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Integration of resource efficiency and waste management criteria in the implementing measures under the Ecodesign Directive

Final Executive Summary

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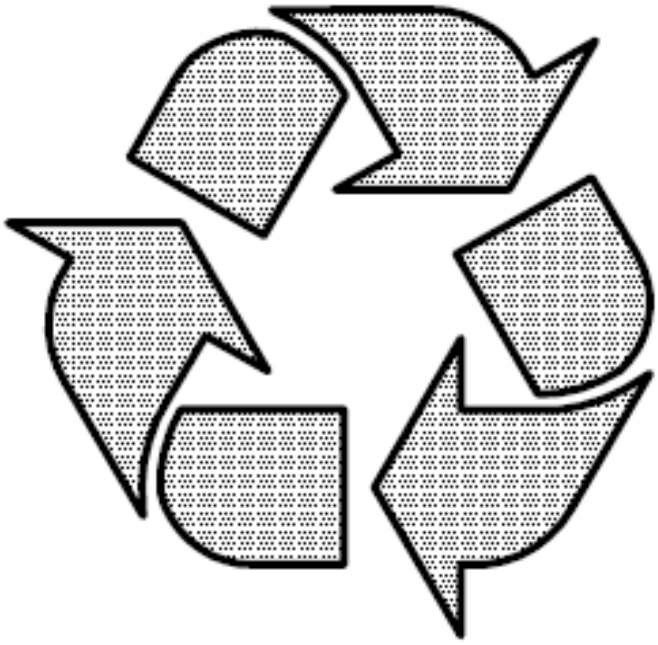

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Please, cite the report as: F. Ardente, M-A. Wolf, F. Mathieux, D. Pennington. *Final Executive Summary*. European Commission. Joint Research Centre. Institute for Environment and Sustainability. Final deliverable of the project "Integration of resource efficiency and waste management criteria in the implementing measures under the Ecodesign Directive" [1]. July 2011.

European Commission
Joint Research Centre
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JRC 66817

[1] Administrative Arrangement n° 070307/2009/546207/G2

FINAL EXECUTIVE SUMMARY

Overview of the project

The project develops the methodologies for the calculation and verification of the following 'parameters' for their potential use in the Ecodesign policies:

- Reusability/Recyclability/Recoverability;
- Recycled content;
- Use of priority resources;
- Use of hazardous substances.

The first step of the project (Deliverable 1) focused on the analysis of methodologies already published in the scientific and technical literature and the survey of the related European legislation. Successively, the methodologies for the calculation of the above mentioned parameter and a set of potential Ecodesign requirements have been discussed (Deliverable 2). Methodologies and the requirements have been illustrated upon a case-study: an internal Hard-Disk Drive for Desktop computer.

Finally the potential relevance and the environmental impacts related to the discussed requirements have been assessed (Deliverable 3).

The results of the project have been presented (Deliverable 4) in the Inter-DG Workshop held in Brussels – 8th July 2011. Details concerning the methodologies, the requirements and the case-study application are following described.

Reusability/Recyclability/Recoverability

Reusability/Recyclability/Recoverability (following 'RRR') are not 'physical' properties of the product but they are 'potentials' meaning 'engineering' properties related to the characteristics of the product and the available technologies. RRR cannot be directly measured (e.g. by a technical instrument or a laboratory test), but indirectly calculated.

Deliverable 2 introduced a set of indices[2] for the calculation of the RRR has been developed. Indices are structured as mass fraction [%] of the overall product's mass. The methodology represents an attempt to progress beyond ISO 22628, by including additional factors that

[2] It has been developed an index for each parameter: reusability, recyclability, recoverability. Also some combined indices (reusability/recyclability and Reusability/Recoverability) have been discussed in Deliverable 2.

influence RRR (e.g. disassembly/separation, contamination among materials, material recyclability).

Potential requirements on RRR include:

- Declarative requirements: the manufacturer has to declare for the product the values of the RRR indices;
- Threshold requirements: the product shall have a minimum value of the RRR indices.

The verification of the requirements can be based on self-declarations supported by technical documentation available before the product is put into the market and provided on request (e.g. a check by the competent body). The declarations of the manufacturer could be verified e.g. by a Market Surveillance Authority that can check the truthfulness of provided information and successively follow the calculation in the 'calculation data sheet'

Use of priority resources

The adoption of mass fraction indices for the calculation of the RRR causes the indices to be dominated by component with the largest mass. However, some materials can be not relevant in terms of mass fraction of the product, but to be relevant in terms of environmental potential benefits achievable by their recovery

According to the purposes of the project, the prioritisation of the resources focuses at identifying resources that can grant largest environmental benefits when reused/recycled/recovered. A new set of indices has been defined: the "RRR Benefit indices". These indices are calculated as percentage of the potential environmental benefits due reuse/recycling/recovery of the product divided by the maximum benefits achievable.

Potential requirements on RRR benefits include:

- Declarative and threshold requirements related to the RRR benefit indices (analogously to those of the above RRR indices);
- Requirements on disassembly of key components, which containing resources that can grant large benefits if recycled.

The verification of the above requirements can be based on self-declarations supported by technical documentation available before the product is put into the market and provided on request (e.g. a check by the competent body).

Recycled content

The recycled content is a physical 'property' of the product, related to its composition and manufacturing history including the entire supply-chain. Unfortunately, the recycled content cannot be directly measured on the final product but it can be only indirectly derived via collecting supply-chain information.

A Recycled content index has been developed by combining information from the BOM with additional information concerning the recycled content of each component and material.

Potential requirements on the recycled content include:

- Declarative requirements of the post-consumers recycled content of the product;
- Thresholds requirements of the post-consumers recycled content of the product.

The verification of the recycled content requirements is based on self-declarations of the manufacturer supported by technical documentation e.g. material flows declaration or chain of custody declaration from manufacturer and its suppliers.

Use of hazardous substances

The content of hazardous substances is a physical property of a product (or of a component) that can be directly measured by laboratory tests.

It is however noted that, the use of hazardous substances cannot be assessed as a stand-alone judgment but on a life cycle perspective (depending on the function of the substance in the product and the related life cycle impacts), because the presence of some hazardous substances can have a technical function that improve the technical performance of the product.

Potential requirements on the use of hazardous substances include:

- Declaration of the content of hazardous substances into a product (or some components);
- Requirements on disassembly of key components (those containing the hazardous substances);
- Maximum content (threshold) of hazardous substances

The verification of the requirement can be based on self declaration of the manufacturer, potentially verifiable by direct measurement (laboratory test).

Assessment of the proposed methodologies and the potential requirements

The last part of the study focused on the testing of the proposed methodologies, the analysis of the potential requirements and the assessment of their relevance for the HDD case-study.

The Life Cycle Assessment of the HDD, upon different assumptions and scenarios, illustrates that the use stage is the most relevant for some impacts (e.g. the Global Warming Potential, the Acidification Potential, the Ozone Depletion Potential, the Eutrophication Potential). However manufacturing and end-of-life are very relevant for some impact categories (e.g. Abiotic Depletion Potential – elements, Terrestric Ecotoxicity Potential, Human Ecotoxicity Potential and Freshwater Ecotoxicity Potential).

Furthermore, the majority of the impacts of the manufacturing are related to some specific components (the printed circuit board, identified as a "key component"). It is noted that some materials (e.g. gold in the circuit board), even if negligible in term of mass fraction, are relevant in terms of environmental impacts.

A selective end of life treatment of the 'key components' could grant relevant environmental benefits. This conclusion is also in line with the previous methodological discussion concerning the need of a prioritisation of resource for the assessment of reusability/recoverability/reusability of the products.

It has been concluded that some requirements concerning the recyclability of the products are potentially relevant. In particular, the improvement of the disassemblability of the printed circuit board has been identified as a relevant issue for the improvement of the end-of-life performance and therefore of the life cycle environmental performance of the HDD. The improved selective recycling of the circuit board could produce large environmental benefits in terms of relevant reductions of the Abiotic Depletion Potential (elements), Freshwater Aquatic Ecotoxicity and Terrestric Ecotoxicity.

Other potential requirements concerning the reusability/recyclability/recoverability have been found not relevant in the HDD case-study, and in particular:

- Requirements based on the mass index for the recyclability are not relevant because they are not addressed to the key materials/components;
- Requirements on the reusability could interfere with the product's energy consumption or the technological development of the product (e.g. the miniaturisation of the components);
- Requirements on the energy recoverability are not relevant because the low content of energy recoverable parts.

Requirements on the 'recycled content' could be addressed to plastics used in the products. However, due to the low content of plastics in the HDD, recycled content requirements were found not relevant.

Analogously the low content of hazardous substances in the HDD does not justify the potential introduction of specific requirements.

European Commission

Joint Research Centre – Institute for Environment and Sustainability
Title: *Final Executive Summary*
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Abstract

The executive summary illustrates the main outcomes of the project. The first step of the project (Deliverable 1) focused on the analysis of methodologies already published in the scientific and technical literature and the survey of the related European legislation. Successively, the methodologies for the calculation of the above mentioned parameter and a set of potential Ecodesign requirements have been discussed (Deliverable 2). Methodologies and the requirements have been illustrated upon a case-study: an internal Hard-Disk Drive for Desktop computer.

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