POLITECNICO DI MILANO





WHAT IS THE TRUE MEANING OF CIRCULARITY? Beverage packaging as a case study

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Assessment on WAste and REsources

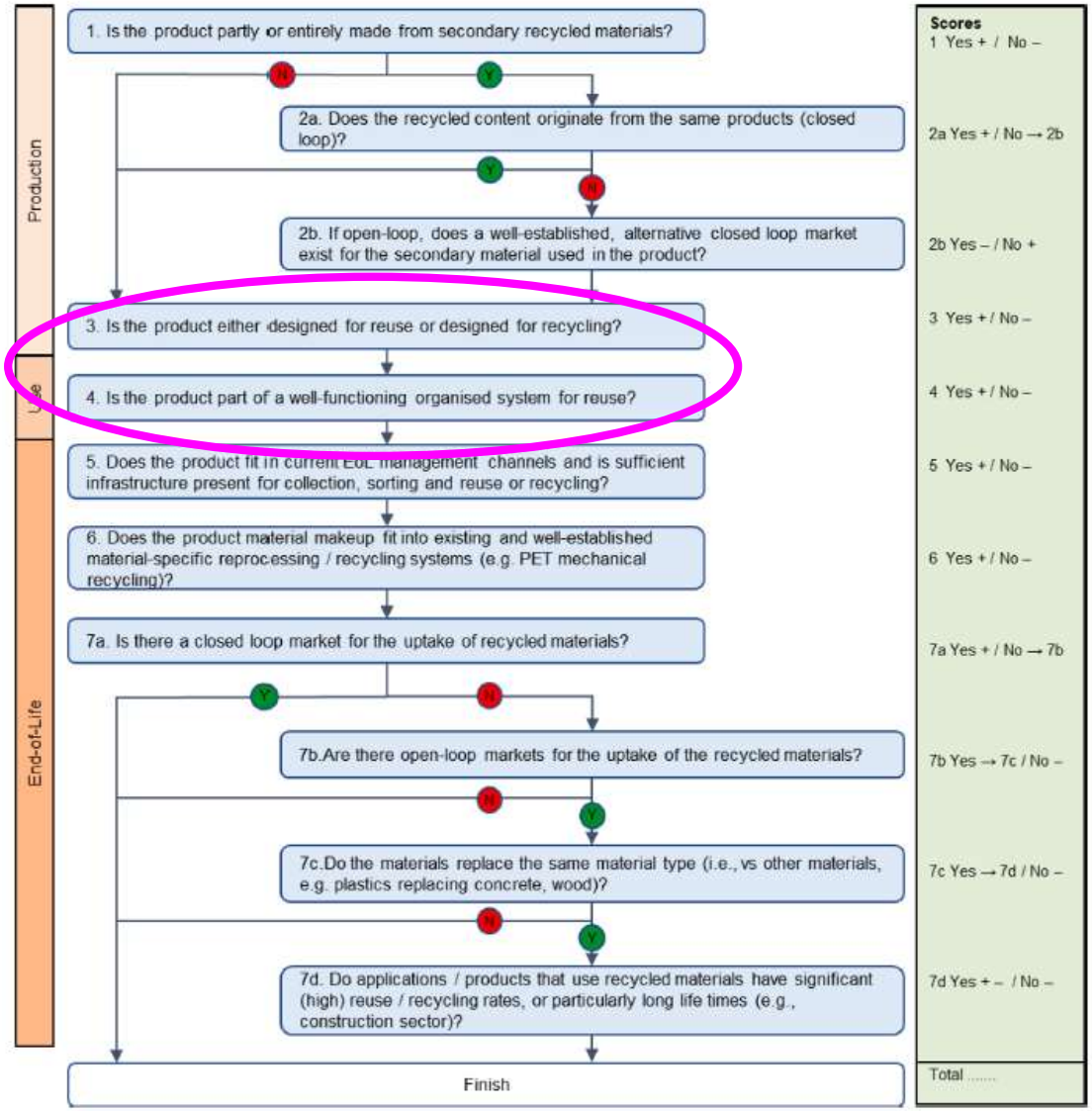
KEEP CIRCULARITY MEANINGFUL, INCLUSIVE AND PRACTICAL: THE SCORECARD

Waste hierarchy

Waste Framework Directive (Directive 2008/98/EC)

"As a simple approach to tackle complexities regarding closed-/open-loop systems, we propose a circularity scorecard which captures aspects that are likely to indicate the environmental sustainability of a product (through its life cycle). It is a "common sense" approach and has parallels to the waste hierarchy, which could work in a similar way, i.e., a simple priority order that most often holds true. Its application, by businesses, for example, could screen for viable new product/packaging designs."

KEEP CIRCULARITY MEANINGFUL, INCLUSIVE AND PRACTICAL: THE SCORECARD



"*A single score can then be derived by summing the individual scores (consisting of + and -) assigned to each of the questions. This single score provides an indication of the level of circularity: the higher the score the more circular the product is likely to be, and the higher the potential for returning environmental benefits in terms of sustainability.*"

REUSE IN THE SCORECARD

MAIN CONCLUSIONS FROM AWARE STUDIES:

- "Packaging reuse (even if including a regeneration process) is generally a preferable practice compared to single-use packaging of the same capacity and material. This also applies when the single-use packaging is lighter"
- When compared to the single-use bottles system, for a local market (within 200 km) the use of refillable glass bottles is by far preferable just starting from 2 deliveries. However, the distance between the bottling plant and the local distributor plays a key role: for 400 km, at least 4 uses of the refillable bottles are required to achieve better environmental performances, while for 800 km or more, the system based on re-use is not convenient even for 30 uses

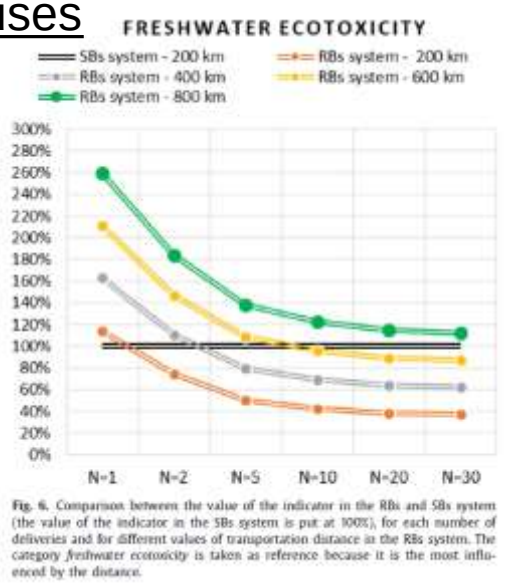


Fig. 6. Comparison between the value of the indicator in the RBs and SBs system (the value of the indicator in the SBs system is put at 100%), for each number of deliveries and for different values of transportation distance in the RBs system. The category *freshwater ecotoxicity* is taken as reference because it is the most influenced by the distance.

Biganzoli L., Rigamonti L., Grosso M. (2018). *Intermediate bulk containers re-use in the circular economy: an LCA evaluation*. Procedia of the 25th CIRP LCE Conference, 69, 827-832. https://doi.org/10.1016/j.procir.2017.11.010

Biganzoli L., Rigamonti L., Grosso M. (2019). *LCA evaluation of packaging re-use: the steel drums case study*. J Mater Cycles Waste 21(1), 67-78. https://doi.org/10.1007/s10163-018-00817-x

Tua C., Biganzoli L., Grosso M., Rigamonti L. (2019). *Life Cycle Assessment of Reusable Plastic Crates (RPCs).* Resources, 8(2), 1-15. https://doi.org/10.3390/resources8020110

Tua C., Grosso M., Rigamonti L. (2020). *Reusing glass bottles in Italy: a life cycle assessment evaluation*. Procedia of the 27th CIRP LCE Conference, 90, 192–197. https://doi.org/10.1016/j.procir.2020.01.094

HOW TO USE THE CIRCULARITY SCORECARD

"It is a "common sense" approach and has parallels to the waste hierarchy, which could work in a similar way, i.e., a simple priority order that most often holds true."

Similar to Article 4(2) of the Waste Framework Directive:

When applying the ~~waste hierarchy~~ scorecard […], ~~Member States~~ decision makers/policy makers/companies shall take measures to encourage the options that deliver the best overall ~~environmental~~ sustainable outcome. This may require specific ~~waste streams~~ situations departing from the hierarchy (+ / - answers) where this is justified by life cycle thinking on the overall impacts of the ~~generation and management of such waste~~ life cycle of that product […]

OPEN LETTER ABOUT LCA & PACKAGING

To guarantee that an LCA is robust, we advise you to check that it:

1. Is a peer-reviewed, independent study conducted using the ISO 14040 and 14044 frameworks
2. Respects steps laid out in ISO standards, starting with clear scope definition and comprehensive description of inventory data
3. Assesses the highest possible number of environmental indicators
4. Includes the full life-cycle of the product reviewed
5. Includes clear hypotheses and assumptions on breakage rate, return (trip) rate, weight and end of life strategies
6. If assumptions or lower quality data on parameters have been used, performs a sensitivity analysis
7. Considers different business model configurations for the use and end of life phases
8. Integrates static comparisons with dynamic ones such as the evaluation of the environmental break-even points

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THE DISCUSSION IS NOW OPEN!

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