Constellium Aluminium for beverage can Life Cycle Assessment summary

Introduction

This document aims at describing the results of Constellium internal Life Cycle Assessment (LCA) work on aluminium beverage can.

This study respects ISO14040/44 standard for LCA and its content, model and an independent third party (Quantis) verified calculations.

The document structure is as follows:

- Scope of the study: description of scope and main assumptions.
- Results: disclosure of results, with a specific focus on climate change (greenhouse gas emissions). Full study was performed on a wider range of indicators.
- Sensitivity analysis: study and discussion of main parameters influencing the results
- Conclusions

Scope of the study

A key issue is the definition of the scope of the study, notably to exclude unsuited comparison or data extrapolation. Comparison should make sure that it addresses the same scope.
This study's scope is an 33 cl (12 oz.) aluminium beverage can manufactured out of aluminium sheets produced by Constellium Neuf-Brisach site, thus based on this site specific performance and metal sourcing.

The figure hereunder summarizes the system boundaries (i.e. life cycle steps that are included or excluded from the scope) and material flows. Investigated life steps included primary metal elaboration, metal transformation (rolling operations, including scrap recycling), can manufacturing and end-of-life (including recycling).

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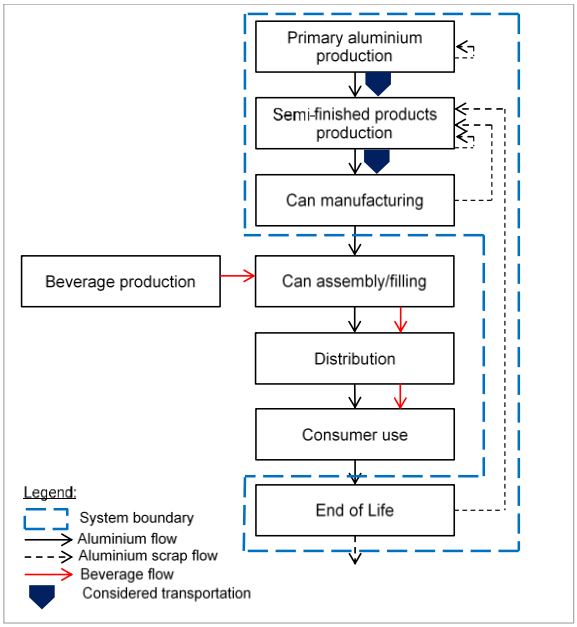

Some aspects of the can life cycle are not accounted for:

- Can content (beverage) production
- Can filling and seaming
- Can transportation (empty cans from canmaking plants to filling plants and further distribution of filled cans to shops)
- Use by consumers.

On the other hand, intermediate scrap production and recycling is included in the model, along with transportation of slabs and coils

Main assumptions:

- Primary metal sourcing according to Constellium Neuf-Brisach 2014 sourcing
- European most recent (2012) recycling rate for aluminium beverage cans (69.5%) at the time of the study.
- Masses of can body 9.8 g; mass of lid+tab: 2.48 g. Average process scrap rate: 17%.
- 100% primary metal input, as recycling credits were considered using the avoided impact (= end of life) approach.
- Metal transformation (semi-product fabrication) was modelled according to Neuf-Brisach actual sources and inputs in terms of energy, raw materials, and outputs (wastes, emissions to air, water…).
- Can manufacturing data were extracted from a joint APEAL-BCME-EAA study from 2010, including amount of scrap generated during canmaking process.
- For transportation of coils to can and end manufacturing sites, a worst case approach was chosen: truck transportation on long distances (760 to 1110 km). In practice, most of such transportation is done by boat, with lower associated environmental impacts.

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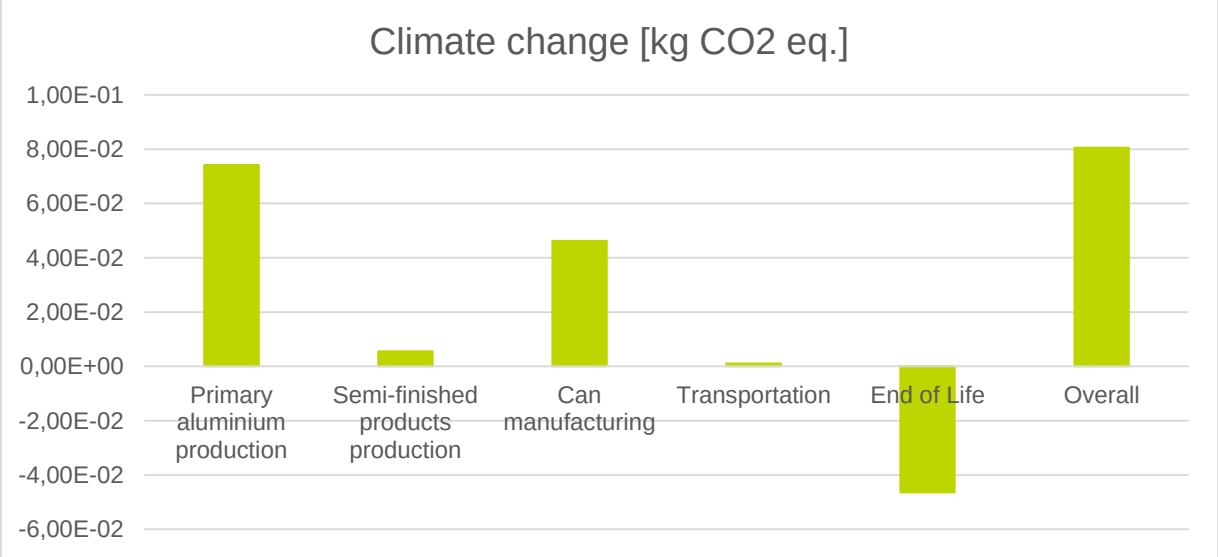
Results:

This section will briefly describe LCA calculation results.

We start with a focus on greenhouse gas emissions (Climate change) indicator, as it is the most frequently asked for. Figure 2 below show the detailed contribution of main life cycle steps.



Primary aluminium remains responsible for the main contribution (57%), while can manufacturing comes second with 35%. End of life provides a significant reduction of the overall impact, as emissions associated to the recycling operations (3%) are more than offset by the production of secondary metal, that bring a negative value (= credit) justified by the avoided need for primary metal for new products.

Metal transformation and transportation show small contributions (4.2% and 0.8% respectively).

Other indicators were investigated, thus showing the distribution of impacts between life cycle steps illustrated in the figure below.

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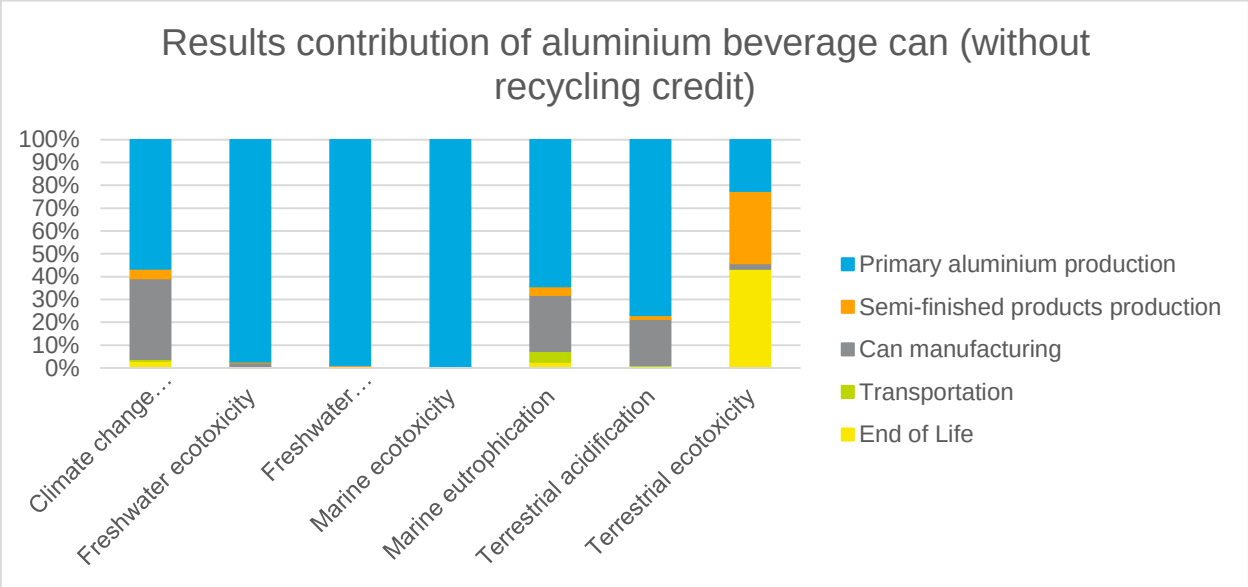

Main trends are similar for Marine eutrophication, terrestrial acidification and Climate change. Terrestrial ecotoxicity shows major contributions from end of life recycling (43%) and sheet manufacturing (32%).

Analysis of the effect of main parameters on the results:

This section allows for interpretation and discussion of the results.

Beverage can mass: results show that overall impacts vary almost proportionally to the mass (i.e. a 8% mass decrease induces a 7.7% to 8.0% decrease of the impacts).

Source of primary aluminium: using and European average source mainly affects climate change (+18%), but shows a limited impact on marine eutrophication (+1%), terrestrial acidification (+7%) and terrestrial ecotoxicity (-5%).

Recycling rate: increased recycling rate linearly decreases all studied environmental impacts, save for terrestrial ecotoxicity (increase).

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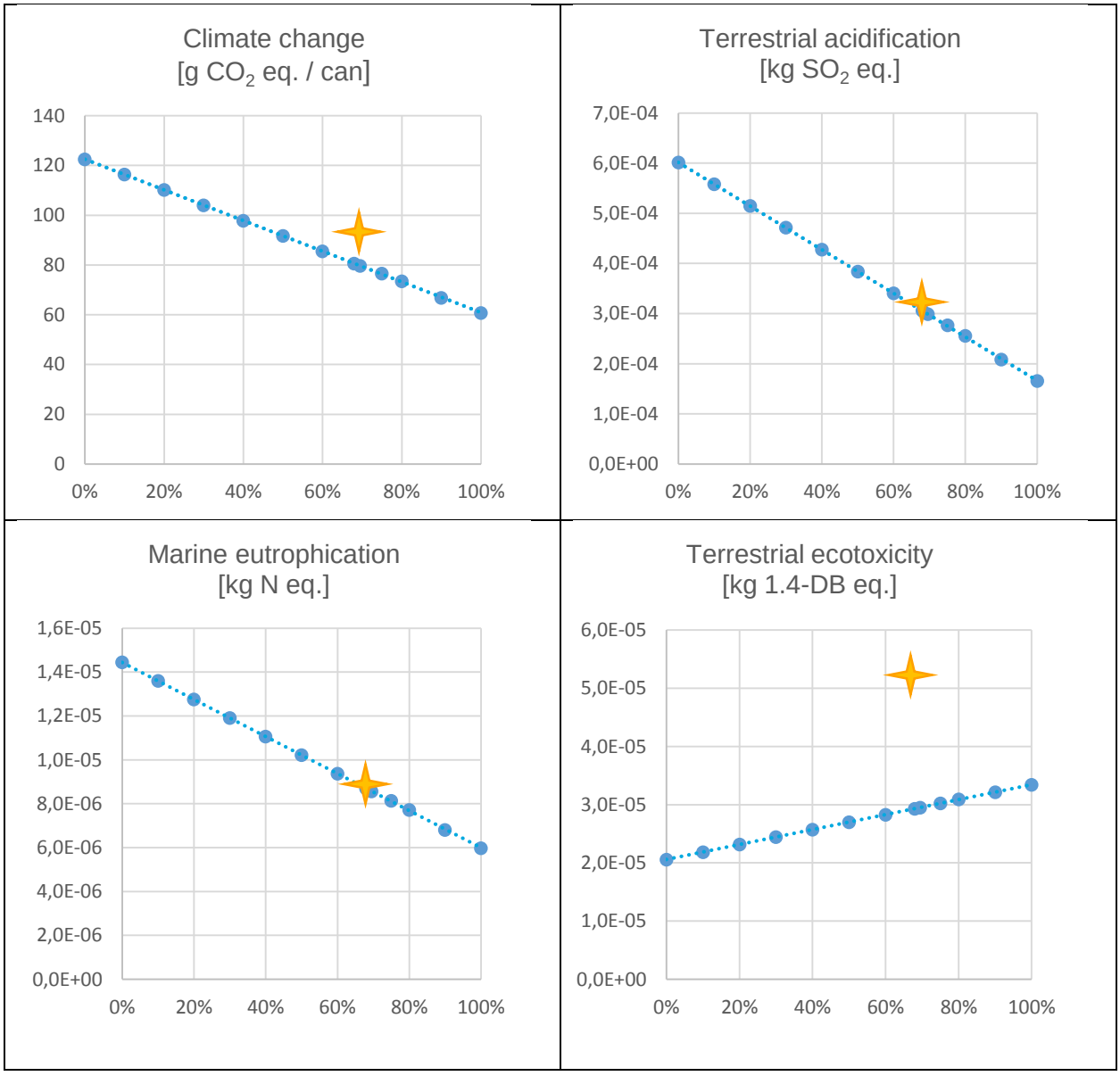

Blue dots show the evolution of a can made with Constellium metal as a function of recycling rate.
The orange star points at European average primary metal results for a beverage can 69.5% recycling rate.

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Conclusions

Primary metal brings the most significant contribution to environmental impacts for all indicators except for terrestrial ecotoxicity. Its impact can be strongly reduced thanks to end-of-life recycling of beverage cans.

Beverage can environmental impacts are strongly influenced by recycling rate. Except for one indicator (terrestrial ecotoxicity), a strong linear decrease of impacts is observed when recycling rate increases. There is room for significant improvement with expected further increase of recycling rates.

Similarly, reducing effect of beverage can mass reduction decreases the environmental impacts of the beverage can over its full life cycle.

Constellium cans hold a good position vs. European average.