



25/11/2013

Feasibility study of a cradle to cradle business model of an aluminium product

LCA Conference 2013

Katrien Boonen, An Vercalsteren, Marlies Vanhulsel, Veronique Van Hoof (VITO)
Peter Verschave (Agfa Graphics)

Introduction

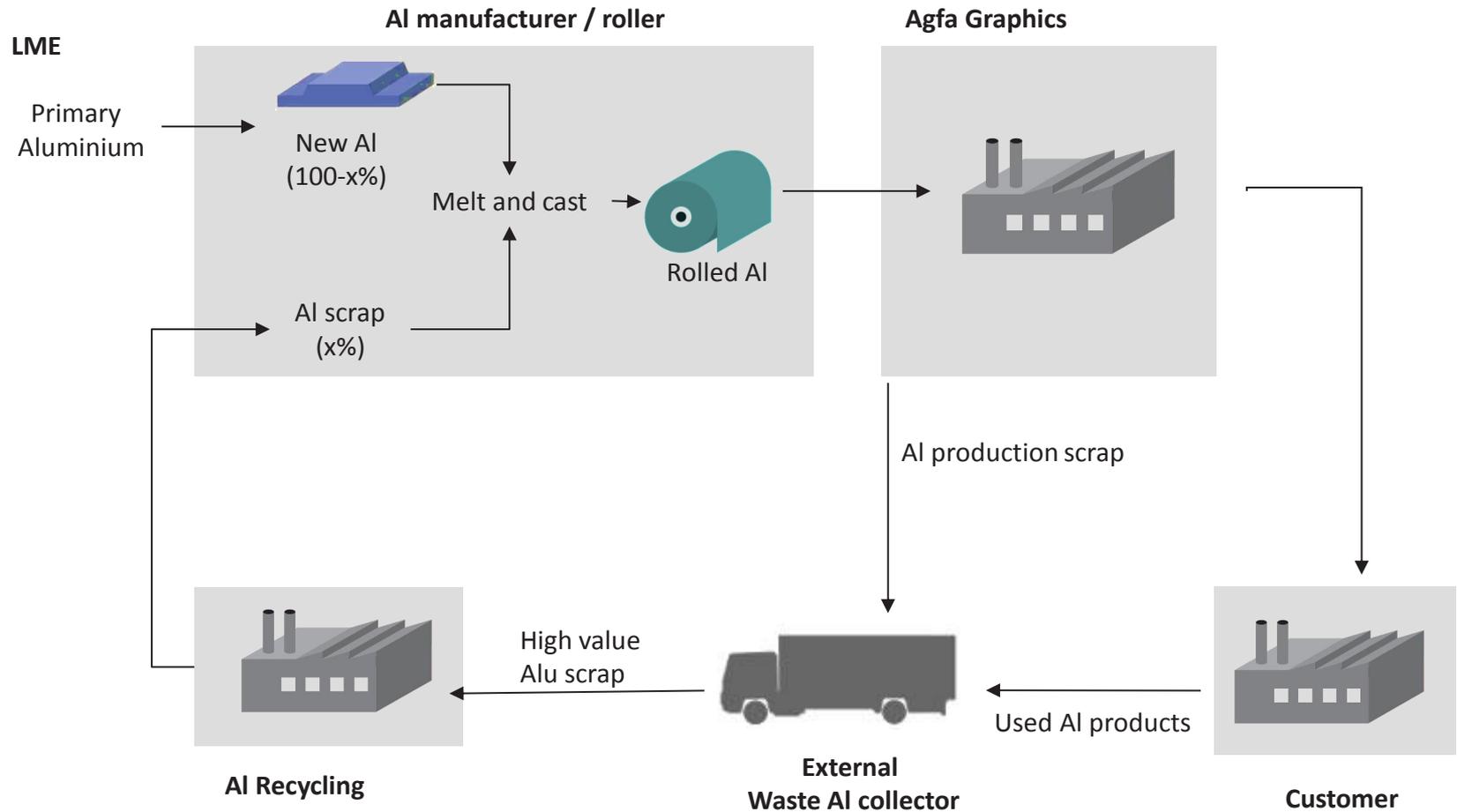
Alluring? project

- » Assessing the feasibility of closing the aluminium loop
- » Consortium between different partners: a producer and a user of aluminium consumables, the aluminium industry, logistic service providers, VITO
- » The feasibility of the business model is evaluated on three levels: business, technical and corporate social responsibility level
- » This presentation focusses on the life cycle assessment work package

Introduction

- » Starting from previous LCA study Agfa
- » Majority of environmental impacts from production of aluminium
- » **Trade-off** between:
 - » environmental credits due to the avoidance of the use of primary aluminium
 - » additional environmental impacts resulting from the extra transport steps needed to collect the aluminium scrap waste and to bring it to a remelter for recycling

Introduction



Schematic presentation of the lithographic aluminium life cycle

Methods

- » LCA-methodology according to ISO 14040 and 14044
- » Functional unit: “the production, the use and the treatment of the waste of 1 m² aluminium printing plate (thickness 275 µm) ready-for-press”
- » **3 methodological approaches for recycling** selected:
 - » **Recycled content approach**: allows to monitor improvements regarding the input of recycled aluminium in the production process and the possibility to benchmark the product with competitors.
 - » **End of life recycling approach**: allows including the possibility of using recycled aluminium consumer scrap as a high quality substitute for virgin aluminium (logical from the perspective of the aluminium industry sector).
 - » **Product Environmental Footprint Guide approach**

Methods

» Transport modelling:



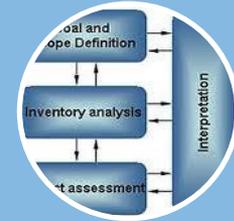
Transport data

- Different parameters (distance, type of truck, loading factor, ...)
- Survey scrap and logistics partners



Transport emission modelling

- MIMOSA model
- Fleet statistics
- Exhaust and non-exhaust emissions



LCA

- Processing results of emission models in the LCA

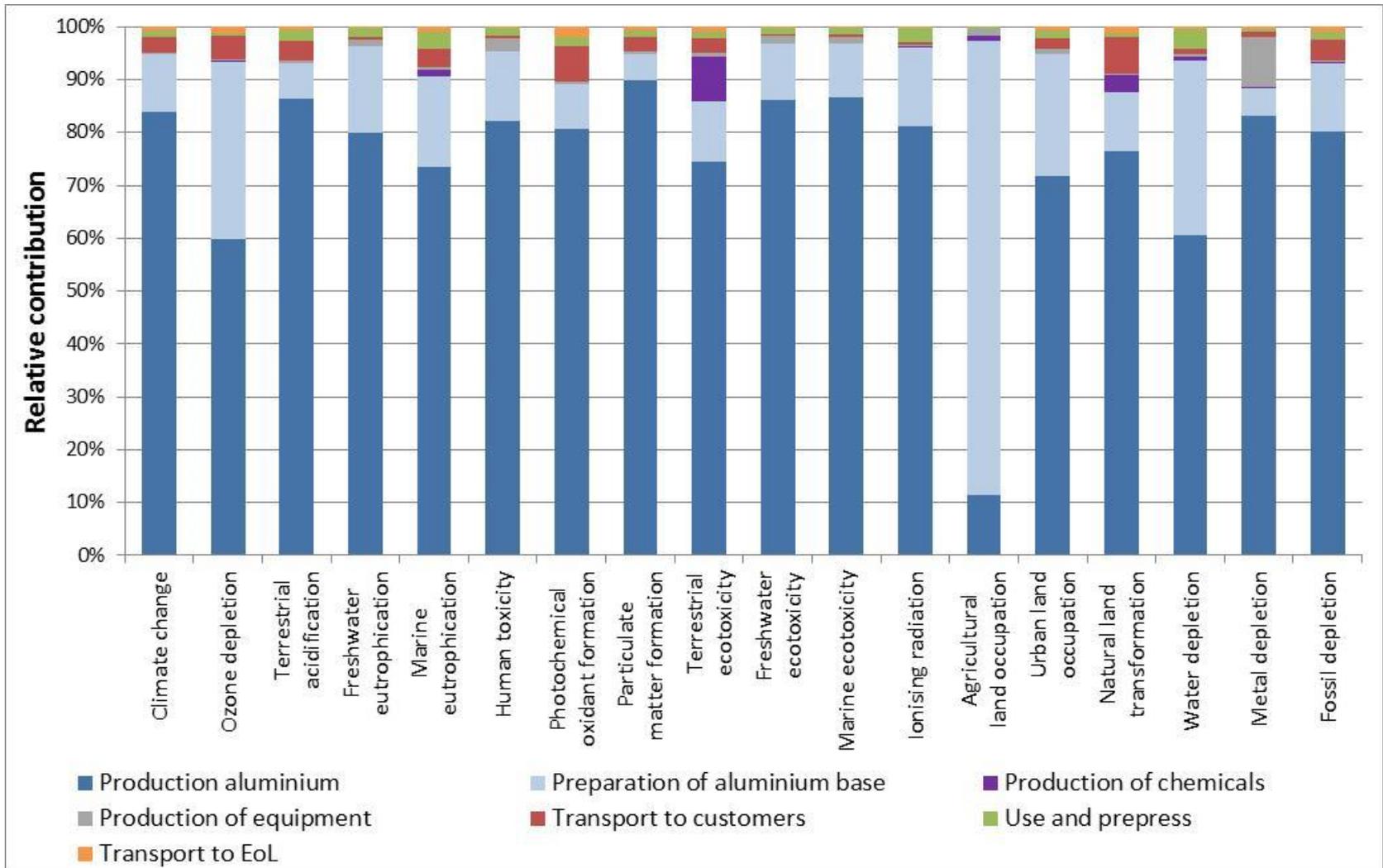
- » Background processes from Ecoinvent v2.2 database
- » ReCiPe v1.07 midpoint (H) impact assessment method

Methods

- » **4 different scenario's** were studied:
 - » BAU: **Business-as-usual** scenario: no recycled aluminium input, at EoL the products become available on the regular open scrap market
 - » AA: **Alternative aluminium** scenario: no recycled aluminium input, at EoL a fraction of the scrap (15%) is guided to dedicated scrap partners
 - » C2C 1: **Cradle-to-cradle scenario**: builds on the AA scenario. The scrap that is guided to dedicated scrap partners eventually could be recycled into high value aluminium by an aluminium converter, and replace x% of the primary raw aluminium of the product. A recycled content of **20%** is considered.
 - » C2C 2: more aluminium scrap is bought on the market to be able to reach a recycled content of **100%**. Like in the AA scenario, it is assumed that at the end of life 15% of the volume of the product goes to dedicated scrap partners.

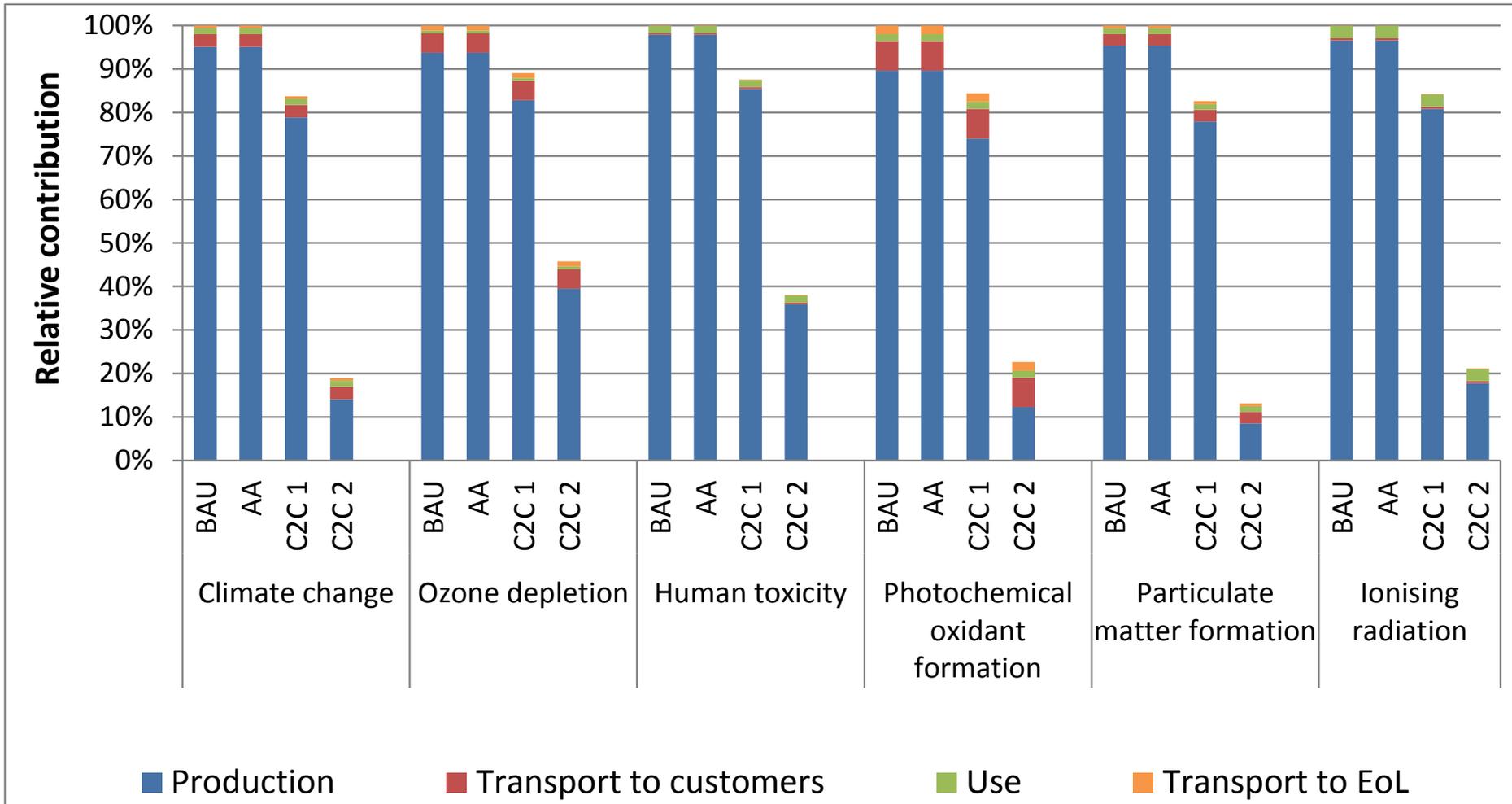
Results

» BAU scenario - recycled content approach



Results

- » Comparison 4 scenarios - recycled content approach, human health related categories



Conclusions

- » **Additional transport steps** needed to collect the aluminium scrap waste and to bring it to an aluminium remelter for recycling have a very **limited environmental impact** compared to the manufacturing
- » It is **environmentally advantageous** to recollect aluminium scrap even at larger distances to be able to **increase the recycled content** of the product.
- » **Alluring!**

Thank you for your attention!

Questions?

katrien.boonen@vito.be

Visit our website: www.vito.be/english