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Total Environmental Burden

Supplement to the technical report

Life Cycle Analysis on hand-drying systems

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1 Introduction

In the following the Total Environmental Burden of the two in Eberle / Möller (2005) investigated mechanical hand drying systems is described. The Total Environmental Burden will be calculated using EcoGrade, an assessment tool developed by Öko-Institut. EcoGrade is an integrated ecological assessment method, which aims to assess the environmental aspects of the examined product system within the phase of Life Cycle Impact Analysis (LCIA). It is based on different impact categories and category indicators and covers a wide range of impacts. These elements can be combined individually according to goal and scope definition of the study in order to form a product-group specific assessment tool (Möller et al. 2005).

2 Total Environmental Burden

Within EcoGrade (Möller et al. 2005), the ecological relevance is investigated by relating the impact indicator results (cf. Eberle / Möller 2005) to their correspondent environmental targets. The applied environmental targets refer to target values, which were defined within international environmental policy making. These target values indicate the emission level, to which a certain environmental impact has to be reduced. Due to the application of internationally negotiated and binding targets, this approach considers the overall relevance of the different impact indicators and thus incorporates the elements of normalization, grouping and weighting within a single step.

For this assessment step the Global warming potential (GWP), the Acidification potential (AP), the Eutrophication potential (EP) and the Photochemical ozone creation potential (POCP) are chosen. Further impact indicators are not taken into account either because the impacts play a more decisive role in social impacts (e.g. resource depletion) or the targets are not quantifiable in terms of LCI data (e.g. ozone depletion potential). The Total Environmental Burden is expressed in Environmental target points (ETP). The aggregation methodology is described in detail in Möller et al. (2005).

The following tables (Table 1, Table 2) and figures (Figure 1 - Figure 3) show the results for the calculation of the Total Environmental Burden for the cotton roll system and the paper towel system for different options (average, best and worst practice, BAT).

Table 1 Total Environmental Burden for the cotton roll system [in µETP]

µETP	**CRT average**	**CRT best**	**CTR worst**	**CRT BAT**
Total (net)	637	415	1,627	288
Relative to CRT average	100%	65%	255%	45%
Cotton towel production	277	182	382	109
Laundering	276	157	1,130	107
Distribution	99	86	126	79
End of life	-16	-29	-10	-7

Table 2 Total Environmental Burden for the paper towel system [in µETP]

µETP	**VLP average**	**RCF average**	**VLP BAT**	**RCF BAT**	**VLP worst**	**RCF worst**
Total (net)	1,612	1,487	491	516	3,083	2,834
Relative to CRT average	253%	233%	77%	81%	484%	445%
Paper towel production	1,629	1,503	508	533	3,100	2,851
Distribution / bin liner production	146	146	146	146	146	146
End of life	-163	-163	-163	-163	-163	-163

The following figure (Figure 1) illustrates these results for the different options analysed.

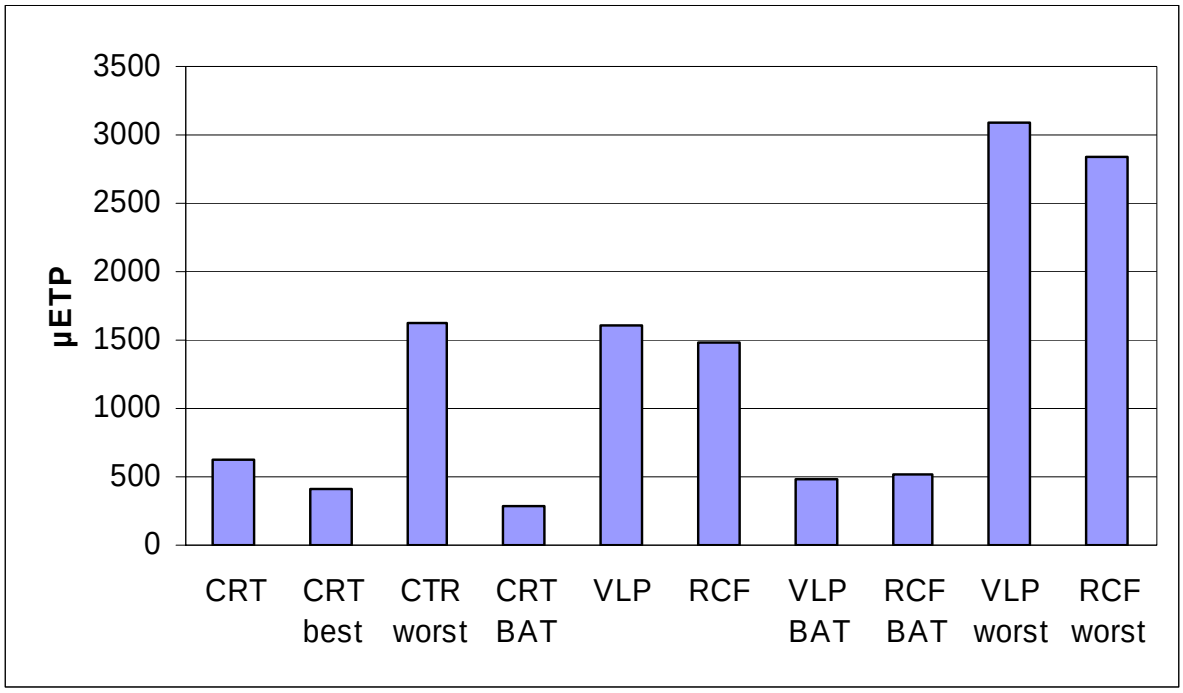

Figure 1 Total Environmental Burden for different options of the cotton roll system and the paper towel system for 10,000 hand dryings (standard scenario)

Having a look on the different process steps, one can see that regarding the cotton roll system the environmental impact caused by cotton towel production and laundering is in the same range for average and BAT. Regarding best practice the impact of cotton towel production is higher than that of the laundering, regarding the worst practice, it is vice versa: the impact of the laundering process is double as high as that of the cotton towel production. Distribution plays a less important role concerning the Total Environmental Burden. In respect to the paper towel system one can see that the most important step is the paper towel production for all options analysed. These results are illustrated in Figure 2.

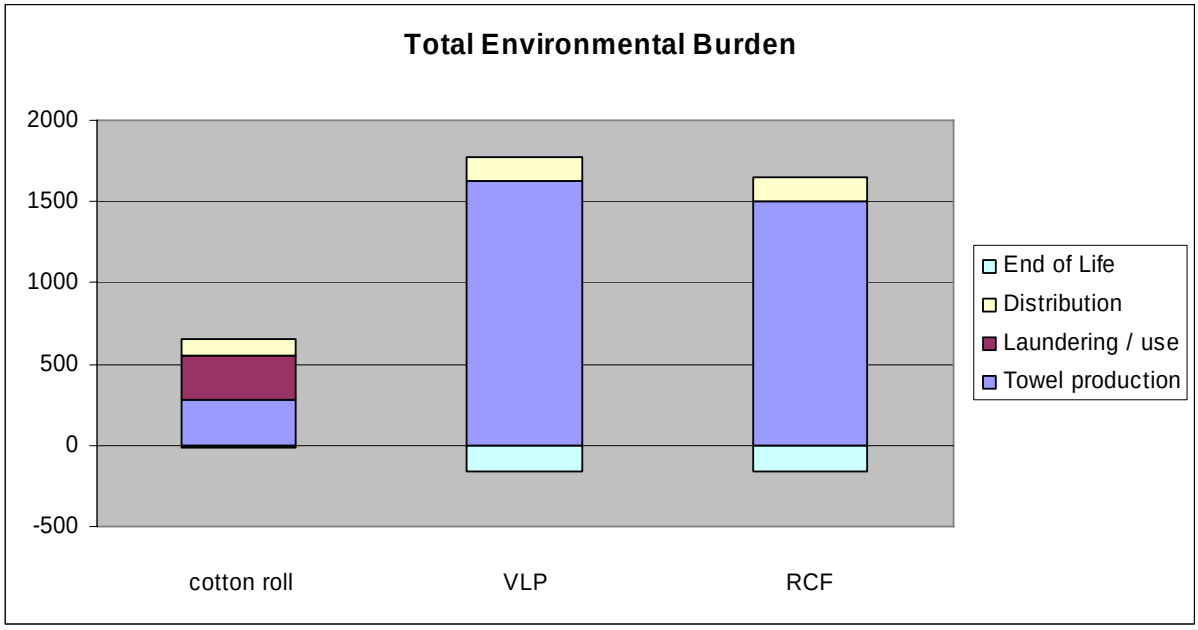

Figure 2 Total Environmental Burden for different life cycle stages for paper towel system (VLP, RCF) and cotton roll system (CRT) for 10,000 hand dryings (standard scenario)

Referring to the LCA results without taking the outlier into account (worst practice) the Total Environmental Burden of the cotton roll system (average) will be reduced to 596 µETP. The contribution of the different life cycle stages is displayed in Figure 3.

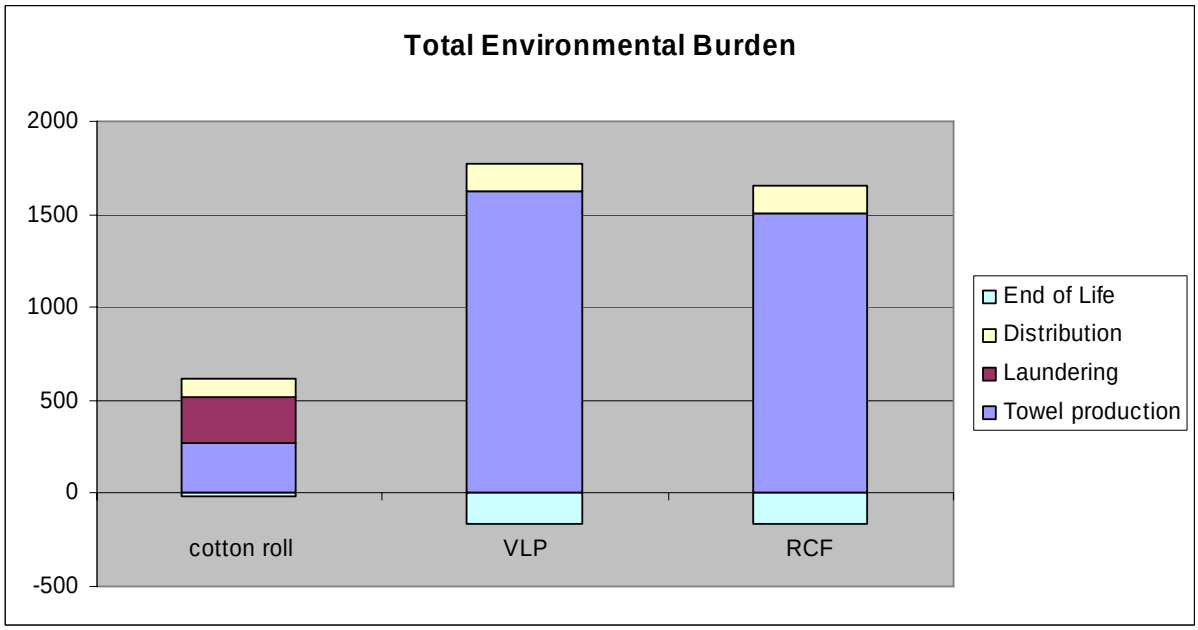

Figure 3 Total Environmental Burden for different life cycle stages for paper towel system (VLP, RCF) and cotton roll system (CRT) for 10,000 hand dryings (standard scenario) without outlier

3 References

Eberle / Möller 2005 — Eberle, U.; Möller, M.; Life Cycle Analysis of hand drying systems. A comparison of cotton towels and paper towels. Technical Report. Öko-Institut e.V., Freiburg 2005.

Möller et al. 2005 — Möller, M.; Bunke, D.; Gensch, C.-O.; Quack, D.; Vogt, P.; EcoGrade 2.0., Methodology Description, Freiburg 2005.