
Ramboll/EPPA LCA

Review by Deutsche Umwelthilfe (DUH)

The Ramboll study “Comparative Life-Cycle Assessment (LCA) single-use and multiple-use dishes systems for in-store consumption in quick service restaurants” commissioned by the European Paper Packaging Alliance (EPPA) has been met with great public interest and vivid discussions about the eco-friendliness of packaging materials. Its results suggest that single-use tableware made of paper has certain advantages over reusable alternatives. How do these results, which appear to counter the logic of the Waste Hierarchy stipulated in the European Waste Framework Directive, come about? Do they stand up to a thorough review?

Overview

- Evaluated reuse system not based on actual market conditions
- Unrealistically high energy and water consumption for washing of reusable packaging
- Single-use benefits from chosen end-of-life allocation
- Incoherent system boundaries for reusable and single-use items
- Recycling rates and scenarios are unrealistic
- Overall data and scope lack transparency and quality

Why is the reuse system fictitious?

The results of life cycle assessments are always relative to underlying assumptions, as well as the sources and data used. The latter should accurately reflect current and existing market conditions. Unfortunately, that is not the case for the Ramboll study. As a reuse option, a hypothetical system is examined. The authors of the study justify this approach by claiming that “no primary data exists” (p. 10) for reuse systems, justifying the use of a “hypothetical future scenario” (p.10). In reality, reuse systems for restaurants and cafes have grown rapidly in many European countries, first and foremost in Germany, where market leaders Recup and Vytal have incorporated more than ten thousand HORECA businesses as participants into their respective systems. Reusable cups have been in use at all kinds of events, ranging from football matches to rock festivals, and more and more, also reusable plates and cutlery is being handed out. Other studies cited in this review take market-based data into account and base their calculations on existing systems. It is incomprehensible why this is supposedly not possible in the context of the Ramboll study. The fact that, already in its design, the study diverges from current market conditions, diminishes the credibility of its results.

Unrealistically high energy and water consumption

This approach leads to perplexing assumptions, for example when it comes to the washing of reusable tableware. The assumed consumption for washing one item, compared to other studies on the subject, is two to three times higher for water, and twenty or more times higher for energy, respectively.

	Ramboll (2020) [14 different multiple-use product items]	Carbotech, Austrian Ecology Institute, Eco-Institute Germany (2008) ¹ [item: drinking cup]	German Environmental Agency (2019) ² [item: drinking cup]	Gallego-Schmid et al. (2018) ³ [item: PP container]
Water consumption [l/item]	0.318	0.1	0.1	0.2
Energy demand/item [kWh/item]	0.027	0.0014	0.0014	0.0000742

From the data provided by the authors of the study, it cannot be deduced which of the reuse items incorporated in the analysis present such high values in water consumption and energy demand. But it is very unlikely that it would be so much higher compared to the items examined in other studies.

Since the cleaning process of reusable packaging is decisive for its overall ecological performance¹, it is not surprising that the stark contrast in energy and water consumption also decisively impacts the overall results of the studies. Whereas in the Ramboll study, single-use packaging presents ecological advantages over reusable solutions, the opposite is the case for the LCAs cited above.

Additionally, a rewashing rate for all reuse items of 5 percent is applied, without explanation on what this assumption is based on. It appears evident that this rate does not stem from actual market data representing reuse systems in practice. After all, Ramboll is looking at a hypothetical reuse system.

Single-use benefits from chosen end-of-life allocation

Instead of a 50:50 end-of-life allocation often applied in LCAs, the study relies on the so-called “Avoided Burden Method” (100:0 end-of-life allocation). Generally speaking, this gives single-use an advantage over reusable options, because they receive a significant amount of credits for being potentially recycled/incinerated:

- In a **100:0 allocation**, the impact of the recycling process is entirely allocated to the *delivering system*, meaning the product that is assumed to be recycled. The (single-use) product receives credits for potentially serving as recycled content.
- In comparison, in a **50:50 allocation**, those credits are (evenly) distributed between *the delivering and the receiving system* (i.e. the product that may be used to produce recycled content and the one that may take up that recycled content).⁴

In addition, in the Ramboll study, single-use options also receive credits for being incinerated: Due to the applied “Avoided Burden Method”, the savings from the use of fossil fuels in electricity generation are credited in full to the *delivering system*, i.e. the single-use packaging that is assumed to be incinerated. In the Ramboll study, the single-use products furthermore benefit from the chosen energy-mix (entire

¹ As is confirmed by the authors of the study: “for the single-use system, major impacts are generated during the upstream production of the items whereas the main contributor to the impacts of the multiple-use system is the use phase, i.e. the washing of items.” (p. 8)

EU+UK), that relies heavily on fossil fuels. Thus, the incineration of single-use packaging, in this scenario, replaces a high amount of fossil fuels, and benefits greatly from the allocated credits.

The incineration and recycling of the single-use products generate significantly higher credits under a 100:0 allocation than under a 50:50 allocation. In Germany, the Federal Environment Agency considers a 50:50 allocation to be the standard and applies it accordingly. This is justified by the fact that a 100:0 allocation would give an excessive advantage to the *delivering system*, which can lead to disposable packaging being legitimized and whitewashed. When comparing reusable to single-use packaging, a 100:0 allocation creates problematic incentives favouring the creation of excessive waste, which contradicts the European Waste Hierarchy. A 100:0 allocation incentivizes the production and disposal of virgin-based, single-use products, without assessing whether there is a true need for them.² Since the single-use products get those credits every time they are disposed of, while the reusable options get them only at their EOL after many reuse cycles, it is obvious how choosing this end-of-life allocation can benefit the performance of single-use options in LCAs.

System boundaries are different for reuse/single-use

The system boundaries applied in the LCA are apparently not uniform. In the calculation of the environmental impact of the reuse system, the production of a dishwasher is taken into account. However, the infrastructure needed to manufacture single-use items does not seem to be included. At least it is not mentioned anywhere in the study. Considering equipment production for the reuse system, while at the same time omitting other production units altogether creates a strong disadvantage for the reuse system. This cannot be considered a balanced approach, but one that strongly favours single-use products.

Hardly credible recycling rates and unrealistic scenarios

The study assumes a very low recycling rate for PP reusables (30 percent). This rate is likely to be exceeded significantly in a real reuse system. In a restaurant environment, 100 percent of the packaging will be collected and, if it needs to be discarded, returned to the system provider for recycling. It is thus collected as a clean, separated waste stream. It is *not* disposed of via the mixed packaging waste or residual waste. PP as a material has very good preconditions for recycling. It is safe to assume that all reusable containers and items used can enter the recycling process once they are not functional anymore. It is therefore not understandable why the authors of the study would apply a recycling rate as low as 30 percent. Even if takeaway consumption is considered (which the Ramboll study does not), most reusable containers would still be returned and collected as a separate waste stream. German reuse system providers such as Vytal and Relevo report return rates of around 98 percent.

At the same time, the high recycling rate of 30 percent for coated paper packaging also seems unrealistic. A statements from the German recycling sector confirms tremendous problems with this type of packaging: "Coated paper packaging may look environmentally friendly. But it is difficult to recycle. In addition, the ecological performance is questionable, to say the least. In any case, such packaging is not really more environmentally sustainable", says Michael Wiener, CEO of DSD – Duales System Holding GmbH & Co. KG.⁵ The company runs the EPR system for a large fraction of German packaging waste.

The recycling of coated paper packaging is a problem in most EU countries. "When PE-coated paper enters a conventional paper recycling facility, it generally results in operational problems and added cost to the papermaker".⁶ The study's recycling rates assume, however, that all countries can recycle coated paper

² Moreover, in a 100:0 allocation, there is no incentive for a *receiving system* to use more recycled material, since all the credits are allocated to the *delivering system*.

cups, which is not the case. Often they are not even collected properly. The reality is that the majority of such waste ends up in landfills or is incinerated.

Even though coated paper products are assumed to consist of 100 percent virgin paper, in the Ramboll study “EoL credits are assigned based on the assumption that an equivalent virgin paper product is displaced in the market by the recovered material” (p. 12). In reality, an equivalent use of recycled paper in food-contact product usually does not occur. Instead, the material will go into less sensitive applications (like transport packaging), which would be considered downcycling. This is not sufficiently reflected in the study. The closed recycling loop sketched by the authors is not realistic.

The studies mentioned above by the German Environmental Agency (2019) and Carbotech, Austrian Ecology Institute, Eco-Institute Germany (2008) both assume 100 percent incineration in their standard scenario for single-use cups, which is a lot more realistic than the 30 percent recycling applied by Ramboll.

Single-use in in-house consumption?

The study only looks at in-house consumption, not takeaway, but this is not clearly communicated when presenting and discussing its results. Clearly, a study concerning in-house consumption cannot just be applied to any scenario in which food and drink packaging for direct consumption is used. The majority of takeaway containers, as well as single-use cups, plates and cutlery are disposed of by consumers on-the-go. At best, they end up in public waste bins, at worst in the environment. Unseparated waste from public bins is almost always incinerated in Europe.

Intransparent scope

Furthermore, the overall scope of the study is not very transparent, as it only states that “all products consumed within one year” were accounted for. This information is not broken down any further. It is thus not clear, for example, how many reusable packaging items were considered to be required for a certain number of use cycles, i.e. how many cycles the reusable packaging items actually go through within this one year timeframe. Although the authors state that 100 potential cycles were assumed, it is not clear how many cycles were actually determined for the reusable packaging items within the scope of the study. This could significantly influence the performance of the reuse system. It is only realistic in certain contexts for reusable packaging to go through 100 cycles within one year:³ It would therefore be a matter of transparency to disclose the basic assumptions that were chosen for the study.⁴

Overall data quality

The study claims to use data from France, Finland and Germany, but at the same time it aims to represent conditions in the EU27+UK. However, comparability is rather limited, since countries in Southern and Central Eastern Europe have different energy mixes and packaging markets. In terms of its own ambitions, the study presents low completeness, and there is a tendency to incorrect extrapolation of its results.

Overall, there is very little information on the sources, as well as the individual products included and evaluated in the study. It is therefore very difficult for the reader to retrace which individual packaging items were used for the reuse, as well as for the single-use scenario, and compare them to other publications in the field. Also in this respect, the Ramboll study falls behind other LCAs on food packaging.

³ For in-house, it could be realistic because the packaging could be returned and rinsed immediately after consumption. For takeaway, which is outside of the scope of the study, it seems less realistic.

⁴ It should be noted however that in comparable studies, the break-even point of reusable vs. single-use options is much lower than 100 cycles.

Concluding remarks

Ramboll's study has several weaknesses, is limited in scope, and severely lacks transparency. Its comparison of a set of poorly described single-use packaging items and products for in-house consumption with a fictitious reuse system, ignoring the existing ones already in place, cannot justify a general verdict on ecological advantages or disadvantages of paper packing in restaurants. The study certainly is not a sufficient basis for statements like "obligatory reusable packaging in take-away services would be more burdensome on the environment than single-use paper packaging"⁷.

Other, more transparent LCAs have examined actual existing reuse systems in the past, comparing them with coated paper packaging and other single-use alternatives. Some of these studies have been quoted in this paper. Relying on actual market data, they have shown that the implementation of reuse systems in cafés, restaurants and at events can result in a reduction not only in waste, but also in CO₂ emissions. When drawing conclusions on ecological aspects of reuse and single-use systems, those LCAs have to be taken into account.

The extrapolation of Ramboll's study's results to applications that have not been examined in the study (like takeaway of food and drinks, and food delivery) is a mistake that should not be made by its readers. Assumptions that are already questionable when considering in-store consumption, like a recycling rate of 30 percent for coated paper packaging, become even more improbable when considering takeaway and other applications, when the point of sale has no control over the disposal of the items.

Ramboll's study single-use and multiple-use dishes systems for in-store consumption leaves us with more questions than answers. Why have actual reuse systems not been considered? Which products are exactly considered? Which assumptions are made for their yearly consumption? In order to be taken into account for the ongoing discourse on packaging systems in restaurants, these questions should be answered and those answers should be closely examined. A process that many LCAs, including the ones cited in this paper, have already gone through, often initiated by its authors, who disclosed the data used and published full reports. With the information at hand, Ramboll's study cannot keep up with publications in the field, and does not provide a valuable addition to the debate. Policy-makers and experts in the field should rather make their assessments based on other studies closer to the realities of the European market.

- 1 Carbotech AG, Österreichisches Ökologie-Institut, Öko-Institut e.V. Deutschland (2008): Vergleichende Ökobilanz verschiedener Bechersysteme beim Getränkeausschank an Veranstaltungen
- 2 ifeu (2019): Untersuchung der ökologischen Bedeutung von Einweggetränkebechern im Außer-Haus-Verzehr und mögliche Maßnahmen zur Verringerung des Verbrauchs
- 3 Gallego-Schmid, Alejandro; Mendoza, Joan Manuel F.; Azapagic, Adisa (2018): Environmental impacts of takeaway food containers
- 4 Allacker et. al. (2017): The search for an appropriate end-of-life formula for the purpose of the European Commission Environmental Footprint initiative, <https://link.springer.com/article/10.1007/s11367-016-1244-0>
- 5 Translated by DUH from an official German statement: <https://www.welt.de/wirtschaft/article214851686/Recycling-Probleme-Plastik-Irrtum-sorgt-fuer-die-wahre-Umweltsuende.html>
- 6 Triantafillopoulos, N., & Koukoulas, A. A. (2020). "The future of single-use paper coffee cups: Current progress and outlook," *BioRes.* 15(3), 7260-7287.
- 7 <https://www.politico.eu/sponsored-content/placing-science-at-the-heart-of-the-circular-economy/>

2022-06-29



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