



Bridging Document to support the PEF methodology integration in other environmental management tools

DELIVERABLE ACTION B5

SARA



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1. Introduction

Globally, concern for the environment is rising and companies are increasingly interested in demonstrating to consumers and other stakeholders that their activities are environmentally friendly, both in terms of goods and services produced and offered and as organisations. This highlights the importance of not only using reliable methods to measure the environmental impact of products, but also of adopting uniform methods in which environmental information is communicated to consumers. In 2013 the European Commission approved a recommendation (n.179 / 2013) that introduced the Product Environmental Footprint (PEF), aimed to provide a common methodology for measuring and communicating the environmental footprint of products and organizations based on various criteria that describe the environmental performance of a product or service throughout its life cycle. The PEF is primarily aimed at providing the analyst with detailed technical guidelines to carry out the LCA, so that the studies and results conducted by different analysts on similar products can be compared more easily. The overarching purpose of the PEF information is to reduce the environmental impacts of goods and services taking into account supply chain activities (from extraction of raw materials, through production and use and to waste management). This purpose is achieved through the provision of detailed requirements for modelling the environmental impacts of the flows of material/energy and the emissions and waste streams associated with a product throughout its life cycle. The rules provided by the PEF method enable to conduct PEF studies that are more reproducible, comparable and verifiable, compared to existing alternative approaches. However, comparability is only possible if the results are based on the same Product Environmental Footprint Category Rules (PEFCR).

The EFFIGE project supports the European Commission in the dissemination of the PEF method, which has become a top priority in the European policy agenda on Circular Economy.

EFFIGE applies this method in four manufacturing sectors – foundries, furniture, agro-food and catering – involving many companies that operate in these businesses. The 15 companies that participate in the project will also be involved in improving the environmental footprint of their products and services by planning strategic actions aimed to create more sustainable products and

features that can make them more competitive. EFFIGE developed PEFCRs for each product category involved in the project, and is testing these rules in 15 pilot companies.

2. Background

The European Green Deal is a new growth strategy that aims to transform the EU into a fair and prosperous society, with a modern, resource-efficient and competitive economy. The European Green Deal launched a concerted strategy for a climate-neutral, resource-efficient and competitive economy. Scaling up the circular economy from front-runners to the mainstream economic players will make a decisive contribution in decoupling economic growth from resource use, while ensuring the long-term competitiveness of the EU and leaving no one behind. Companies and consumers play a key role in the transition to a Circular Economy:

- Businesses, working together on creating a framework for sustainable products, will provide new opportunities in the EU and beyond;
- Consumers have an enormous impact on the transition to a circular economy through their purchasing choices, but they need access to reliable information in order to be able to play their role in the circular economy to the full extent.

PEF implementation can support companies to adopt more sustainable production methods and consumers in the purchase of truly sustainable products. But the PEF methodology is just one of the European tools that can be adopted to achieve the new Green Deal objectives. There are many European tools aimed to reduce the environmental impacts of production and increase trust among companies, consumers, institutions and other stakeholders. Among these, there are environmental management systems and the eco-labels. The most common are the Ecolabel Regulation (EC) No 66/2010 (EU flower), the ISO14001 certification, the EMAS Regulation and the Green Public Procurement. These tools have different levels of diffusion: the Ecolabel is leader in some product categories such as cleansing soaps or paper, EMAS and ISO14001 introduced an environmental management system in Europe and in the world. Green Public Procurement is a voluntary

instrument that plays a key role in the effort of the EU to become a more resource-efficient economy. In addition to these tools, there are different methods used for calculating the environmental footprint of products and services. In this context, the PEF method represents an opportunity to integrate all these tools for a more effective environmental management and to harmonize the methodologies for the evaluation of environmental performances from which labels and claims emerge.

There are many similarities between these tools. Both the PEF and the Ecolabel aim to reduce information asymmetries in the market and to increase the quantity and quality of information available to consumers for defining their purchasing decision. The last update of EMAS and ISO14001 standard clearly refers to the Life Cycle perspective and encourages companies to consider their impacts in all phases of production (inside and outside of the plan).

Researches have demonstrated that the PEF methodology can be further implemented and integrated. For instance, the JRC (2019)¹ identified suggestions for “potential application” of the PEF:

- *In-house applications: optimisation of processes along the life cycle of a product; support to environmental management; identification of environmental hotspots; support for product design minimising environmental impacts along the life cycle; environmental performance improvement and tracking.*
- *External applications: (e.g. business to business (B2B), business to consumer (B2C)): responding to customers and consumers demands; marketing; co-operation along supply chains to optimise the product along the life cycle; participation in 3rd party schemes related to environmental claims or giving visibility to products that calculate and communicate their life cycle environmental performance.*

European stakeholders also confirmed the need to integrate the PEF with other tools. A survey conducted by the EC during the PEF pilot demonstrated that different stakeholders believe that the

¹ Zampori, L. and Pant, R., Suggestions for updating the Product Environmental Footprint (PEF) method, EUR 29682 EN, Publications Office of the European Union, Luxembourg, 2019, ISBN 978-92-76- 00654-1, doi:10.2760/424613, JRC115959.

PEF should be used in conjunction with other tools. The 291 respondents) affirm that the PEF/OEF methods can be used as common knowledge basis in the existing or new policies and can provide requirements on how to communicate to consumers, businesses and other stakeholders (source EC: Sustainable Products in a Circular Economy 2019).

In the past, all cited tools have demonstrated to support organizations in improving their environmental performance, reducing costs, including workers and, more recently, these tools are appreciated by consumers. Surely, companies can further improve their own environmental management and products by integrating the PEF methodology with ecolabels and the environmental management system (EMS). The scope of this guideline is to support companies with this integration process.

This guideline lists the main linkages between the PEF, Ecolabels, EMS and GPP and describes the advantages that can emerge from their integration.

3. Environmental management tools

Companies can adopt different types of tools to measure, manage, improve and communicate their environmental performance. There advantages of environmental management are many, and include: cost savings, ensuring legislative compliance, anticipating future legislation, reduced environmental risk, meeting supply chain requirements, improved relations with regulators, improved public image, increased market opportunities, etc.

Environmental management provides the implementation of tools related to the company's processes or specifically for products.

One of the main tools that describes the sustainability of a product is the "Ecolabelling", a voluntary method of environmental performance certification and labelling that is adopted around the world. The EU Ecolabel is a label of environmental excellence that is awarded to products and services that meet high environmental standards throughout their life-cycle: from raw material extraction, to production, distribution and disposal. The EU Ecolabel is a voluntary scheme, which means that

producers, importers and retailers can choose to apply for the label for their products. The EU Ecolabel logo makes it simple to know that a product or a service is both environmentally friendly and of good quality. Established in 1992, it is a multi-criteria approach recognized and applied throughout Europe. It ensures that improvements are addressed for the main environmental impacts caused by products throughout their life cycle (EC 2019). EUF is an important element of the SCP/SIP Action Plan of the EU, and for many years, it has been the only concrete EU-wide tool that set product design targets (EC 2010; BEUC 2014).

More details on the EU Ecolabel can be found here: <https://ec.europa.eu/environment/ecolabel/>.

Another tool to monitor the sustainability of a product is the “Life cycle assessment (LCA)” a *cradle-to-grave* or *cradle-to-cradle* analysis technique to assess the environmental impacts associated with all stages of a product's life – i.e. from raw material extraction through materials processing, manufacturing, distribution, and use. LCA is a field that has grown considerably over the past two decades. It is an important tool to support decision-making processes and it is used in the environmental management context to identify alternatives with low environmental impacts. In recent years, the increasing demand for LCA-based product declarations, such as Environmental Product Declarations, has generated a need for setting rules for making declarations on products within the same category. These rules are defined as Product Category Rules (PCRs) in ISO 14025, Product Rules in the GHG Protocol Product Life Cycle Accounting and Reporting Standard and Supplementary Requirements in PAS 2050.

Starting from this method, the European Commission developed the “Product Environmental Footprint” (Rec. 179/2013). The aim of the PEF is to set the basis for a better reproducibility and comparability of results.

Many other details on the PEF can be found here: https://ec.europa.eu/environment/eussd/smgp/ef_pilots.htm.

At the national level, the most recent approach for products environmental assessment is the “Made Green in Italy (MGI)” (<https://www.minambiente.it>), introduced by National Law n. 221/2015. It is **fully based on the Environmental Footprint method** and it adopts Rec. 2013/179/CE and the following guidelines. An operational Regulation has been issued by the Ministry of the

Environment to enact and apply the Law. MGI is applicable to **all products** (goods and services) **originating in Italy**. According to the *EU regulation 952/2013*, **an applicant company can participate in the scheme if:**

- *The product can be classified as «**Made In Italy**» (Eu Reg. 952/2013)*
- *A specific Category Rule has been developed for the submitted product (otherwise, the applicant may develop one)*
- *It carries out a PEF study in line with all the applicable rules (Rec. 179, EC guidelines, National operational Regulation, Category rules),*
- ***It performs at least average (B) against the «3 levels» benchmark***
- ***It pursues and achieves a continuous improvement of the product footprint (main impact categories), if not in the «best class» (A): in case of a B performance, a specific Program for the continuous improvement of environmental performance must be sent to the Scheme manager. Failure to achieve the improvement objectives is a reason for not renewing the certification.***
- ***It positively concludes the external verification process***
- ***It communicates the PEF results to the stakeholders,***
- *It updates the PEF study.*

Environmental Management System (EMS) is the most common management tool. EMS is a set of processes and practices that enable organizations to reduce their environmental impacts and increase their operational efficiency. This EU web site provides information and resources related to EMS for small businesses and private industry, as well as local, state and federal agencies.

Environmental management systems enable firms to manage their environmental impacts in a planned and systematic way and to identify ways of improving their environmental performance that most benefit their business performance. This chapter focuses on the requirements of two EMS schemes: 1) ISO 14001, the international environmental management system standard and 2) EMAS, the European Community's eco-management and audit scheme.

For more details on EMAS: https://ec.europa.eu/environment/emas/index_en.htm

For more details on ISO14001: <https://www.iso.org/iso-14001-environmental-management.html>

Green Public Procurement (GPP) is another voluntary instrument, which means that member states and public authorities can determine the extent to which they implement it. Through GPP, public authorities seek to procure goods and services with a reduced environmental impact compared to similar goods and services with higher impact that would normally be procured. GPP stimulates demand for more sustainable goods and services which otherwise would be difficult to get on the market. GPP is therefore a strong stimulus for eco-innovation. Details on GPP are available at: https://ec.europa.eu/environment/gpp/index_en.htm

4. Synergies among the PEF and other European tools to increase environmental sustainability

4.1 Integration between PEF and EMS

The integration of the PEF methodology with EMS can be very useful. A relatively large number of companies has started to incorporate more explicit environmental considerations in their product development as a result of EMSs. Some authors have emphasized the potential integration between the life cycle dimension and some of the key processes and activities of environmental management: the environmental initial review (Baldo 2001), the environmental policy and programmes (Pujari, Wright, 1999), audit (Carnimeo et al. 2002) etc.

PEF and OEF are multi-criteria measures of the environmental performance of a product or service and of an organization throughout its life cycle. The information produced by PEF and OEF has the overarching purpose of seeking to reduce the environmental impact taking into account supply chain activities (from extraction of raw materials, through production and use, to final waste management).

PEF/OEF can accommodate a broader set of relevant environmental performance criteria using a life-cycle approach. A life-cycle approach takes into consideration the spectrum of resource flows and environmental interventions associated with a product or an organization from a supply chain

perspective. It includes all stages from raw material acquisition through processing, distribution, use, and end-of-life processes, as well as all related environmental impacts, health effects, resource-related threats and burdens to society. Based on this assumption, in 2015 the ISO Standard introduced the life cycle perspective in the ISO14001 certification for environmental management systems. Likewise, the European Commission (2018) has integrated the contents of EMAS regulation to the new version of ISO14001:2015 and introduced the LCA as a tool to assess the impact of organizations. According to the ISO14001:2015, (0.2 Aim of an environmental management system) Life cycle perspective is *“A systematic approach to environmental management that can provide the top management with information to build success in the long term and create options for contributing to sustainable development by controlling or influencing the way an organization’s products and services are designed, manufactured, distributed, consumed and disposed by using a life-cycle perspective that can prevent environmental impacts from being unintentionally shifted elsewhere within the life cycle”*. Therefore, in the context of EMSs, the term life cycle refers to the consecutive and interlinked stages of a product system from the acquisition of raw materials to end-of-life disposal. Furthermore, organizational environmental analysis approaches have begun to emerge. Companies have started to analyze the environmental impacts considering not only the production phase. For example, the calculation of the carbon footprint of corporations was included in the Greenhouse Gas Protocol initiative (WRI and WBCSD, 2004, 2011a) and it is an impact assessed by the life cycle assessment. The interest to assess direct and indirect environmental impacts and the need to become an EMAS or ISO14001 organization compliant with new requirements encourages the adoption of PEF/LCA. Several advantages arise from the integration of LCA/PEF in an EMS, such as: standardised methodology, possibility of inclusion of quantitative information, presence of some methodological steps enabling the verification of the data collected, results reproducibility. The scientific literature considers the PEF/LCA methodology as a tool for identifying and assessing the impacts in the environmental management systems. The adoption of LCA and PEF in an EMS allows to better identify and quantify the direct and indirect impacts of organizations inside and outside the production site. For instance, some of the impacts could be neglected if only a gate-to-gate perspective is considered (Lewandowska et al., 2011).

By introducing the PEF methodology, European organizations can be supported in the compliance

with EMAS and ISO14001 requirements not only with regard to the assessment of direct and indirect environmental impacts. The integration between PEF and EMS can support organizations in the definition of their environmental improvement plan. The PEF/LCA results identify the main significant productive phases and impact categories. Therefore, EMAS/ISO14001-registered organizations can identify additional improvement objectives based on the PEF/LCA results. Their improvement plan can be integrated with improvement actions aimed to achieve better performance concerning one or more impact categories in specific productive phases. These improvement actions can affect the technologies adopted, procurement, packaging, transport, procedures and others.

Another synergy between EMS and PEF relates to data collection for the initial review and data processing for the measurement of the footprint of products. The data collected in the environmental initial review can be valorized for the PEF/LCA data processing, one of the main barrier to footprint implementation (Testa et al., 2016). EMAS/ISO14001 organizations can modify the approach for data collection to valorize the environmental information both for the PEF study and for monitoring the impacts of environmental organizations. In addition, the data input for PEF/LCA can enrich the information introduced in the initial environmental review defining additional indicators for monitoring the environmental performance of organisations. For instance, PEF results on Climate Change (GWP 100) can be filled in the environmental analysis to demonstrate the yearly progress by EMAS or ISO14001 organizations.

PEF is used in decision-making processes, product development and marketing activities. The PEF methodology may be used for supporting the identification of 'hot spots' in the value chain or in the initial analysis of EMS and for measuring progress towards sustainability targets. It is important for companies to find common ground on how to implement these approaches, which data assessments and impact assessments should be used and how results should be interpreted. ISO14001:2015 and EMAS introduced some rules to implement the life cycle prospective for decision-making process and to involve different stakeholders. The ability to create meaningful and easily understandable results is essential in order to increase the acceptability and applicability of the methods, and to mainstream their use in different decision-making situations, that may include for example product and process development, supply chain management,

investment decisions, marketing and responding to stakeholder requests. The integration of PEF in the EMS can contribute to identify the most innovative solution for a greener production. The PEF method identifies the most relevant productive life stages where the organization should improve its environmental performance. In addition, the PEF allows to compare different technologies, raw materials, packaging and transport solutions to identify those with less environmental impact. This process can make EMS flexible and dynamic, able to quickly identify the most innovative and efficient choices for the organization. PEF/LCA integration with EMS can “drive” a decision-making process towards environmentally less impacting solutions.

4.2 PEF integration with the EU Ecolabel

The PEF is also used for communication and ecolabelling. Opinions of experts involved in the PEF pilot phase diverge on this matter. For instance, some of them support the development of different approaches for business-to-consumer (B2C) and business-to-business (B2B) communication (Vincent-Sweet et al. [2017](#)). Others assume that a more beneficial use of the PEF would be to support existing ecolabels or to be applied only for, e.g., in-house product improvement (Bach et al. [2018](#)). Being a market-based policy instrument, the EU Ecolabel depends on market actors’ awareness, recognition and trust. Provided that market data has been collected, the measurement of the environmental impact of products can be performed either by conducting an LCA study or by relying on the available literature. Obviously, a complete LCA/PEF study is more expensive in terms of human and financial resources (including costs for software, purchase of data or external experts/reviewers) and in terms of time needed compared to a simple literature research. A background document issued by DG ENV (EC [2018a](#)) very briefly indicated options to integrate the PEF in the existing policies. One of the options scratches upon the interlinkage with EU flower in two directions:

1. application of PEF as a hotspots identification method of new ecolabel awarding criteria and
2. integration of PEF results into conditions for award and communication.

1) The main synergy between the EU Ecolabel and the PEF relates to the PEFCR role as a guide

for environmental impact assessment and hot spots identification (Minkov et al., 2020). The PEF study could be conducted based on a PEFCR, which complements the general methodological guidance for a PEF study by providing and fixing product-specific LCA rules for a particular product category (EC [2018b](#)). So the organization, integrating the PEFCR, that identified all life cycle stages with the EU Ecolabel criteria, guarantees a complete environmental profile of the product to register under the EU flower.

- 2) In a recent study of the PEF communication method (2019) the EC assessed the integration of EU Ecolabel (EU Regulation No. 66/2010) certification with some PEF results. The research demonstrated that the PEF/LCA methodology can support the EU Ecolabel providing information on the main impact categories to consumers. Consequently, while the EU Ecolabel signals which products are “best in class” in terms of environmental performance (i.e. product either have an Ecolabel or not), the PEF information allows for a more fine-grained comparison of the environmental impact of products (whether performing well or not) within a specific category.

4.3 PEF integration with national tools

In Member States with weak national ecolabels, the EU Ecolabel should adopt a more proactive and comprehensive communication strategy to act as the main methodology for labels on product environmental performance. European labels harmonization should be based on the PEF methodology that can be integrated with other EU policies. This process should be encouraged and supported with a common communication strategy to improve the market of green products.

A first example of national environmental scheme that adopts the PEF method is the “Made Green in Italy” scheme that aims at promoting and communicating the environmental profiles of Italian products. It represents a first experience of PEF integration in a national tool for product environmental qualification. It is fully based on the Environmental Footprint method and adopts



Rec. 2013/179/CE and the following guidelines. The Italian scheme provides product category rules (RCP) for each “Made Green in Italy” registered product. If a PEFCR published at the European level is available, the RCP shall use it and integrate it with additional requirements. The organizations that register their own products under the scheme receive the opportunity to publish the “Made Green in Italy” logo. This logo is assigned and must be placed on the product. A bi-dimensional bar code is used to lead the consumer to a landing page with an EPD-like detailed declaration. This logo valorises the environmental features of product and shows the company’s commitment to the environment. The Product Environmental Footprint Declaration required by “Made Green in Italy” includes a description of the environmental performance of a product through data and indicators (certified by an external verifier). In addition, the “Made Green in Italy” logo can be associated to a claim based on the PEF results that the Italian Environmental Ministry verifies and approves.

The “Made Green in Italy” scheme also includes 3 benchmark levels to classify a product based on its environmental footprint. The products classified in the lower levels (B and C) should pursue and achieve a continuous improvement of the product footprint (main impact categories) through the planning and implementation of an improvement plan. An external verifier monitors the implementation of the improvement plan and the progress of the product’s environmental footprint.

Therefore, the “Made Green in Italy” is an “exercise” of tools integration; it combines the life cycle prospective, the continuous environmental improvement and the external checks by independent verifiers (liked to EMS). Finally, Made Green in Italy supports the communication with consumers including a logo, the Product Environmental Footprint Declaration and claims that describe the product environmental performance.

4.4 PEF integration with GPP

Life cycle assessment has been identified as an important source of environmental information in public procurement (European Commission 2016), and the PEF method based on LCA seeks to provide even more reliable information (Nissinen et al. 2019). Public agencies can contribute to

Sustainable Consumption and Production by implementing Green Public Procurement (GPP), an instrument that municipalities or provinces can use voluntarily to purchase green products. The European Commission recommendations, guidelines and reports can be used to determine the cases in which the overall PEF data could be used for product comparison, supporting the public administrations in the products selection. For public authorities, sustainability criteria must go beyond environmental impacts, and must also include social, humanitarian and economic aspects. Weighting and characterisation of environmental criteria based on the differences in environmental impacts are therefore a must (Brankley,2017). LCA/PEF benchmark values can improve European Green Public Procurement (GPP) criteria and it can also support stakeholders with sustainable strategies improving the product environmental performances. LCA/PEF could also support the GPP verification process made by public administrations. For instance, LCA-based criteria are required in the optional EU-GPP for “Office Building Design, Construction and Management” (Dodd et al., 2016), including the environmental evaluation of impacts during all stages of the buildings life cycle (production of materials and elements, construction, use stage and end of life), promoting the application of a cradle-to-grave LCA. This approach can be replicated in each Member State to improve the GPP market. The inclusion of LCA/PEF benchmark values in GPP criteria can stimulate the market, making available transparent LCA/PEF data and facilitating the integration of LCA/PEF in the GPP criteria. Consequently, LCA is implemented in public tenders to benchmark products in terms of their environmental performance. Using LCA helps to reduce the environmental impact by, for instance, increasing the percentage of recycled materials or reducing transportation distance.

5. Advantages of PEF integration with other environmental management tools

LCA plays a major role in promoting the basic principles of sustainable development LCA as a business tool is well established and is widely used by goods and services industries. Car manufacturers such as BMW and Volvo use LCA techniques to compare methods and materials to make their vehicles more sustainable and to reduce the generation of hazardous waste in both the

manufacturing and disposal phases. Chemical companies such as Dow, 3M, BASF, Unilever and Bristol-Myers Squibb use LCA as a means of testing their products (actual and anticipated) for legal compliance and for eco-friendliness. Samsung Electronics used LCA to study the environmental performance of a colour computer monitor. The tool is thus well established as a mechanism and proven as a credible contributor to the business decision-making process. The PEF adopts a life cycle approach, which takes into account the product's entire range of resource flows and environmental interventions throughout its life cycle, that is, throughout all stages of a product system. The integration of PEF in the business strategy for environmental management allows companies to achieve some important advantages such as:

1. Support the eco-innovation development
2. Increase consumers' trust by improving the communication methods and introducing details linked to eco-labels
3. Improve the market (GPP market too) supporting product comparison

PEF Guide (EC, 2013) explains that the interpretation of the results of a PEF study serves two purposes: i) to ensure that the performance of the PEF model corresponds to the goals and quality requirements of the study; in this sense, PEF interpretation may inform iterative improvements of the PEF model until all goals and requirements are met; and ii) to derive robust conclusions and recommendations from the analysis, for example in support of environmental improvements. PEF results can drive companies in the adoption of eco innovation solutions. PEF results represent internal input to improve the environmental performances and to spread an environmental culture. PEF results include all productive phases.

Accordingly, the Communication on *A European Consumer Agenda - Boosting confidence and growth* posited that consumers should have access to non-misleading information about the environmental impacts of products throughout their life cycle stages and they should be able to easily identify the most environmentally friendly choice. If producers do not provide complete, correct and easy-to-understand information on the life-time environmental performance of their activities and products, and if it is costly and time-consuming for clients and consumers to acquire that information, this asymmetry may lead to better performing organizations not being properly

valorized in the market. This problem causes misleading communication on environmental performance on the market. To solve this problem, the EC adopted the PEF methodology. PEF information can help to inform consumers on the purchasing choices that should be made. Using a life cycle approach, the PEF method can also be used to calculate and communicate the percentage contribution of different life cycle stages to the total. So, rather than providing a qualitative claim regarding the life cycle stage in which most of the product's environment footprint is made, it is also possible to provide more complete insight into the relative contribution of the different life cycle stages – (1) raw material acquisition and pre-processing, manufacturing, distribution, use and end of life – to the total environmental footprint of the product.

The integration of PEF into the communication strategy of companies has two objectives: to encourage consumers to buy green products through the publication of information on environmental performance and to encourage consumers to adopt greener behaviors. In most cases, the PEF information enabled more fine-grained product comparisons on environmental aspects and the identification of the single best performing product within a product set. As demonstrated by an experiment of EC where the PEF information was present, products with better-than-average PEF performance were selected in 35,8% of the cases. The same products were selected in only 24,3% of the cases when the PEF information was not provided despite the presence of other eco labels (source EU 2019).

Concerning consumer behavior, the communication of PEF results can encourage the adoption of a greener "lifestyle". The purpose of providing the PEF information would be to make consumers more aware, for example, of their own contribution to the environmental performance of products and to act upon this knowledge. As an example, for shampoos and detergents, the use phase (e.g. the quantity of product that should be used, the water temperature to be set for washing) has a relatively strong impact on the total environmental performance. Providing this information might promote more conscious usage behavior.

The information provided by the PEF can thus strengthen the presence of eco-labels and claims or enrich the communication documents in EMS. EMAS Environmental statement can include PEF results to demonstrate to consumers and stakeholders the main hot spots of the products and the

improvement yearly achieved .

Finally, the PEF integration with other tools offers additional assurance to consumers and public institutions on the environmental performance, supporting their purchasing choices and creating a market where product can be compared.

Despite the many advantages emerged from the PEF integration with other tools, there are also some barriers to the adoption of this methodology. The main one is represented by the low knowledge of this methodology by companies that adopt other environmental management tools. For instance, a research among 31 EMAS companies and 14 cleaning and personal care Ecolabel companies in Emilia Romagna (2018) has demonstrated that 52% of these companies have only heard of PEF while 13% know nothing about it and only 10% attended projects and experiences on PEF. In addition, there are still many barriers concerning the adoption of LCA, such as the data availability, the costs and its promotion in the market (Testa et.al, 2016).