition of the automotive sector to a circular economy’ (IA, p. 4). In the section on objectives – in line with the focus on Article 114 as legal basis – ‘the overall objective of this initiative is to improve the functioning of the EU internal market by reducing negative environmental impacts linked to the design, production, service life and end-of-life treatment of vehicles and contributing to the sustainability
of the automotive and recycling sectors' (IA, p. 19). Moreover, information in Annex 16 indicates that the competitiveness of the EU automotive sector was originally a general objective that was dropped following the first negative opinion of the Regulatory Scrutiny Board (RSB, see section below). However, the IA emphasises that it expects various positive impacts from the preferred options on the automotive sector's competitiveness and resilience.

According to the Better Regulation Guidelines, general objectives should be Treaty-based, and general and specific objectives should be clearly distinct. In this case, however, the general objectives seem to be partially overlapping with the following five specific objectives, defined in relation to the four identified problems (IA, pp. 19-20):

1) **to make design and production of vehicles more circular**, to facilitate and increase the removal, reuse, remanufacturing and recycling of materials (problem 1);

2) **to significantly increase the use of recycled materials** in the production of vehicles, to incentivise recycling and reduce strategic dependencies on raw materials (problem 1);

3) **to significantly increase the quality, quality and value of materials reused and recycled**, to reduce the environmental footprint of the automotive industry and support the creation of a dynamic market for secondary materials in the EU (problem 2);

4) **to significantly increase the collection of ELVs** in the EU and ensure that used vehicles exported from the EU are roadworthy, to reduce the number of ‘missing vehicles’, the pollution and safety risks associated with exporting non-roadworthy used vehicles outside the EU (problem 3);

5) **to increase the circularity in the design, production and end-of-life treatment of vehicles currently outside the scope of ELV and 3R TAT legislation** (lorries, buses, trailers, and vehicles in categories L3e-L7e) (problem 4).

While the IA does not present operational objectives, Annexes 7 and 8 provide numerous implementation details, including timelines and targets for implementing measures, which indicate specific deliverables relative to the preferred option package that go well beyond the rather unspecific indicators presented in the IA’s section on monitoring and reporting (IA, p. 65). Therefore, taking all parts of the IA and the annexes into account, the Better Regulation Guidelines’ S.M.A.R.T criteria, according to which objectives should be specific, measurable, achievable, relevant and time-bound, seem to be fulfilled.

The IA illustrates how the specific objectives contribute to six different Sustainable Development Goals (SDGs), with details on each SDG (IA, p. 43, Annex 3, pp. 50-52).

**Range of options considered**

The presentation of the IA’s policy options put forward to achieve the above-mentioned objectives is preceded by a comprehensive description of the dynamic baseline scenario, i.e. the problems’ future evolution if the identified market and regulatory failures (problem drivers) were not addressed (IA, pp. 20-23). The IA assumes no EU action would lead to a considerable loss of resources – and to increased EU strategic dependency, because the trend to heavier electric vehicles and increased use of, among others, aluminium, rare earth elements and magnesium, would still be managed under the current, insufficient ELV rules and capacities. Moreover, the exclusion of entire vehicle groups from the current legislation and the ineffectiveness of soft-law and individual national initiatives taken by some Member States to address the ‘missing vehicles’ problem, would exacerbate the problems (despite measures to equip heavy-duty vehicles with advanced after-treatment technologies under the Euro VI standard).

The IA presents **three policy options to achieve each of the five specific objectives** (four for specific objective 3 on collection, which also covers the export issue), **complemented by three horizontal options** aiming to address all specific objectives options (by EPR schemes). Although
the IA’s intervention logic is clear overall, some confusion stems from the fact that two specific objectives (1 and 2) address problem 1, whereas the other specific objectives address one problem each (while being partially overlapping, as noted above). This makes it challenging to see clearly to which problem(s) and objective(s) the options relate (and even more difficult after adding the 52 measures forming the options, many of which are combinations of measures). This can be seen in the IA’s simplified overview of the options shown in Figure 1 below (‘intervention areas’ correspond to the problems to tackle):

Figure 1: Policy options (POs) assessed in the IA relative to the specific objectives and the problems (‘intervention areas’)

<table>
<thead>
<tr>
<th>Intervention areas</th>
<th>Options</th>
<th>Contribute to:</th>
<th>Specific Objectives</th>
</tr>
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<tbody>
<tr>
<td>Design and production</td>
<td>3RTA: Reusability, recyclability and recoverability</td>
<td></td>
<td>1. Design circular</td>
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<td></td>
<td>PO1A: Strengthen the 3RTA framework</td>
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<td>PO1B: PO1A + Circularity strategy</td>
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<td>PO1C: PO1B + Environmental vehicle passport + declarations</td>
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<td></td>
<td>Recycled content</td>
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<td>2. Use recycled content</td>
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<td>PO2A: Medium recycled content plastics</td>
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<td></td>
<td>PO2B: High recycled content plastics and steel</td>
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<td></td>
<td>PO2C: Very-high recycled content plastics</td>
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<tr>
<td>End-of-life</td>
<td>Reuse, recycling and recovery</td>
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<td>3. Treat better</td>
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<td></td>
<td>PO3A: Modernising treatment requirements</td>
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<td></td>
<td>PO3B: PO3A + Enhanced reuse and recycling targets</td>
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<td></td>
<td>PO3C: PO3B + Advanced quality and CRM targets</td>
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<tr>
<td>Collection</td>
<td>Collection and export</td>
<td></td>
<td>4. Collect more</td>
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<tr>
<td></td>
<td>PO4A: Enhanced reporting</td>
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<td></td>
<td>PO4B: Interoperable national registers</td>
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<td></td>
<td>PO4C: Export measures</td>
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<td></td>
<td>PO4D: PO4A+PO4B+PO4C measures in combination</td>
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<tr>
<td>EPR</td>
<td>Financial and organizational incentives</td>
<td></td>
<td>All specific objectives 1-4</td>
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<td>PO5A: ELV specific EPR schemes</td>
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<td></td>
<td>PO5B: PO5A + Harmonised EPR requirements</td>
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<td></td>
<td>PO5C: PO5B+ Advanced economic incentives + GPP</td>
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<td>Scope extension</td>
<td>Scope extension</td>
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<td>5. Cover more vehicles</td>
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<td>PO6A: Information requirements (basic extension)</td>
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<td></td>
<td>PO6B: PO6A + Mandatory treatment (phased-in approach)</td>
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<td></td>
<td>PO6C: PO6B + Full scope extension (incl 3RTA)</td>
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Source: IA, p. 23. The IA’s preferred options are PO1C, PO2B (for plastics), PO3B, PO4D, PO5B and PO6B. The IA’s main text further features a table with all 52 measures screened under the policy options, varying between two and six measures per option (IA, pp. 24-26). The combinations of measures do not only concern each specific objective, but also stretch across different specific objectives. The options’ most important elements are presented briefly, as illustrated in the above figure, while a detailed description of the measures (and options) is found in Annex 7, which also provides the environmental, economic or other ‘rationale’ behind the measures, as well as other useful explanations, for instance relating to automotive manufacturing, recycling targets, relevant definitions, raw materials and the EPR schemes for vehicles (Annex 7, pp. 137-205). The IA’s range of options and measures complies with the Better Regulation Guidelines (minimum two options in addition to the baseline), although many of them are cumulative, implying an increasing level of ambition, but not self-standing alternatives (e.g. extending the list of materials to be removed prior to shredding ELV, or adding incentives and penalties for implementation and non-compliance). The IA indicates several discarded measures and informs thoroughly about the reasoning behind the decision to discard them (IA, pp. 34-35 and Annex 7, pp. 206-217).
Assessment of impacts

The assessment of the options’ impacts is qualitative and quantitative, the latter mainly based on the extensive external supporting study, which is, in turn, based on ‘custom-made’ modelling (IA, pp. 35-48, see section on methods below). The IA’s main text reads like a very condensed summary of the most relevant modelling results. Explanatory information is scarce, referring the reader either to the more detailed assessment in Annex 8 and/or from there to the supporting study and the relevant work of the Joint Research Centre (JRC), also involved in the modelling. These references are therefore essential for a full understanding of the IA. The same holds for Annex 15 (pp. 419-432) for impacts of the measures aiming to improve circularity of CRMs and, as noted above, Annex 7, which contains many details on the measures and options, including various dates for entry into force of different measures. Annex 4 explains the approach, data collection and modelling of different parts of the assessment, treating the five specific objectives first as if they were ‘unrelated’, then selecting ‘the best performing option … for each problem’ (Annex 4, pp. 55-86). In a third step, the preferred option package ‘takes into account the synergies between them’ (Annex 4, pp. 54-55).

The assessment concludes with two separate sections, one presenting an overall comparative cost/benefit analysis, and the other the combined impacts of the preferred options on the most affected stakeholder groups (IA, pp. 52-63). The options’ administrative burden is assessed in a short separate section, in the comparison of the options and in Annex 3, which provides an overview of all benefits and costs of the preferred options assessed by 2035, compared with the baseline scenario (IA, pp. 46 and Annex 3). In addition, Annex 8 features modelled benefit-cost ratios for all options.

The estimated ‘amplification’ of impacts by EPR measures is assessed for the options on the design, recycling and collection, and takes into account other relevant elements, such as energy demand for steel production and recycling-related initiatives in third countries (IA, pp. 40-42 and 45-46). The model-based estimations are presented for the years 2030, 2035 and 2040, using 2035 as the main year for the comparison of the options' effectiveness, efficiency, coherence and proportionality (IA, pp. 56-61 and Annex 8). The IA and annexes provide multiple justifications for the preferred options’ selection, reflecting the complexity, technicality and ‘interplay and synergies’ of the measures and options assessed.

The IA’s focus is on environmental and economic impacts, the former measured in terms of avoided GHGs (CO₂ equivalents, or CO₂eq.), and in the amount and quality of materials recovered for environmental effects. Economic impacts are measured in cost and revenue redistributions between ‘operators’, the future value of plastic recyclates, the value of cleaner steel scraps, the revenues derived from dismantled materials at authorised treatment facilities, and the value of vehicles that are no longer exported (IA, p. 36).

The IA expects gradual positive environmental impacts from most of the measures and options (IA, pp. 36-42). For instance, it anticipates increasingly improved levels of reuse and recycling, through better verification of type-approval compliance and exchange of information between manufacturing and dismantling sectors, and through targets for higher rates of recycled content for plastic (opting for a 25 % target in PO2B). For steel, the IA identifies several uncertainties, and leaves the decision on a possible target to be determined within three years, following a feasibility study. The IA also envisages future assessments of targets for other materials such as aluminium and CRMs (IA, pp. 37-38 and Annexes 4 and 8). The increased separation of (cast) aluminium components (under option P03B) is expected to bring the most efficient GHG savings, notably at lower costs than option PO3C (IA, pp. 44, 58). The cumulative option PO4D, which includes all screened measures on ELV collection, is estimated to bring GHG savings worth 5.6 million tonnes of CO₂eq., in addition to a decrease in pollution and negative health effects in third countries (consequences of the reduction of exported non-roadworthy ELV, IA, pp. 39-40). Finally, as regards the scope of the future legislation, the IA suggests a ‘phased-in approach’, i.e. including L3e-L7e category vehicles, lorries, buses and trailers, with basic environmental requirements and a basic EPR
regime (less far-reaching requirements than for passenger cars) (IA, p. 61). The preferred options' overall expected annual GHG reduction is 12.3 million tonnes of CO₂eq. (monetised as €2.8 billion) in 2035, with 3.8 million additional vehicles collected and treated, and around 2.1 million less vehicles exported (IA, pp. 61-62 and Annex 3).

In terms of economic impacts, the IA anticipates total annual benefits of 5.2 billion in 2035 (including the €2.8 billion worth of CO₂eq. savings), and total costs of €3.3 billion. For vehicle manufacturers, costs are linked to design, production and increased responsibility in the collection of ELV under an EPR regime. According to the IA, €39 of the €66 of total costs anticipated per new vehicle would be incurred by the manufacturers in the short to medium term, but covered by the vehicle buyers in the long term (IA, p. 62). When it comes to the amplifying effect of horizontal incentives for a better recycling and collecting of ELV under the preferred EPR regime, the IA finds that the most effective and efficient option is an obligation for producers to increase ELV collection and cover dismantling costs that cannot be offset by the trade in used parts or recyclates (option POSB). It highlights that the fees would be paid by vehicle manufacturers to recyclers when ELV treated in one EU Member State would be placed on the market in another ('cross-border' EPR mechanism, IA, p. 59). The impact of the EPR regime is expected to differ between those Member States that already have advanced EPR schemes (e.g. the Netherlands) and those that have not.¹¹

The waste treatment sector is expected to incur costs for dismantling and treatment, which, according to the IA, will also differ 'considerably' between Member States and economic operators, depending on their current treatment technologies (IA, pp. 62-63). Finally, recyclers are expected to have more revenues than costs.

Social impacts are only mentioned briefly in the main text, with the expected creation of 21 000 additional jobs resulting from the combination of preferred options (IA, pp. 45-46 and Annex 3); more detailed information, including modelled values for job creation per option and economic operator compared with the baseline, is provided in Annex 8. The IA further notes expected health benefits from less pollution and from export restrictions both in the EU and third countries (IA, p. 47, 52-53 and Annex 8). Moreover, Annex 9 analyses the impacts of the measures aiming to reduce chemicals in vehicles, including substances of concern, as well as interactions with the REACH¹² and Batteries Regulations. Annex 15 assesses in detail how the preferred options (and individual measures) are expected to contribute to the circularity of CRMs, not only in passenger cars but also in lorries, buses and motorcycles. The IA anticipates positive effects from the consistent use of digital technologies, which is in line with the Better Regulation principle of 'digital by default', notably for the 'circularity vehicle passport' envisaged under the preferred options, which is expected to entail annual development costs of €2 million (IA, pp. 42). The overall cost for public authorities (e.g. national waste and vehicle registration authorities) is estimated at around €24 million in 2035 (IA, p. 61 and Annex 3).

SMEs/Competitiveness

According to the IA, dismantlers are mostly small and medium-sized enterprises (SMEs), and the proposed measures increasing the number of parts and components to be removed and recycled prior to vehicle shredding will have 'substantial impacts on these SMEs' (IA, pp. 16, 47-48). Noting that, generally, their position is 'already fragile' under the baseline scenario, the IA argues that they will be able to offset parts of the 'important extra costs' of investments in new technologies by additional revenues from the sales of used spare parts, promoted under the preferred options, and by financial support from vehicle manufacturers under the proposed EPR measures. For SMEs unable or unwilling to make these investments, the IA suggests shifting their focus to repair or sales of second-hand cars, and it anticipates overall a concentration in the dismantling and recycling sectors (which it considers, however, bound to happen under the baseline scenario, as manufacturers have already started taking more control over recovery of materials in electric vehicles due to their value, Annex 13, p. 402).
Given the direct relevance of this initiative for SMEs, the IA contains a four-step SME test (Annex 13), as required by the Better Regulation Guidelines and Toolbox (tool #23). The SME test identifies around 12 000 authorised treatment facilities for dismantling, 'a few hundred' (some 350) shredding/recycling companies, around 450 000 repair shops and garages, and an unspecified number of companies involved in the export of used vehicles. It states that these SMEs are well represented in the stakeholder feedback reflected in the IA, noting 62.5% of respondents were SMEs (mostly dismantlers) 'covering a wide geographical scope' (Annex 13, p. 393). The SME test expects benefits in particular from the EPR-related measures and the compensation payments to dismantlers for their investments (deriving from the up to 3.2 million additionally collected ELVs to be delivered to authorised treatment facilities, as mentioned above). The IA stresses that 'extra costs which cannot be offset under normal market conditions should be borne by vehicle manufacturers to support the recycling sector' (Annex 13, pp. 401-402). These payments from vehicle manufacturers under the EPR schemes are to be further specified later on in implementing legislation.

The IA expects net costs of €190 million in 2035 for the shredding sector (compared with the baseline), with at the same time €265 million net revenues for the recycling sector (Annex 13, p. 402). The overall impact on companies exporting used vehicles is estimated to reach 'a loss of €510 million costs by 2035' compared with the baseline (linked, inter alia, to costs for carrying out the roadworthiness test and decreased revenues from lower prices for ELV than the prices they would obtain from exporting them, IA, p. 48 and Annex 13, p. 403). Altogether, the IA emphasises that negative impacts of the preferred options were minimised by keeping the costs of the measures proportional to the expected benefits and 'not excessive for SMEs' (IA, pp. 403-404). In this context, the IA points to the 'unprecedented level of public financial support for investments' in the green transition put in place by the EU in recent years, citing funding opportunities under the European structural and investment funds, the Recovery and Resilience Facility, REPowerEU and Next Generation EU (IA, p. 405).

The IA assesses the impacts of the preferred options on the automotive industry's competitiveness in detail in Annex 14. It highlights the importance of the EU automotive industry (15.3% of global motor vehicle production), taking into account the current 'pressures' of the transition to climateneutrality (Annex 14, p. 407). Acknowledging the costs of the (EPR) payments from manufacturers to dismantlers and shredders, it stresses that producers will benefit from higher quality recycled materials with a lower environmental footprint and lower energy consumption, as well as a reduction of their dependence on CRMs (the IA notes, however, that the latter effect cannot be quantified, IA, pp. 62-64). The IA further mentions the positive indirect impact of a positive brand image committed to sustainability. It concludes that the preferred options would neither affect EU manufacturers' competitiveness nor the global supply chains that structure the automobile industry's functioning, as rules would also apply to third-country importers, who must type-approve their vehicles and follow EU design and labelling rules before importing their vehicles. According to the IA, 'the majority of the manufacturers, representing the most popular brands of the imported vehicles to the EU, already integrate business practices to optimise the functioning of their production ... and to increase the efficiency in material use' (Annex 14, pp. 408-414). The IA substantiates this claim by citing the current use of recycled materials by, for instance, BMW group, Stellantis and Toyota, the system of steel emissions pricing in China, and the current set-up of carbon border adjustment mechanisms in the United States and the EU (Annex 14, p. 410). Finally, the IA expects the EU automotive sector to keep its traditionally leading role in innovation, pointing to EU funding opportunities such as Horizon Europe and LIFE.

Simplification and other regulatory implications

The IA expects improved efficiency and simplification from the harmonised application and enforcement of common requirements under the preferred options. It highlights the inclusion of several suggestions from the 2022 opinion of the 'Fit for Future Platform', which concern the
clarification of requirements, the harmonised application of common rules under a regulation
(repealing the current directives), the usage of digital tools, and the alignment with other relevant
EU acts such as the REACH Regulation, the Waste Framework Directive and the Batteries Regulation
(IA, p. 64 and Annex 5). Overall, regulatory burden and short-term costs for vehicle design are
expected to be offset over time by GHG savings in the production phase and by revenues for
recycled spare parts. Annex 8 provides a long series of modelled tables on detailed one-off and
recurrent costs per option for various stakeholders, including new administrative obligations for
businesses and citizens (Annex 8, pp. 252-264). For all measures under the preferred options, the IA
expects total one-off administrative costs of between €1.4 million and €4.0 million, and
recurring administrative costs of between €72 million and €106 million in 2035 (indicated also
as €5 and €7 per new vehicle sold, respectively, IA, p. 46). As regards the 'One in, one out' approach,
the IA anticipates in 2035 around €2.3 million in recurrent costs for consumers and around
€80 million costs for businesses to be offset (IA, p. 65 and Annexes 3 and 8). Streamlining of
reporting obligations and digitalisation is expected to result in €8.8 million and around €32 million
of costs savings, respectively. The coherence with a range of interlinked pieces of EU legislation
is consistently noted in the IA, for instance with the Euro 7 proposal, the Batteries Regulation, the
critical raw materials act and REACH (Annexes 7, 8 and 15).

Monitoring and evaluation
As noted above, before the 3R TA Directive was included in the IA process, the ELV evaluation had
considered some of its elements linked to reuse and recycling, and found its monitoring provisions
unclear. In the same vein, the IA highlights the differences in reporting requirements between the
two directives, involving different types of information, timing and stakeholders. It emphasises the
need to harmonise these elements, and presents a tabled overview of some monitoring indicators
in relation to each specific objective (IA, p. 65). While these indicators seem not exhaustive, more
detailed monitoring requirements are included in the presentation of the technical details of all
measures in Annex 7. Some of the suggested indicators are based on existing reporting, for which
data are already collected by Eurostat, while others are new, such as the obligation for exporters of
used vehicles to make information on vehicle numbers and roadworthiness status for each used
vehicle available to customs and 'other relevant authorities'. More specific reporting details are to
be determined later on by implementing legislation. Finally, the IA suggests an evaluation of the
new rules by the Commission eight years after their entry into force.

Stakeholder consultation
The wide range of stakeholder groups affected by this 'double' life cycle initiative is reflected in the
mapping of affected stakeholders designed to underpin the IA, which is described in Annex 2. The
Commission ran a 14-week open public consultation in all EU languages from 20 July to
26 October 2021, which covered key aspects – from the problem definition to likely impacts – and
gathered 208 responses (69 of respondents asked to remain anonymous). Additional input came
from targeted consultations via email, personal interviews and a two-day workshop in March 2022.
Annex 2 provides quantitative information on these consultations, including a breakdown of the
invited interviewees and workshop participants. Annex 4 stresses the specific approach to the
targeted consultations. The IA specifies that the measures forming the options were 'extracted' both
from the evaluations and from the stakeholder consultations, as well as from the above-mentioned
'Fit for future' opinion (IA, p. 24 and Annex 5). While stakeholder positions are scarcely referred to
throughout the IA’s main text, it does summarise the 'feedback from affected stakeholders' for each
preferred option (IA, pp. 56-60).

Supporting data and analytical methods used
In addition to the stakeholder consultations, the IA is based on a wide range of internal and external
expertise and evidence, in particular the evaluation of the ELV Directive and the 'back to back'
evaluation of the 3R TA Directive (Annex 11), an extensive supporting study (809 pages), a JRC
report on recycled plastic content targets in vehicles, and a JRC study on CRMs in vehicles. All sources are referenced consistently and transparently and accompanied by informative annotations. Moreover, the IA draws on extensive research undertaken for the Euro 7 IA, as well as targeted support from the European Chemicals Agency (Annex 9). Data comes from relevant EU and national authorities such as Eurostat and the JRC (in particular its raw materials information system, RMIS), from the GREET model (Argonne 2021), the automobile industry and other stakeholders. Annex 4 and Annex 8 inform about the data sources and analytical methods of the different steps of the assessment, including some insight into the functioning of the modelling. As noted above, the IA is based on estimations from complex modelling of a ‘custom-made impact assessment model’, developed ‘for the purpose of this revision’ in the framework of the supporting study (IA, p. 35-36 and Annex 4). A detailed insight into the set-up and functioning of the modelling, scenarios and assumptions — and therefore about uncertainties — has to be drawn from the main sources cited above. The supporting study (p. 241) explains for instance that one challenge of the IA was the parallel analysis of impacts both at vehicle level and at the level of several different materials. The IA uses the established open-source life cycle assessment software, openLCA. It also mentions the PRIMES model and, as noted before, the Euro 7 IA (which, in turn, also used the SIBYL and COPERT models). However, it does not provide a clear overview of all models used — a comprehensive bibliography of all sources and models used would have been very useful. At the time of writing, the IA is not featured in the European Commission’s modelling inventory and knowledge management system (MIDAS).

The IA is transparent about certain limitations and uncertainties, noting for instance that the effects of measures on recyclability, reusability and recoverability will only occur many years later, which makes a quantitative ex-ante analysis generally ‘difficult’ (IA, p. 37). According to the IA, the robustness of the estimated impacts and underlying assumptions was tested in stakeholder workshops and verified by independent experts, the JRC and stakeholders. On the expected differences in impacts between Member States, the IA states that a detailed sensitivity analysis per Member State was not feasible owing to the lack of detailed information, whereas for the effects of different EPR schemes on operators, for instance, such an analysis seems to have been carried out in the support study (Annexes 4 and 8).

The IA could have been more precise and coherent in facilitating access to the complex analysis. Both in terms of content and method, information is often scattered across the main text and the annexes (and the main sources). The same holds for the rather unspecific and varying determinations of affected stakeholders (e.g. dismantlers, dismantling sectors, shredding and recycling companies, shredding sector, (economic) operator). Frequent cross-references between the main text, the annexes, the support study and other sources, as well as between options, measures (indicated as M1-MS2) and other relevant pieces of EU legislation, are not helpful in this respect either. Nor are the changes between cost and benefit categories, making the understanding and comparison of the modelled effects and estimations challenging (e.g. total/annual/per vehicle/per stakeholder group costs; ‘values in addition to the baseline’; ‘loss of costs’; benefit-cost ratios (which refer to cost-effectiveness, not cost-benefit analysis); total net costs). In addition, important elements such as the distinction between used vehicles, ELVs and recycled vehicles, and the relevance of the roadworthiness test could have been explained more clearly and consistently from the start. Finally, as noted in previous sections, the transparency and accessibility of the very complex and (over 500 pages) long IA could have been enhanced by a more straightforward and accessible presentation of the links between problems, objectives and options.

Follow-up to the opinion of the Commission Regulatory Scrutiny Board

The Regulatory Scrutiny Board (RSB) issued a first negative opinion on the draft IA in March 2023, followed by a second ‘positive with reservations’ opinion on 16 May 2023. The IA explains in a detailed table in Annex 1 how the RSB’s comments (from both opinions) were addressed in the final IA (Annex 1, pp. 5-11). However, not all of them seem to have been fully addressed. For instance, after the revision of the first draft IA, the RSB saw in particular the need to clarify issues linked to the
Coherence between the Commission’s legislative proposal and IA

The proposal is in line with the IA’s findings. Rather unusually, it features a table with all screened technical measures of the IA, including those not retained in the preferred option package.

The IA provides an integrated life cycle analysis of the benefits and costs/burdens of vehicles in the EU, from their design and production, to their end-of-life management. From a political and legal perspective, the choice of merging the revisions of two complex directives into one regulation, and the choice of the functioning of the internal market as sole legal basis seem duly justified in the IA. However, from a better regulation and transparency perspective, these choices entail considerable challenges. The definitions of both the problems and the objectives show some inconsistencies stemming from the complexity of the integrated issues at hand, which complicates the IA’s intervention logic. In addition, the IA’s narrative relies heavily on the results of complex ‘custom made modelling’ that structures the assessment, but whose analytical methods, underlying assumptions and limitations (and thus, uncertainties) are not always evident. This also affects the presentation and assessment of the 52 measures (featured under 16 options), which could have been more coherent and accessible. A wealth of important information, explanations and evidence is featured in the annexes and/or the studies supporting the IA, rather than in its main text. These caveats notwithstanding, the comparative assessment and the selection of the preferred option package appear to be thorough and well substantiated.

Altogether, without questioning the quality and the findings of this rich IA, it may well indicate the limitations of this type of integrated life cycle analysis as an accessible support tool for policymakers, in particular when the expected (cumulated) costs and benefits stretch over a range of different large policy areas, sectors and stakeholder groups. It is worth highlighting the importance of having these inherent limitations in terms of accessibility and transparency in mind when setting up an IA process and drafting the IA.

ENDNOTES

1 The 2020 Inception Impact assessment addressed ‘only’ the revision of the ELV Directive and the waste-related issues.

2 Vehicle manufacturers, importers, suppliers of spare parts for the automotive industry, dismantlers, shredding/recycling companies, industries relying on scraps as feedstock for their production (notably in the steel, aluminium, copper and plastics sectors), exporters of used vehicles, insurance companies (who own and sell a large share of ELVs), workers, consumers, non-EU stakeholders such as third-country producers exporting vehicles to the EU and importers of used vehicles from the EU, competent authorities in charge of implementing the ELV and type-approval legislation. Annex 3 further mentions repair shops and garages, companies involved in the export of used vehicles, EU consumers/citizens and society as a whole.

3 The current ELV Directive already contains provisions on cost coverage by producers to implement the polluter pays principle, which was also recommended by the Fit for Future Platform opinion of December 2022.

4 The proposal’s explanatory memorandum (p. 5) stresses that the ‘rationale or centre of gravity of the proposal is to uniform the requirements for placing on the market … and consequently to ensure that … they are treated in an environmentally sound manner, and quality secondary raw materials can effectively be retrieved from them’. In the same vein, the ‘back to back’ evaluation of the 3R TA Directive notes that the directive ‘establishes the link between the design and production stages of certain road vehicles and their end-of-life treatment by setting type-approval requirements for these vehicles regarding their reusability, recyclability and recoverability’ (Annex 11, pp. 365, 370).

5 The German Bundesrat, the Czech senate, the Italian senate and chamber of deputies. The Italian Chamber of Deputies would have preferred keeping directives instead of a regulation, leaving ‘room for consideration to be given to the peculiarities of the Member States’.

6 ‘The impact assessment report has been changed, so that the contribution of the initiative to the competitiveness of the automotive sector is no longer included among the general objectives of the initiative. As the initiative will
however have a number of positive impacts on the competitiveness and resilience of this sector, a new section 8.3 on this point has been added,' Annex 1, p. 5).

7 L-category vehicles include light 2-wheel powered vehicles, three wheel mopeds and two-wheel motorcycles, IA, p. 20.

8 Annex 3 provides an overview explaining how the IA’s preferred options contribute to SDGs 6, 12, 13, 14, 15 and 17.

9 These include voluntary measures on circularity and collecting ELV; a higher than 30% of recycled content target for plastics in 2030; and the extension of the scope of the legislation to special-purpose vehicles.

10 The first version of the external study supports the review of the ELV Directive. It has been complemented/updated in 2023 by a second public contract. The evaluation of the 3R TA Directive (Annex 11 of the IA) was conducted in the framework of this study (Annex II, pp. 697-738).

11 The contributions of manufacturers are expected to be higher in Member States that do not yet have an EPR scheme. The IA admits that these effects and cost differences between the Member States could not be quantified (Annex 4, p. 86).

12 REACH stands for registration, evaluation, authorisation and restriction of chemicals.

13 The IA cites sources and examples from the EU automotive industry itself in this context.

14 The IA suggests application of these provisions three years after the adoption of the implementing acts, seven years after the entry into force of this regulation (Annex 7, p. 188).

15 The IA explains that the latter was only available after the first submission to the RSB, i.e. on 15 February 2023 (Annex 1).

This briefing, prepared for the ECON committee, analyses whether the principal criteria laid down in the Commission’s own Better Regulation Guidelines, as well as additional factors identified by the Parliament in its Impact Assessment Handbook, appear to be met by the impact assessment. It does not attempt to deal with the substance of the proposal.