

Comparative eco-assessment of different tumbler systems for serving drinks

Darmstadt, Basle, Vienna 15.11.2007

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On behalf of:

Federal Ministry for Agriculture, Forestry and Water (Austria) Federal Environment Agency
(Switzerland)

Federal Ministry for Environment, Nature Conservation and Nuclear Safety (Germany)

And the towns/Federal states: Basle - Bern - Hannover - Klagenfurt - Salzburg - Vienna – Zürich

Starting Point:

Austria, Switzerland and Euro 2008 SA committed themselves in June 2007 when they signed the Sustainability Charter to support ecological, economic and social measures for UEFA EURO 2008. In the environmental field the aim was to set sustainable standards for future large-scale events through waste avoidance measures such as the optimum ecological containers for serving drinks. Various manufacturers and operators of drinks tumblers point out the ecological benefits of their systems. Therefore there is now wide uncertainty as to which system is the best variant from an ecological perspective for large sports events such as UEFA EURO 2008™.

The Environment Ministries from Austria, Switzerland and Germany together with support from the Federal States and the cities of Basle, Bern, Hannover, Klagenfurt, Salzburg, Vienna and Zürich, the Austrian Ecology Institute, the German Eco-Institute e.V. and the Swiss company Carbotech AG commissioned a comparative eco-assessment of the different tumbler systems, and in which the current experiences of FIFA WM 2006™ in Germany and specific framework conditions of a European Football Championship should be taken into consideration. The aim was to arrive at basis for the decision as to which drinks tumbler systems are to be preferred from an ecological perspective. The results were presented to Euro 2008 SA and the drinks sponsors on 8 November 2007 in Nyon (Switzerland).

Method

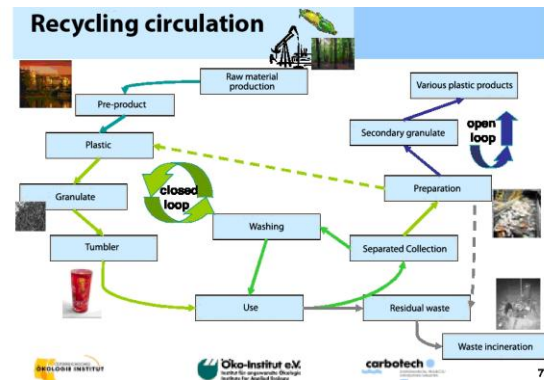
This eco-assessment analysed the usage of different disposable and reusable tumblers available on the market for large-scale events such as UEFA EURO 2008™. And in this process the environmental impacts over the entire lifecycle were collated and assessed. The overall assessment was created using two recognised aggregating methods using eco-indicators and environmental pollution points. An external critical review by Ass.Prof.Dr. Martin Patel from Utrecht University confirmed the correctness of the approach and the methods used.

Tumblers of fossil and renewable raw materials plus biologically degradable materials were investigated. The comparison basis selected was the dispensing of a drink in a 0.5 litre tumbler (beer and soft drinks). And in accordance with the eco-assessment approach the following environmentally-relevant processes were collated and assessed over the entire lifecycle:

- Availability of the basic materials such as plastics, cardboard, PLA etc.
- Processing and coating of the materials and production of the tumblers
- Availability of the energy sources required
- Transport
- Cleaning of the reusable tumblers
- Costs for recycling and/or disposal.

The following environmental impacts or **environmental indicators** were considered:

- Influence on the climate through greenhouse potential (Global Warming Potential GWP);
- Use of non-renewable resources such as crude oil or natural gas through the Accumulated Energy Cost
- Contribution to the formation of ozone (summer smog) through potential ozone creation
- Contribution to the acidification of soils and water through potential acid formation
- Impacts on human health (toxicity)
- Impacts on animals and plants through substance emissions (eco-toxicity)
- Change in the nutrient balance in soils and water by eutrophication or over-fertilisation
- Influence on biodiversity through the surface use and its change.



Disposable drinks tumblers made of the plastics PET (Polyethylene terephthalate) and PS (Polystyrene), of coated cardboard, of biologically degradable plastic PLA (Polylactide) and of Belland material were analysed over the entire lifecycle. A differentiation was made as to whether the drinks tumblers, after single use, were disposed of in a refuse incinerator plant or materially recycled or composted.

In the case of reusable drinks tumblers made of the plastic PP (polypropylene) different scenarios were also evaluated. The main difference between the systems arises through a potential "UEFA EURO 2008 branding" which may prevent commercial usage of the drinks tumblers after UEFA EURO 2008™. However, reusable drinks tumblers taken away replace a souvenir with the same materials cost or are taken away in addition to a fan memento, or are reused at home as drinks tumblers and thereby replace a disposable or reusable tumbler. The usage type of the drinks tumblers taken away was discussed with an expert panel and these results were integrated into the calculations.

The data on the circulation cycles and take-away ratios at UEFA EURO 2008™ is based on the experiences of the FIFA WM (World Cup) 2008™ and on offers of potential system operators for UEFA EURO 2008™ and on our own model calculations. These sources were used to check the feasibility. In the case of doubt rather conservative values were used for the reusable tumblers, e.g. a safety margin was considered which leads to the fact that a relatively large number of tumblers must be either recycled or disposed of if further usage is not permitted. No such safety margin was allowed for in the calculations of the disposable tumblers. For the assessment the customary methods, the UBA-Process (*Federal Environment Agency, Dessau*) and the total aggregating method Eco-Indicator 99 and UBP (EPP) (2007) were used. The results were investigated comprehensively for their robustness through sensitivity analyses. In this way the influence through the change in the assessment definitions or through an unstable set of base data can be recognised and integrated into the final assessment.

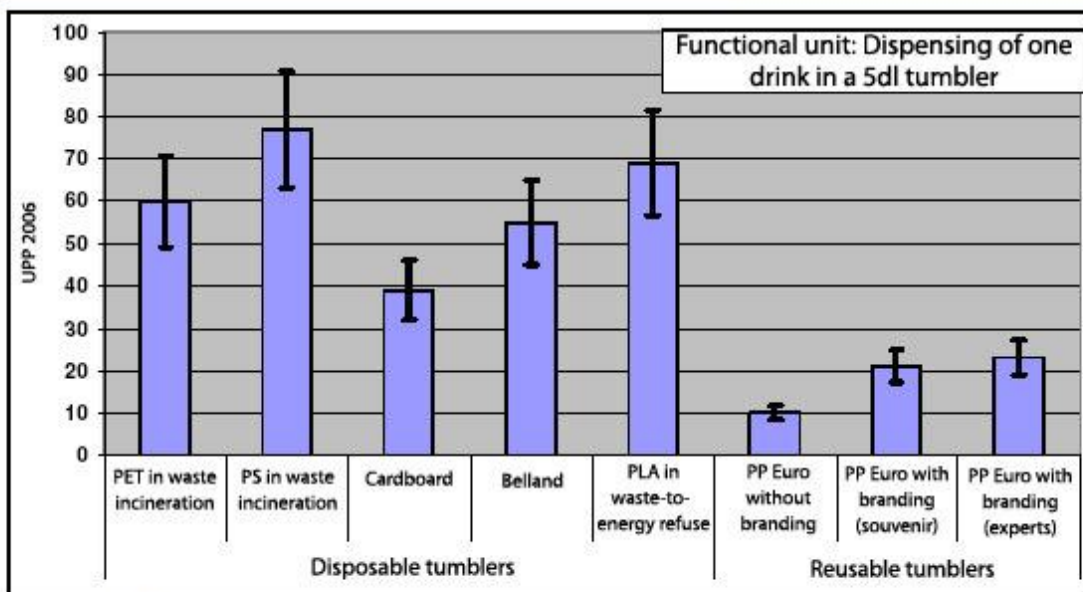
Results

The drinks tumbler systems investigated led to the following conclusions:

- All reusable tumbler scenarios pointed to significantly lower environmental pollution than the disposable scenarios considered.
- For the best disposable tumbler scenario twice as many environmental pollution points (EPP) were identified as for the least favourable reusable tumbler scenario, in which a subsequent use is not possible due to branding (PP Euro with branding (souvenir)).
- Within the reusable tumbler scenarios, the scenario with subsequent usage of the tumblers (PP Euro without branding) was by far the best.
- Biologically degradable disposable drinks tumblers made of PL (polylactide) do not present any technologically comparable alternative to reusable tumblers. The compostability of the tumblers does not lead to lower environmental effects since no noteworthy ecological use is associated with the composting of this plastic. In addition the impacts of the disposal are marginal in comparison to the production of the tumblers.
- The environmental pollution aspects of the PLA disposable drinks tumblers are comparable with those of the PET disposable drinks tumblers and are clearly above those of the cardboard disposable tumblers.
- The total aggregated environmental pollution of disposable drinks tumblers of Belland material is in the range of traditional disposable drinks tumblers such as those made of PET. The proof of a functioning circulation system of Belland material must still be delivered in practice.

EPP 2006 (total sums)

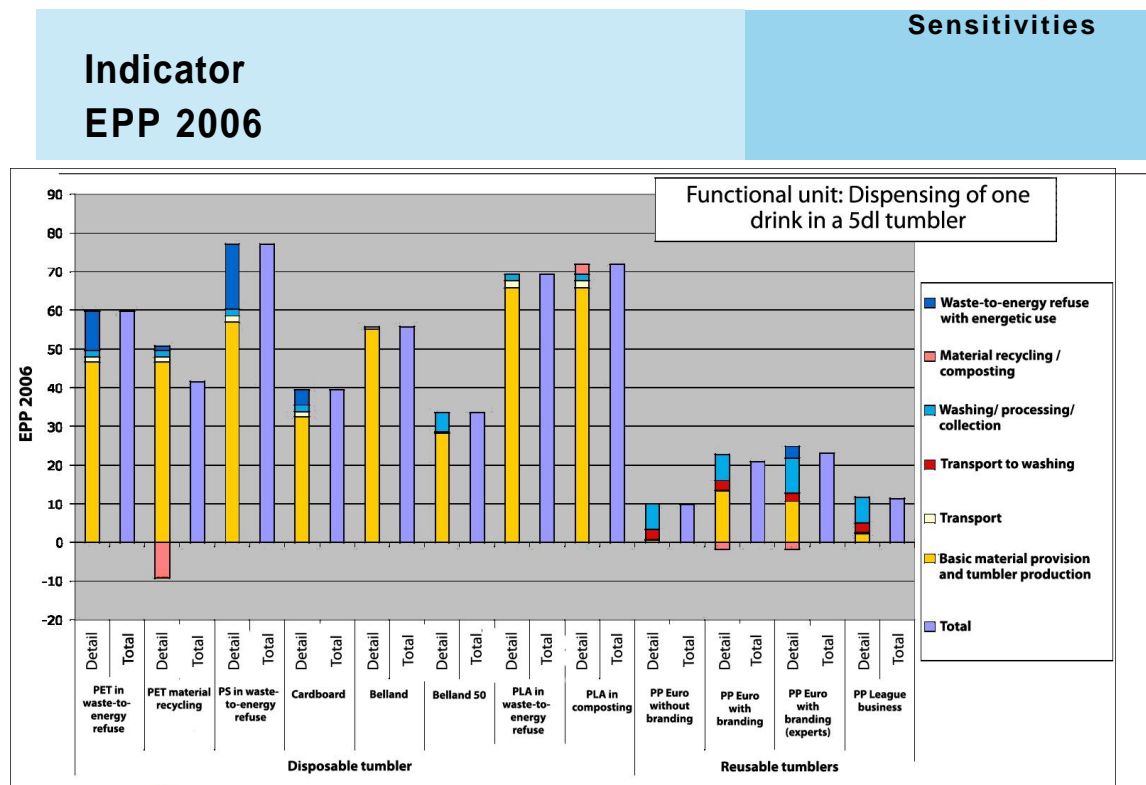
Standard scenarios



Also in the individual GWP effectiveness category, all reusable drinks tumblers were shown to be more climate-compatible than disposable tumbler scenarios. In the comparison within the disposable tumbler scenarios, the cardboard tumbler was shown to be – in both assessment methods and also for its influence on the climate through greenhouse gas potential (GWP) - responsible for the lowest level of environmental impact.

All **sensitivity considerations** confirm the trend of the results from the standard scenarios:

- Recycling of tumblers made of the material PET could lead, in the case of disposable tumblers made of PET, to a clear discharge in relation to the thermal recycling in a refuse incineration plant or waste-to-energy plant, but still does not represent any ecological alternative to reusable systems. The proof whether a technical execution of a PET to PET drinks tumbler recycling technology is possible must still be provided.
- A functioning circulation system for Belland material has not yet been executed in practice. Under the theoretical assumption that Belland was able to implement a *closed loop* recycling up to 50% recyclate, implied for example as sensitivity, the Belland tumbler would still show significantly larger environmental polluting effects than all reusable variants investigated.
- All reusable tumbler scenarios consistently have the lowest level of environmental pollution. No disposable tumbler can be described as an ecologically comparable container since these are always associated with significantly higher environmental pollution.



Recommendation

- Based on the results of the study of the Austrian Ecology Institute, the German Eco-Institute e.V. and the Swiss company Carbotech AG, from ecological perspectives, reusable tumblers for large-scale events such as UEFA EURO 2008™ are recommended.
- A subsequent usage of the tumblers after UEFA EURO 2008™ in league business or at other events is recommended. This can further reduce the negative environmental impacts and avoid additional waste. This will enable one of the demands from the catalogue of the Austrian and Swiss Sustainability Plan for UEFA EURO 2008™ to be achieved and executed.
- The recommendations are based on unambiguous, significant results which on the one hand are confirmed by the sensitivity analysis and on the other, despite rather conservative assumptions in relation to the reusable tumbler scenarios, their clear benefits in relation to all disposable tumbler systems.