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COM(2023) 451 final

2023/0284 (COD)

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

What does the new EU ELV proposal mean for composites?

AZL Webinar – August 24th 2023

In cooperation with:

Contents

- Why a new regulation?
- What is in the new regulation?
- What is unclear? And what are the issues?
- What is AZL doing in this field?
- Discussion

Download EU ELV proposal documentation from:

https://ec.europa.eu/info/law/better-regulation/have-your-say/initiatives/12633-End-of-life-vehicles-revision-of-EU-rules_en

Why did the EU propose a new End of Live Vehicle (ELV) regulation?

- Previously we had an ELV directive
(Directive = Guideline, Regulation = Law)

- ELVs should be 95% "reused"
- ELVs should be 85% recycled to material



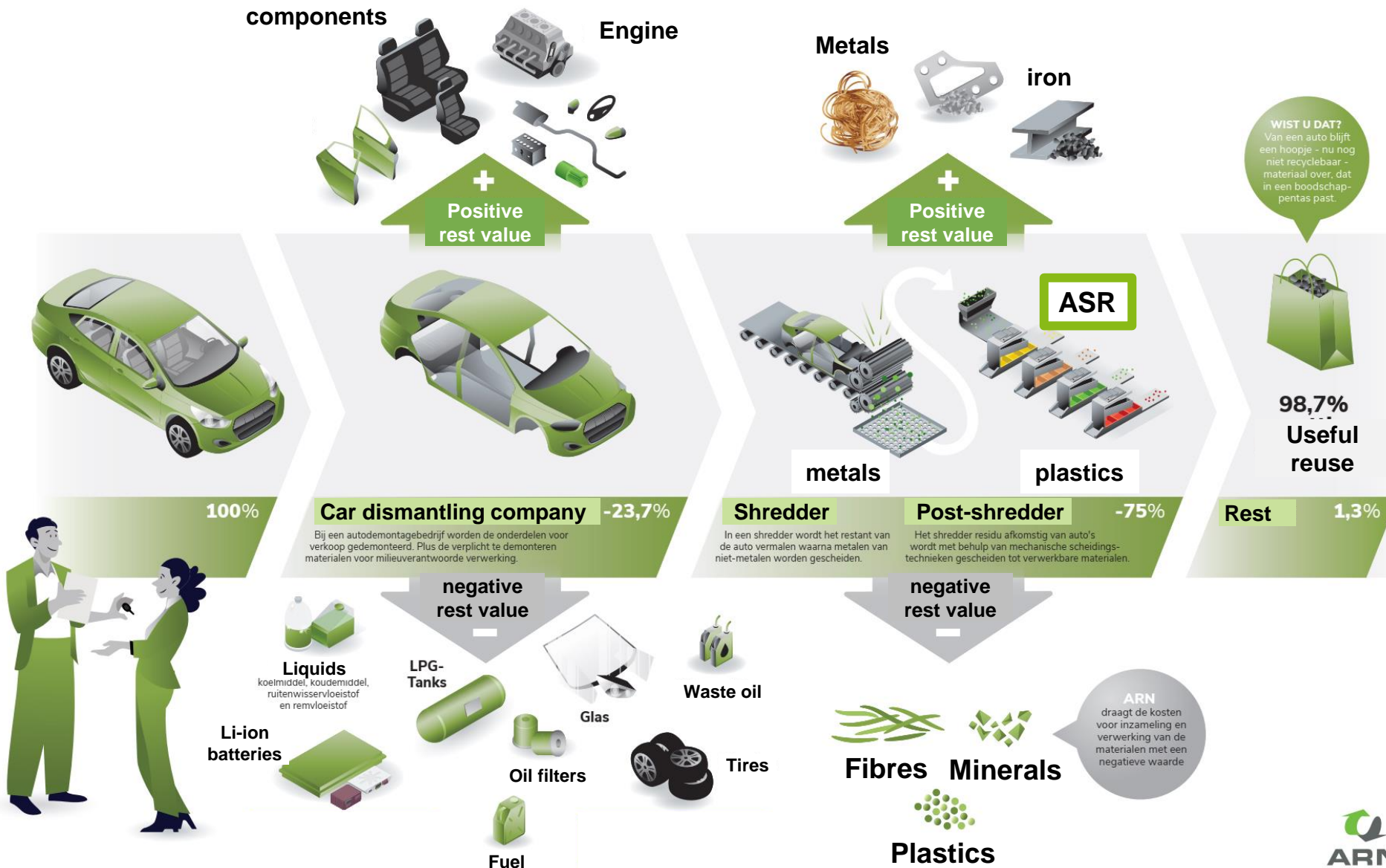
→ Highly simplified: Cars are shredded
~ 85% is steel → recycled
~ 10% is plastic → burned
= "thermally recycled" (energy recovery)



<https://www.wendtcorp.com/2019/05/02/wendt-commissions-modular-automobile-shredder-plant-newco/>

Real world is much more complex, see next slide

Car recycling example today in the Netherlands - 2021



ASR = Automotive Shredder Residue. Sometimes also called: shredder light fraction.

Some advanced recycling units can further separate into different densities.

- Largest fraction = Poly-olefins.
- Still a mix of materials, not easy to make new material.



Why did the EU propose a new End of Live Vehicle (ELV) regulation?

- Green deal, Circular Economy Action Plan:

- More circular economy for automotive industry, lower footprint, sustainable
- But today: low quality metal scrap, very little plastic recycling & Vulnerability of supply chain

More specific, today:

- Lack of circularity in vehicle design
- End of life vehicle treatment sub-optimal
- Missing vehicles & other vehicle types

"In addition, the increasing use of sophisticated and composite materials poses particular challenges for dismantling, reusing and recycling end-of-life vehicles."

Snippet from the proposal, NOT the opinion of AZL!

- **Objective:**

- Design Circular
- Use recycled content
- Treat better
- Collect more vehicles
- Collect more vehicle types

} Focus of this webinar

- Estimations 2035: Cost 66 €/vehicle (39 € for OEM), 22.100 extra jobs, 12.3MM ton CO₂ saving/yr

What is in the new regulation? – Recycling quotes NEW vehicles

- 95% reuse, 85% recyclable end-of-life is still there.

New is: chapter 2, article 6, new vehicles:

- Plastics should contain >25% PCR*,
At least 25% of that is from ELVs in the vehicle type concerned. → 6.25% = vehicle PCR.
(methodology to calculate percentages implemented by EU com. in 23 months from ELV enforcement)

Effective from ~2030

- Steel recycled content - still to be defined
(feasibility study finalized by EU com. in 23 months from ELV enforcement)
- Aluminium, Magnesium, rare earth metals recycled content - still to be defined
(feasibility study finalized by EU com. in 35 months from ELV enforcement)

Effective from ?
Not yet defined

* PCR = Post Consumer Recycled

What is in the new regulation? – Recycling quotes End-of-Live Vehicles

- 95% reuse, 85% recyclable end-of-life is still there.


Article 34, par.2:

- 30% of plastic in ELVs to be recycled

Effective from ~2029

What is in the new regulation? - Design

New is: chapter 2, article 7:

- Design for easy removal of parts in recycling facilities. Parts are defined in Annex VII, part C, see list. 
no.18: any mono-material plastic component > 10 kg
Remove prior to shredding*, → 3R
Reuse, Remanufacture/Refurbishment, Recycle

- Design for easy non-destructive removal of batteries and electric motors, also during use phase.

("list of parts and components that are to be designed for removal and replacement from vehicles" may be adopted by commission via "delegated acts".)

"The batteries shall be separately removed from end-of-life vehicles and stored in a designated area for further treatment in accordance with Article 70(3) of Regulation (EU) 2023/ [OP: Batteries Regulation]"

MANDATORY REMOVAL OF PARTS AND COMPONENTS FROM END-OF-LIFE VEHICLES

1. Electric vehicle batteries;
2. E-drive motors, including their casings and any associated control units, wiring, and other parts, components and materials;;
3. SLI batteries as defined in Article 3, point (12), of Regulation (EU) 2023/****[on batteries and waste batteries];
4. Engines;
5. Catalytic converters;
6. Gear boxes;
7. Windshields, rear and side windows made of glass;
8. Wheels;
9. Tyres;
10. Dashboards;
11. Directly accessible parts of the infotainment system, including sound, navigation, and multimedia controllers, including displays of a surface greater than 100 square centimetres;
12. Headlights, including their actuators;
13. Wire harnesses;
14. Bumpers;
15. Fluid containers;
16. Heat exchangers;
17. Any other mono-material metal components, heavier than 10 kg;
18. Any other mono-material plastic components, heavier than 10 kg;
19. Electrical and electronic components:
 - (a) inverters of the electric vehicles;
 - (b) printed circuit boards with a surface area, larger than 10 cm²;
 - (c) photo-voltaic (PV) panels with a surface area, larger than 0.2 m²;
 - (d) control modules and valve boxes for the automatic transmission.

*Exception for efficient post shredding separation possible.

What is in the new regulation? – OEM obligations

- Provide a circularity strategy
- Provide information for recycling
- Provide Circularity Passport ~ 2031
- EPR: Extended Producer Responsibility:
Collecting (art.23) & treatment (art.27) of ELVs is in place

EPR:

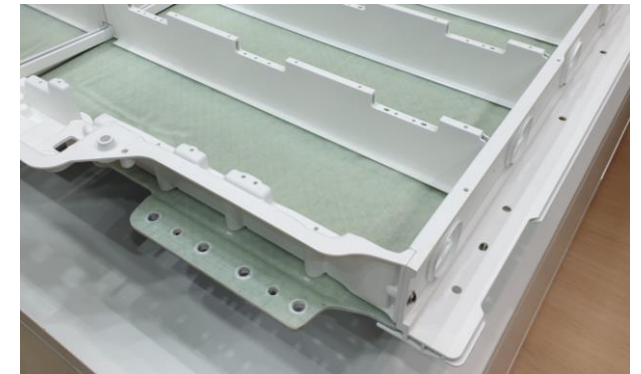
Producers should have extended producer responsibility for the vehicles that they have placed on the market once they reach their end-of-life stage. The extended producer responsibility should cover the obligations to ensure that the vehicles made available by the producers on the market in a Member State are collected and treated in accordance with this Regulation and that waste management operators treating such vehicles meet the recycling targets established by this Regulation.

What is not in the regulation?

- LCA Life Cycle Analysis, CO₂ impact, Natural fibres/biomaterials, Lightweight & less material use.
- Description on what is 25% PCR (6.25% vehicle PCR):
 - Mechanical or chemical recycling
 - Chemical recycling: Mass balancing
- Treatment of battery casing materials, could be 50 to 100 kg/vehicle.
 - Battery regulation* seems to only treat recycling of Cell materials!
Annex XII, part B/C: lithium batteries 70% recycling quote in 2030, with specifics for Cobalt, Copper, Nickel: all 95%, Lithium 80%.

Methodology to calculate percentages implemented by EU com. in 23 months from ELV enforcement

But what about the tray?
Casing typical ~90 kg



Example Lucid Air bottom tray, glass composite + aluminium profiles

Selected battery recycling projects

Location	Carson City, US	Toronto, CA	Munich, DE	Hoboken, US	Salzgitter, DE	Reno, US	France, FR
Type	Closed loop ambition	Shredding & hydrometallurgy	Focus on hydrometallurgy	Combining pyro & hydro metallurgy	Shredding & hydrometallurgy	de-manufacturing & hydrometallurgy	Shredding & hydrometallurgy
Investor/partners	Private company funded by strategic investors	Listed company, partnering with LG, KOCH and others	Pre-seed round with Atlantic Labs and angels	Listed materials technology company	Volkswagen Group activities	Listed company with market cap of \$ 860 million	JV of Group Renault with Veolia and Solvay
Details	<ul style="list-style-type: none"> 1,268 battery packs recycled in 2022 Partnerships with OEMs (Ford, Toyota, VWGoA) to explore end-of-life options Scaling cathode and anode production Increasing use of recycled materials for production Expansion to Europe planned Circulating recycled materials back into battery production 	<ul style="list-style-type: none"> Public listing via SPAC in 2021 Spoke and hub setup, until today only spokes active Shredding processes at spokes Hydrometallurgical processes at hubs Scaling phase, 7 spokes and 1 hub planned by 2023 Recycled materials circled back into battery production Expansion to Europe planned 	<ul style="list-style-type: none"> One of Europe's first startup recycling lithium-ion batteries Focusing on recovering critical materials, like lithium, nickel, cobalt, and graphite in a sustainable way Raised €3.5m to build prototype plant in Munich Recycled materials circled back into battery production 	<ul style="list-style-type: none"> Battery recycling plant in Belgium with capacity for an equivalent of 50k EV batteries >10 years of experience Combining high-temperature and wet chemical processes Expect that end-of-life EV batteries surging in the second half of the decade Working with ACC and others 	<ul style="list-style-type: none"> Pilot plant project Recycles batteries that can no longer be used for other purposes Plant has been designed to initially recycle up to 3,600 battery systems per year (equivalent to 1,500 tons) Aim: industrialized recovery of raw materials Recycled materials circled back into battery production 	<ul style="list-style-type: none"> Recycling based on a strategic de-manufacturing process to extract metals and recover materials from spent batteries via hydrometallurgy Founded by six Tesla engineers Pre-commercial stage, recycling plant planned for 2023 Recycled materials circled back into battery production 	<ul style="list-style-type: none"> Partnering to establish a secure & sustainable supply source for strategic metals Renault to bring in batteries and re-use material Veolia as partner for logistics, dismantling and recycling Solvay as expert for chemical processes and extraction Recycled materials circled back into battery production
Source	Redwood Materials	Investors deck	EU-Startups	Umicore	Volkswagen	Investors Deck	Solvay

Desktop research, Not exhaustive

All recycling projects:
Cell shredding

https://www.linkedin.com/posts/friedel-batterytechnology-recycling-e-activity-7066008477151682560-U_PX/

* Battery regulation: REGULATION (EU) 2023/1542 OF THE EUROPEAN PARLIAMENT AND OF THE COUNCIL of 12 July 2023 concerning batteries and waste batteries, amending Directive 2008/98/EC and Regulation (EU) 2019/1020 and repealing Directive 2006/66/EC

Next steps

- Feedback period: 14 July 2023 - 16 October 2023 (midnight Brussels time)
- AVK & Composites United are preparing a response including feedback from AZL, September.
- ELV regulation implementation: likely in 2024 → Effective from 2030

What is AZL doing in this field?

- Product Cost&CO₂ Benchmarking workgroup:
 - AZL compares alternative designs & technologies

Example reclining rear seat back part

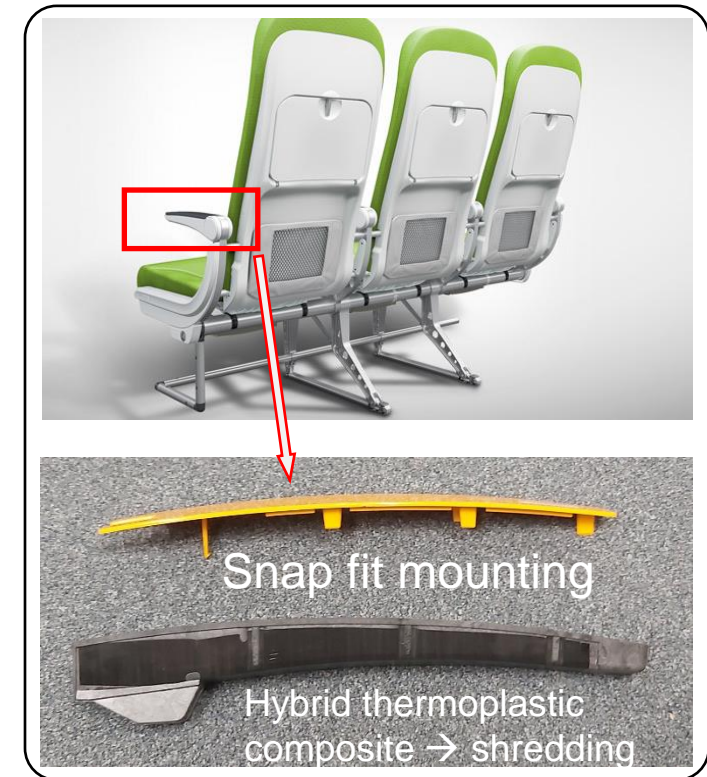


→ Next activities in this workgroup:

- Design for recycling
- Design with recycled materials
- Analysing recycling routes – disassembly chain, mechanical recycling, etc.
- Analysing recycling costs

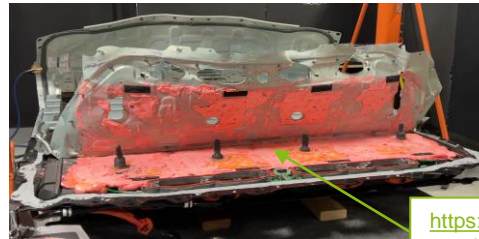
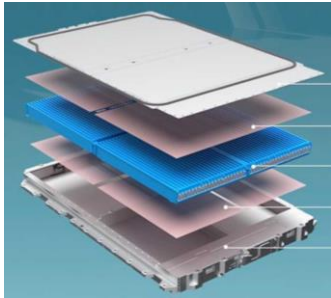
AZL does this type of analysis also on a one-to-one basis.

Example aerospace



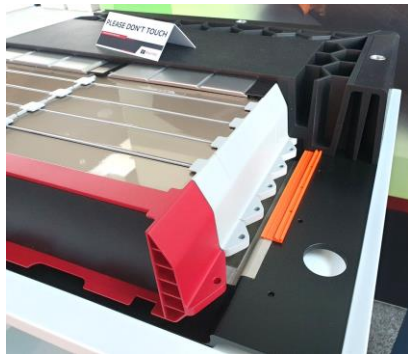
What is AZL doing in this field?

- Consortium project on "Cell-to-Pack" Battery casings
 - Analysing alternative layouts/materials on weight, cost, CO₂, etc. AND Recyclability



Example bonded designs:
BYD Han, Tesla model Y

<https://www.youtube.com/watch?v=BBbQbnulVvk>



Example modular composite designs:
Polytec

- And same analysis in tailgate project



AZL develops many alternative battery casing concepts.

AZL also provides these services on a one-to-one basis.

Discussion items

- Composite materials seen as difficult to recycle by regulators
→ help OEMs with recycling strategy?

EPR art.21: OEM to pay fees to recycling organisers depending on:
....(e) the share of materials and substances preventing a high-quality recycling process, such as adhesives, composite plastics, or carbon-reinforced materials.

Snippet from the proposal, NOT the opinion of AZL!

- Composites in battery packs
- What is (good) design for recycling
- Definition of recycling contents

Many thanks! Your AZL – Lightweight Center and One-stop Shop for Business and Technology Development



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