

PRODUCT ENVIRONMENTAL FOOTPRINT (PEF) CATEGORY RULES (PEFCR) FOR INTERMEDIATE PAPER PRODUCTS – OVERVIEW AND DISCUSSION OF IMPORTANT CHOICES MADE IN THE DEVELOPMENT

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Abstract: *Between 2013 and 2018, the paper industry, together with the European Commission and Non-Governmental Organisations (NGOs), developed the Product Environmental Footprint (PEF) Category Rules (PEFCR) for intermediate paper products as part of the EU Environmental Footprint (EF) pilot phase. Based on the recommended method for life cycle assessment (LCA) in a European context, the technical secretariat involving the majority of paper producers in Europe, but also with international contribution from Asia and Brazil, developed the product category rules (PEFCR). The process involved three stakeholder consultations and one common environmental footprint study of three average intermediate paper category grades, namely packaging paper, graphic paper and tissue paper. The PEFCR can be used by paper producers to quantify the environmental footprint of their intermediate paper products. This contribution presents an overview of the PEFCR and discusses some important choices made in the PEFCR.*

Key words: packaging paper, wood, Product Environmental Footprint (PEF) Category Rules (PEFCR), life cycle assessment (LCA), circular economy, paper pilot

1 INTRODUCTION

The pulp and paper industry in the European Union accounts for 34% of total wood material use (Cazzaniga et al 2019). In 2010, the globally direct energy- and process-related CO₂ emissions from the pulp and paper industry was 0.2 GtCO₂ yearly (Fischedick et al. 2014). This is equal to the CO₂ emissions in a country like Egypt (Janssens-Maenhout et al., 2017).

In 2013, the European Commission published their recommendation for a method to evaluate the environmental footprint (EF) of products (PEF) and organisations (OEF) based on the life cycle assessment method (European Commission, 2013). These methods are generic, appropriate for all kinds of products or organisations and important integrated tools in the transition to a circular economy. PEF and OEF enable the industry to document and communicate environmental performance of their product or organisation. However, in order to further enable the comparison of the environmental footprint for different products in the same product category, reduce the cost for assessment and increase relevance, the European Commission arranged a broad in scope development of Product EF Category Rules (PEFCR) and Organisation EF sector rules (OEFSR) between 2013 and 2018 (European Commission-Environment, 2018).

The PEFCR for intermediate paper products helps the paper industry reduce the cost of producing LCA-like studies, is an important contribution to the circular economy and makes it possible to compare products based on one measurement.

This contribution presents a general overview how the PEFCR was developed and some important aspects of the PEFCR, namely the representative product(s) (benchmark), allocation and system boundaries when recycling is involved as well as impact assessment indicators, normalisation and weighting (Schau and Jelse, 2014). Also, some limitations are presented and discussed.

2 ORGANISATION OF THE PILOT PHASE

The pilot project was led by the European Commission – DG Environment. A Steering Committee, with associated Technical Advisory Board, and Helpdesk to support the initially 27 Technical Secretariats (TS) were set up. Stakeholders not part of the TS had the possibility to influence category and sectoral rules in several public stakeholder consultations, organised as public meetings and/or online consultations (see for example Schau et al., 2016).

The Intermediate Paper Pilot was suggested by the Confederation of European Paper Industry (CEPI) and the TS had 40, mostly organisational, members.

3 METHODS AND DATA

In order to build on already existing Product Category Rules (PCR), for example, those under the ISO14025 umbrella (Environmental Product Declarations – EPDs), an initial overview of other PCRs, related to paper products were drafted (Schau and Jelse 2014). This identified gaps in the existing PCRs, such that these could not directly be used to develop the new PEFCR but could be used as underlying references. Differences identified were related to the representative product(s) (benchmark), system boundaries when recycling is involved, allocation, impact assessment indicators, normalisation and weighting (Schau and Jelse, 2014).

3.1 Environmental footprint of the representative European product(s)

A very useful (in many aspects) innovation in the PEFCR development is the use of representative product(s) and the EF study of this. The representative product is a real or virtual product on the European market, calculated by taking the weighted average of all existing product technologies/materials covered by the product (sub-)category (Zampori and Pant, 2019). In the paper pilot, there were three sub-categories, namely graphic papers (including newsprint), packaging papers and boards and tissue papers. The EF of these three virtual products were performed by the drafting group on behalf of the TS and discussed with stakeholders. The EF study of the representative products served to identify the most relevant life cycle stages, processes, elementary flows and impact categories. For other PEFCR (not intermediate), the PEF of the representative product serves as a benchmark and indicates the average performance of products in that category.

4 RESULTS

The PEFCR for intermediate paper products has been published and should be used by the paper industry to assess the environmental footprint of their products. Training materials, like e-learning tools based on the (almost finished) PEFCR have been developed to assist companies understanding the Environmental Footprint and to apply the PEFCR for intermediate paper products) https://ec.europa.eu/environment/eusds/smgp/PEFCR_OEFSR_en.htm#e-learnings).

The remaining of this paragraph presents some selected aspects of the PEFCR and discusses some important choices made in the PEFCR-development.

4. 1 Scope of the PEFCR of intermediate paper product

In contrast to most other EF pilots, the intermediate paper PEFCR does not include final conversion of the paper material into paper products, nor the use phase. For example, a packaging box is outside the scope, while the main material, the paper and packaging board used for producing the packaging box, is included in the scope (Ringman et al, 2018).

4. 2 Allocation of co-products

Pulp and papermaking from wood usually involves several different co-products along the value chain from forestry to end of life, with, eventually, heat and electricity production e.g. from the wasted paper. In the PEFCR for intermediate paper, allocation rules for the processes involved are described. For forest and saw mill operations and virgin pulping, physical allocation based on dry mass of the products involved shall be used. For the paper making process, subdivision should be used to avoid allocation; if this is not possible, then direct substitution (e.g., electricity or heat) shall be used (Ringman et al., 2018).

To ensure that electricity from renewable sources is not double-counted, for example, by using the same renewable electricity in the PEF declaration and to sell the same renewable electricity by contractual instruments (certificates like Guaranties of Origin) on the electricity market, the PEFCR provides detailed modelling guidance for situations where sub-divisions are not possible. These rules are, in principle, also valid for the co-product heat (Ringman et al, 2018).

4. 3 Allocation when recycled material is involved - Use of the EF Circular Footprint Formula (CFF)

The scope of the intermediate paper PEFCR does not include end of life, but recovered paper for recycling is an important “raw” material in many paper grades. Therefore, the PEFCR gives guidance on how to apply the EF CFF for intermediate products, where allocation between the previous paper product “life” and the intermediate paper product under study are involved. The formula to use for modelling the recycling content in the EU CFF is given as (Ringman, 2018):

$$(1 - R_1) \times E_V + R_1 \times \left(A E_{recycled} + (1 - A) E_V \times \frac{Q_{Sin}}{Q_P} \right) \quad (1)$$

In which:

A: allocation factor of burdens and credits between supplier and user of recycled materials.

E_V = specific emissions and resources consumed (per functional unit) arising from the acquisition and pre-processing of virgin paper (e.g., relevant upstream silvicultural, transport or wood processing activities, pulping without intermediate paper production; see Figure 1).

E_{recycled} = specific emissions and resources consumed (per functional unit) arising from the recycling process of the recycled (or reused) paper (e.g., collection, sorting, transportation, deinking, pulping without intermediate paper production; see Figure 1).

R₁ [dimensionless] = “recycled (or reused) content of the intermediate paper product”, is the proportion of material (dry weight) in the intermediate product that has been recycled from a previous system (0=<R1<=1).

Q_{Sin}: quality of the ingoing secondary material, i.e., the quality of the recycled pulp at the point of substitution.

Q_p: quality of the primary material, i.e., quality of the virgin pulp.

The parameter A is 0.5 for graphic paper and tissue paper, while 0.2 for packaging and board paper as well as other undefined intermediate paper material. Figure 1 shows the paper product system and E_v and E_{recycled} for paper production. The lines indicated with letters A – D show the discussed boundaries for E_v and E_{recycled}. Figure 1 indicates the result of discussion in the TS and with other stakeholders: The pulping is part of the virgin process (E_v) when it comes from virgin wood; however, when it comes from recovered paper (already used in another product life), pulping belongs to E_{recycled}. Q_{Sin}/Q_p is equal to 1 at the point of substitution; too short fibres have been sorted out in the cleaning and screening step of recycled pulp production (Ringman et al., 2018).

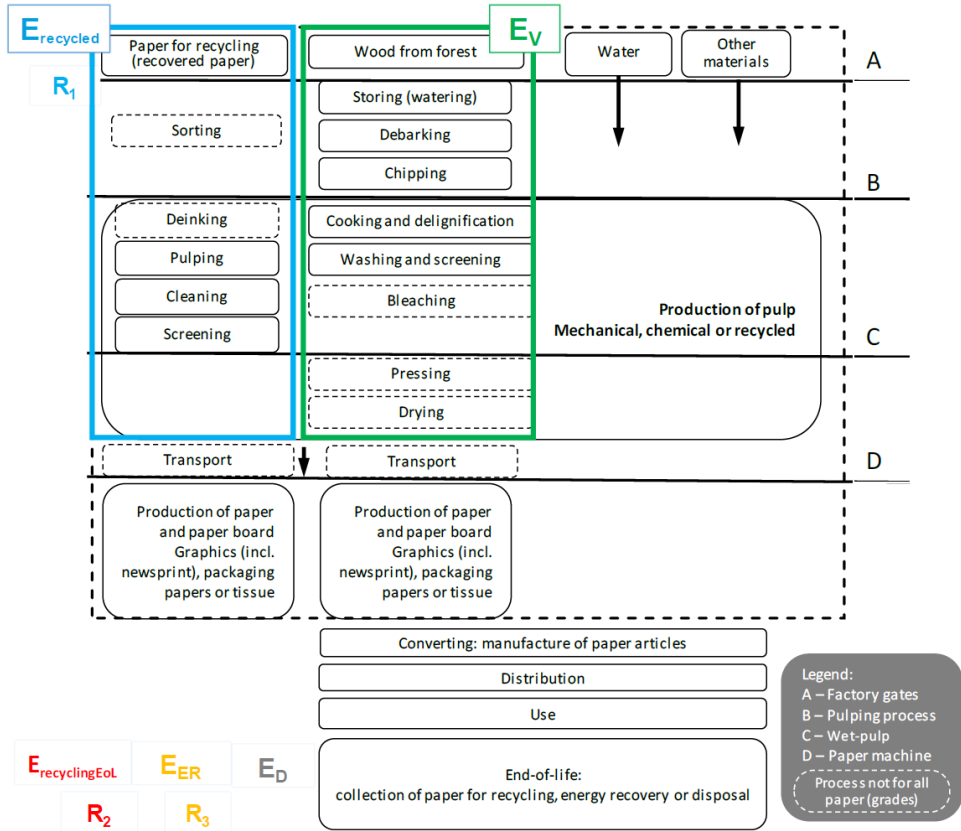


Figure 1: System boundaries for Evirgin (Ev) and Erecycled in the EU Circular Footprint Formula for intermediate paper (based on Ringman et al, 2018).

4. 4 Indicators

The PEFCR for intermediate paper products requires all 15 default EF impact categories like climate change, acidification and eutrophication (see Ringman et al, 2018, p. 33 for the full list) to be included. The indicators also cover, for example, particulate matter, ionising radiation and three different toxicity indicators that are often omitted in other Product Category Rules. In addition, the PEFCR requires information on biodiversity and chain of custody (Ringman et al., 2018).

The climate change impact category is divided into three sub-categories: 1) fossil, 2) biogenic and 3) land use and transformation. As an intermediate product, the biogenic carbon content at the factory gate (physical content and allocated content) shall also be reported as additional technical information.

4. 5 Normalisation and weighting

In addition to the 15 default EF impact categories as absolute values (characterised results), the PEFCR requires that normalised and weighted results (following the overall EF method, see Zampori and Rana, 2019) are displayed in the PEF profile. The aggregated single score shall also be included and the aggregated EF-compliant data set shall be made available on the EF data node (<http://eplca.jrc.ec.europa.eu/EFnode>). The latter considerably facilitates reuse and computerization of other EF studies that include intermediate paper products.

5 LIMITATION AND DISCUSSION

Small fractions of dust, particulate matter PM_{10} and $PM_{2.5}$, are not commonly measured in the pulp and paper industry, but are often only measured as total dust (Ringman et al 2018). As different sizes of dust have different impact on the human body – the smallest particles can reach the blood system and are therefore more dangerous than the more course particles that are stopped in the lungs (WHO, 2018) – this is a remarkable limitation. However, the pulp and paper industry underlies different national requirements, where only a few countries require measurement of $PM_{2.5}$, some of PM_{10} and most of the larger aggregated “dust” only (Ringman et al., 2018; Suhr et al., 2015). The PEFCR “recommended that further analysis be undertaken to obtain the specific size distribution for particle emissions from each site so that this impact category can be reported more accurately” (Ringman et al., 2018, p. 40).

The EF CFF operates with different A values for different intermediate paper products. The A value, not equal 0.5, in the EF CFF can be problematic when recycling at end of life is also included (following a whole paper product life). As one paper grade might be recycled into another, there is a possibility of over-crediting or under-crediting recycling in a paper product. Over-crediting would be the case where packaging and board paper ($A=0.2$) is recycled into tissue or newsprint papers ($A=0.8$). Opposite, there will be under-crediting, when tissue (rare) or newsprint, including graphic (more common), are recycled into packaging and board papers. However, this problem is up to the paper products PEFCRs (to be developed) to solve. A simple solution would be to require $A=0.5$ in such studies.

6 CONCLUSION

The PEFCR for intermediate paper products represents a large step in the direction of standardising LCAs of intermediate paper products. With the

PEFCR present, production of PEF studies can be computerised such that the cost of producing an LCA-like study (i.e., PEF of intermediate paper product) has been drastically reduced (on the scale of 1:10) (Without PEFCR, a typical cost to make a PEF study was 10 000 – 15 000 Euro. With the PEFCR and offline or online tool developed, the cost might be well below the 1500 Euro as commissioner Karmenu Vella, Commissioner to Environment, Maritime Affairs and Fisheries at the European Commission announced as a goal for each EF calculation at the mid-term conference on the environmental footprint pilot phase (http://ec.europa.eu/environment/eussd/smgrp/conference_2015_en.html). This opens the possibility for the pulp and papermaking industry to scale up environmental information of their products in order to reduce environmental impact and costs as well as gain market share as a green product. As such, the PEFCR is an important contribution to the circular economy and makes it easy to compare products based on one measurement.

However, as an PEFCR for intermediate paper product, further PEFCRs needs to be developed to include the whole life cycle of different paper product for the final consumer. In this regard, when the end of life is also included, the A factor, which allocates burdens and credits between supplier and user of recycled materials, should be revisited. Also, the limitations, like measurement of PM_{2.5} and PM₁₀ where this is missing, should be addressed.

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