Allianz

Repair, Reuse or Replace:

The role of reclaimed vehicle parts in reducing carbon emissions in vehicle repair.

An Allianz overview of a joint project by
Vehicle Recyclers' Association, SYNETIQ Limited and Oakdene Hollins Ltd

Repair, Reuse or Replace: The role of reclaimed vehicle parts in reducing carbon emissions in vehicle repair.

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Content

Please note:

The content of this report is largely based on the project report published by the VRA Certification [source: https://www.vracertification.org.uk/wp-content/uploads/2024/09/ODH-report-19-08-24-EU.pdf; accessed on 2025-01-30] and the final project presentation by Oakdene Hollins Ltd [source: VRA Repair, Reuse Or Replace Study: Internal Report], which have been summarised here for better understanding.

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Executive Summary

One of the goals of the published „Repair or Replace – Investigating the relative GHG emissions of repairing or replacing damaged vehicle parts“ report [ALL, 2023] by Allianz, was to kick-start collaborations across the industry on the topic of low-emission repair processes for damaged vehicles. Allianz had sought to validate the assumption that repairing a damaged vehicle part is a more climate friendly option than using a replacement part, but the method was created with the intention of being open for further refinement and development. The British Vehicle Recyclers Association (VRA) has led a study [VRA, 2024] that builds on this existing work but rather focusing on potential carbon emission savings of the use of used part replacement. In this short paper we would like to summarize the new study and highlight results on the example of a front door.

The report underlines the fact that the use of reclaimed parts should not form the entirety of the repair sector's emission reduction initiatives, which is in line with the belief at Allianz. The „Repair or Replace“ study supports that repairing a part is the optimal choice, but if repair is no longer viable for technical and/or economic reasons, then the use of „green“ parts becomes the most preferable over replacing with new original parts (please see Figure 1).

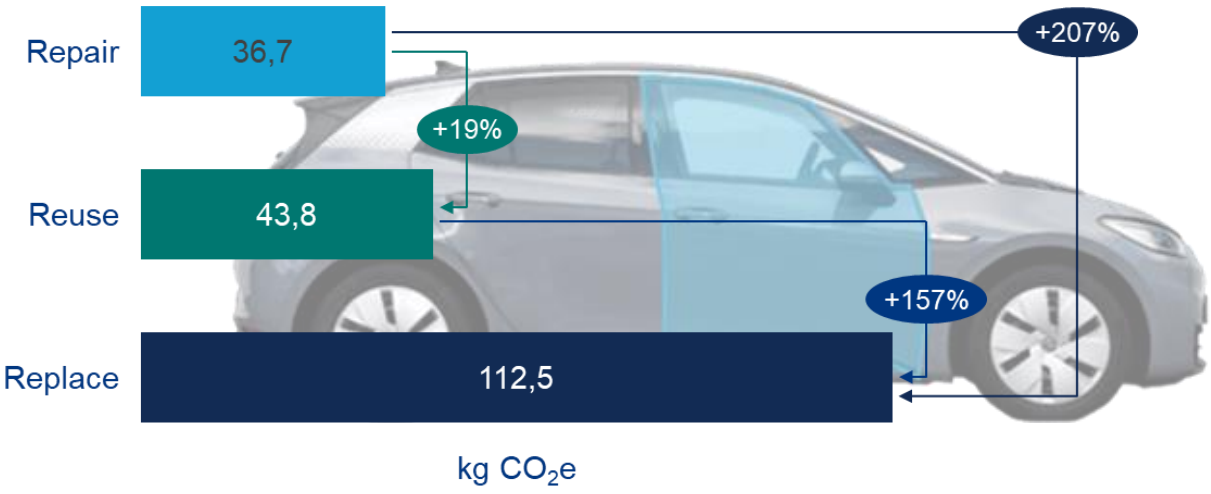

Figure 1: CO_2e-emission and reduction potential of different repair methods for the example of a VW ID.3 door (own depiction, adapted from [VRA, 2024])

This new report by the VRA proves that Allianz's Repair over Replace study is being seen and driving wider discussions and change within the industry, thus creating further opportunities for collaboration.

Scope

VRA's research into vehicle part reclamation and reuse does expand the scope of Allianz's study; the efforts to maintain some similarity with the repair over replace report are evidenced by VRA's use of a Volkswagen ID.3 car and focusing on particular geographies and particular parts on the car. Aside from the clear separating factor being that VRA have studied the CO_2e savings of using 'green parts' rather than repairing the original damaged part, there are a couple of other differences to point out between the two studies, most notably; the VRA study considered China as a manufacturing location for new parts, as before the assumption was that this would be Europe based. However as this does just add another dimension and not influence the other results, it is being mainly disregarded here. Later seen within this report it is also shown that packaging was within scope for VRA where the first report had not included it. One final key difference is a change in the system boundary for the replacement with a used part (shown in Figure 2 below), which is with regards to the inclusion of a salvage vehicle, where the used parts are taken from. This replaces the step of raw material production as it is assumed that the material production has fully been considered within the first lifecycle of the parts. However, for further material inputs within the replacement process, smaller material production is being considered.

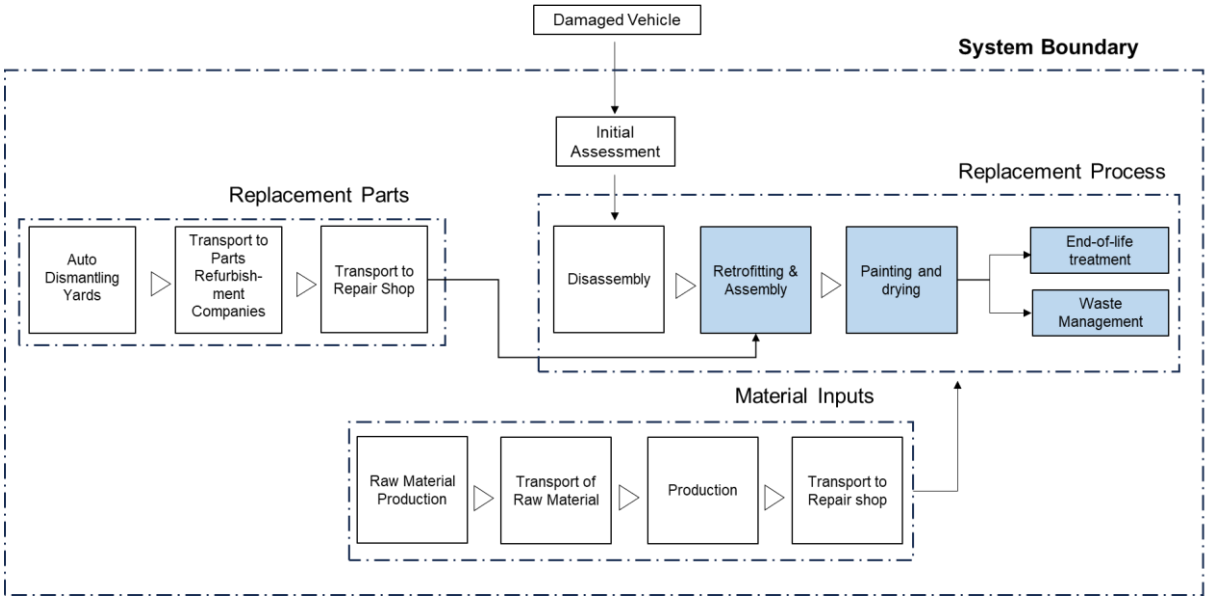

Figure 2: System boundaries for repair with used parts

Methodology

In the following section, the process flow map (please see Figure 3 ff) for reused parts has been illustrated in slides taken from the newly published report [VRA; 2023]. The logistics for modelling reused parts can be explained as follows; SYNETIQ's (a British vehicle salvage, dismantling and recycling specialist company) Bentley Moor Lane operations have been used as to represent the assumed typical salvage process for reused parts. SYNETIQ's dismantling process most often uses a mobile dismantler van to retrieve the parts from a vehicle. The salvaged vehicle is first collected, processed and then placed in storage. When a certain part is required, the mobile dismantler van will drive to the location where the vehicle is stored, remove the required part and transport it back to where it is needed for further processing. On the topic of dismantling processes, the VRA study points out that other recyclers may operate variations of the above described process, in which all of the parts of a vehicle are dismantled „in one go", with parts being stored in a warehouse until they are required. These variations may influence different results in emission levels.

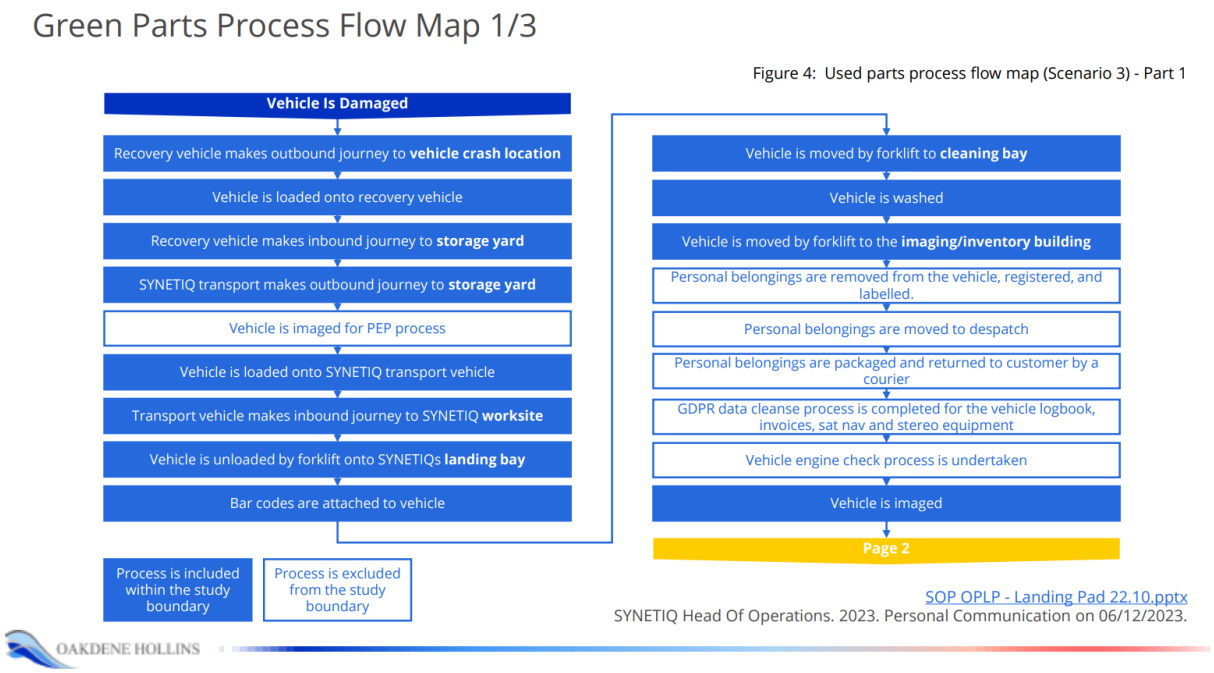

Figure 3: Flow map for used parts process – part 1 [VRA; 2024]

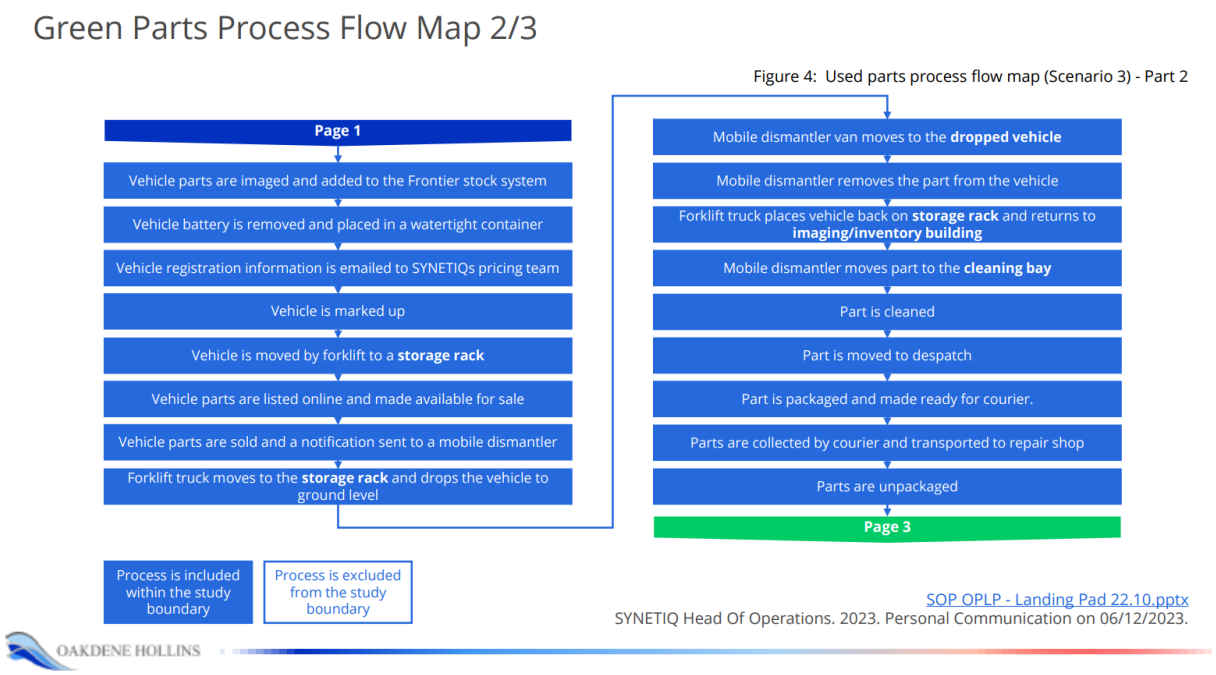

Figure 4: Flow map for used parts process – part 2 [VRA; 2024]

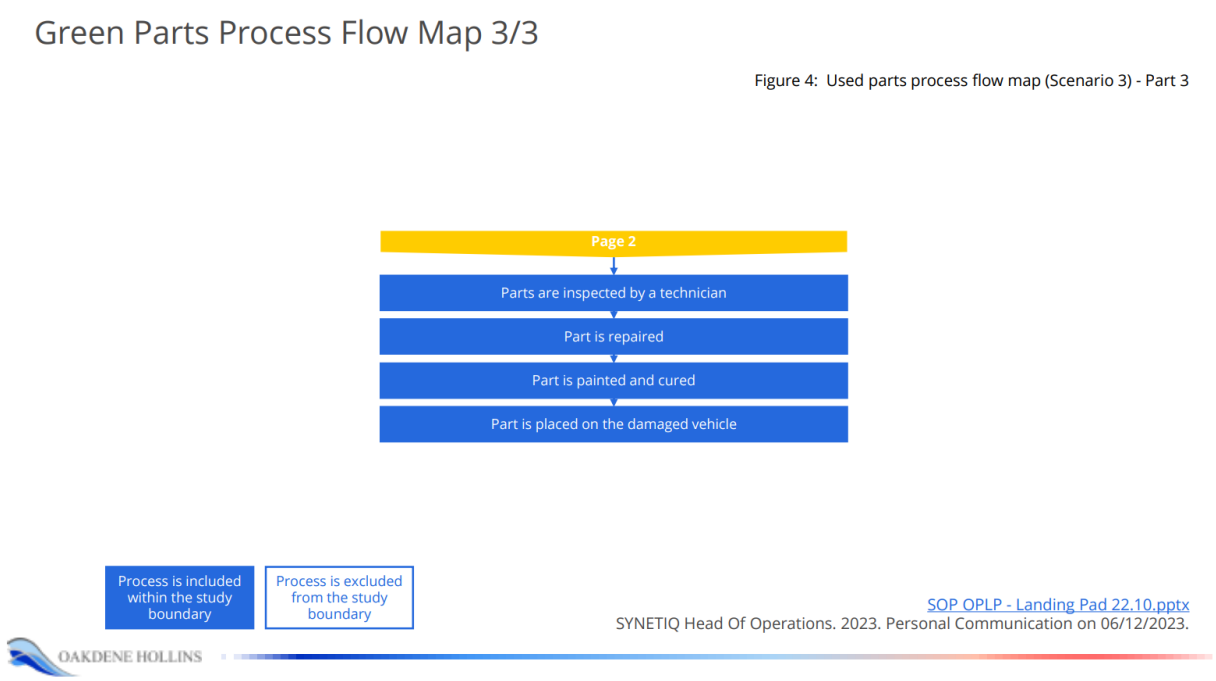

Figure 5: Flow map for used parts process – part 3 [VRA; 2024]

The process for used parts and new parts is quite similar but the first steps are always different (production / dismantling). There are also differences in logistics and packaging, which were not considered at all in the „Repair or Replace“ report [ALL, 2023]; so this is being highlighted within the following section.

Up-/Downstream Logistics & Packaging

In the context of this study, the logistics refers to bringing the vehicle to the repair shop. For new parts, the study considered parts manufactured in central Europe, whereas the repair is based on repairs in the U.K. As for the used parts, they are assumed to originate from a collision within the U.K. This could be argued as the common case for U.K. used parts.

UPSTREAM/DOWNSTREAM LOGISTICS

As there is no manufacturing footprint for the used parts, the logistics turn out to be significant in the full picture, even though they appear to be on a small scale. These logistics include dismantler van movements and onsite forklift movements. Figure 6 f gives a brief overview on the up- and downstream logistics for used and new parts. There are more details on the logistics within the dismantling facilities that can be found in the full report. It is worth noting that the mobile dismantler van movements were taken into account according to VRA experience and averages.

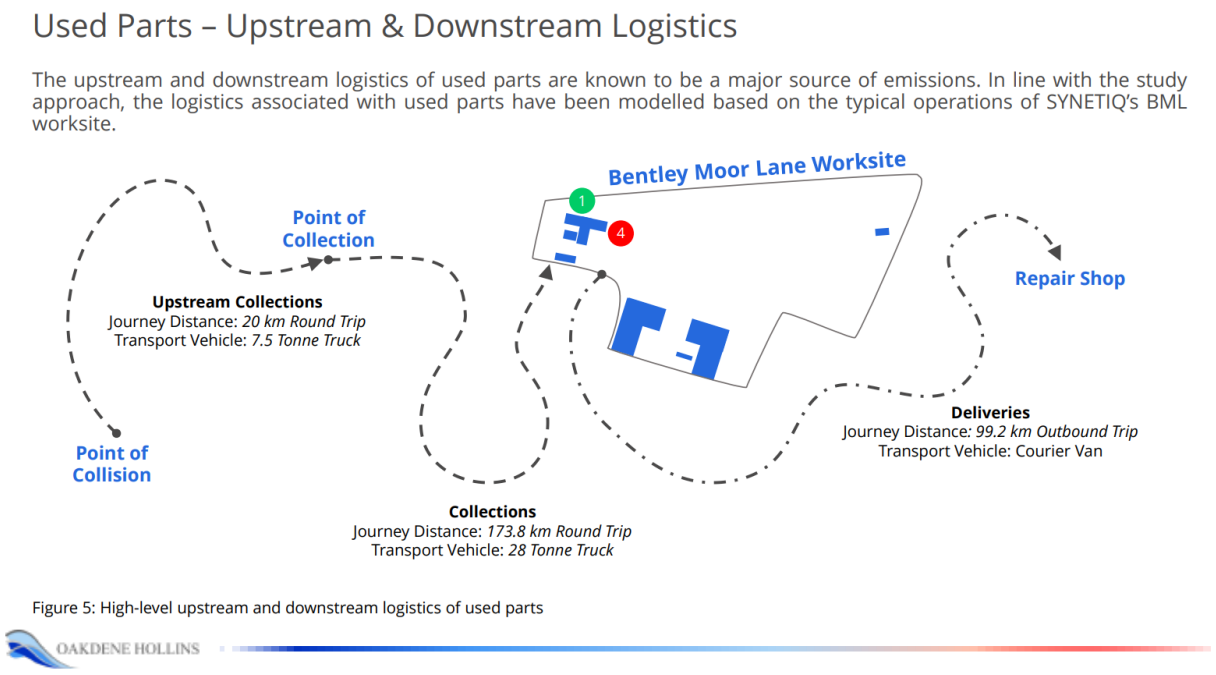

Figure 6: Upstream & Downstream logistics for used parts [VRA; 2024]

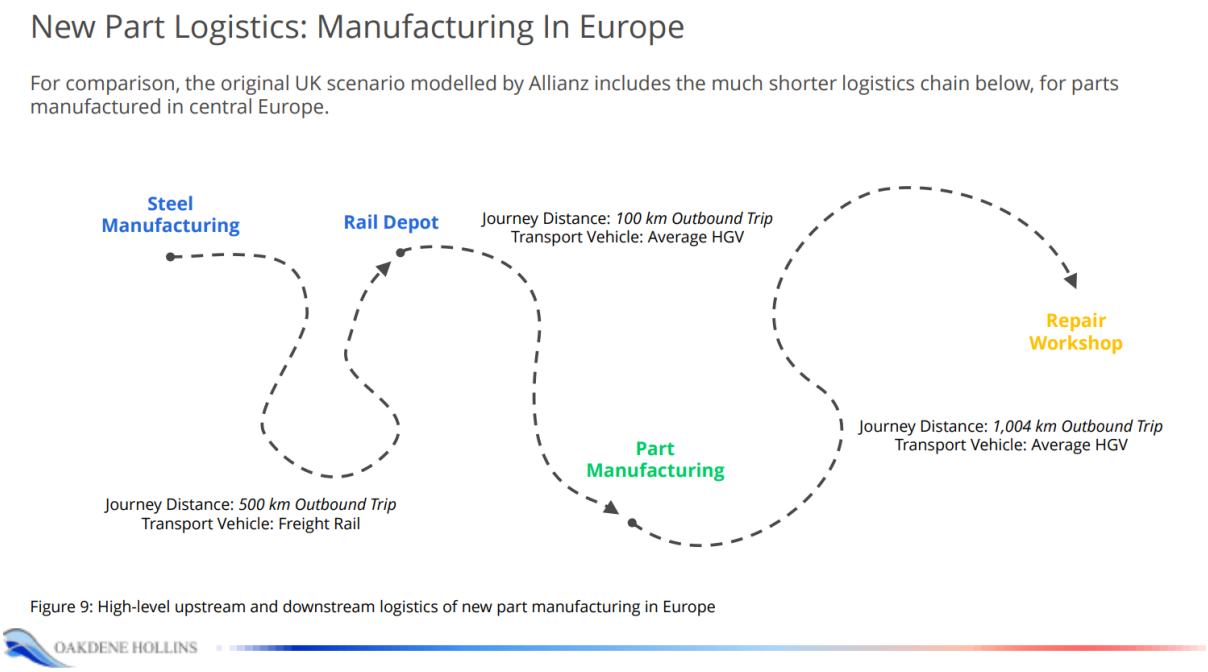

Figure 7: Upstream & Downstream logistics for new parts [VRA; 2024]

PACKAGING

Packaging was also considered within this report the first time. We see that for the used parts it looks quite similar to the new parts (please see Figure 8) due to the assumption that the new parts come from the continent, that is why there is tertiary packaging. This is still quite conservative as the parts and packaging may still come from beyond Europe.

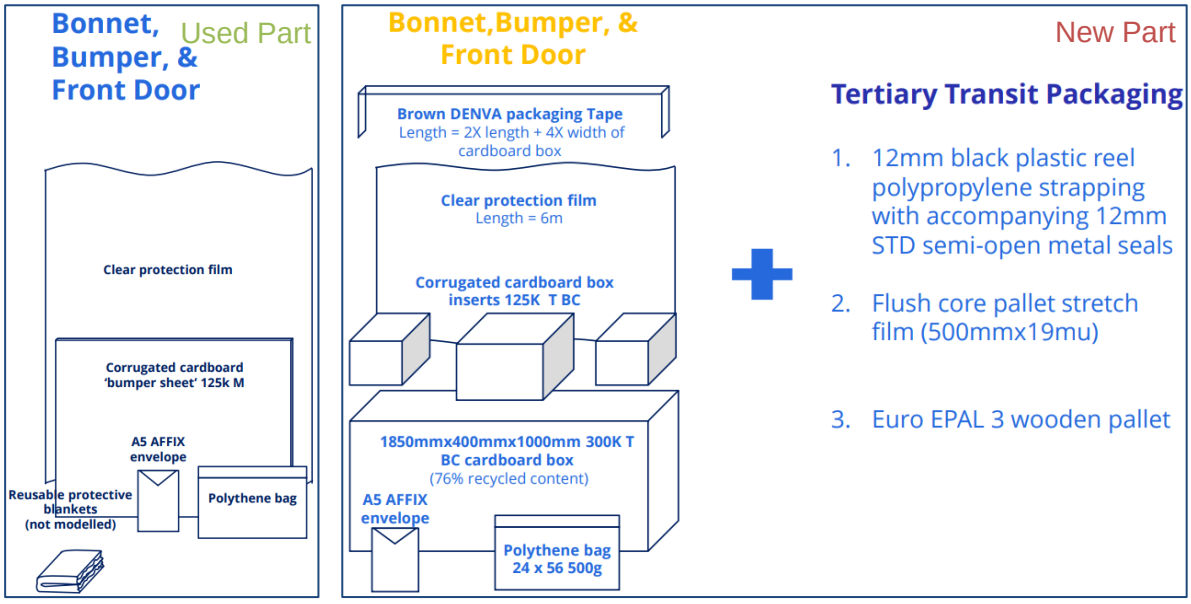

Figure 8: Exemplary description for packaging of used (left side) and new parts (right side) [VRA; 2024]

Packaging, operations and transport emissions might seem low in absolute numbers but become significant for used parts as there is no production of new parts considered. However,

in line with other research on repairs, painting and curing is the most relevant emission source, in this scenario forming nearly 80% of emissions for the example of a used front door, as demonstrated in the Sankey Diagram in Figure 9.

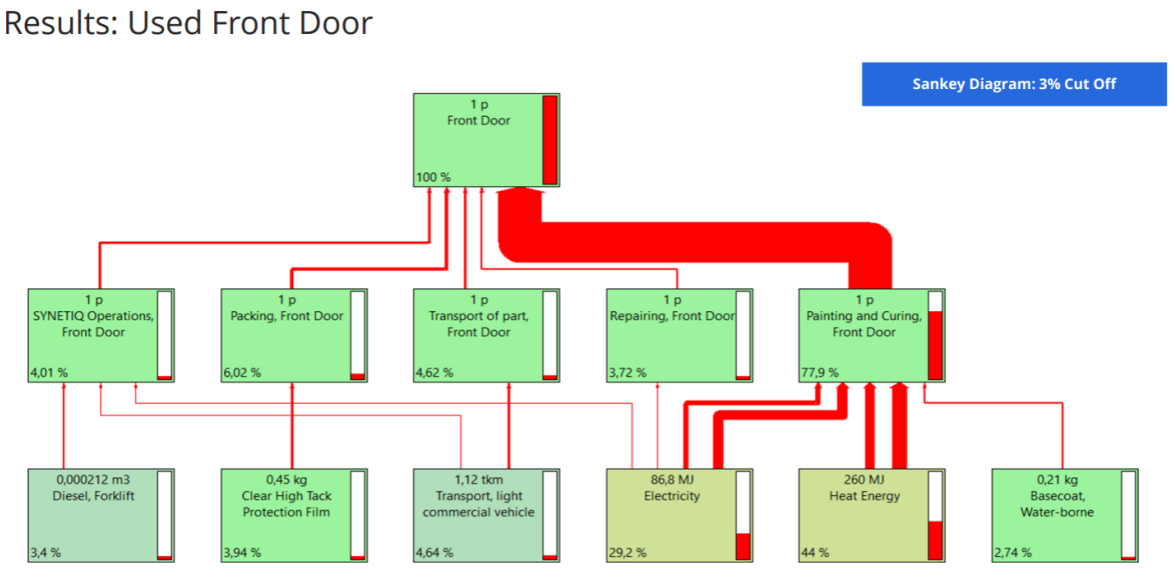

Figure 15: Sankey diagram of the main scenario used front door results (% contribution to total impact)

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Figure 9: Sankey Diagram of the main scenario used front door results (% contribution to total impact) [OAK; 2024]

Results Summary

The below graphs and diagrams display the most relevant results from VRA's study on used part repairs. The concluding results confirm what was established within the introduction of this report; repair is the least emission intensive repairing method, followed by reused parts and then finally with large difference repairs using a new replacement part.

The diagrams will delve deeper into which scenarios, process stages and car parts have the biggest impact on emissions.

The diagram in Figure 10 summarizes the results of the study. "Main scenario" refers to the average electricity mix in the U.K. and the "solar scenario" refers to fully solar powered repair shops. As visually demonstrated, the influence is most significant in repair as it purely comes from repair shop energy sourcing.

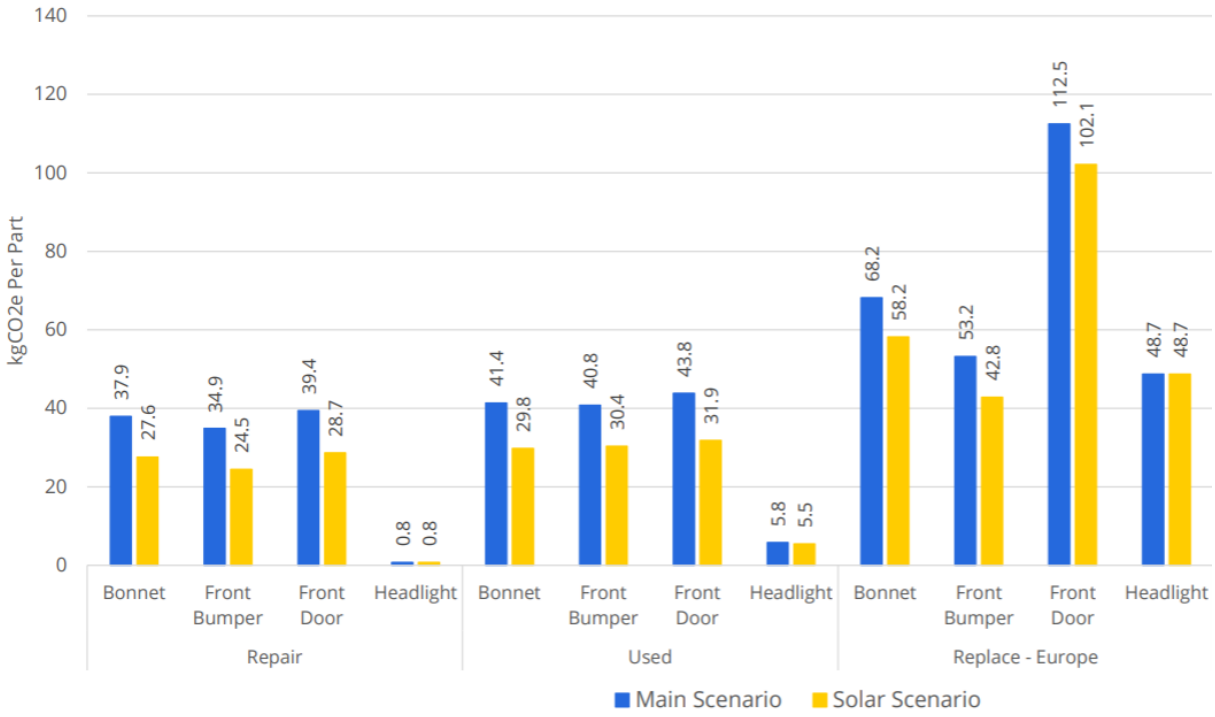

Figure 10: CO_2e emissions per part - Summary of all results [OAK; 2024]

The dominance that painting and curing has for used parts is very visible in Figure 11, with the exception of the headlight where there is no painting and curing involved, resulting in comparably much lower emissions than in the rest of the car parts.

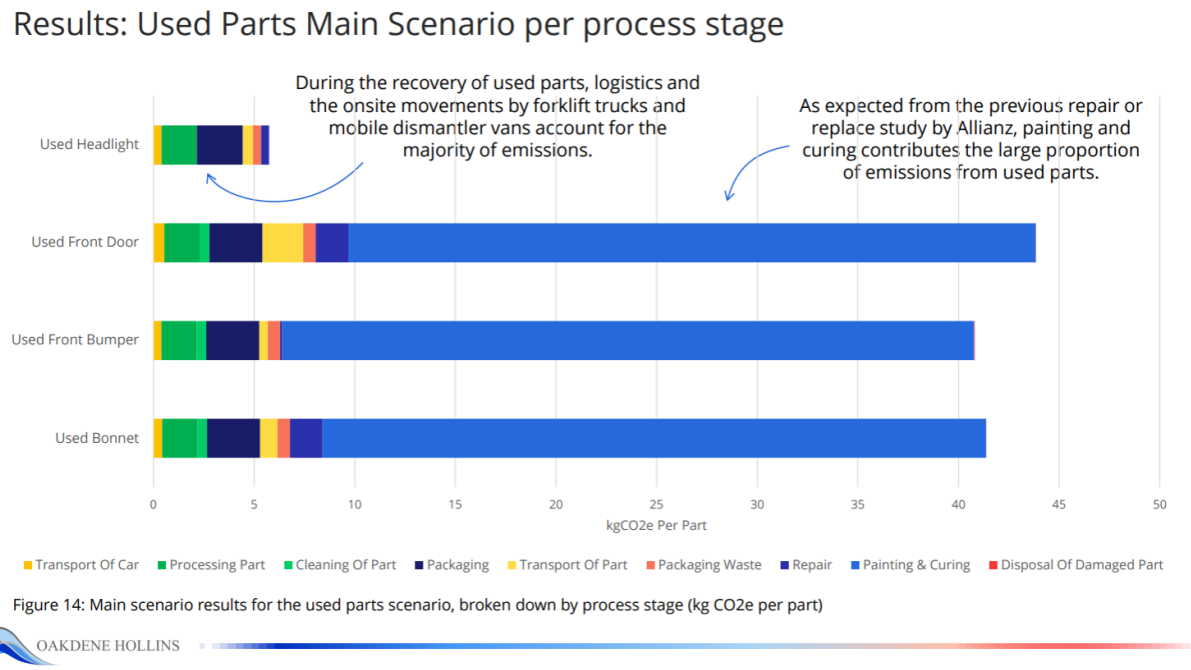

Figure 11: Main scenario results for the used parts scenario, broken down by process stage (kg CO_2e per part) [OAK; 2024]

Of all of the parts studied, the front door is the most carbon intensive part to manufacture, largely due to the energy intensive steel production required, as demonstrated in above shown Figure 11.

In Figure 12, in addition to the front door, the front bumper, headlights and bonnet are also taken into account for the various scenarios (repair, used parts, new parts from Europe, new parts from China).

Paint is assumed to be the same in absolute terms, which is 101.5kg, for used parts, more than 80% of the total footprint. For new parts, the same kg makes only around 30% to 35% of the footprint.

New parts are always significantly higher in emissions, but based on location of production some variations are realistic. In addition, it becomes clear that the share of CO_2e emissions that must be attributed to transportation plays a subordinate role in all scenarios.

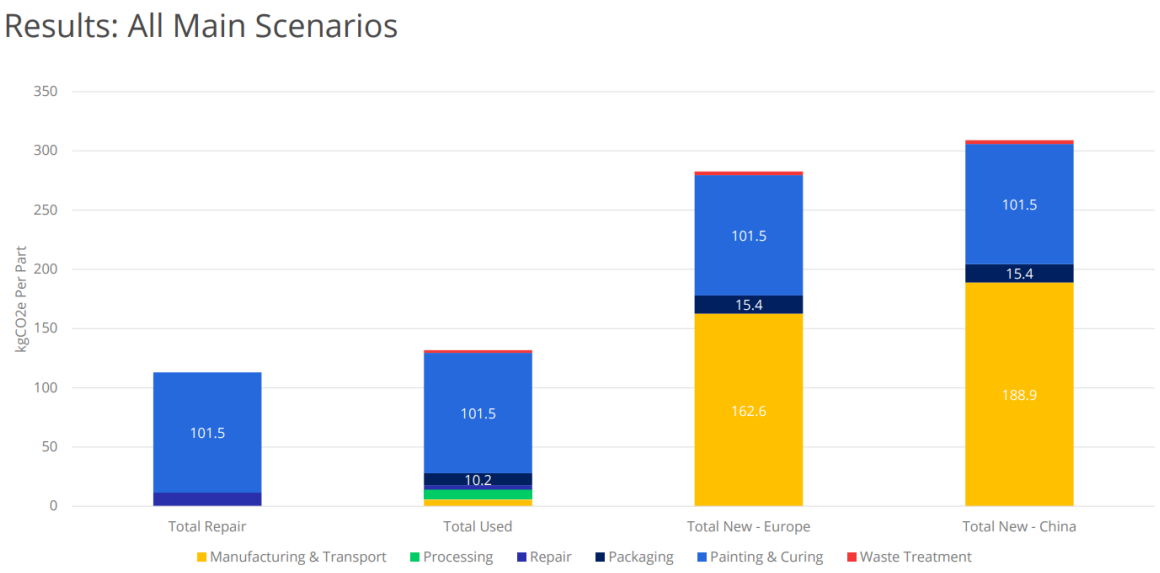

Figure 13: Main scenario results broken down by process stage (kgCO2e total parts)

Figure 12: All main scenario results for the combination of spare parts (front bumper, headlight, bonnet & front door) broken down by process stage [VRA; 2024]

In Figure 13, the kg of CO_2e emissions for transport is clearly set into perspective when the used part comes from within Europe. This addresses the question as to whether a used part that has been imported from Spain for example, can be defined as a sustainable repair method: Compared to a newly produced spare part and its production-related CO2e emissions, the transport-related CO2e emissions of a used part are not significantly relevant.

Results: All Main Scenarios

	Manufacturing	Processing	Cleaning	Transport	Repair	Packaging	Painting & Curing	Waste Treatment	Total
Total Repair	0.0	0.0	0.0	0.0	11.5	0.0	101.5	0.0	113.0
Total Used	0.0	7.0	1.4	5.6	3.8	10.2	101.5	2.4	131.8
Total New - China	178.5	0.0	0.0	10.4	0.0	15.4	101.5	3.1	309.0
Total New - Europe	155.8	0.0	0.0	6.8	0.0	15.4	101.5	3.1	282.6

Table 2: Summary of main scenario results (kgCO2e)

Figure 13: CO_2e emissions - Results across all main scenarios [VRA; 2024]

Conclusion & Outlook

The study that VRA has completed evidences the achievement of one of the key goals that Allianz's „Repair or Replace – Investigating the relative GHG emissions of repairing or replacing damaged vehicle parts" study [ALL; 2023] set out; to be used as a platform for further collaboration and development. The focus on used parts within a repair definitely builds upon Allianz's studies on repairing car parts and there is still room for further studies to be developed since both Allianz and VRA focused the respective studies on certain car models and/or certain parts on the car only.

Between VRA and Allianz's study, and any further studies that are additionally developed, there will be inevitable differences in absolute numbers, due to variables in location and providers. So although this study was U.K. based and used SYNETIQ's operations as an assumed representative for the typical salvage process for reused parts, the core message on sustainable repair is not expected to change; repairing over replace remains to be the best option for lessening environmental impact, followed by the 2nd best option of repairing with a used part, which has a significant reduction in emissions compared to repairing with a newly manufactured part.

References

[ALL; 2023] Allianz SE, AZT Automotive, Metsims Sustainability Consulting and Oakdene Hollins. “Repair or Replace: Investigating the relative GHG emissions of repairing or replacing damaged vehicle parts.”. January 2023. URL: https://www.azt-automotive.com/_Resources/Persistent/2f45e03259a22b3a5390863e1ed956fd3f1b9732/AZT-Report_Repair%20or%20Replace_Final%20Version.pdf. Cited: 2024-12-18.

[OAK; 2024] Oakdene Hollins Ltd. “VRA Repair, Reuse Or Replace Study: Internal Report”. August 2024. Internal final presentation of the project results.

[VRA; 2024] Vehicle Recyclers’ Association (VRA) and VRA Certification. “Repair, Reuse or Replace: The role of reclaim vehicle parts in reducing carbon emissions in vehicle repair.”. August 2024. URL: https://www.vracertification.org.uk/wp-content/uploads/2024/09/ODH-report-19-08-24-EU.pdf. Cited: 2025-01-30.


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