Nissinen, Ari; Suikkanen, Johanna; Salo, Hanna

Book

Product environmental information and product policies : how Product Environmental Footprint (PEF) changes the situation?

Nordic Council of Ministers

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Ari Nissinen, Johanna Suikkanen and Hanna Salo

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Contents

Definitions 7

Foreword 9

Summary 11

1. Introduction and the aim of the report 15
   - 1.1 Product environmental information and the new footprint: the Product Environmental Footprint 15
   - 1.2 Life Cycle Assessment LCA 15
   - 1.3 Eco-labels 16
   - 1.4 A focus on environmental performance and more coordinated actions 17
   - 1.5 The aim of the report 18
2. Material and methods 19
3. Types of Product Environmental Information PEI 21
4. Environmental information basis in the policy instruments of IPP, SCP and the CE 23
   - 4.1 Product environmental information in IPP, SCP and the CE 23
   - 4.2 Product environmental performance and product policy instruments 24
   - 4.3 The present environmental information basis for each policy instrument of IPP, SCP and the CE 25
5. The Product Environmental Footprint PEF 35
   - 5.1 Properties of the PEF that are under development 36
   - 5.2 Plans for updating the method 38
6. The past challenges of LCA and the potential of the PEF 39
   - 6.1 The challenges of LCA and the PEF 39
   - 6.2 The PEF as an Environmental Product Information Scheme EPIS 43
   - 6.3 Can the PEF be required from manufacturers? 46
7. Three analyses about eco-design tools and the relations between the PEF/OEF and the Nordic Swan Ecolabel 47
   - 7.1 Product Environmental Information PEI in eco-design in companies 47
   - 7.2 Differences and possible synergies between the PEF and the Nordic Swan Ecolabel 49
   - 7.3 Differences and possible synergies between the OEF and the Nordic Swan Ecolabel 53
8. Considerations about the use of the PEF in policies 57
   - 8.1 The background document for the EU stakeholder meeting, 26 April 2018 57
   - 8.2 EC staff working document from March 2019 58
   - 8.3 The feedback from a Nordic expert workshop 59
   - 8.4 The idea about a common information basis 62
9. Conclusions 63

Sammanfattning 65

References 69

Definitions

CE	Circular economy, https://ec.europa.eu/growth/industry/sustainability/circular-economy_en
Criteria information	See Chapter 3 "Types of product environmental information"
EC	European Commission
EDD	Ecodesign Directive
EF	Environmental Footprint
EMS	Environmental management system (ISO 14000)
EPD	Environmental product declaration (ISO 14025)
EPIS	Environmental product information scheme
EU	European Union
Green products	This is used as a synonym for terms like *ecologically sound products, environmentally sound products, environmentally friendly products* and *environmentally preferable products*. It refers to products that have lower environmental impacts during their whole life cycle than other products suitable for serving the same function
GHG	Greenhouse gas
IPP	Integrated Product Policy, http://ec.europa.eu/environment/ipp/index_en.htm
LCA	Life cycle assessment (ISO 14040)
LCA information	See Chapter 3 "Types of product environmental information"
Life cycle thinking	This refers to considering the significant environmental impacts throughout life cycles (ISO 14006)
MEErP	Methodology for Ecodesign of Energy-related Products
MEEuP	Methodology for Ecodesign of Energy-using Products (the older version of the MEErP)
OEF	Organisation Environmental Footprint
PEF	Product Environmental Footprint
PEFCR	Product Environmental Footprint Category Rules, i.e. PEF category rules, i.e. product-group-specific rules for making the PEF analysis
PEI	Product environmental information (in this report) – information about the environmental aspects, impacts and performance of products which is significant across the whole life cycle of those products (reference *Making Product Information…* 2006)
Product	*Product* includes both goods and services
SCP	Sustainable consumption and production, http://ec.europa.eu/environment/eussd/escp_en.htm and https://www.un.org/sustainabledevelopment/sustainable-consumption-production/
SMGP	Single market for green products, http://ec.europa.eu/environment/eussd/smgp/
Type 1 Eco-labels	Voluntary, third-party verified, multiple-criteria-based eco-labels (ISO 14024)
UCPD	Unfair Commercial Practices Directive

Foreword

In 2016 the Nordic Council of Ministers (NCM) decided to fund the project "Nordic Swan, Circular Economy and Product Environmental Footprint" (SCEPEF) as one of the projects of Finland's Presidency. In 2013 the European Commission had published "a recommendation on the use of common methods to measure and communicate the life cycle environmental performance of products and organisations" in the EU's official journal, introducing the Product Environmental Footprint (PEF) and the Organisation Environmental Footprint (OEF). Later, in the Action Plan for the circular economy, the following statement was given: "The Commission is working with stakeholders to make green claims more trustworthy, and will ensure better enforcement of the rules in place, including through updated guidance on unfair commercial practices. It is testing the Product Environmental Footprint, a methodology for measuring environmental performance, and will explore its use to measure or communicate environmental information." While the Nordic Swan Ecolabel has been the key tool for communicating about environmentally sound products and services to consumers in the Nordic countries, it was important to see what the new methodology could offer to the Nordic Swan Ecolabel and how both systems could benefit from each other.

Numerous experts have contributed to the SCEPEF project. We are grateful for the input of the experts Karin Bergbom and Elisabeth Magnus from the Nordic Swan Ecolabel – they patiently commented on the numerous versions of the reports. We were fortunate to have Marianne Wesnaes from the University of Southern Denmark (SDU) as a co-author in the PEF Swan report. The reviewers of the working paper for the first workshop were Thomas Rydberg (IVL, Sweden) and Catharina Hohenthal (VTT, Finland), and Kim Christiansen and Preben Kristensen voluntarily provided in-depth written comments. The reviewers of the manuscript for the second workshop were Arnold Tukker (Leiden University) and Harri Kalimo (Univ. of Eastern Finland, Vrije Universiteit Brussel), and we warmly thank them and the other participants of the workshops organised in Helsinki in May 2017 and September 2018. Our compliments to Jachym Judl and Sirkka Koskela (SYKE) who have kindly advised us on many technical aspects of LCA and PEF.

Discussions in the Nordic expert group on the PEF – that is, the NEF group, of which Ari Nissinen is a member – and the material produced by the group also gave a lot of input to the analyses. We want to thank the group coordinator, Preben Kristensen (Denmark), the chair, Cecilia Mattsson (Swedish EPA) and the host of the meetings, Gert Hansen (Danish EPA). It is also good to note that since 2018, a Nordic project has been run by Preben Kristensen and guided by the NEF group, focusing on new ideas about the Integrated Product Policy (IPP), including the use of the PEF in policies.

In addition to the NEF group, we are also grateful to the people in the other Nordic reference groups for their positive attitude and constructive comments throughout the

whole project period, from the planning phase to the execution and finalisation of the project. These groups are the HKP (the Nordic Working Group for Sustainable Consumption and Production) group, its follower, the NCE (the Nordic Working Group for Circular Economy) group and a Nordic expert group for eco-labelling under the HKP, with Søren Mørch Andersen (DK) and Bjørn-Erik Lønn (Nordic Swan Ecolabel) as its key members.

The content of this report has benefited from the contribution, through physical participation to workshops in May 2017 and September 2018 and through written feedback, of different members of the European Commission working in DG Environment and the Joint Research Centre of Ispra and closely involved in the conception and testing of the PEF/OEF methods. In particular, we would like to thank An De Schryver, Erwin Schau, Imola Bedo and Michele Galatola for their collaboration and constructive feedback.

Satu Reijonen, in the secretary of the NCM, has guided us through the bureaucratic questions and has encouraged us to fulfil our plans about publications and happenings, like the PEF-conference[1] in Helsinki in September 2018. Media experts Ulla Ala-Ketola and Hannele Ahponen (SYKE) have helped with the press releases and the website.

This final report of the project focus on the PEF (see also Suikkanen *et al.* 2019 on PEF), but it also shortly presents project results regarding the OEF and eco-design tools (Salo *et al.* 2019a, 2019b).

It is important to note that the development of the PEF is an ongoing process, and this report is both looking back and providing a kind of snapshot of the situation in early 2019. However, we hope that this report, together with the other SCEPEF reports, contributes to the development of both the PEF and Type 1 Eco-labels like the Nordic Swan Ecolabel and to the overall progress in product policy, sustainable consumption and production, and the circular economy.

Helsinki, October 2019
The authors

[1] https://www.dropbox.com/s/01a6041l6zm775y/Nordic%20PEF%20conference%20program%20%28final%202018-09-10%29.pdf?dl=0, https://www.dropbox.com/sh/1xkqyjuh8la6xlm/AAAzdRxRfGj4FY8BmoSFNyQga?dl=0, https://www.youtube.com/playlist?list=PLgGFtRVUTORQabMceLFNeyob6ubMf96JV

Summary

In 2016 the Nordic Council of Ministers (NCM) decided to fund the project "Nordic Swan, Circular Economy and Product Environmental Footprint" (SCEPEF) as one of the projects of Finland's Presidency. In 2013 the European Commission had published "a recommendation on the use of common methods to measure and communicate the life cycle environmental performance of products and organisations" in the EU's official journal introducing the Product Environmental Footprint (PEF) and the Organisation Environmental Footprint (OEF). While the Nordic Swan Ecolabel has been the key tool for communicating about environmentally sound products and services to consumers in the Nordic countries, it was important to see what the new methodology could offer to the Nordic Swan Ecolabel and how both systems could benefit from each other.

It is important to note that the development of the PEF is an ongoing process, and this report is both looking back and providing a kind of snapshot of the situation in early 2019. But it cannot foresee what kind of success the PEF will be. However, this report, together with the five already published SCEPEF reports (Suikkanen and Nissinen 2017a, 2017b, Salo *et al.* 2019a, 2019b, Suikkanen *et al.* 2019), hopefully gives a contribution to the cooperation between the PEF and Type 1 Eco-labels (like the Nordic Swan Ecolabel) and to the overall progress in the policy instruments of the Integrated Product Policy (IPP) and Sustainable Consumption and Production (SCP) and the Circular Economy.

Product Environmental Information (PEI) plays a crucial role in striving for ecologically sounder products. Environmental problems like climate change, ozone depletion, the acidification of soils and waters, and the loss of biodiversity can often easily be traced back to the manufacturing, use and disposal of products. Reliable PEI is needed to drive the market towards better products.

The general aim of this report was to clarify if the PEF has such properties that it could have a larger role in product policy instruments than life cycle assessment (LCA) has had. A related specific goal was to clarify what kinds of PEI are used at the moment by the different IPP and sustainable consumption and production (SCP) policy instruments. In addition, the goal was to analyse possible synergies between the PEF and the criteria type of information, the latter being nowadays commonly used in Type 1 Eco-labels and green public procurement. More specifically, we analysed what kind of synergies can be seen between the PEF and the Nordic Swan Ecolabel, and between the OEF and the Nordic Swan Ecolabel. The study aimed to consider how PEI could better serve eco-design, manufacturing and the end-of-life of green products. And finally, the report also serves as the final report of the SCEPEF project.[2]

[2] https://www.syke.fi/projects/scepef

The main conclusions of the SCEPEF project are shown below. However, many other conclusions and recommendations concerning the relations between the Nordic Swan Ecolabel, the PEF and the OEF, together with results related to eco-design, are introduced in the chapters of this report and especially in the other reports of the SCEPEF project[3].

The PEF has many properties that are new to the LCA tradition, increasing the consistency, accuracy and comparability of the results. It offers a much better information basis for product policy instruments than "stand-alone" LCA serves. Cooperation with the existing Environmental Product Declaration schemes could be one way to rapidly gain new users.

It is important to continue the development of the method and provide support to potential users, start the organisation of the PEF scheme, and to invest in efforts to rapidly increase the number of product and service groups and actual product-specific PEF reports involved in the PEF scheme.

PEFCRs are now being used in the preparation of the eco-design regulations for photovoltaic panels and batteries. It is good to consider the broader use of the PEF method in the eco-design directive. It is also important to develop a new instrument on green claims and the UCPD directive, and the PEF could be the basis for this instrument.

Possibilities for a common information basis and coordination between already existing PEI sources and possible new PEI sources for the various product policy instruments and the PEF should be explored.

Cooperation between the type 1 eco-labels and the forthcoming PEF is crucial. First, it is important that Type 1 Eco-labels and possible PEF communication tools do not give very different messages to consumers about what is an environmentally preferable product and what is not. Second, eco-labels could gradually increase the use of the PEF in the development of their requirements and finally, as requirements for potential eco-label license holders. Third, at the same time, the development of Product Environmental Footprint Category Rules can receive beneficial information from the eco-label organisations. The EU Ecolabel can certainly do the integration of the PEFCRs in its processes fastest. But the Nordic Swan Ecolabel can also have a specific role here in figuring out how to use the PEF so that the eco-label maintains its independent role. The possible forerunner role is eased by the facts that the Nordic Swan Ecolabel is well aware of the PEF process in the EU and is known among policy experts and companies in Europe, including those outside the Nordic countries.

[3] Salo, H., Suikkanen, J. and Nissinen, A. (2019a). Nordic Swan Ecolabel and Organisation Environmental Footprint. Focus on the organisation environmental information used in the retail sector. TemaNord 543/2019. https://doi.org/10.6027/TN2019-543;
Salo, H., Suikkanen, J. and Nissinen, A. (2019b). Use of ecodesign tools and expectations for Product Environmental Footprint. Case study of Nordic textile and IT companies. TemaNord 542/2019. https://doi.org/10.6027/TN2019-542;
Suikkanen, J. and Nissinen, A. (2017a). Nordic Swan and PEF: Focus on product environmental information. Nordic Working Paper 910. https://doi.org/10.6027/NA2017-910;
Suikkanen J and Nissinen A (2017b). Circular economy and the Nordic Swan ecolabel - An Analysis of Circularity in the Product-Group-Specific Environmental Criteria. TemaNord 2017:553. http://norden.diva-portal.org/smash/record.jsf?pid=diva2%3A1142769&dswid=-6349;
Suikkanen, J., Nissinen, A. and Wesnaes, M. (2019). The Nordic Swan Ecolabel and the Product Environmental Footprint. Focus on product environmental information. TemaNord 544/2019. https://doi.org/10.6027/TN2019-544

However, it is worth noting that experts in the Nordic Swan Ecolabel organisation are not fully convinced about the added value that the PEF would currently bring to the ecolabel, and they are concerned about the extra costs for companies applying for the eco-label if it would require carrying out a PEF analysis.

The PEF will be an important tool regarding eco-design in companies, used side by side with Type 1 Eco-labels. It is important to encourage capacity building in companies regarding eco-design, for example, by offering service like "eco-design clinics", especially for small and medium sized enterprises. At the same time, it is important to assess if more teaching about eco-design (and the tools such as the PEF and the eco-label criteria to do it) is needed at the various levels of education in the Nordic countries.

Much emphasis is now put on the mitigation of climate change and subsequently on the communication about the life cycle greenhouse gas emissions (i.e. the carbon footprint) of various products and services to the consumers and public procurers. The PEF offers a methodology for assessing the carbon footprint in addition to several other environmental impacts at the same time. Furthermore, both the PEF and Type 1 Eco-label schemes should pay more attention to the loss of biodiversity, which is often connected to the production chains of various products. They could also develop methods in cooperation in order to make product-related problems more visible to companies, consumers and public organisations, promoting the design and manufacture of more sustainable products and services.

1. Introduction and the aim of the report

1.1 Product environmental information and the new footprint: the Product Environmental Footprint

Product environmental information (PEI) has a crucial role in striving for more sound products. Environmental problems like climate change, ozone depletion, the acidification of soils and waters, and the loss of biodiversity can often easily be traced back to the manufacture, use and disposal of products. Reliable PEI is needed to drive the market towards better products. A working group on PEI (*Making Product Information*… 2006, p. 4) summarised the situation in the following way:

> Good product information is a necessary condition for effective policies to improve the environmental performance of products. But the potential for making product information work for the environment is a long way from being achieved, in spite of more than a decade of work. The investment of effort on product information could be very cost-effective in delivering improvement for policy implementation and market efficiency. However, under the present conditions, the market on its own is unlikely to deliver good product information: the barriers in this field are steep and the drivers are weak. Work is needed to create the right frameworks and to apply the necessary influences.

Now, more than 10 years later, the drivers are still weak, but the European Union (EU) is trying to define a better framework for PEI and policies (EC 2019a).

In the updated Integrated Product Policy (IPP) framework, a large role will be given to the Product Environmental Footprint (PEF) (EC 2019a). The PEF is a methodology based on life cycle assessment (LCA) that tries to solve some central problems that the use of LCA for measuring and showing the environmentally most preferable products has faced.

1.2 Life Cycle Assessment LCA

In order to mitigate and prevent environmental problems, we need information about the causes of the problem. Then actions and policy measures to tackle the causes can be designed. LCA was developed to understand, manage and reduce the environmental, health and resource consumption impacts of products during their whole life cycle. For example, the Nordic Council of Ministers (NCM) produced guidelines on LCA in a long project, running over the years 1991–1995, written by

researchers from the Nordic countries and guided by environmental officials at the environmental ministries and agencies (Lindfors *et al.* 1995).

So far, LCA has only been used in a few policy instruments. The Ecodesign Directive uses a kind of LCA method (first the Methodology for Ecodesign of Energy-using Products [MEEuP] which then became the Methodology for Ecodesign of Energy-related Products [MEErP]) when relevant environmental aspects are determined for a product group. Type 1 Eco-labels like the EU Flower and the Nordic Swan Ecolabel use LCA as one tool in the identification of relevant environmental aspects for each product group. Regarding green claims (i.e. claims about the environmental soundness of a product) manufacturers can use an LCA analysis as the background for the claim.

It was hoped that LCA would give useful results for public procurement, side by side with environmental product declarations and eco-labels like the Nordic Swan Ecolabel (see, e.g. Nissinen *et al.* 1993). But there have only been a few cases in which LCA or the carbon footprint has been documented in real procurement cases (i.e. in the comparison of tenders) (see, e.g. Mattinen and Nissinen 2012, Nissinen *et al.* 2012, Parikka-Alhola and Nissinen 2012). A recent breakthrough has been seen in the common green public procurement (GPP) criteria of the EU, where LCA is introduced in the criteria of buildings and roads (EC 2018b).

Now, almost 30 years after LCA was introduced to policy makers and companies, it hardly has any visible role at the market of various products and services, although it is used in companies as a tool for eco-design (Salo *et al.* 2019b). However, capacity building has been going on for making more reliable and comparable LCA. The EU project "European Platform on Life Cycle Assessment" started in 2005, resulting in the ILCD handbook first published in 2010 (e.g. EC *et al.* 2011). Since then, the ILCD handbook has been re-edited and the related ELCD database has been developed to help LCA practitioners; ELCD development was only discontinued in 2018.

Finally, in 2013 the European Commission (EC) published the "Commission recommendation on the use of common methods to measure and communicate the life cycle environmental performance of products and organisations" (EC 2013a), introducing the PEF, which builds on LCA.

1.3 Eco-labels

Type 1 eco-labels and their criteria-based approach have had a more visible role than LCA, at least for private and public consumers. Criteria mean that thresholds are set, and the properties of the product, manufacture, use patterns or disposal are compared to these thresholds. Criteria have been used in the product-group-specific regulations of the Ecodesign Directive, Type 1 Eco-labels and recommended requirements for public procurement (e.g. EC 2018b). In addition, the specific criteria of Type 1 Eco-labels are used in many other circumstances as the properties of ecologically sound products; for example, they are used in eco-design by manufacturers and in the development of environmental criteria for the specific tender calls of public procurers.

The Nordic Swan Ecolabel was introduced by the Nordic Council of Ministers (NCM) in the year 1989. It aims to help consumers, companies and other organisations to purchase in an environmentally conscious manner. It also encourages the development of products and services that have less impact on the environment and climate than similar products on the market. The Nordic Swan Ecolabel takes into account the environmental impact of goods and services during their entire life cycle, from raw materials to the waste phase. It places strict requirements on environmental impacts, and also on function and quality. The label serves as a consumer-policy tool for the environment and complements other environment-policy instruments. It is an important instrument for achieving the Nordic countries' goals for sustainable consumption and production, as outlined in the Nordic Environmental Action Plan and the Nordic Sustainable Development Strategy (NCM 2014).

After the label's establishment, it was soon adopted as an important tool (e.g. in public procurement) (see, e.g. Nissinen 1993).

1.4 A focus on environmental performance and more coordinated actions

According to the EC (EC 2013a), the world was moving fast in the area of the measurement and communication of environmental performance, similar to what was happening at the Member State level. Outside Europe, Japan, South Korea, Australia and Canada are using LCA approaches in policy making. The US Environmental Protection Agency was leading the development of a guidance document on how to develop Product Category Rules (which are used in environmental product declaration [EPD] schemes). The Sustainability Consortium was one of the biggest private initiatives, and new initiatives, such as the Sustainability Accounting Standards Board and Sustainable Procurement Leadership Council, were emerging. France started experimentation with "affichage environnementale" using an LCA-based approach, and it was evident that similar (but at the same time different) other government-led schemes would also emerge within the EU. The EC saw a concern that the majority of these initiatives were being developed in relative isolation, while the increasingly globalised and complex supply chains would require a more coordinated approach. Thus, more exchangeability and inter-operability of the existing tools and platforms was needed. The EU intended to cooperate actively with key trading partners, for example in the context of the 10-Year Framework of Programmes on Sustainable Consumption and Production.

The United Nations (UN) and others (e.g. the NCM) have also recognised that the growing environmental problems call for methods to ensure effective eco-design by the companies and product policies of governments. The UN work done through the LCA Initiative[4], and the NCM has a specific PEF policy group (the NEF[5]).

[4] https://www.lifecycleinitiative.org/

[5] www.nordic-pef.org/

1.5 The aim of the report

The general aim of this report was to clarify if the PEF has such properties that it could have a larger role in product policy instruments than LCA has had. A related specific goal was to clarify what kinds of PEI are used at the moment by the different Integrated Product Policy (IPP) and sustainable consumption and production (SCP) policy instruments. In addition, the goal was to analyse possible synergies between the PEF and criteria information, the latter being nowadays commonly used in Type 1 Eco-labels and GPP. More specifically, we analysed what kind of synergies can be seen between the PEF and the Nordic Swan Ecolabel, and between the OEF and the Nordic Swan Ecolabel. The study aimed to consider how PEI could better serve eco-design, manufacturing and the end-of-life of green products.

The report also serves as the final report of the SCEPEF project.

2. Material and methods

The main work methods for the SCEPEF project and this final report of the project were desk studies (conducted to gain literature material and make related analyses and conclusions), a questionnaire, two workshops on 4 May 2017 and 19 September 2018 (references Workshop…2017 and Workshop…2018) and a conference[6] in Helsinki, Finland (on 18 September 2018). Discussions in the NEF group – of which the first author, Ari Nissinen, is a member – and the diverse materials produced by the group (e.g. Kristensen 2018) also have given a lot of input to the thoughts and analyses.

The literature included relevant legislation and recent literature about PEI and the policy instruments of IPP and SCP (see the reference list).

For this report, the workshop on 19 September 2018 had a special role as its main theme was the possible use of the PEF in policies. Before the workshop, a draft report was produced. This was first introduced to two experts who were asked to comment on the draft report and present their views about using the PEF in the IPP/SCP policy instruments and circular economy (CE) instruments. Then some modifications were made and the second draft was distributed to 18 participants of the workshop. This final report includes the contribution from the workshop, and the draft report was used as a basis of this report.

Also, material from the other reports produced in the SCEPEF project was used, related to the comparison of the information basis of PEF-Swan and OEF-Swan, and to the use of various information sources in the eco-design in Nordic IT and textile companies.

[6] https://www.dropbox.com/s/01a6041l6zm775y/Nordic%20PEF%20conference%20program%20%28final%202018-09-10%29.pdf?dl=0, https://www.dropbox.com/sh/1xkqyjuh8la6xlm/AAAzdRxRfGj4FY8BmoSFNyQga?dl=0, https://www.youtube.com/playlist?list=PLgGFtRVUTORQabMceLFNeyob6ubMf96JV

3. Types of Product Environmental Information PEI

This chapter identifies the major types of PEI, using standards and product policy instruments as data sources. LCA-based and criteria-based information are described.

Three types of PEI are defined in the standards about eco-labelling (ISO 14020, reference ISO 2000). These are Type 1 Eco-labelling, self-declared claims and EPDs.

The Type 1 environmental labelling programme (ISO 14024, reference ISO 2018) is a voluntary, multiple-criteria-based programme. It awards a license to an organisation authorising the use of an environmental label on a product, indicating overall environmental preferability within a particular product category based on life cycle considerations. Following ISO 14024, the objective is to reduce environmental impacts over the course of the life cycle of a product, and therefore the *environmental product criteria are developed by identifying environmental impacts and potential for improvement* in the extraction of resources, manufacture, distribution, use and disposal.

Type 2 environmental labelling (ISO 14021, reference ISO 2016) means self-declared environmental claims. Self-declared environmental claims may be made by manufacturers, importers, distributors, retailers or anyone else likely to benefit from such claims. Environmental claims made in regard to products may take the form of statements; symbols or graphics on product or package labels, or in product literature, technical bulletins, advertising, publicity and telemarketing, as well as in digital or electronic media, such as the Internet. The standard focuses on the assurance of the reliability of the claims.

Type 3 environmental declarations (ISO 14025, reference ISO 2006a) present *quantified environmental information on the life cycle of a product* in order to enable comparisons between products fulfilling the same function. They are often called *environmental product declarations* (EPDs). The declarations are based on independently verified LCA data, life cycle inventory (LCI) analysis data or on information modules in accordance with the ISO 14040 series of standards. They are developed using predetermined parameters, and they are subject to the administration of a programme operator. The programme operator can be, for example, a company or a group of companies, an industrial sector or a trade association, public authorities or agencies, or an independent scientific body or other organisation. EPDs can also include additional environmental information.

The LCA-standards include ISO 14040 (ISO 2006b) and ISO 14044 (ISO 2006c).

Finally, it can be useful to simplify the terms used above. Instead of using "quantified environmental information on the life cycle of a product" we use here "the LCA type of information" or more shortly "LCA information". This means information

that can be presented as numerical values on a continuous scale and is both required by and produced by the various LCA methods and EPDs. For example, CO_2 emissions are given as "g CO_2 per functional unit".

Another type of product information is the one described above, "product environmental criteria are developed by identifying environmental impacts and potential for improvement", which we call "the criteria type of information" or more shortly "criteria information". It can also be described as "using thresholds". Often the fulfilment of a certain condition ("yes" or "no") is asked. For example, the specific eco-design requirements for vacuum cleaners under the European Ecodesign Directive include a requirement that "annual energy consumption shall be less than 43.0 kWh/year" (EC 2013c). It can also mean asking for values for certain properties, then calculating scores and comparing these to acceptable levels. Criteria information is used in many eco-labels, determining the conditions for the environmental performance which the eco-labelled products must fulfil. It is also used in public purchasing.

Finally, it is good to note that the PEF does not belong to just one of the standardised groups above but follows many features of both the LCA standard and EPD standard.

4. Environmental information basis in the policy instruments of IPP, SCP and the CE

This chapter first looks at how LCA-based information was present in the central documents of IPP, SCP and CE. Secondly, a figure is presented to explain the assumed change in the environmental performance of the product stock due to the product policy instruments. Thirdly, a major task of the chapter is to analyse and present the use of both LCA PEI and criteria PEI in the different product policy instruments.

4.1 Product environmental information in IPP, SCP and the CE

The Communication on Integrated Product Policy (EC 2003) very much emphasised the possibilities of LCA while, however, also recognising some challenges:

> LCAs provide the best framework for assessing the potential environmental impacts of products currently available. They are therefore an important support tool for IPP. However, the debate is ongoing about good practice in LCA use and interpretation. Through a series of studies and workshops, the Commission will further this discussion, with the aim of producing a handbook within two years on best practice, based on the best possible consensus attainable among stakeholders.

In the Sustainable Consumption and Production Action Plan (EC 2008b), LCA was not mentioned at all. The life cycle of products was however still mentioned at several points, for example:

> The Ecodesign (EuP) Directive establishes a framework for setting eco-design requirements for energy-using products. A number of other pieces of legislation address specific aspects of the life-cycle of products, such as waste. The labelling schemes set by the Energy Labelling Directive, the Energy Star Regulation, the Ecolabel Regulation and other schemes developed by Member States, retailers and other economic operators provide consumers with information on the energy and environmental performance of products.

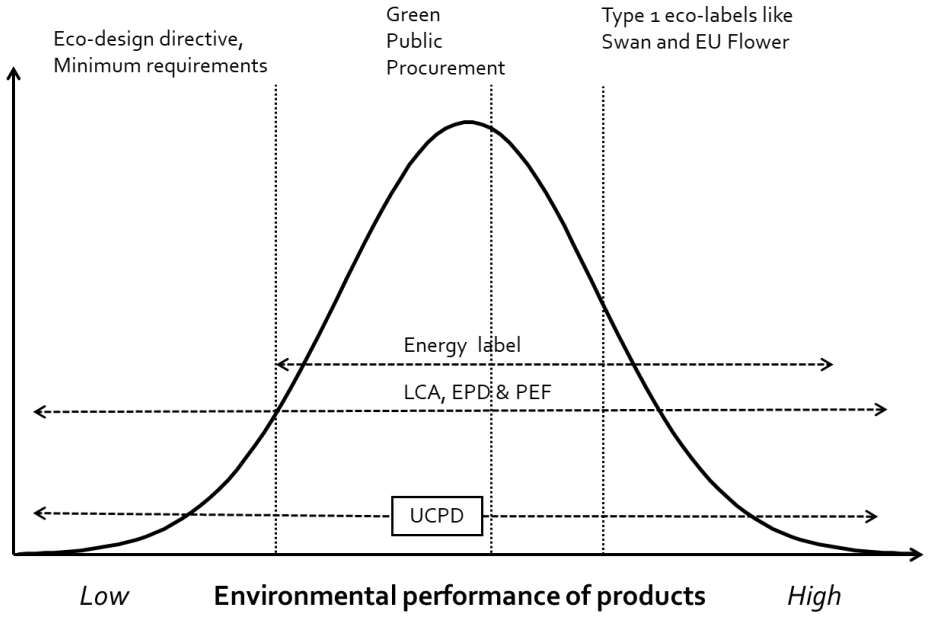
Finally, an LCA-based PEF was introduced by the EC (2013a) in a "recommendation on the use of common methods to measure and communicate the life cycle environmental performance of products and organisations". Later, in the Action Plan for the CE (EC 2015), the following statement was given:

The Commission is working with stakeholders to make green claims more trustworthy, and will ensure better enforcement of the rules in place, including through updated guidance on unfair commercial practices. It is testing the Product Environmental Footprint, a methodology for measuring environmental performance, and will explore its use to measure or communicate environmental information.

4.2 Product environmental performance and product policy instruments

Below an often-presented figure is shown about the assumed impact of using PEI in different policy instruments.

Figure 1: A schematic figure about the focus areas of some policy instruments in relation to a hypothetical distribution of products in relation to their environmental performance



Source: Redrawn and slightly modified from Dalhammer (2007 p. 139), Galatola (2015) and the EC (2019a).

It is often assumed that determining and showing the real environmental performance of products will end up in removing the worst performing products from the market whereas the best performing products would gain a competitive advantage. This has happened in reality for household appliances after the introduction of the energy label; nowadays, in most product groups, only A and better classes are seen. As Figure 1 aims to show, the development can be further sped up by setting minimum requirements, such as in the Eco-design Directive, and awarding the environmentally best products, like Type 1 Eco-labels have done and like GPP can do.

4.3 The present environmental information basis for each policy instrument of IPP, SCP and the CE

As already dealt with above, both LCA PEI and criteria PEI have been used in the policy instruments of IPP, SCP and the CE. Table 1 presents the types of information used when requirements are defined (e.g. based on the Eco-design Directive and Public Procurement Directive). It also presents what kind of information is required from the manufacturer of the product.

A major difference is easy to see, so LCA information is used when requirements for a product group are prepared and defined but it is not required from the manufacturer of each product. However, certain exceptions exist, such as the Renewable Energy Directive (EC 2009), which requires a certain kind of LCA from each product.

Table 1: The types of Product Environmental Information (PEI) used in the policy instruments related to Integrated product Policy (IPP), Sustainable Consumption and Production (SCP) and the Circular Economy (CE)

Policy instruments	For companies, is it compulsory, voluntary, or somewhere in between?	Development of requirements for product groups			Required information about each product		
		Documents in which development is described	LCA information	Criteria information	Documents in which requirements are described	LCA information	Criteria information
Eco-design	Compulsory	Directive 2009/125/EC.	*The use of LCA information well specified,* using the MEErP methodology.	The use of criteria information well specified.	Product-group-specific regulations, e.g. European Commission 2013.	Eco-profile could be required, using MEErP, but this *LCA-option has not been used.*	Requirements are of the criteria-type. E.g. for computers criteria on energy consumption and related information.
Energy labelling	Compulsory	Regulation EU 2017, Directorate-general 2018.	The use of LCA information not specified.	The use of criteria information and its presentation well specified.	Regulations, e.g. for TVs, EC 2010.	No requirements on LCA or e.g. carbon footprint.	Use of criteria information and its presentation are well specified.
Green Public Procurement	In between. If information is asked in a procurement case, it must be given.	Directive 2014/24/EU.	The use of LCA information not specified.	The use of criteria information well specified. Technical specifications may include environmental characteristics (Article 42).	One source is the common criteria for EU at their website, EC 2018b.	*For 'office buildings' and 'Roads' LCA-based requirements have been developed,* but not for other product groups.	Requirements are of the criteria-type (except for office buildings and roads also LCA-based ones, see left).
Type 1 Eco-labels	Voluntary. Information only needs to be given if permission to use the eco-label is applied.	Regulation, EC 2010 Nordic Ecolabelling (2014, 2018a).	Extent and overall relevance of the environmental impacts associated with the product group, *based partly on existing or new life cycle assessment studies (Nordic Ecolabelling 2013).*	"Those criteria should be simple to understand and to use and should be based on scientific evidence, taking into consideration the latest technological developments." (EC 2010).	Product-group-specific criteria documents. Can be found at: EC 2018d, Nordic Ecolabelling 2018b.	No requirements on LCA or e.g. carbon footprint.	Requirements are of the criteria-type. For computers the criteria relate to, e.g. energy consumption, hazardous substances, lifetime extension, end-of-life management.

Policy instruments	For companies, is it compulsory, voluntary, or somewhere in between?	Development of requirements for product groups			Required information about each product		
		Documents in which development is described	**LCA information**	**Criteria information**	**Documents in which requirements are described**	**LCA information**	**Criteria information**
Environmental footprint PEF	Voluntary or compulsory, not known yet.	Recommendation (EC 2013a) and PEFCR Guidance (EC 2018c, Zampori & Pant 2019).	*LCA steps and models to use for impact assessment are defined in the PEF guide and PEFCR guidance for developing product-group-specific PEFCRs.*	An approach for deriving performance classes A-E exist (Zampori and Pant 2019).	Product-group-specific PEFCRs (EC 2018c, 2019a, Zampori & Pant 2019).	*LCA steps to follow and models to use for product and the required data defined in product-group-specific PEFCRs.*	No criteria information, but additional information requirements are possible, defined in product-group-specific PEFCRs.
Promotion of the use of energy from renewable sources	In between. If claim about renewable energy, then information must be given.	Directive 2018/2001/EU, the so called RES directive.	*Evidently LCAs are being used* to set the limit values: the life cycle greenhouse gas emissions savings must be at least 70 %.	A large number of different requirements for the renewable energy sources, e.g. sustainability criteria in article 29 of the RES directive.	Directive 2018/2001/EU.	*GHG emissions must be determined for each energy product* claiming to be renewable. *LCA methodology is defined in* Annexes II, III and V of the directive.	A large number of different requirements for the renewable energy sources, e.g. sustainability criteria in Article 29 of the directive.
Referring to unfair commercial practices	In between. Information must be given to justify any green claims, if the authority or court requires it.	Directive 2005/29/EC (the so called UPCD), and UCPD Guide (EC 2016b).	Provides a legal basis to ensure that traders do not present environmental claims in ways that are unfair to consumers.		The so called UCPD Guide (EC 2016b)	The guide mentions LCA as providing proof for excellent environmental performance.	The guide mentions type 1 eco-labels as providing proof for excellent environmental performance.

4.3.1 The Ecodesign Directive

The Ecodesign Directive establishes the requirements that energy-related products need to meet in order to access the market and/or be put into service (Directive 2009/125/EC, Table 1). It applies life cycle thinking and considers the significant environmental impacts of the entire life cycle, including packaging, products, processes, services, organisations and systems (ISO 14006, reference ISO 2011). The directive aims to remove the least sustainable products from the market. Although it encourages voluntary methods and sees organisations and markets as the main drivers for sustainability transition, it also recognises that legislation may be needed if market forces fail to develop in the right direction or with sufficient speed. By harmonising the national laws, it also aims to prevent barriers to trade and unfair competition. The directive focuses on eliminating, avoiding or reducing upstream and downstream environmental impacts with a preventive approach and without excessive costs. In addition, trade-offs in environmental burden between life cycle stages and impacts should be considered.

The Ecodesign Directive (2009/125/EC) sets both mandatory requirements and voluntary agreements that are dynamic in nature, meaning that they aim to set higher requirements over time. The mandatory requirements, called *implementing measures* in the directive and in practice being regulations (see, e.g. EC 2013b, 2013c), include generic and specific requirements for energy-related products that have great demand, environmental impacts and that are potential sold in the EU. The generic requirements do not set limit values but may demand compliance with relevant harmonised European standards or information requirements, like material coding that enables reuse and recycling (Calero Pastor *et al.* 2014). The specific requirements set limit values for the product group for specific technical aspects, like the maximum energy consumption or levels of chemical emissions. In addition, there are voluntary agreements proposed by industry sectors as alternatives to the mandatory requirements. The voluntary agreements need to fulfil the specific criteria set in the directive but they may be quicker to achieve and cause lesser expenses to companies than the mandatory ones.

A new phenomenon is that the PEFCRs are now being used in the preparation of the eco-design regulations for photovoltaic panels and batteries. It is used in addition to the MEErP method, which is the "official method" of the Ecodesign Directive.

See also Calero Pastor *et al.* (2014) about the steering effect of the directive.

4.3.2 Energy labels

Energy labels help consumers to make informed choices based on the energy consumption of energy-related products (EU 2017, Table 1). The regulation on energy labels aims to contribute to energy savings, together with promoting innovations and investments into the production of more energy-efficient products. Each product group is regulated by a supplementary regulation that describes the required measurement

and calculation methods, the technical documentation, the design and the content of the label, the location of the label and the duration of the label's classification. The information on the energy label includes information on energy efficiency, annual energy consumption and, in addition, non-energy-related aspects related to, for example, function, capacity, quality and noise levels.

The energy label provides information that is classified with letters of the alphabet ranging from A (the most efficient) to G (the least efficient) (EU 2017). Currently, as the result of more and more energy-efficient products, labelling has been possible up to A+++. However, gradual relabeling will take place to reintroduce the simpler A–G scale. In addition, there will be an online database where manufacturers must upload information about their products before the product may enter the EU market.

4.3.3 Eco-labels of Type 1

The Type 1 environmental labelling programme, according to ISO 14024 (reference ISO 2018), is a voluntary, multiple-criteria-based programme (see Table 1). It awards a license to an organisation authorising the use of an environmental label on a product, indicating overall environmental preferability within a particular product category based on life cycle considerations. Following ISO 14024, the objective is to reduce environmental impacts over the course of the life cycle of a product, and therefore, the product's environmental criteria are developed by identifying environmental impacts and the potential for improvement in the extraction of resources, manufacturing, distribution, use and disposal.

The Nordic Swan Ecolabel, as an example of an ISO Type 1 Eco-label, also applies life cycle thinking in setting the product-group-specific criteria. Let us look how the Nordic Swan Ecolabel sets the criteria for each product group (Suikkanen *et al.* 2019). First, potential license holders, different stakeholders and internal working processes suggest new product groups. If accepted, the development of criteria documents starts. Criteria documents describe the specific requirements for each product group. The environmental criteria for products are the environmental requirements that the product must fulfil in order to be awarded an environmental label, according to ISO 14024 (ISO 2018). Their role is to differentiate environmentally preferable products from others in a product category. All products that meet the criteria are eligible to apply the label. Currently, the Nordic Swan Ecolabel has published criteria documents for over 60 product groups (including services). In addition to the criteria documents, there are background documents which contain background facts, details and explanations of the criteria for each product group. The criteria and background documents are publicly available[7] (Nordic Ecolabelling 2018b).

Criteria are developed in a process headed by the Nordic Swan Ecolabel. The multi-stakeholder process includes expert group input (e.g. concerning energy, harmful

[7] http://www.nordic-ecolabel.org/product-groups/

chemicals, nanotechnology) and assessment, a broad public consultation and approval of the criteria by the Nordic Ecolabelling Board.

The draft criteria are first developed by experts from Nordic eco-labelling organisations. Studies (feasibility studies, light RPS [relevance, potential, steerability] studies and pre-studies) support the definition of the criteria. The criteria are set through a process referred to as RPS. This is an analytical tool used to prioritise environmental challenges and to clarify where the eco-label can make a difference. It identifies most significant life cycle environmental aspects of a product group, taking into consideration "materials, energy, chemicals and other aspects" (MECO, Nordic Ecolabelling 2013). During this process, readily available LCA studies are used and are an important source of data when setting the product group-specific criteria. Below is an explanation of the RPS (referred in Suikkanen *et al.* 2019):

- *Relevance* (R) identifies the extent of the environmental problem for the product group;
- *Potential* (P) determines what can be done about the problem;
- *Steerability* (S) identifies how well the Nordic Swan Ecolabel can influence the problem.

In order for the Nordic Swan Ecolabel to adopt a requirement, all three of these factors must be positive, that is to say, the environmental challenge must be relevant for the product group, there must be some potential to influence the problem and the Nordic Swan Ecolabel must be seen to have an influence on the challenge. The RPS assessment hence necessitates a prioritisation of environmental parameters so that the focus of the criteria requirements is on those that result in the maximum environmental benefit (within the environmental aspects that can be affected by a Type 1 label, i.e. steerability).

Stakeholders, including industry and NGOs, are consulted during the process. When a draft criteria document is finalised there is an open consultation process, and all incoming comments are considered and the response to the comments is made publicly available. The Nordic Ecolabelling Board approves the proposed criteria and carries out judgement on potential grey zones. A similar process is applied to revisions of criteria, which take place approximately every four to five years.

4.3.4 Environmental Product Declarations EPDs

Type 3 Eco-labels, EPDs, present quantified environmental information on the life cycle of a product in order to enable comparison between products with the same function (ISO 14025, reference ISO 2006a, Table 1). So-called Product Category Rules (PCRs) specify the quantification method and communication format. One or more organisations can make a declaration based on LCA or LCI data or information modules. The data must be either internally or externally independently verified. The EPDs are primarily intended to be used in business-to-business communication, but the audience may consist of public procurers and consumers as well.

There are a large number of EPD programmes, and their PCRs for a given product group differ from each other, meaning that there is no comparability although a lot of information has been collected. For example, Hunsager *et al.* (2014) found 27 EPD programmes in 2013.

One of the programmes, the International EPD System, which has over 1,100 published EPDs from over 45 countries, has declared that during the transition phase of the PEF, from 2018 to 2021, it will provide input (when possible) to contribute to harmonisation and to help broaden the use of environmental declarations on the international market. To prepare for any upcoming policies, companies could start assessing the life cycle environmental impact of their products, and EPDs serve as a tool to communicate the results (Environdec 2019).

It is good to note that the possible PEF scheme will have many similarities with EPD programmes.

4.3.5 Green Public Procurement GPP

GPP is built on an idea of having clear, verifiable, justifiable and ambitious environmental criteria for products and services, based on a life-cycle approach and scientific evidence base (EC 2008a, EC 2018a, Table 1). According to Directive 2014/24/EU, which is on public procurement, technical specifications (i.e. the obligatory requirements for products to be procured) can include environmental characteristics. In regard to labels, they may – in the technical specifications, the award criteria or in the contract performance conditions – require a specific label as means of proof of such environmental characteristics. However, the label must fulfil certain conditions, like the criteria of the label being linked to the subject matter of the contract, the label being established in an open and transparent procedure in which all relevant stakeholders may participate, the label being accessible to all interested parties and the label requirements being set by a third party over which the economic operator applying for the label cannot exercise a decisive influence.

The GPP approach of the EU uses two types of criteria that are to be used in each sector: core criteria and comprehensive criteria (EC 2018a). The core criteria address the key environmental impacts suitable for any contracting authority across the EU. The comprehensive criteria are aimed to provide sufficient information for those who wish to purchase the best environmental products on the market. These may require additional verification or a slight increase in cost compared to other products with similar functions.

In the award criteria for the most economically advantageous tender, environmental characteristics can be used when defining the best price–quality ratio (Directive 2014/24/EU). Also, the life cycle costs of the product can be used so that procurers may use costs imputed to environmental externalities linked to the life cycle of a product, service or works. Such costs may include the cost of greenhouse gas emissions and of other pollutant emissions.

Environmental LCA is not mentioned in the directive. About eco-labels, it is said in the introductory part of the directive (point 75) that contracting authors should be able

to refer to, such as the European eco-label and (multi)national eco-labels (and see also above). However, *life cycle* has been defined in Article 2 as meaning "all consecutive and/or interlinked stages, including research and development to be carried out, production, trading and its conditions, transport, use and maintenance, throughout the existence of the product or the works or the provision of the service, from raw material acquisition or generation of resources to disposal, clearance and end of service or utilization". For example, about technical specifications, it is said in Article 42 that "characteristics may also refer to the specific process or method of production or provision of the requested works, supplies or services or to a specific process for another stage of its life cycle even where such factors do not form part of their material substance provided that they are linked to the subject-matter of the contract and proportionate to its value and its objectives."

Even if LCA is not mentioned in the Public Procurement Directive, it is brought up in the guidebook *Buying Green* (EC 2016a, p. 7): "Most of the criteria sets (see Table 1, EU common criteria) rely upon life-cycle assessment (LCA) data where it is available, together with eco-labels and the evidence which these are based upon." And more is found on page 35:

> Carrying out an LCA for an individual contract implies considerable extra effort. The criteria underlying Type I labels typically draw upon an LCA for the product and service groups covered and can help in identifying applicable criteria for production processes and methods. The EU GPP criteria take these findings into account and specify relevant production methods for some product and service groups, including electricity, textiles and food.

4.3.6 Green claims and the Unfair Commercial Practices Directive

The Unfair Commercial Practices Directive (UCPD; 2005/29/EC) and the related guide (EC 2016b) do not give any detailed rules or guidance about misleading environmental claims (see Table 1). The guide mentions that LCA or the Type 1 Eco-label can prove excellent environmental performance so a general benefit claim can be presented. Regarding LCA, it should be made according to recognised or generally accepted methods applicable to the relevant product type and should be third-party verified. In a study about green claims, no LCA-based or Type 1 Eco-label for either computers or textiles were found, but on the other hand the sample was very small (EC 2014).

According to the EC recommendation on the PEF (EC 2013a), there is no EU legislation specifically harmonising all green claims and marketing. In 2013 the EC stated the following:

> The EU has regulated the use of claims by either requirements in specific legislation regulating different types of products performance (such as for example the Energy Star Regulation); or by setting general rules for preventing misleading environmental claims, leaving to national authorities the task to interpret and enforce them on a case-by-case basis as provided for by the Unfair Commercial Practices Directive (UCPD). In the context of the implementation of the UCPD, in 2009 the Commission has issued specific guidance to promote the use of clear, accurate and relevant environmental claims in marketing and advertising. The Commission intends to provide further guidance in this respect, to ensure an adequate and uniform enforcement in Member States.

4.3.7 *The directive on the promotion of the use of energy from renewable sources*

Directive 2018/2001/EU, the so-called RES directive, defines an LCA method (Table 1). It must be used to determine the greenhouse gas emissions of the energy source that is claimed to be renewable. The life cycle greenhouse gas emissions savings must be at least 70%.

4.3.8 *Other policy instruments (EMS, BAT/BREF, standards, communications etc.)*

It is evident that the PEF would also be referred to in other policy instruments, like best available techniques (BAT) and its BREF document, but as they focus mainly on production processes and not on products, they are not dealt within in this report. For environmental management systems (EMSs) the OEF can, in the future, be a key tool. The PEF and OEF will also have a use for standards, and on the other hand, they use standards (and will cause new ones to be created). However, these policy instruments are not dealt with in this report.

5. The Product Environmental Footprint PEF

This chapter explains why the EC developed the PEF, which improvements it includes compared with other approaches to PEI and which parts are not ready yet and must be developed and finished.

According to the EC (2013d), it has done methodological work to measure the environmental impact of products and organisations for a long time, together with a range of stakeholders. The following description is from the SMGP (Single Market for Green Products) Communication (EC 2013d, pp. 7–8) and it describes the road towards environmental footprints (the PEF and OEF):

> In 2003 the Integrated Product Policy (IPP) Communication introduced the concept of Life Cycle Thinking in EU policy making. It was followed in 2008 by the Sustainable Consumption and Production/Sustainable Industry Policy Action Plan, leading to the publication in 2010 of the *International Reference Life Cycle Data System (ILCD) Handbook.* This handbook provided technical guidance for detailed LCA studies and the technical basis to derive product category-specific criteria, guides, and simplified tools. In 2010, the Council of the European Union called on the Commission to develop a harmonised method for the calculation of the environmental footprint of products. Since then, the Commission has been working on the basis of existing LCA approaches and international standards, introducing further methodological specifications necessary to achieve more consistent, comparable and accurate results. This work, supported by a consultation process as well as by a road-testing exercise in collaboration with industry, has culminated in the development of the Product Environmental Footprint (PEF) and Organisation Environmental Footprint (OEF) methods.

According to the SMGP Communication (EC 2013d), these two methods introduce several important improvements compared to other existing methods. These improvements include the clear identification of the environmental impact categories that are to be looked at and clearer instructions for addressing some critical aspects of an LCA study (Figure 2). They also set requirements for quantifying data quality and a minimum quality of data (e.g. EC 2018c). In addition, the PEF method develops PEFCRs that allow focusing on three to four of the most relevant impacts amongst the 16 key environmental impact categories and the most relevant processes or life cycle stages for a given product (for a given sector in the OEF).

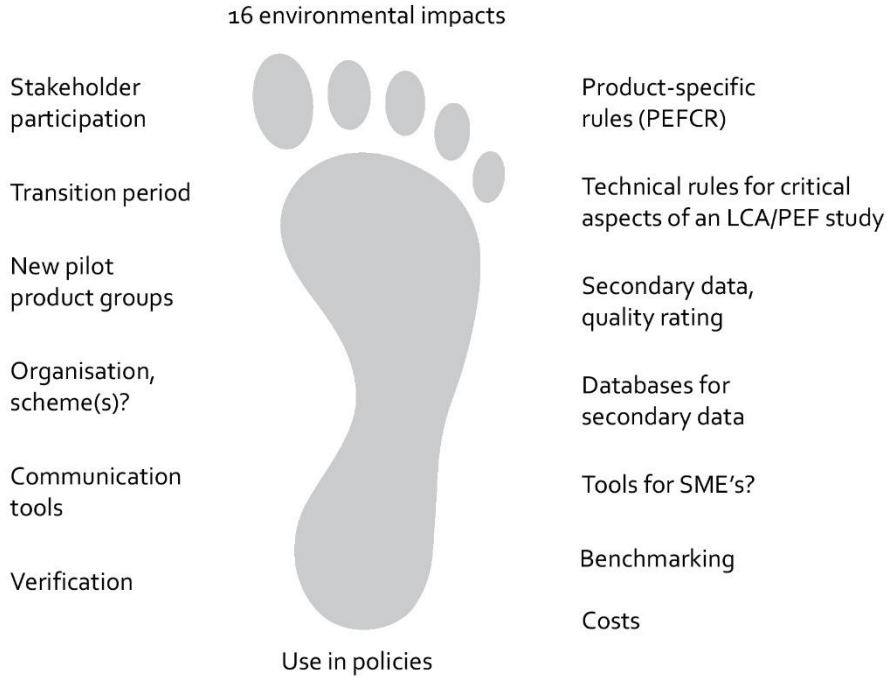
The SMGP Communication further foresees that, in the future, these crucial developments should allow the environmental footprint methods to be applied in the market and in policies as reliable tools used to differentiate products or organisations at a reduced cost (EC 2013d).

See more about the PEF on the webpages of the EC: "Single Market for Green Products Initiative"[8] and "Results and deliverables of the Environmental Footprint pilot phase"[9].

Also, see Product Environmental Footprint Guide (2012), EC 2018c, Suikkanen *et al.* (2019), and Zampori and Pant (2019). The answers found on the "Questions and Answers" web-page[10] of EC also shed further light on the nature and aims of the PEF.

As a conclusion from the description above, it is clear that the PEF is not just a methodology used to measure the environmental impacts of a product. It can be seen as a package of methods and related tools, communication methods and channels and, finally, information allowing effective policies.

Figure 2: Properties of Product Environmental Footprint (PEF).



Source: SYKE

5.1 Properties of the PEF that are under development

In April 2018 when the transition phase began there was a rather long list of PEF properties that were under development. However, in October 2019 many of them have been finalised. For example the report about characterisation methods for human toxicity – cancer effects, human toxicity – non-cancer effects, and eco-toxicity has been

[8] https://ec.europa.eu/environment/eussd/smgp/index.htm
[9] https://ec.europa.eu/environment/eussd/smgp/PEFCR_OEFSR_en.htm
[10] https://ec.europa.eu/environment/eussd/smgp/pdf/q_a.pdf

published (Saouter *et al.* 2018). And a benchmarking method shows performance classes A-E (Zampori and Pant 2019, p. 181), although it has not been tested yet.

A possible PEF label is interesting, although EC is working with a wide range of communication vehicles, and not specifically on labels. A detailed report about studies on possible PEF communication types was published by Lupiáñez-Villanueva *et al.* (2018). They concluded that the most effective label would have an A–E rating and an average product score (Lupiáñez-Villanueva *et al.* 2018, p. 11). In addition, they added that it would be good to offer QR codes, bar codes, links, websites and banners for those who want further information. O'Brien *et al.* (2018, p. 75) summarised their results like this:

> Both for citizens and businesses the clarity and simplicity of the information is key. Citizens find numerical information and scientific terms too complex and prefer graphics, bars and colour scales. QR codes, barcodes and links can lead to more detailed information for the interested citizen. Translating the complexity of EF information into simple, easily understandable messages is a challenge. Consumers want certification of information from named and independent sources.

Another deficiency is that there is no impact assessment method for biodiversity yet, but this has been a problem also for the LCA methodology in general. However, biodiversity aspects and data can be given under "additional environmental information".

Report on verification was published already in 2017 (Product and Organisation Environmental Footprint: Verification … 2017), and it made a proposal for the verification process. Verification is described in the report "Suggestions for updating the Product Environmental Footprint (PEF) method" (Zampori and Pant 2019).

Regarding costs, Kerkhof *et al.* (2017) made a technical evaluation of the pilot phase, and found a possibly significant reduction of costs resulting from the use of the PEF and PEFCRs in comparison to conventional LCA. The main drivers of this cost reduction are the rules, the materiality principle (selecting the most important environmental impacts), freely available background data and models, and having a single method as a basis.

A tool for small and medium sized enterprises (SMEs) was planned, but hasn't succeeded yet.

The governance structure of the whole PEF system is also under consideration by the EC (see Chapter 8.1 and EC 2018e). In April 2018, the EC seemed to be quite confident that the PEF solves many of the problems of LCA (EC 2018e), stating the following:

> The pilot phase resulted in improvements in the Environmental Footprint methods, proved the possibility to set a benchmark and compare the performance of similar products and confirmed the potential for significant cost reductions for users, compared to conventional Life Cycle Assessment (LCA). The tests of communication vehicles are pointing to how to effectively communicate Environmental Footprint information. The tests on verification provided information on how to establish a reliable verification system.

However, the need for further improvement was recognised regarding certain issues, such as:

- scope definition: identifying rules for identifying the right coverage/granularity for PEFCRs and OEFSRs;
- the further development of the approach for defining classes of performance;
- the improvement of the modelling of agriculture and animals, regarding especially the allocation of impacts (a specific working group will start in 2020);
- the improvement of the International Life Cycle Data Network format for datasets.

5.2 Plans for updating the method

In 2019 Zampori and Pant (2019) published a report (of 248 pages) about updating of the PEF method. It is a technical report by the Joint Research Centre (JRC) of the EU; it is a working document, and it does not yet modify Recommendation 2013/179/EU on the use of common methods to measure and communicate the life cycle environmental performance of products and organisations.

In March 2019 the EC published a staff working document: *Sustainable Products in a Circular Economy – Towards an EU Product Policy Framework contributing to the Circular Economy* (EC 2019b). It describes the present state of the PEF and the opinions of various stakeholders towards the PEF, collected in various workshops and consultations. However, it does not yet clearly outline any one proposed way to proceed with the PEF and policies.

6. The past challenges of LCA and the potential of the PEF

We first look at the problems that have been identified in relation to LCA and if the PEF really solves the problems. Discussions in scientific journals between LCA and PEF experts are used as a source. Then the requirements and evaluation criteria that can be set for PEI and environmental product information systems (EPISs) are shown, and the requirements and criteria are used to consider if the PEF is better than LCA for use in EPISs and product policy instruments. Finally, if the PEF analyses of products can be required from a company that produces the products is shortly discussed.

6.1 The challenges of LCA and the PEF

In the SMGP Communication (EC 2013d, pp. 7–8), the EC recognised the following needs for improving LCA:

- More consistent results;
- More comparable results;
- More accurate results.

It was further outlined that improvements to LCA would be reached by, for example (EC 2013d, p. 8; see also Figure 2):

- Clear identification of the environmental impact categories to be looked at;
- The requirement to quantify data quality and setting minimum data quality requirements;
- Clearer technical instructions for addressing some critical aspects of an LCA study (such as for allocation and recycling);
- Developing PEFCRs which allow focussing on the three or four most relevant environmental impacts amongst the 14 key environmental impacts indicators and focussing on the most relevant processes or life cycle stages for a given product category or sector.

Finkbeiner (2014) and Galatola and Pant (2014) had a discussion in the *International Journal of LCA* where they raised up problems with PEI, and especially with LCA, and argued about whether or not the PEF solved the problems or just caused more of them. Some topics of that discussion, as well as some topics presented in later articles, are shown below.

Regarding PEI, Galatola and Pant (2014) highlighted a growing concern among Member States and industries related to the rapid growth in the number of "similar-but-different" methods and approaches related to the calculation of various footprints. They said that the proliferation of approaches for measuring environmental performance makes it unnecessarily complicated and expensive to make environmental claims regarding the environmental performance of products. They added that consumers are confused by the proliferation of available information which is based on different measures, and the majority of them do not trust "green" claims.

While Finkbeiner (2014) brought up the large number of standards that already exist, Galatola and Pant (2014) pointed out that the flexibility inherent in the existing standards leads to LCA results that are often neither reproducible nor comparable, and this situation contributes to a lack of confidence that weakens the potential role that the LCA tool could have, especially in a policy context. The PEF would strive to provide a common basis for measuring and communicating environmental performance, which would be recognised by market actors across Europe.

The PEF method would request the development of product-specific rules, which would set unique, consistent requirements, leading to comparable results. It would evaluate performance with respect to an average product or organisation (in other words, it would do benchmarking), and in this way it would help define what can be considered a green product. The need for reliability would mean that strict attention is paid to data quality and to review (Galatola and Pant 2014).

Regarding the concern of Finkbeiner (2014) about there being so many environmental impact classes (14 at the time), some of them with a low maturity level, Galatola and Pant (2014) gave the following response:

> Regarding the selection of impact assessment methods, it must be recalled that the objective of the PEF and OEF is to enable the assessment of a comprehensive set of environmental information for decision support purposes. Therefore, the PEF and OEF use a broad set of impact categories, including all midpoint methods according to the ILCD Handbook that are recommended with levels I, II and III (EC *et al.* 2011). The ILCD Handbook has five categories: the three levels of recommendation (I, II, III), Interim (not recommended) and not even mentioned (not recommended). So, while recommendation level III is the worst of the recommendations and is to be used with caution, it remains a recommendation by the Commission that should be used to ensure a comprehensive picture and to avoid the unintended shifting of burdens.

Regarding weighting, Finkbeiner (2014) reminded us that there has been a long-established global consensus (formulated in ISO 14044, ref. ISO 2006c) that subjective weighting is not to be used for comparative assertions disclosed to the public. Galatola and Pant responded to this by saying that there is a desire of consumers for a single indicator regarding products' overall environmental performance, and this could be based on a weighting system. They continue to state that they are well aware of how this issue is dealt with in ISO standards but they are also aware of how weighting is actually implemented in practice. While weighting is part of many, if not all, decision-making processes and the majority of current environmental policies, it is often hidden. For example, in the case of developing a carbon footprint standard, 100% of weighting

is implicitly and automatically assigned to climate issues. It was therefore considered appropriate to push for a systematic, and transparent, use of normalisation and weighting in the development of the category/sector rules within the pilot phase.

A large part of the environmental impacts of almost every product are born in the production chain (of companies), before the final manufacturing stage and company. The PEF does not require production-chain specific data from all the life cycle stages and processes, and the use of secondary data has caused worries (see e.g. Lehmann *et al.* 2016, Workshop…2017). Secondary data from databases can be used for those parts of the life cycle that are not run by the company applying the PEFCR and without access to company-specific information (EC 2018c, p. 118), and which are not under the "mandatory company-specific information" chapter of a PEFCR. However, PEFCR can also contain mandatory data points from other parts of the supply chain, if these were identified as most relevant ones. And for the secondary data, the quality index of the secondary data makes visible the uncertainty that is related to the secondary data.

With regard to the objective of cost reduction, Galatola and Pant (2014) proposed that pre-defined choices will reduce the overall cost of achieving more reliable and robust assessments compared to the very heterogeneous situation that exists today. Based on data from companies, they expected a 30–50% reduction in assessment costs compared to the current situation, i.e. life cycle assessment LCA.

Regarding participation, Galatola and Pant (2014) stated that the EC has set up a very open, transparent and inclusive process for including feedback from stakeholders around the world in the final pilot outcomes, as appropriate. In the final conference of the PEF (24 April 2018 in Brussels) Michele Galatola told in his presentation that in the 27 pilots there have been 2024 individual stakeholders, out of which 85.2% were from Europe, 5.3% were from North America, 4.3% were from Asia, 2.9% were from South America, 0.8% were from Oceania and 0.15% were from Africa. They represented large companies (23.3%), sectoral organisations (13.9%), research organisations and universities (17.0%), consulting companies (13.9%), SMEs (11.7%), public administration (7.4%), NGOs (3.7%) and EU stakeholder organisations (3.1%).

In 2016, based on a mid-term evaluation of the pilots, Lehmann *et al.* (2016) continued the analysis with Finkbeiner, analysing the possible shortcomings of the PEF. They listed the following challenges:

- Open PEFCR scope definition;
- An open communication format;
- Definition of the functional unit;
- End-of-life recycling formula;
- The scientific robustness and applicability of the predefined LCIA methods as well as the procedure for prioritising impact categories;
- "Comparability over flexibility" or "reproducibility over flexibility";
- Definition of the product category and the representative product;
- Generic vs specific data.

In 2018, the same research group continued the analysis (Bach *et al.* 2018), revealing that the PEF method, as well as its implementation in PEFCRs, is not able to guarantee fair comparability due to shortcomings related to:

- The definition of product performance;
- The definition of the product category;
- The definition and determination of the representative product;
- The modelling of electricity;
- Requirements for the use of secondary data;
- The circular footprint formula;
- Life cycle impact;
- Assessment methods;
- The approach to prioritising impact categories.

Bach *et al.* (2018) provided recommendations for the improvement of some of the shortcomings, but at the same time, they concluded that the PEF method has to be further improved to guarantee fair comparability.

Regarding the critiques of both Lehmann *et al.* (2016) and Bach *et al.* (2018), it is evident that Galatola and Pant (2014) responded to some of them already in their response to Finkbeiner (2014). And it is evident that some of the challenges are based on the properties which are still under development, like the communication format. However, much of the new critiques by Bach *et al.* (2018) addressed specific methodological questions, which should be compared to, for example, the recently published report by Zampori and Pant (2019) about updating the PEF method. However, in this project we had no possibility to do this (and unfortunately Zampori and Pant did not do that either in their report).

Recently several reports have been published that evaluate various aspects of the PEF. In 2017 an independent review was done (Vincent-Sweet *et al.* 2017). The following summaries are highly relevant:

- "The PEF/OEF pilot phase is considered by many to be a good opportunity for the LCA harmonization at EU level and beyond Europe. The level of technical discussion and the large participation of LCA experts and industry is considered a strong point. However, some feel that the aim of the process is unclear or unrealistic, and a number have doubts about the robustness and the feasibility of the methodology.";
- "Many recognized the technical robustness of the existing rules, at the same time noting that for some impact category (e.g. ecotoxicity) the level of scientific consensus is not enough to promote a standardized use. Some others noted the lack of consideration of other important topics, like biodiversity and marine littering.";

- "The area of verification is considered one of the less mature of the entire EF process, where more work needs to be done in terms of the development of the production of reliable and consistent results for the EU market.";
- "One of the most critical areas remains the lack of clarity on the future implementation of the EF, in particular on its communication.";
- "The PEF/OEF pilot exercise is perceived as both a potential risk of overlapping with existing, more established schemes such as the ecolabels or sector standards, but at the same time it offers potential synergies with many of these schemes due to its methodological robustness. A potential for feeding into GPP (green public procurement) is perceived by many.";
- "From an international perspective, relevant bodies such as the 10 Year Framework of Programmes Consumer Information programme, or the International Trade Centre should be actively engaged in the Steering Committee, and experiences developed outside of Europe should be incorporated to the extent possible. More generally, the efforts already shown in the pilot phase to link with consensus building processes at the methodological level (e.g. with the Life Cycle Initiative, and ISO), and also with all stakeholders (consumer and environmental NGOs, EU country representatives), should be strengthened."

It is also good to keep in mind the reminder that was already published in 2000 by Tukker (2000): he described three frames that play roles in toxicity evaluations and concluded that in situations where science lacks robustness, there will inevitably be pluriformity in the views of society. More generally, this means that there are no simple solutions since such solutions artificially reduce the real complexity and can result in bias (Tukker, personal comment). This raises the questions of which parts of the PEF methodology are most critical in this respect and how this real complexity could be taken into account (e.g. using several methods for some impact categories). However, this was not in the focus of this report.

6.2 The PEF as an Environmental Product Information Scheme EPIS

Several requirements can be set for PEI and EPISs. In the SMGP Communication (EC 2013d, pp. 11–12), the EC recommends the following set of principles (detailed in Table 2) to be applied when communicating about the environmental performance of products and organisations (in other words, they are requirements regarding PEI).

Table 2: The requirements of Product Environmental Information PEI

Requirement	Explanation
1. Transparency	Economic operators should release information not only on the environmental performance of the products and organisations concerned but also on the way the information has been generated, namely the assessment procedure, method, data source, criteria etc.
2. Availability and accessibility	Economic operators should display the information concerning the environmental performance of the product in relation to the most relevant environmental impacts in a simple and immediately understandable format. The essential information should be complemented by making detailed information available for consultation through additional channels, such as websites, smartphone applications etc.
3. Reliability	The information communicated should be scientifically accurate and verifiable to ensure users' confidence in the green claim.
4. Completeness	Economic operators should provide information on all environmental impact categories that are relevant for the product and the organisation concerned in a cost-effective way.
5. Comparability	Economic operators should make consistent methodological choices in order to guarantee the comparability of the environmental performance information related to a specific product category or to sector over time. Whenever possible, they should use methods that enable the comparison of environmental performance between products belonging to the same product category and between organisations operating in the same sector.
6. Clarity	Economic operators should present the information in a way that is clear, precise and fully understandable for the users. The content of the information should be clear as well: its range and complexity should be adjusted to the target audience, to the characteristics of the product and to the purpose of the communication.

Source: EC 2013d.

Regarding all the principles above, the PEF methodology offers good possibilities to fulfil the principles, but the final judgement depends on the forthcoming PEF scheme (or PEF schemes, if multiple schemes are allowed). Compared with stand-alone LCA, the PEF quite evidently offers better possibilities to fulfil the principles.

The PEF can also be seen as an EPIS. Rubik *et al.* (2007) evaluated the influencing factors which determine the success or failure of an EPIS, looking especially at Type 1 Eco-labels. Two of the factors that Rubik *et al.* identified are general; the others are dependent on the product group. The two general key influencing factors are costs, fees and verification (Point A in Table 3) and credibility (Point B). Other key influencing factors depend on the product group.

Table 3: Factors which determine the success or failure of an Environmental Product Information Scheme EPIS

Factor	Explanation
A. Costs, fees and verification	
B. Credibility	
C. Determination of the main environmental impacts	Identification of the life cycle stage in which the main environmental impacts of a product or service occur is necessary for establishing targets, formats and criteria for an EPIS.
D. The role of stakeholders	Identification of the key stakeholders is clearly a crucial issue – not only in terms of environmental impacts but also in terms of the economic and policy implications.
E. Consumer awareness	Awareness is the basis of any behavioural change and is therefore a crucial key for success. Consumer awareness strongly differs depending on both country and product group.
F. Market structure	Rubik *et al.* differentiated three main structures: markets where production is concentrated in the hands of a few producers; markets in which a link in the supply chain has control of the market yet is not directly responsible for the environmental impacts of the industry and; markets with a strong presence of SMEs in the various links of the supply chain.

Factor	Explanation
G. Format	The format should be an appropriate compromise between conciseness and clarity. Simple products such as paper need only a very short and simple item of environmental information. On the contrary, with more complex products like washing machines, a logo or a phrase may not be enough and, for example, guidance for correct use is needed.
H. Criteria (requirements)	Criteria strongly influence adoption by companies, and the challenge is to achieve an appropriate balance between too strict criteria and too easy criteria (which might create mistrust among consumers and thus discredit the scheme). Another challenge is to find a good compromise between the need to reflect local conditions and the issue of harmonisation in an increasingly global market.
I. Quality and price	If the introduction of environmental issues represents a diminution in quality or a significant increase in price, consumers might not accept it.
J. Environmental policy targets	Criteria should be clearly linked to national policy.
K. Links with other IPP tools	These are of course important so that they point in the same direction.
L. The multi-stakeholder approach	Participation is more necessary when several stakeholders are responsible for environmental impacts throughout the life cycle of the product or service concerned (e.g. in the case of tourism).

Source: Rubik *et al.*, 2007.

Regarding costs (Point A in Table 3), Rubik *et al.* (2007) noted that in most of the existing eco-labelling schemes, fees are based on the annual turnover of the eco-labelled product and that, in absolute terms, this is not a big percentage but, in some cases, companies may prefer to invest in more profitable marketing tools rather than an EPIS. They note also that verification costs can represent another important bottleneck for SMEs. Regarding LCA, costs have certainly also played a role for the relatively low success of LCA (however, see Salo *et al.* 2019b, showing that LCA has been in use in Nordic companies in textile and ICT branches). And regarding the PEF, a lot of emphasis has been put on getting lower prices than those of LCAs.

Regarding credibility (Point B in Table 3) Rubik *et al.* (2007) saw that it depends strongly on the guarantee of the competent body, which must be fully independent but not necessarily part of the administrative body. They see that consumers tend to prefer NGOs and consumer organisations as competent or guarantee bodies and generally do not trust producers and retailers as sources of environmental information. Regarding the PEF, if the scheme operator will be the EC, there are obviously quite good changes to have a good score for the credibility.

Points C, D, J, K and L in Table 3 have been well taken into account in the PEF methodology and the development process of PEFCRs. Point E depends of the awareness of consumers in each country, but can also be affected by the marketing of the PEF. Point G remains to be seen (i.e. what kind of format will be developed). The same concerns Point H (i.e. how the benchmarks are defined and what kind of label will be used). Regarding Point I, the eco-design of products and services should be done in a way that guarantees the satisfaction of the consumer and fulfils ecological goals, for example, by having innovative solutions (Salo *et al.* 2019b).

6.3 Can the PEF be required from manufacturers?

Regarding the use of LCA by "the system operator" (e.g. the administration managing eco-design regulations and eco-labelling organisations), LCA information has always been used to define the criteria information. See, for example, Chapter 7.2 and the work of Suikkanen *et al.* (2019) about the use of LCA-based information in defining Nordic Swan Ecolabel criteria.

But consider that policy instruments would involve asking the manufacturer to do a PEF analysis and that the PEF results would be used to evaluate if the environmental performance is good enough. This is discussed in Section 8.3, but some viewpoints are only presented here. A major fear connected to this is caused by the increase of costs, which can lower the success of voluntary instruments (like Type 1 Eco-labels) that would set the requirement for having the PEF.

On the other hand, the RES Directive already requires LCA that produces carbon footprint analysis (see Table 1). There are public procurement cases in which carbon footprint assessment has been required or used as an award criterion. It seems that the requirement for doing the PEF can be introduced to companies, but it may be wise to proceed gradually. As proposed in Section 8.3, and even if the PEF were a compulsory requirement of a policy instrument, capacity building – for example, in the form of expert help (see the "LCA clinics" in the work of Judl *et al.* [2015]) – is important, accompanied by awareness raising.

7. Three analyses about eco-design tools and the relations between the PEF/OEF and the Nordic Swan Ecolabel

This chapter shortly describes the main results and conclusions of three reports produced in the SCEPEF project. One report examined how ecodesign and green innovations are implemented in textile and IT companies that manufacture and/or design products in the Nordic countries. The two other reports analyse differences and synergies between environmental footprint and the Nordic Swan Ecolabel, the first one looking at products and the second one looking at organisations like grocery stores.

7.1 Product Environmental Information PEI in eco-design in companies

One part of the SCEPEF project examined how ecodesign and green innovations are implemented in textile and IT companies that manufacture and/or design products in the Nordic countries. The textile sector was defined as covering textiles and wearing apparel. The IT sector included electronic components, computers, communication equipment and consumer electronics. The IT sector was limited to the manufacturing of hardware, excluding games and software, programming and the repair of IT equipment (Salo *et al.* 2019b).

The report looked at how and why ecodesign and green innovations are promoted by companies, what barriers they have faced, what tools they use to support their work and how they perceive the PEF. It applies this framework in the context of the Nordic countries, which are perceived as forerunners in environmental matters.

The data used in the report was collected using a structured questionnaire to gather a broad overview of the situation. The questionnaire was conducted in Webropol and sent by both the national industrial associations and the researcher to the target population (N = 104).

7.1.1 Design, innovations and environment

Many companies have recognised the value of environment-related product responsibility as a vital contributor to sustainable long-term success.

Eco-design considers the environment during the design process. Eco-design tools help the designer to integrate environmental aspects into the product development processes in a prescriptive, problem-solving way. Environmental assessment tools provide a systematic vision at a specific level of product development or life cycle, typically with quantitative measures, including LCA, simplified LCA, eco-labels, matrices and footprints. Environmental improvement tools, such as guidelines and manuals, offer quick and simple information in the early stages of the product design process, when there is less data about a product. A wide variety of tools exist, which is why the EC proposed the use of a PEF to harmonise the various environmental impact assessment methods (*Product Environmental Footprint Guide*, 2012).

7.1.2 Main Findings

The respondent companies were fairly mature in terms of integrating sustainability into their operations and were driven by general willingness and other internal stimuli, as well as customer demand. IT companies were also driven by legislation. Therefore, the tightening of legal requirements seems to be a pushing element for several companies and the criteria should be revised regularly.

Despite the perceived maturity of the Nordic companies, in reality their actions mainly remained focused on technological changes. The respondents primarily focused on products and sub-system change, especially change concerning material choices and prolonging life cycles. Some of the questionnaire respondents stated that they had had difficulty finding information on the environmental performance of different options regarding materials, for example, which indicates a growing need for research in this field to provide reliable information on how to operate more sustainably. An area where innovations were lacking was revealed to be the functional change of developing product-service systems. Still, no remarkable change had taken place based on these results in comparison to the previous studies from the beginning of the 21st century.

The majority of the respondents were interested in using an eco-design tool. Danish companies were the most common tool users whereas Finnish companies used eco-design tools the least. Tool users were found to have significantly more product-, process- and marketing-related innovations. The most promising tools are suitable for assessing environmental performance specifically and provide for communication at the same time. No single, superior tool was found, but instead, companies used different tools for different purposes, such as LCA and eco-labels.

The majority of the respondents had not heard of the PEF before. Finnish companies were more often among those that had not heard of it. However, most of the respondents were eager to find out more about the PEF, and as a result, they were sent a short and informative document about it, together with the results of the study and its recommendations. Those respondents that had heard of the PEF before usually felt that it would complement the eco-design tools that the company was already using. The respondents mainly saw the PEF as a tool for evaluating the accuracy of environmental product claims.

7.1.3 *Recommendations*

Salo *et al.* (2019b) identified a need for future policy development in the area of eco-design, such as:

- helping companies to dematerialise their business model by supporting a transition from a product-based market to a service-based market, for example, by taxation – this could include repair, renting, take-back-schemes etc.;
- revision of the Ecodesign Directive minimum requirements and development of similar regulations for other non-energy-using product sectors;
- implementing the PEF in companies as a way of evaluating the accuracy of environmental claims about products and supporting the use of eco-design tools in companies;
- research funding for projects that engage companies and build their capacity regarding eco-design tools, as well as funding for studying environmentally preferable materials.

7.2 Differences and possible synergies between the PEF and the Nordic Swan Ecolabel

One part of the SCEPEF-project compared the EC's PEF methodology and the Nordic Swan Ecolabel in terms of their goals, methodology and environmental information. It aimed to identify the similarities and differences in the use of environmental information and the synergies and opportunities for cooperation regarding the environmental information produced by the two systems (Suikkanen and Nissinen 2017, Suikkanen *et al.* 2019). The transition period of PEF is a good time for the Nordic Swan Ecolabel to consider the role of the PEF in its work and to internally assess the eventual opportunities.

7.2.1 *Main findings*

At the end of the PEF transition phase, a policy proposal is expected to be disclosed by the EC and the future use of the PEF will become clearer. The need for communicating the best products to buy to the consumer is clear. Cooperation between Type 1 eco-labels and the PEF is important in this regard, and a process for understanding any differing results should be in place.

Both schemes have the objective of including the environmental impacts from the life cycle of products and promoting the development of products with reduced environmental impacts. However, the methodologies differ, in particular in the approach to using life cycle assessment, i.e. the extent of quantification of environmental impacts. The PEF is a Life Cycle Assessment method, whereas the Swan Ecolabel uses a Life Cycle Thinking approach. In particular existing LCAs are used often for defining how criteria for a product group are set. In this phase also a life cycle

thinking based "MECO" approach is used. The PEF focuses on a pre-defined set of 16 environmental impact categories, whereas the issues addressed in the ecolabel product group specific criteria can be broader, and may include quality, social and ethical issues and may integrate emerging issues. The differences in the approaches may lead to the identification of different environmental issues as most relevant.

7.2.2 Discussion

Consumers look for a trustworthy and uncomplicated indication of the environmental performance on a product. Both schemes have the goal to reduce the environmental impact of consumption, products and services by finding products with the least environmental impact. The Swan is a very well-known brand on the Nordic market and there is significant consumer trust in the label. For the consumer the continued proliferation of different labels is a challenge, which means that integrating the new method into existing instruments, such as type 1 ecolabels, can be a good idea.

Table 4 below summarises some opportunities and challenges that different stakeholders could face if PEF was used as the analytical basis for the eco-label. For more detail, please refer to the Discussion chapter in Suikkanen *et al.* 2019.

Table 4: Opportunities and challenges for different stakeholders if PEF was used as the analytical basis for the Nordic Swan Ecolabel

	Opportunities	Challenges
Nordic Ecolabel Authority	- PEFCRs and PEF studies are a good source of information for identifying hotspots for the "Relevance" and "Potential" assessment of an RPS study and may reduce workload. - The eventual benchmarks available through representative products can be used to define a better-than-average product.	- The PEFCRs may point to processes that are not currently considered "steerable" by the Swan's assessment, in particular in the use and end-of-life stages. - The representative product (in PEFCR) is an average product on the European market and may not correspond to the Nordic situation. - Data verification may present extra costs if criteria require PEF studies from companies.
Companies	If PEF-studies are included as criteria requirements in Swan: - For companies using an LCA the PEF can possibly offer a way to simplify the data creation requirements for multiple purposes, such as product design and benchmarking and the ecolabel.	If PEF-studies are included as criteria requirements in Swan: - For companies not yet using LCA, voluntary PEF-based requirements could require a large and expensive extra effort, especially for smaller companies. - The data required currently for the PEF and the Swan schemes is different and this could lead to extra work for companies. - In the transition phase, some companies might lose their license when the focus of the requirements would change.
Consumers	- Using the PEF within the Swan would contribute to the provision of reliable and comparable information on product environmental performance, also across different product environmental information schemes.	- Many environmental issues that are of important to consumers, including emerging environmental issues and quality and ethical matters, may not be included in the PEFCRs, and the inclusion of these in the ecolabel criteria should be maintained.

If there were a change in the way the criteria are set, this could also mean that, in the transition, some ecolabelled products could lose their license. However, the situation is

similar always when the criteria are revised. For example, since climate impact has a high weighting score in the PEF, a fictive Swan eco-labelled product may end up not being eligible for the Swan, if a good PEF value is required for applying for an eco-label (see Suikkanen *et al.* 2019).

7.2.3 Recommendations – how the PEF could be used by the Nordic Swan Ecolabel and vice versa

The study resulted in recommendations that can be grouped into three options (or "levels"). These three options could best be seen as a possible progression over time. There is currently no knowledge regarding to what extent the PEF will develop into an environmental information scheme in the future, and this is crucial for options 2 and 3. However, it is already possible to start using PEF information (option 1). The three options are as follows:

1. Use PEF information (*most simple*):
   The Nordic Swan Ecolabel could use the PEFCRs, screening studies and any other possible readily available PEF studies as information sources in the criteria-setting process, whenever such information is available. The most relevant impact categories, life cycle stages, processes and elementary flows identified in the PEFCRs will provide a useful indication of the "hotspots" for which criteria would be set. They would support the "Relevance" and "Potential" assessment in the RPS. The Swan could look at PEFCRs in setting criteria for new product groups (e.g. in feasibility studies). This option is most simple and is expected to have no significant impacts on companies or consumers.
2. Create PEF information:
   The PEFCRs would be a key source of information for criteria setting. The Swan would actively participate in producing PEF information. This could involve participating in the PEFCR development processes or proposing the development of new PEFCRs in line with upcoming product groups. This would imply being invited by the Technical Secretary of a PEFCR development process (e.g. in screening study preparation) or participate actively as a stakeholder. On the other hand, PEFCR related stakeholders could be invited to participate in the criteria setting. The Technical Secretariats developing new PEFCRs should consider the significant environmental aspects identified by Swan and other type 1 eco-labels, to include those to the additional environmental and technical information, where relevant. The impacts of this option are mainly on required human resources (and related costs) of the different organisations.

3. Require PEF information *(most demanding):*
   The Swan could promote the integration of the PEF into voluntary eco-labelling schemes, by assimilating the eco-label criteria with the PEF criteria, and requiring PEF studies from the license applicants. Based on a PEFCR, the product groups would be defined in a similar way and the information basis would be the same, criteria would focus on the most relevant impact categories, life cycle stages etc. identified in the PEFCR. This would be complemented by the Swan's own process for introducing requirements on chemical risks, social aspects, durability and emerging environmental issues. To obtain an ecolabel a PEF study would be performed by the applicant. The Swan would define the PEF value that would be required from applicants or would act as a baseline for giving points. The costs associated with this option have not been addressed in this study, but it is evident that this most demanding approach would have remarkable impacts on the eco-labelling process, it's costs, as well as on the companies that are applying for an ecolabel.

However, it is important to note that experts in the Nordic Swan Ecolabel have not yet been fully convinced about the added value that the PEF would bring to the eco-label. Concerns have been raised from the beginning of the SCEPEF project (Workshop…2017) and they became clear in the written review process of this report. Their main arguments to be considered in the future cooperation are:

- The PEF does not always take into account all relevant viewpoints, e.g. the quality of the product or whether the ecolabel identifies a new important aspect (which microplastics were some years ago) which would not be taken into account in the PEFCRs.
- PEFCRs have identified life cycle stages such as transport from the shop to the home (e.g. for paints) and for textiles also the user phase which type 1 eco-labels do not consider as a steerable environmental aspect in the product context.
- The PEF is presented as the default method to identify and show environmentally preferred products, however, this is not the case, and it is not better than type 1 eco-labels for this purpose.
- The high costs of extra work if type 1 eco-labels would need to cooperate in the preparation of PEFCRs more than they would do voluntarily.
- Concern about the extra costs for companies applying for the eco-label, if the label would require a PEF analysis – this would be reflected in the motivation of companies to apply for the eco-label.

The Nordic Swan Ecolabel has informed the authors that the possibilities to use the PEF in the criteria of the Nordic Swan Ecolabel have recently been discussed during the latest revisions of some relevant criteria, e.g. generation 3 of the Basic Module in paper criteria, but the PEF is not yet subject to any requirements in the hearing phase of the

criteria preparation. Nordic Ecolabelling will follow with interest the possibilities to use the PEF in the next generation of the paper Basic Module.

7.3 Differences and possible synergies between the OEF and the Nordic Swan Ecolabel

One part of the SCEPEF project was to bring up the OEF method and to compare it with the Nordic Swan Ecolabel. The focus was on the environmental information used and produced, concerning grocery stores and the retail sector in the two schemes (Salo *et al.* 2019a).

Both schemes ultimately aim at making consumption and production more sustainable, but their approaches vary. The goal of the Nordic Swan Ecolabel is to push stores to perform better and to help customers make environmental choices whereas the OEF aims to create a common methodology and to enable the use of high quality, open data in environmental performance calculations. The Nordic Swan Ecolabel grants a license to a store that mainly sells groceries while also a retailer selling a broader category of products – for example, food, pets or gasoline – can use the OEF. The Nordic Swan Ecolabel applies an analysis of the RPS of the environmental issues, and it focuses on the hotspots related to the operation of a store and its product range. The OEF takes into consideration the processes and sites controlled by the retailer and the upstream and downstream impacts related to the products the retailer provides.

Despite differences, the schemes recognise fairly similar environmental aspects relevant for stores, such as climate change and resource use. They both find four common aspects important and there are three impact categories that they do not share. This difference between the most relevant impact categories is due to different views on important life cycle stages as the Nordic Swan Ecolabel only sets requirements for those stages with high overall RPS, which partly concerns different stages than those covered by the OEF. For example, the exclusions made for the life cycle stages of the OEF virtual retailer increase the differences between the two schemes.

Both schemes act more as internal tools for retailers than as tools for communication, wherefore they can be considered EMSs.

7.3.1 Retailer perspectives on the schemes

From a retailer's point of view, both schemes act more as EMSs than as a way of external communication and gaining added value in the market. Therefore, the original goals of the schemes, represented in the work of Salo *et al.* (2019a), have not yet been fully met. By applying for the Nordic Swan Ecolabel, the retailer shows willingness to provide better products in terms of their environmental performance and quality for its customers. The store also strives to reduce its own environmental burden in terms of hotspots related to the sector: energy and waste. The OEF too acts, to the best of our knowledge, as a voluntary system for measuring the life cycle impacts of the products provided by the store. As opposed to the Nordic Swan Ecolabel, the OEF does not give

a special focus on the store's operations (because these were not identified as the most relevant processes) or set any requirements for performance levels. Therefore, it could be easier for the store to adopt, but on the other hand, it does not yet indicate good performance externally like the Nordic Swan Ecolabel does.

Use of the Nordic Swan Ecolabel and the OEF benefits the retailer in many ways. By using the Nordic Swan Ecolabel, retailers can benchmark their environmental performance compared to other stores operating in the Nordic market and show customers their good environmental performance compared to a non-labelled store. It could bring profit to the retailer as the eco-label is seen as an important aspect when selecting a store by approximately one fifth of survey respondents in Sweden. The OEF is expected to offer a harmonised method for retailers to measure their environmental impacts and to reduce the costs related to having multiple schemes in different markets. The retailer can only conduct the OEF study and have the opportunity to enter the whole EU market by fulfilling one scheme of requirements, which has not been possible with the current schemes.

Both schemes demand resources from a retailer. Lots of information must be collected before applying for the Nordic Swan Ecolabel and changes may be needed, for example, changes to energy use and other facility management. To reduce the workload, the Nordic Swan Ecolabel concentrates on the most relevant aspects, based on the RPS analysis. The Nordic Ecolabelling collects fees from the applicants, and therefore, in order to have a positive balance, the stores should get an economical advantage from using the label. Most of the burden related to adopting the OEF was in the screening studies related to data provision because the OEF demands data concerning a broad range of products and ideally their life cycles are considered from cradle to grave. Thus, it necessitates a lot of time and work resources though the OEF is meant to reduce the burdens through harmonisation.

7.3.2 Producer perspectives on the schemes

The impacts on a retailer mostly relate to the production stage, which in general are out of the control of the retailer. Therefore, the producer is a relevant actor in the life cycle impacts on the retailer. The retailers may use both the OEF and the Nordic Swan Ecolabel in B2B communication and involve their suppliers in the retailer's sustainability policy. The Nordic Swan Ecolabel covers indirect impacts on the production stage by providing eco-labelled and organic products. As a Nordic Swan Ecolabel eco-labelled store favours products produced with lower environmental impacts than other products in the same product group, the producers are encouraged or pushed to produce goods fulfilling the set requirements of organic and eco-labels. In the OEF, a retailer gets information on the hotspots of its supply chain and can choose suppliers that offer products with lower environmental impacts. Thus, it can promote the design and manufacturing of products with less environmental impact.

7.3.3 Consumer perspectives on the schemes

It could be stated that, from a consumer's point of view, it is important that the store provides "green" products, but eco-labelling a store or a store measuring its own performance is not a prerequisite. Eco-labels are seen as relatively important factors in consumer decision-making – in two surveys, a quarter of the respondents always looked or often looked for an eco-label when buying a product. However, some of the stores licensed by the Nordic Swan Ecolabel have felt that the eco-label does not attract customers nor bring added value. According to the Nordic Ecolabelling, the stores feel that often the consumers do not know what a Nordic Swan Ecolabel eco-labelled store stands for.

The results of an OEF study in the retail sector are compiled into an OEF profile. A verified OEF profile may be communicated externally by using a vehicle selected during the transition phase. The vehicle may be, for example, a label, website or infographic. The results for all environmental impact categories shall be publicly available. However, according to a representative of the EC, OEF retail does not work for consumer communication, and therefore it remains as an internal and B2B way of communication. The OEF is not expected to be visible to consumers and therefore does not attract them.

7.3.4 Possible synergies identified for the Nordic Swan Ecolabel and the OEF

The OEF and the Nordic Swan Ecolabel (as well as other Type 1 Eco-labels) could find synergies and benefit from each other in many ways. After all, they share the common goal of reducing environmental impacts related to consumption and production. Below a few examples are listed:

- To use the OEF in the Nordic Swan Ecolabel criteria-setting process:
  - the Nordic Swan Ecolabel could consider setting criteria based on an OEFSR for grocery stores;
  - the OEF identifies sector-specific hotspots, which could then be assessed with the RPS tool, in order to reduce workload;
  - the Nordic Swan Ecolabel could have a point score requirement to reward companies that have conducted an OEF study;
  - the Nordic Swan Ecolabel could aim at decreasing stores' environmental impacts by rewarding stores for cutting down the amount of products with high environmental burden (indicated in the OEF) or replacing them.
- To use the OEF as a measure in the Nordic Swan Ecolabel:
  - the OEF could benefit the Nordic Swan Ecolabel by using representative products, product groups and their PEF values as measures of the overall life cycle impacts of the products provided by the store, which the sale of eco-labelled and organic products only partially reflect;

  - the geographical context of organisations could be taken into account when using the OEF default data to assess environmental impacts, in which the local eco-labelling schemes, such as the Nordic Swan Ecolabel, could help.
- To use the Nordic Swan Ecolabel as a communication tool for the OEF, the OEF for retail is best suited as an environmental performance tracker and a management system within an organisation, and another way of communicating the environmental performance to consumers is evidently needed; it could take place through eco-labels such as the Nordic Swan Ecolabel – however, in this case, further synergies should be built between the two systems.

8. Considerations about the use of the PEF in policies

This part of the report presents different viewpoints regarding the possible use of the PEF in product policies. We start by describing which options the EC introduced in a stakeholder meeting in spring 2018. Next, the results of consultations made in 2018 are shortly described, based on an EC staff working document. A Nordic expert workshop produced interesting viewpoints on the possible use of the PEF in policies, also asking if new policy instruments should be developed. Finally, an idea about a common information basis is presented.

8.1 The background document for the EU stakeholder meeting, 26 April 2018

The EC organised a workshop about policy options for stakeholders on 26 April 2018 (EC 2018e), just a day after the final PEF conference in Brussels. A background document was sent to the workshop participants. It presented five different approaches for the use of the PEF in policies (the text below is directly from the document, just shortened a bit):

- *Option 1*. Business as usual:
  The EC would take no further steps in applying the methods in other policies and further developing PEFCRs. The methods would remain at the disposal of interested sectors and industries for the autonomous development of the PEFCRs.
- *Option 2*. Continued support to the implementation of the EF methods:
  The EC would continue to follow the development and update of PEFCRs based on the EC guidance and to maintain and periodically update the environmental footprint methods.
- *Option 3*. Licensing the right to use the PEF and OEF:
  The EC would protect the PEF as a trademark and then license its use to interested bodies.
- *Option 4*. Integration of the methods in existing policies:
  The PEF method could strengthen several existing EU policy instruments. The range of instruments could be further expanded to consider arising policy needs. The existing instruments include the following:

  - *The EU Ecolabel*. The eco-label helps criteria setting based on a PEF analysis and/or integrating PEF results into conditions for awards and communication;
  - *GPP*. GPP helps set criteria based on a PEF analysis and/or use PEF thresholds as technical specifications in GPP;
  - *EMAS*. EMAS brings clarity to calculating and communicating the indirect impacts of an organisation (mostly those connected to the OEF);
  - *The UCPD*. The UCPD provides a tool / guidance for competent enforcement authorities based on EF methods in order to check the accuracy of environmental claims.
- *Option 5*. A new instrument for specific green claims:
  The instrument, conceived to be complementary to the EU Ecolabel and GPP, would require the use of the PEF to substantiate clearly defined types of green claims. It would only apply to those companies that wish to advance such green claims related to their product. These could include claims related to overall environmental performance (e.g. claiming a product is a "green product") or claims related to a single environmental aspect covered by the PEF (e.g. claiming to be a "low carbon" product). Comparative environmental claims would also be relevant.

The role of the PEF profile would be to substantiate the claims. The PEF can inform whether the claim is relevant (if the environmental issue is significant for the given product) and whether there are any misleading omissions (if any important environmental impacts are excluded from the claim).

The potential scope of environmental claims would not include issues that are not covered by the PEF (e.g. GMOs, reparability), implicit claims (e.g. the imagery and colours suggest environmental friendliness) and labels regulated at the EU level (e.g. energy labels, organic labels and the CO_2 labelling of cars).

The instrument would apply to products sold in the EU market and would also contain rules on how to communicate PEF information. These rules would be based on the principles established in the SMGP Communication (2013d): transparency, availability and accessibility, reliability, completeness, comparability and clarity. They would cover the content but not the format of the communication.

8.2 EC staff working document from March 2019

The EC organised several stakeholder meetings and web-based consultations in 2018. The input from all the consultations was considered in the EC staff working document about sustainable products in the CE (EC 2019a), concluding that stakeholders expressed most support for the following options:

- Using the PEF for the substantiation of environmental claims (making claims is voluntary, substantiating them with the PEF is mandatory);

- Providing requirements on how to communicate about the environmental footprint (it is not mandatory to communicate environmental information, but if communicated, the communication has to comply with specific requirements);
- Using the environmental footprint methods in the support of existing instruments as a common knowledge basis (the EU Ecolabel, GPP, the UCPD and EMAS).

For the OEF, it was concluded that most support was for:

- Encouraging the use of the method on a voluntary basis;
- Promoting harmonised reporting in the framework of non-financial reporting,
- Creating an EU registry of OEF results;
- Regarding investors, all five investors who replied (investors being the main users of the results of the method) thought that a registry, reporting and an EU rating scheme were very important.

8.3 The feedback from a Nordic expert workshop

One part of the SCEPEF project was to organise a workshop to discuss the possibilities and challenges for using the PEF in product policy instruments. The 18 participants included Nordic environmental product policy experts, Nordic Swan Ecolabel experts and the EC. The workshop was organised on 19 September 2018 in Helsinki, in connection with the Nordic PEF Conference that was held on 18 September 2018 at Finlandia Hall, Helsinki (Workshop report… 2018).

A draft report, which was an earlier version of this report at hand, provided the background for the workshop. In addition, two reviewers (Harri Kalimo and Arnold Tukker) of the draft report and Michele Galatola from EC presented their views about the topic.

Below a few highlights from the discussion are presented (see more in Workshop report… 2018).

First, Ari Nissinen presented the SCEPEF project and continued by clarifying both the assets of the PEF in comparison to existing PEI schemes and future improvements already foreseen for the PEF approach. Nissinen also pointed out the five options the EC has presented for using the PEF, ranging from business as usual to a new policy instrument (EC 2018e).

Harri Kalimo presented perspectives on the PEF from the viewpoint of law and law-making. He reminded those present that there were various (environmental) policy instruments, in the context of which the PEF (and the environmental information created within PEFs) would need to be considered. He also illustrated how any policy instrument requires political balance and careful compromises between a wide range of variables. The analytical approach could integrate both "bottom-up" and a "top-down" perspectives: Is the PEF seen to feed into policy instruments or should there be a new policy instrument on the PEF? It is also important to clarify why environmental

information is useful for each policy instrument and be specific about the associated information needs for each instrument. (What does the instrument want to do? Is information needed? If so, what kind? Is PEF the answer?) It is also relevant to ask whether the PEF in itself is an instrument or a way of analysing data that is used as an input to policy.

Arnold Tukker offered several ways of systematically addressing the report's research question: showing the categories of policy instruments, positioning policy instruments on a circular value chain, having a table of the policy instruments per life cycle stage and having a diagram that shows how the various instruments in question are in a continuum (e.g. regarding the product life cycle). In addition, one main comment for improving the analysis would be to address PEF, LCA and criteria information as a continuum and not as opposites. While LCA is used when we have no information, the PEF is used when we wish to have even more information, and criteria may be developed when we know the main parameters and impacts. He also reminded those present about a wish of the retailers that criteria that they can apply to their supply chains are developed.

Regarding the "distribution vs. environmental performance figure" (Figure 1 in this report), Michele Galatola noted that most products are where there are the least effective policy instruments (i.e. in the middle of the distribution). He furthermore discussed that there is a need for reproducible, comparable and verifiable information in policymaking. Of interest would be to discuss whether criteria information (e.g. for Type 1 Eco-labels) could move from pass/fail criteria to "life cycle indicator" criteria. The second type gives the manufacturer more options (options for Design for the Environment) provided that the manufacturer prepares a PEF in order to know where efforts should be targeted.

After the presentations, the participants were divided into four groups, each group discussing one key theme. Some key topics from each of the four themes are shown below.

The theme "Synergies", moderated by Arnold Tukker. In general the group agreed that in principle the PEF could be used as the main information basis for integrated product policy as well as SCP and CE policy instruments. However, as the starting point of the PEF is the product level, its use was seen as challenging for addressing systemic-level changes (which are seen to be necessary). The participants discussed an example from the food sector where addressing the environmental impacts of meat may not support a systemic-level reduction of meat consumption on the whole. The group considered that the PEF is a useful starting point in situations where good information on hotspots does not exist. But it was also emphasised that the administrative burden for companies should decrease and not increase (this is affected by, e.g. the requirements for updating the PEF for each product).

The theme "Mainstreaming the use of the PEF in Policies", moderated by Arne Remmen and Morten Birkved. The participants identified several major obstacles regarding mainstreaming the use of PEF in policies: price, interpretability, complexity, credibility, marketing, timing and having a flagship product. It was suggested that the PEF should be ready for use when the currently pending topics are finalised. The group suggested that future PEFCRs that will be developed should address the so-called big

impact or BBC (beef, buildings and cars) sectors (i.e. food, buildings and transportation). These are sectors that the general public can relate to and, at the same time, they meet the demand for increasing consumer acceptance of the PEF in the market. The group considered multi-stakeholder participation essential for mainstreaming. In particular, the role of NGOs in ensuring consumer acceptance was mentioned to be important.

The theme "Requiring the PEF from companies", moderated by Ari Nissinen. The group discussed the PEF's usability in the development of product-group-specific requirements for the Ecodesign Directive and eco-labels, and criteria for GPP, as well as policy instruments that could require a manufacturer to prepare a PEF. It was agreed that the PEF can be useful in criteria development. However, the experts hesitated about requiring PEF analyses from companies (i.e. setting a requirement about PEFs for manufacturers and products). The costs to companies were mentioned as an important factor for company uptake. The group suggested that company uptake may necessitate capacity building in the form of, for example, expert help (see LCA clinics by Judl *et al.* [2015]), and that much more awareness raising is needed.

The theme "The need for new product policies", moderated by Harri Kalimo. The theme was further specified like this: Is there any need for new product policy initiatives, and if so, what could the role of the PEF be in them? The group engaged in an exploratory brainstorming of the issue using a light policy analysis approach. As an analytical tool, they introduced a matrix that grouped existing and potential future product policy instruments into mandatory and voluntary instruments and further divided them along the classic categories of economic, administrative and informative tools. They assumed that an eventual new policy instrument could target the products that currently make up the bulk of the supply in the middle part of a normal distribution curve (see Figure 1 in this report), considering that the low end and the high end are already addressed by various tools (e.g. by eco-design and eco-labels respectively). They considered that the gaps in the existing product policy instruments might be grouped into two types: vertical and horizontal gaps. By *vertical gaps* they meant the environmental information-related reasons for preventing a specific policy goal from being reached by the existing instruments. *Horizontal environmental information gaps*, on the other hand, plague many instruments in parallel and could potentially be filled in by a common database that is used consistently. The group agreed that the PEF could provide for a common base of data for all (environmental) policy instruments. They furthermore wondered whether the integration of the PEF would lead to a general evolution wherein the currently voluntary policy instruments would have the potential (maybe even a tendency) to "harden": they might become increasingly mandatory and thereby push the whole market while at the same time allowing the creation of possibilities for new voluntary initiatives. One example of a possible future instrument facilitated or built around the PEF is a "top 10 performer list", a dynamic public database promoting the products with the best PEF values in a specific product group.

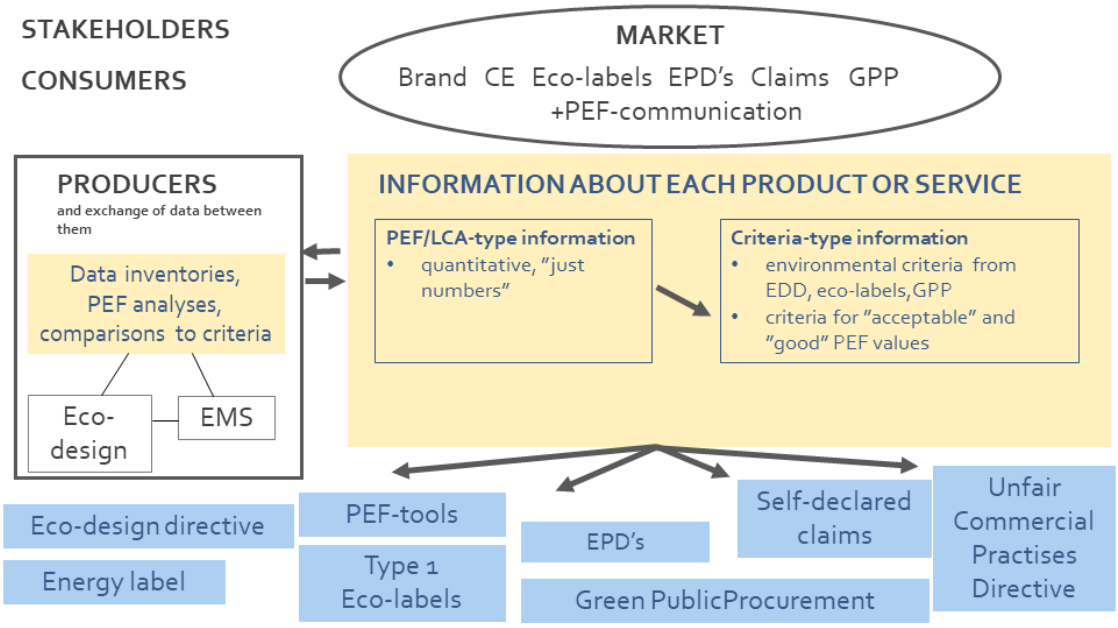
In summary, the PEF could provide a common base of data for all environmental product policy instruments. However, the currently pending topics need to be finalised, and companies need enough capacity building in order to calculate PEFs.

8.4 The idea about a common information basis

The information basis was very much focused on by the EU in 2006, for example, by the EU Working Group on Product Information (*Making Product Information…* 2006). It was also discussed elsewhere, e.g. in the EU Informal IPP Meeting in Helsinki (Nissinen 2006). Many databases have been established since then (e.g. the databases that can be used for PEF purposes,[11] and earlier ILCD databases connected to the LCA's development[12]).

It is evident that *a common information basis* could be one of the goals of the development work around PEI (see Figure 3). However, crucial questions are how the cooperation between different EPISs will evolve and how the EPISs are integrated with the various policy instruments. As there are already numerous databases available to offer the basic information (see, e.g. the one found at the link above), this would very much be coordinating work.

Figure 3: The relations between some integrated product policy instruments and a possible information system for gathering, organising, delivering, benchmarking and presenting product-category-specific LCA environmental information and criteria environmental information. The system would serve both producers in their exchange of data in a production network and the administration of the different policy instruments



Source: The figure is updated and modified from that of Nissinen (2006).

[11] https://ec.europa.eu/environment/eussd/smgp/ef_pilots.htm#compliant
[12] https://eplca.jrc.ec.europa.eu/ResourceDirectory/faces/databases/databaseList.xhtml

9. Conclusions

Some of the main conclusions about the SCEPEF project are drawn here. However, many conclusions concerning the relations between the Nordic Swan Ecolabel, the PEF and the OEF, together with results related to eco-design, have already been introduced in the earlier chapters of this report, as well as in the reports of the SCEPEF project (see Salo *et al.* 2019a, 2019b, Suikkanen *et al.* 2019).

The PEF has many properties that are new to the LCA tradition, increasing the consistency, accuracy and comparability of the results. It offers a much better information basis for product policy instruments than of a stand-alone LCA. Cooperation with the existing EPD schemes could be one way to rapidly gain new users. It is important to continue the development of the method and provide support to potential users, start the organisation of the PEF scheme, and invest in efforts to rapidly increase the number of product and service groups and actual product-specific PEF reports involved in the PEF scheme.

PEFCRs are now being used in the preparation of the eco-design regulations for photovoltaic panels and batteries. It is good to consider the broader use of the PEF method in the eco-design directive. It is also important to develop a new instrument on green claims and the UCPD directive, and the PEF could be the basis for this instrument.

Possibilities for a common information basis and coordination between already existing PEI sources and possible new PEI sources for the various product policy instruments and the PEF should be explored.

Cooperation between the type 1 eco-labels and the forthcoming PEF is crucial. First, it is important that Type 1 Eco-labels and possible PEF communication tools do not give very different messages to consumers about what is an environmentally preferable product and what is not. Second, eco-labels could gradually increase the use of the PEF in the development of their requirements and finally, as requirements for potential eco-label license holders. Third, at the same time, the development of Product Environmental Footprint Category Rules can receive beneficial information from the eco-label organisations. The EU Ecolabel can certainly do the integration of the PEFCRs in its processes fastest. But the Nordic Swan Ecolabel can also have a specific role here in figuring out how to use the PEF so that the eco-label maintains its independent role. The possible forerunner role is eased by the facts that the Nordic Swan Ecolabel is well aware of the PEF process in the EU and is known among policy experts and companies in Europe, including those outside the Nordic countries. However, it is worth noting that experts in the Nordic Swan Ecolabel organisation are not fully convinced about the added value that the PEF would currently bring to the ecolabel, and they are concerned about the extra costs for companies applying for the eco-label if it would require carrying out a PEF analysis.

The PEF will be an essential tool regarding eco-design in companies, used side by side with Type 1 Eco-labels. It is important to encourage capacity building in companies regarding eco-design, for example, by offering services like "eco-design clinics", especially designed for SMEs. At the same time, it is relevant to assess if more teaching about eco-design (and the tools such as the PEF and eco-label criteria to do it) is needed at the various levels of education in the Nordic countries.

Much emphasis is now put on the mitigation of climate change and, subsequently, on the communications about the life cycle greenhouse gas emissions (i.e. carbon footprint) of various products and services to the consumers and public procurers. The PEF offers a methodology with which to assess the carbon footprint and several other environmental impacts at the same time. Furthermore, both the PEF and Type 1 Eco-label schemes should pay more attention to the loss of biodiversity, which is often connected to the production chains of various products. They could also develop methods in cooperation in order to make product-related problems more visible and promote the more sustainable products and services.

Sammanfattning

Det nordiska ministerrådet beslutade att finansiera ett projekt kallat "Miljömärkning Svanen, cirkulär ekonomi och miljöavtryck (SCEPEF)" år 2016 som ett av projekten under Finlands ordförandeskap. EU-kommissionen publicerade år 2013 en rekommendation om användningen av gemensamma metoder för att mäta och informera om produkters och organisationers miljöprestanda utifrån ett livscykelperspektiv och introducerade en metod för mätning av produkters och organisationers miljöavtryck. Eftersom miljömärkning Svanen har varit det centrala verktyget för spridning av information om miljövänliga produkter och tjänster till konsumenterna i de nordiska länderna, var det viktigt att ta reda på vilket mervärde den nya metoden skulle kunna ge Svanen och på vilket sätt de båda systemen skulle kunna dra nytta av varandra.

Det är viktigt att framhålla att utvecklingen av metoden för mätning av miljöavtryck är en fortgående process och den här rapporten blickar både bakåt och ger en sorts ögonblicksbild av situationen i början av år 2019. Rapporten kan dock inte förutspå vilken framgång metoden kommer att ha. Framgången beror givetvis på insatsen för att slutföra de delar som ännu inte är klara och för att etablera det egentliga systemet för metoden och göra den allmänt använd. Det oaktat bidrar den här rapporten tillsammans med andra centrala SCEPEF-rapporter (Salo et al. 2019a, 2019b, Suikkanen et al. 2019) förhoppningsvis till samarbete mellan metoden för mätning av miljöavtryck och miljömärkning av typ 1, såsom Svanen, samt till den övergripande utvecklingen av politiska instrument för integrerade produktstrategier samt hållbar konsumtion och produktion.

Miljöinformationen har en avgörande roll i strävan efter ekologiskt hållbarare produkter. Miljöproblem som klimatförändringen, nedbrytningen av ozonskiktet, försurningen av jordmåner och vatten samt utarmningen av den biologiska mångfalden kan ofta spåras till tillverkningen, användningen och avyttringen av produkter. Tillförlitlig miljöinformation behövs för att styra marknaden mot bättre produkter.

Det allmänna målet med den här rapporten var att reda ut om metoden för mätning av produkters miljöavtryck har sådana egenskaper att den kunde ha en större inverkan på politiska produktinstrument än vad livscykelanalysen har haft. Ett relaterat specifikt mål var att reda ut vilken sorts miljöinformation som för närvarande används i olika former av integrerad produktpolitik och politik för hållbar konsumtion och produktion. Ett annat mål var att analysera möjliga synergier mellan mätningen av miljöavtryck och kriteriebaserad information. Kriteriebaserad information används i dagsläget vanligen i miljömärkning av typ 1 och i grön offentlig upphandling. Mer specifikt analyserade vi vilka synergier som kan skönjas mellan mätningen av produkters miljöavtryck och miljömärket Svanen, samt mellan mätningen av organisationers miljöavtryck och miljömärket Svanen. Studiens syfte var också att begrunda på vilket sätt

miljöinformation bättre skulle kunna vara till nytta för ekodesign och tillverkningen av gröna produkter samt för hanteringen av uttjänta produkter. Slutligen fungerar rapporten också som slutrapport för SCEPEF-projektet.[13]

SCEPEF-projektets huvudsakliga resultat redogörs för nedan. Många andra resultat och rekommendationer avseende förhållandet mellan Svanen och mätningen av produkters och organisationers miljöavtryck samt resultat relaterade till ekodesign presenteras emellertid i rapportens kapitel och i synnerhet i de andra rapporterna om SCEPEF-projektet.[14]

Metoden för mätning av miljöavtryck har många egenskaper som är nya för livscykelanalysen. Egenskaperna gör resultaten mer följdriktiga, exakta och jämförbara. Metoden skapar en mycket bättre informationsbas för instrumenten för produktpolitik jämfört med en fristående livscykelanalys. Samarbete med det befintliga systemet för miljövarudeklarationer skulle kunna vara ett sätt att snabbt få nya användare. Det är viktigt att fortsätta utveckla metoden och stöda potentiella användare, inleda organiseringen av systemet kring mätning av miljöavtryck, och satsa på att snabbt öka både antalet produkt- och tjänstegrupper och antalet produktspecifika rapporter om miljöavtrycket, som omfattas av systemet.

Kategoriregler för mätningen av miljöavtryck används nu i förberedelserna för regleringen av ekodesignen av fotovoltaiska paneler och batterier. Det är bra att överväga mera omfattande användning av metoden för mätning av miljöavtryck i ekodesigndirektivet. Det är också viktigt att utveckla ett nytt instrument för miljöpåståenden och direktivet om otillbörliga affärsmetoder. Metoden för mätning av miljöavtryck kan utgöra grunden för detta instrument.

Möjligheterna för en gemensam informationsbas och koordinering av befintliga och eventuella nya källor för miljöinformation om produkter avsedda för olika instrument för produktpolitik och för mätningen av miljöavtryck borde utforskas.

Det är viktigt med samarbete mellan miljömärkningarna och den framtida mätningen av miljöavtryck. För det första är det viktigt att miljömärkningen av typ 1 och mätningen av miljöavtryck inte förmedlar väldigt olika information till konsumenterna om vilka produkter som miljömässigt är att föredra och vilka som inte är det. För det andra kunde mätningen av miljöavtryck gradvis integreras i utvecklingen av kraven för miljömärkningarna för att slutligen ingå i kraven för potentiella innehavare av miljömärken. För det tredje kan utvecklingen av kategoriregler för

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[13] https://www.syke.fi/projects/scepef

[14] Salo, H., Suikkanen, J. and Nissinen, A. (2019a). Nordic Swan Ecolabel and Organisation Environmental Footprint. Focus on the organisation environmental information used in the retail sector. TemaNord 543/2019. https://doi.org/10.6027/TN2019-543;
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mätningen av miljöavtryck samtidigt få nyttig information från organisationerna för miljömärkning. Integreringen med EU-miljömärkningen kan säkerligen genomföras snabbast. Men nordiska miljömärkningen Svanen kan också ha en särskild roll – att komma underfund med hur integreringen kan genomföras så att miljömärket samtidigt behåller sin självständiga funktion. Den möjliga rollen som föregångare underlättas av att organisationen bakom Svanen är väl medveten om utvecklingen av mätningen av miljöavtryck i EU. Det finns också kännedom om Svanenmärket utanför de nordiska länderna bland politiska experter och företag i Europa. Det är dock värt att notera att experter i organisationen för miljömärkningen Svanen inte är helt övertygade om vilket mervärde mätningen av miljöavtryck i dagens läge skulle skapa för miljömärket. Dessutom är de oroade över de extra kostnader det skulle medföra för företag som ansöker om miljömärket, om det också ställs krav på mätning av miljöavtryck.

Metoden för mätning av miljöavtryck kommer att bli ett viktigt verktyg för ekodesign i företag, vid sidan om miljömärken av typ 1. Det är viktigt att sporra kompetensutvecklingen i företag när det gäller ekodesign, till exempel genom tjänster såsom "kliniker för ekodesign", i synnerhet för små och medelstora företag. Samtidigt är det viktigt att utvärdera om ekodesign behöver läras ut i större omfattning (och verktygen för mätning av miljöavtryck och kriterierna för miljömärkning för att kunna skapa ekodesign) på olika nivåer inom utbildningen i de nordiska länderna.

För tillfället läggs stor vikt vid att begränsa klimatförändringen och följaktligen vid förmedlingen av information till konsumenter och för offentlig upphandling om växthusgasutsläpp under livscykeln, med andra ord om koldioxidavtrycket för olika produkter och tjänster. Mätningen av miljöavtryck erbjuder en metod för utvärdering av koldioxidavtrycket och flera andra former av miljöpåverkan samtidigt. Vidare borde både mätningen av miljöavtryck och systemen för miljömärkning av typ 1 fästa större uppmärksamhet vid förlusten av den biologiska mångfalden, som ofta har samband med produktionskedjorna för olika produkter. Metoder kunde också utarbetas i samarbete mellan systemen för att göra produktrelaterade problem synligare för företag, konsumenter och offentliga organisationer i syfte att främja utformning och tillverkning av hållbarare produkter och tjänster.

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Product Environmental Information and Product Policies

Reliable information is needed to drive the market towards ecologically sound products. Product Environmental Footprint has many properties that are new to the Life Cycle Assessment tradition, increasing the consistency, accuracy and comparability of the results. It is important to start the organization of the PEF scheme, and invest in efforts to rapidly increase the number of product and service groups and actual product-specific PEF reports involved in the PEF scheme. Possibilities for common information basis and coordination between environmental information sources for the various product policy instruments and the PEF should be explored. Cooperation between type 1 eco-labels like the Nordic Swan and the forthcoming PEF scheme(s) is important.