Product and Organisation
Environmental Footprint

Verification of embedded impacts and traceability as part of the Environmental Footprint methods implementation
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</table>
1. Executive summary

1.1 Context and objectives

The development of EU methodologies for PEF and OEF and the EU “Single Market for Green Products Initiative”

Since 2011, the European Commission (EC) has worked towards the development of a harmonized methodology for the calculation of the environmental footprint of products (PEF) and organizations (OEF). Building on a number of existing standards and guidance documents, technical guidelines have been developed. These guidelines provide requirements on how to calculate a PEF or an OEF, as well as on how to create product or sector-specific methodological rules called Product Environmental Footprint Category Rules (PEFCRs) or Organization Environmental Footprint Sector Rules (OEFSRs); to be used for comparisons between products or between organizations.

With the Single Market for Green Product Communication, the EC also launched a three year pilot-project for the period 2013-2016 to “test the process for developing product- and sector-specific rules, test different approaches to verification; and test communication vehicles for communicating life cycle environmental performance to business partners, consumers and other company stakeholders”.¹ This pilot-project involves more than 280 volunteering companies and organisations.

A need for verification to bring trust on EF figures

The objective of the pilot relative to verification is crucial in many regards. Indeed, certification is necessary to ensure reliability and comparability of the PEF and OEF results. As a result, adequate certification is necessary to ensure the credibility of the environmental claims and is therefore essential to encourage the uptake of resource efficient products. However, certification comes at a certain cost, which can be problematic in particular for Small and Medium Enterprises (SMEs) as well as companies with long supply chain (e.g. 4 or 5 tiers of suppliers). In order to analyse this trade-off, the EC commissioned a first study entitled “Investigating options for different compliance systems for PEF and OEF declarations”.

Building on this first study and on the audit of selected entities involved in the project, the current study presents an analysis of the effectiveness, cost, and credibility of possible options regarding external verification of the PEF and OEF methods.

¹ http://ec.europa.eu/environment/eussd/smgp/ef_pilots.htm, European Commission, The Environmental Footprint Pilots
1.2 Potential verification approaches in EF framework

Definition of an assurance

Prior to defining an appropriate verification approach it is important to understand what providing assurance to an information means.

An assurance engagement is what defines the practice that consists of providing such trust. It is defined as an engagement in which a Practitioner aims to obtain sufficient appropriate evidence in order to express a conclusion designed to enhance the degree of confidence of the intended users other than the responsible party about the outcome of the measurement or evaluation of an underlying subject matter against criteria.

In the context of EF, above bold words can be understood as follow:

- The Practitioner is a third party that is independent from the intended users (such as for instance the consumers to which EF results are presented) and the responsible party (which is the company issuing EF results).

![Figure 1 - Interactions between company and third party](image)

- The output of an assurance engagement is a conclusion on the results of the verification work performed. This output is generally prepared on the format of a report.
- Assurance is performed on a well-defined “subject matter,” being the information to be verified. In the EF context “subject matter” is the EF result; its format is not yet clearly defined. Indeed, subject matter could be a list of values for over 15 different indicators, a single normalized and weighted value, one or several environmental classes (A, B, C, D, E classes for instance) or the information that the product is below or above an EF value threshold.
- An important characteristic for an assurance statement is that it is performed by comparing “subject matter” not only against standard criteria that can be defined by a referential such as the PEFCR (or OEF SR) and EF guidelines in EF context, but also against broader criteria such as the relevance, completeness, reliability, neutrality, and understandability of information when rules are not clearly stated in the protocol.

Conditions in which an assurance engagement is realized are defined by the nature of the “subject matter” and associated “criteria”. This report aims at providing an insight into such conditions in order to define a suitable verification approach in the framework of EF.
Appropriate verification structure for EF

Considering that EF is constituted of a methodology, the use of data, calculations crossing these two dimensions and as mentioned in the report "Investigating options for different compliance systems for PEF and OEF declarations," there are three major levers to provide reassurance on the results of a PEF/OEF study, namely via verification:

- Of the methodology
- Of the input data
- Of the LCA calculations

As mentioned by this same report, in order to be able to provide assurance on an EF study, the verification approach shall mix verification of:

1. LCA rules and underlying assumptions
2. Data reliability and traceability, and
3. How these two aspects are transcribed in terms of calculations in the LCA tool

Currently two verification approaches are commonly used that can be considered as closed to such verification: firstly LCA critical review/EPD verification and secondly non-financial data verification.

However, neither of these two approach are sufficient, as LCA critical review usually does not cover properly verification of specific data used and non-financial verification usually lacks expertise in LCA methodology verification.

Taking the best of existing methods and allowing appropriate EF verification, a verification relying on three main components is required, as follows:

- First a risk analysis, supporting the definition of a proper audit strategy by focusing the audit work where the risk is the highest
- Secondly a model verification consisting of verifying that PEFCR (OEFSR) and EF guidelines are well applied in the EF model. Model verification includes the following:
  - Life cycle stages/processes completeness
  - Good implementation of the functional unit
  - Use of the right/up-to-date characterization methods
  - Use of the right/up-to-date normalization and weighting methods when relevant

![Figure 2 - Description of verification approaches](image)
o DNM conformity (identification of specific vs. generic data)
o Use of the right/up-to-date datasets
o Right calculation formulas
• Finally specific data verification comprising verifying relevance, completeness, reliability, neutrality and understandability of the data used in the model.

Potential verification approaches for EF

Each of the three components that should define a verification approach can be performed in different ways providing every time a different cost / benefit balance, with benefit being linked to the level of credibility of the EF result through verification.

The various possible identified scenarios for each of the three components are described below.

Risk analysis scenarios

The various scenarios for risk analysis rely upon the scope where risk analysis is performed as described in the table 1.

Table 1 - Outcomes of risk analysis

<table>
<thead>
<tr>
<th>Level of risk analysis</th>
<th>Content</th>
<th>Pros</th>
<th>Cons</th>
</tr>
</thead>
<tbody>
<tr>
<td>PEFCR-level risk analysis</td>
<td>Theoretical risks are identified considering through an analysis of the PEFCR and considering the most probable situation companies would face when implementing PEFCR. It considers: - On the one hand, the “most relevant processes” - On the other hand, processes potentially relying on specific data for which there is - High probability of data unavailability - High probability of complex data reporting - High data/model complexity</td>
<td>- Define standard risky life cycle stages - Define standard work program - Free</td>
<td>- May not be adapted to products that strongly differ from the reference product - May not be adapted to companies differing not implementing PEF in a standard way</td>
</tr>
<tr>
<td>Company-level risk analysis</td>
<td>Risks are identified considering the PEFCR characteristics and the way the company really implements it. It considers: - On the one hand, the “most relevant processes” - On the other hand, processes relying on specific data for which there is - High data reporting complexity - High data definition complexity - High data/model complexity</td>
<td>- Risk analysis adapted to company’s specificities allowing to identify the main risks - Define the specific work program - Cost allocated to all products from a company</td>
<td>- Risk analysis not specific when it comes to defining the most relevant processes and therefore measure the gap between a specific product and the reference product</td>
</tr>
</tbody>
</table>
Model verification scenarios

In the context of EF, there are four main possibilities for performing a model compliance audit combining the two dimensions that can influence the cost/consistency balance:

- **Audit conditions:**
  - Model is verified at distance through phone calls and screen sharing
  - Model is verified at the company level ("on-site")

- **Audit timing:**
  - Model is verified in the meantime as data verification while auditing the EF results
  - Model verification is separated from data verification and is done globally for a full category of products for a company. The tool (that could be both company specific or general) performing EF calculation and its configuration is then "accredited" to be used by the company for a limited time.

Data verification scenarios

Two drivers are used to balance cost and consistency for data verification:

- **Audit conditions:**
  - Data is verified at distance through phone calls and screen sharing
  - Data is verified at the company level ("on-site")

- **Audit coverage,** defined as the % of overall environmental impact that is verified. Audit coverage is calculated by summing up the impact of processes for which specific and generic data is verified. Audit coverage is a major driver to define level of assurance in verification practice.

1.3 Testing verification approach on 38 supporting studies

Objectives and approach for supporting studies verification

The main objective of the supporting studies verification testing phase was to define benefits and drawbacks for the different risk analysis, model verification and data verification possibilities and to test more globally EF auditability.
Three types of audits were defined and performed on companies, as follows:

<table>
<thead>
<tr>
<th>Description</th>
<th>Red audit</th>
<th>Blue audit</th>
<th>Green audit</th>
</tr>
</thead>
<tbody>
<tr>
<td>Model and data verification</td>
<td>Model and data verification limited to data owned by company</td>
<td>Model and data verification limited to data owned by company</td>
<td>Model and data verification extended to data owned by suppliers</td>
</tr>
<tr>
<td>Data verification limited</td>
<td>Distance audit</td>
<td>Audit on site at the company</td>
<td>Audit on site at the company and remote or on site supplier audit</td>
</tr>
<tr>
<td>to data owned by company</td>
<td>In one day</td>
<td>In two days</td>
<td>In two days and half a day with suppliers</td>
</tr>
</tbody>
</table>

Verification was performed on 38 supporting studies with an objective to achieve correct representation of various sectors and company sizes.

Learnings from supporting studies verification

Testing verification on real supporting studies confirmed the need for verification and identified interesting learnings both on the conditions in which verification can be performed and on the limitations that need to be tackled to make verification possible.

Some limitations to ensure proper verification are identified

While performing verification on supporting studies, several limitations were identified that need to be tackled in order to make EF auditable, as follows:
• A first limitation to be tackled concerns the level of precision of current PEFCR/OEFSR that in some cases is sometimes too limited to ensure verification to make EF verifiable or that leave too much room for interpretation.

• A second limitation is the limited possibility to ensure the DNM is properly applied. The DNM brings two main limits for verification. The first related to the definition used: the difference between suppliers and subcontractors is not clear, which leaves room for interpretation. The second reason is that it is impossible for a verifier to ensure that while a company states that they cannot get specific information from a supplier, this is true. That kind of information is indeed not formalized within a company.

• Finally, one of the most important limitations is with regards to supplier audit. Supplier specific data is at high risk as the level of understanding and control is much more limited as for company data. However, it is likely that in many cases suppliers will not be willing to be audited on a data provided to their customers. Therefore, it should be studied further what solutions are legally possible when it comes to mandatory verification.

Proper PEFCR/OEFSR verification requires a combination of skills

Concerning the conditions of execution of the audit, verification testing demonstrated first of all a need to mix specific competencies to ensure valuable verification. Such competencies is in most cases a combination of LCA expertise that is needed when it comes to verifying proper EF model implementation and data verification expertise bringing both the audit methodology to the team as well as the knowledge of companies’ reporting systems. In some cases however, additional expertise is needed to be able to challenge companies on some of the information they provide, such as, for instance, chemical expertise when it comes to challenge the way chemicals interact in a formula. Such additional expertise should be defined by PEFCR/OEFSR.

Performing a risk analysis

When it comes to risk analysis, the verification testing demonstrated a strong link between processes with the highest identified risk and findings identified during the audit reinforcing the need for a risk analysis. Recommendation would be at minimum to develop a standard risk analysis for each PEFCR/OEFSR. Such risk analysis could then be used by auditors to be adapted to company specificities and in some cases to product specificities.

Model verification

Regarding model verification, verification testing demonstrates that such verification cannot be performed through remote audit. Being in person with the one in charge of the model allows the auditor to understand the way the product was modeled in much more detail and provides more opportunity for the verifier to delve into the model.

Data verification

When it comes to data verification, the main learning/finding is that to reach a certain level of assurance, it is necessary to obtain high verification coverage (80%). However, such coverage can most of the time be reached with a limited number of specific data, as usually a few data lead to a large part of the total footprint. This is confirmed by the fact that time required to obtain most of the audit findings is limited to about one day.

Other conclusions relating to the way verification can be performed are relying on the public policy embedding EF. Indeed, according to the level of assurance needed for a public policy, the number and
the type of indicators to be communicated and therefore verified, and the quantity of products that would be concerned within a company indicate the conditions for verification may be different when it comes to optimizing the cost / benefits balance of verification.

Furthermore, according to the way PEF would be integrated by the company and what tools and procedures would be implemented, very important economies of scale can be foreseen.

### 1.4 EF implementation scenarios

#### A need to define EF implementation scenarios

Testing verification approaches on supporting studies allows for defining benefits and limits for all components of a verification approach, but does not allow for defining a generic optimum verification approach. The following approach is developed in this chapter to define the right scenarios to be assessed:

- A scenario is based upon a public policy scenario, as defined in the following chapter.
- For each scenario two sub-scenarios are developed:
  - A case where the PEF approach is fully integrated and automated in the company in order to illustrate economy of scale
  - The case where several indicators are expected to be communicated to illustrate the impact on cost of communicating single indicator vs. multiple indicators

#### Public policy scenarios

1. Six scenarios of public policy types are considered in this study, through consideration of two dimensions on which public policies can rely on and that affect the level of verification. These two dimensions are as follows:

- Voluntary/mandatory aspect of the policy: mandatory participation policies are more demanding in terms of level of assurance required to audit a larger share of data compared with voluntary policies
- Format of the Environmental information: the format of information can have an impact on the level of verification required considering that communicating a numerical value requires more precision than providing an environmental class or statement on being above or below a defined threshold, given that the last two categories allow a higher margin of error. Based upon this classification the following 6 policies are defined in the table 3:

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2 Note that as no scenario for EF implementation have be released, scenario proposed in the document are EY propositions.
Table 3 - Overview of public policies scenario

<table>
<thead>
<tr>
<th>Threshold</th>
<th>Range system</th>
<th>Precise value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Voluntary participation</td>
<td>Policy type A: Integrate PEF in the Ecolabel framework / Create a new EU label / Integrate PEFCR within national label frameworks</td>
<td>Policy type C: Mandatory use of a range system for all companies wishing to disclose environmental footprint information</td>
</tr>
<tr>
<td></td>
<td>Policy type E: PED-like use of PEF / Voluntary disclosure of precise value of some indicators / Inclusion of OEF in EMAS</td>
<td></td>
</tr>
<tr>
<td>Mandatory participation</td>
<td>Policy type B: PEF in the CE marking system / Shaming – reward system</td>
<td>Policy type D: Mandatory use of the range system</td>
</tr>
<tr>
<td></td>
<td>Policy type F: Mandatory disclosure of indicators on products / Mandatory inclusion in annual reports / Inclusion of OEF in non-financial reporting directive</td>
<td></td>
</tr>
</tbody>
</table>

Other implementation scenario
While the level of accuracy expected from PEF verification is fully defined by public policy scenario, its cost depends also on two other main parameters, as follows:

- The way PEF is implemented at a company level and the extent to which PEF is automated and integrated
- The number of indicators to be communicated

As such, studied public policy scenarios are divided into sub-scenarios taking into consideration those two parameters.
1.5 Recommendations per tested PEF scenario

Based upon supporting studies testing and a cost model detailed in the report, the following options are proposed as verification options for PEF verification according to the expected scenario.

Table 4 - Cost estimate for the different scenario

<table>
<thead>
<tr>
<th>Public Policy</th>
<th>Sub Policy</th>
<th>Expected Conditions</th>
<th>Audit Approach</th>
<th>Price range</th>
</tr>
</thead>
</table>
|               | Main Scenario | • A limited\(^3\) data coverage  
• Supplier audit may not be possible  
• Annually, PEF studies should be performed only on a limited number of products (<10\(^4\)) | • Risk analysis done at PEFCR-level  
• Model verification is combined with data verification into a single PEF verification  
• Only most relevant processes are verified | 1000 € (+ 250 € / year for follow-up) |
|               | Sub Scenario 1: Several indicators | • A limited data coverage  
• Supplier audit may not be possible  
• Annually, PEF studies should be performed only on a limited number of products (<10) | • Risk analysis done at PEFCR-level  
• Model verification is combined with data verification into a single PEF verification  
• Full data coverage due to the multiple indicators verification | 1500 € (+ 250 € / year for follow-up) |

\(^3\) The definition of “limited” and “large” data coverage is derived from the classic audit framework, aligned with the international audit standards:

- Limited assurance: limited coverage, only a part of specific data used in hotspot is verified (in this framework and based upon current situation it is assumed that such level of assurance can be reached when 80% of the total impact);
- Reasonable assurance: large coverage, in this framework and based upon current situation it is assumed that such level of assurance can be reached when all specific data is verified.

\(^4\) The threshold to distinguish between a limited number and a large number of products was fixed to 10 as an order of magnitude. Below the order of magnitude, it is possible for companies to make the impact calculation for each product separately, while above it, company would be more inclined to standardize the way PEF are calculated (through procedures and tools).
<table>
<thead>
<tr>
<th>Scenario B</th>
<th>Mandatory participation - Threshold</th>
</tr>
</thead>
<tbody>
<tr>
<td>PEF and/or OEF in the CE marking system/Shaming – reward system</td>
<td></td>
</tr>
<tr>
<td><strong>Sub Scenario 2: Large number of products</strong></td>
<td></td>
</tr>
<tr>
<td>Scenario</td>
<td><strong>Main Scenario</strong></td>
</tr>
<tr>
<td><strong>Scenario 2</strong></td>
<td><strong>Sub Scenario 1 Limited number of products</strong></td>
</tr>
<tr>
<td><strong>Sub Scenario 2 PEF integration</strong></td>
<td></td>
</tr>
</tbody>
</table>

| **Scenario 2** | **Main Scenario** |
| **Sub Scenario 1 Limited number of products** | **Sub Scenario 2 PEF integration** |
| **Scenario B** | **Mandatory participation - Threshold** |
| **PEF and/or OEF in the CE marking system/Shaming – reward system** |
| **Scenario 2** | **Main Scenario** |
| **Sub Scenario 1 Limited number of products** | **Sub Scenario 2 PEF integration** |
| **Scenario B** | **Mandatory participation - Threshold** |
| **PEF and/or OEF in the CE marking system/Shaming – reward system** |
| **Scenario 2** | **Main Scenario** |
| **Sub Scenario 1 Limited number of products** | **Sub Scenario 2 PEF integration** |

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5 Supplier Audit: when the number of suppliers necessary for a PEF assessment is high it is expected that verification can be based upon sampling. Supplier sampling coverage is defined in regards to the requested level of assurance. Based upon current situation, for a limited assurance level, coverage of 20% for supplier related specific data should be relevant. When it comes to reasonable assurance the coverage should raise to 50%. The sampling may be adjusted based on the number of suppliers and on the impact of suppliers’ data over the total impact of the audited product.

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## Scenarios

### Scenario C
**Voluntary participation - Range system**
Mandatory use of a range system for all companies wishing to disclose environmental footprint information

<table>
<thead>
<tr>
<th>Sub-Scenario</th>
<th>Data Coverage</th>
<th>Risk Analysis</th>
<th>Model Verification</th>
<th>Cost (€)</th>
<th>Follow-up Costs (€/year)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Main Scenario</td>
<td>Limited data coverage</td>
<td>Risk analysis done at PEFCR-level</td>
<td>Model verification is combined with data verification into a single PEF verification</td>
<td>1 000</td>
<td>(+ 250/year for follow-up)</td>
</tr>
<tr>
<td>Sub Scenario 1: Several indicators</td>
<td>Limited data coverage</td>
<td>Risk analysis done at PEFCR-level</td>
<td>Model verification is combined with data verification into a single PEF verification</td>
<td>1 500</td>
<td>(+ 250/year for follow-up)</td>
</tr>
<tr>
<td>Sub Scenario 2: Large number of products</td>
<td>Limited data coverage</td>
<td>Risk analysis done at PEFCR-level</td>
<td>Model verification is done through an annual tool/model accreditation</td>
<td>500</td>
<td>(+ 250/year for follow-up)</td>
</tr>
</tbody>
</table>

### Scenario D
**Mandatory participation - Range system**
Mandatory use of the range system

<table>
<thead>
<tr>
<th>Sub-Scenario</th>
<th>Data Coverage</th>
<th>Risk Analysis</th>
<th>Model Verification</th>
<th>Cost (€)</th>
<th>Follow-up Costs (€/year)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Main Scenario</td>
<td>Large data coverage</td>
<td>Risk analysis done at PEFCR-level</td>
<td>Model verification is done through an annual tool/model accreditation</td>
<td>1 500</td>
<td>(+ 250/year for follow-up)</td>
</tr>
<tr>
<td></td>
<td>It is assumed here that supplier audit would be possible</td>
<td></td>
<td>All primary data are verified to ensure</td>
<td>2 500</td>
<td>(+ 250/year for follow-up)</td>
</tr>
<tr>
<td>Sub Scenario 1</td>
<td>Limited number of product</td>
<td>Scenario E Voluntary participation - Exact value</td>
<td></td>
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<td>----------------</td>
<td>---------------------------</td>
<td>-----------------------------------------------</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Large portfolio of products</strong></td>
<td><strong>Large coverage</strong></td>
<td><strong>PED-like use of PEF/Voluntary disclosure of precise value of some indicators/Inclusion of OEF in EMAS</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>• A large data coverage</td>
<td>• Supplier audit is performed</td>
<td><strong>Main Scenario</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>• It is assumed here that supplier audit would be possible</td>
<td></td>
<td><strong>Risk analysis done at PEFCR-level</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>• Annually, PEF studies should be performed on a limited portfolio of products</td>
<td></td>
<td><strong>Model verification is done through an annual tool/model accreditation</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Data verification is performed on a sample of products</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td><strong>All primary data are verified to ensure large coverage.</strong></td>
<td></td>
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<tr>
<td></td>
<td></td>
<td><strong>1 000 €</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>(+ 250 € / year for follow-up)</td>
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<tr>
<td></td>
<td></td>
<td><strong>2 000 €</strong></td>
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<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>(+ 250 € / year for follow-up)</td>
<td></td>
<td></td>
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</tbody>
</table>

<table>
<thead>
<tr>
<th>Sub Scenario 2PEF integration</th>
<th><strong>Large data coverage</strong></th>
<th><strong>Risk analysis done at PEFCR-level</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td>• It is assumed here that supplier audit would be possible</td>
<td></td>
<td><strong>Model verification is done through an annual tool/model accreditation</strong></td>
</tr>
<tr>
<td>• Annually, PEF studies should be performed on a sample of products</td>
<td></td>
<td><strong>Data verification is performed on a sample of products</strong></td>
</tr>
<tr>
<td></td>
<td></td>
<td><strong>All primary data are verified to ensure large coverage.</strong></td>
</tr>
<tr>
<td></td>
<td></td>
<td><strong>250 €</strong></td>
</tr>
<tr>
<td></td>
<td></td>
<td>(includes follow-up costs)</td>
</tr>
<tr>
<td></td>
<td></td>
<td><strong>750 €</strong></td>
</tr>
<tr>
<td></td>
<td></td>
<td>(includes follow-up costs)</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Sub Scenario 1</th>
<th>Limited number of product</th>
<th><strong>Scenario E Voluntary participation - Exact value</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Large portfolio of products</strong></td>
<td><strong>Large coverage</strong></td>
<td><strong>PED-like use of PEF/Voluntary disclosure of precise value of some indicators/Inclusion of OEF in EMAS</strong></td>
</tr>
<tr>
<td>• A large data coverage</td>
<td>• Supplier audit is performed</td>
<td><strong>Main Scenario</strong></td>
</tr>
<tr>
<td>• It is assumed here that supplier audit would be possible</td>
<td></td>
<td><strong>Risk analysis done at PEFCR-level</strong></td>
</tr>
<tr>
<td>• Annually, PEF studies should be performed on a limited portfolio of products</td>
<td></td>
<td><strong>Model verification is done through an annual tool/model accreditation</strong></td>
</tr>
<tr>
<td></td>
<td></td>
<td>• All primary data are verified to ensure large coverage.**</td>
</tr>
<tr>
<td></td>
<td></td>
<td><strong>1 500 €</strong></td>
</tr>
<tr>
<td></td>
<td></td>
<td>(+ 250 € / year for follow-up)</td>
</tr>
<tr>
<td></td>
<td></td>
<td><strong>6 500 €</strong></td>
</tr>
<tr>
<td></td>
<td></td>
<td>(+ 250 € / year for follow-up)</td>
</tr>
</tbody>
</table>
### Scenario F

**Mandatory participation - Exact value**

Mandatory disclosure of indicators on products/Mandatory inclusion in annual reports

<table>
<thead>
<tr>
<th>Sub Scenario</th>
<th>Description</th>
<th>Costs</th>
</tr>
</thead>
</table>
| **Sub Scenario 1 Limited number of product** | A large data coverage  
It is assumed here that supplier audit would be possible  
PEF performed on a limited number of products | 2 000 €  
(+ 250 € / year for follow-up) |
| **Main Scenario** | A large data coverage  
It is assumed here that supplier audit would be possible  
PEF performed on a limited number of products | 2 500 €  
(+ 250 € / year for follow-up) |
| **Sub Scenario 2 PEF integration** | A large data coverage  
Supplier audit may not be possible  
PEF performed on a sample of products  
Risk analysis done at PEFCR-level  
Model verification is done through an annual tool/model accreditation  
All primary data are verified to ensure large coverage | 20 €  
(includes follow-up costs)  
100 €  
(includes follow-up costs) |
| **Sub Scenario 3 OEF verification** | Limited assurance  
It is assumed that conditions are not met to allow for a supplier audit  
Risk analysis is company specific;  
Verification is performed annually targeting a limited assurance for data coverage. This means both data reporting and model are verified annually | 10 k€  
(the price refers to the full verification of the organisation depending on its size)  
500 k€  
(the price refers to the full verification of the organisation depending on its size) |
<table>
<thead>
<tr>
<th>Sub Scenario 2</th>
<th>PEF integration</th>
<th>Sub Scenario 3</th>
<th>OEF verification</th>
</tr>
</thead>
</table>
| • A large data coverage  
• It is assumed here that supplier audit would be possible  
• PEF performed on a sample of products | • Risk analysis done at PEFCR-level  
• Model verification is done through an annual tool/model accreditation  
• All primary data are verified to ensure large coverage  
• Supplier audit is performed | • limited assurance  
• It is assumed that conditions are not met to allow for a supplier audit | • Risk analysis is company specific;  
• Verification is performed annually targeting a limited assurance for data coverage. This means both data reporting and model are verified annually. |
| | | | • 10 k€ (the price refers to the full verification of the organisation depending on its size)  
• 500 k€ (the price refers to the full verification of the organisation depending on its size) |
2. Introduction

2.1 General context

A key element of sustainable consumption and production is environmental claims, which are important for both consumers and producers. Currently, companies are often faced with a variety of labels and certification mechanisms for their products, which creates high transaction costs and hampers the integration of the European market. In parallel, consumers might limit their consumption of products with high environmental claims if they feel that those claims are hard to understand or not entirely trustworthy.\(^6\)

In line with the European Commission’s objective to provide correct incentives for public authorities and citizens to choose the most resource efficient products via effective pricing signals and clear environmental information by 2020, and in order to mitigate the problems described above, it is important that environmental claims are standardised, clearly understandable and made credible by appropriate verification mechanisms.

2.2 Regulatory and project-specific context

The European Commission has taken many steps in this direction starting with the 2003 Integrated Product Policy (IPP) Communication. This communication was followed by the Sustainable Production and Consumption Action Plan in 2008 and work by the Joint Research Council, which led to the publication of the International Reference Life Cycle Data System (ILCD) Handbook in 2010. In 2013, the Recommendations on the use of common methods to measure and communicate the life cycle environmental performance of products and organisations\(^7\), and the Building the Single Market for Green Products Communication\(^8\) were published. These two key documents introduced the PEF (Product Environmental Footprint) and OEF (Organisation Environmental Footprint). The PEF and the OEF are “general methods to measure and communicate the potential life cycle environmental impact of a product”/“organisation”\(^9\).

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\(^6\) For instance, while a large majority of EU citizens believe that buying environmentally-friendly products can make a difference to the environment (89%) and that environmentally-friendly products are as effective as regular products (74%), only 66% are confident that products indicated as environmentally-friendly will cause less damage to the environment than other products. 


\(^9\) recommendation 2013/179/EU
With the Single Market for Green Product Communication, the EC also launched a three year pilot-project for the period 2013-2016 to “test the process for developing product- and sector-specific rules, test different approaches to verification; and test communication vehicles for communicating life cycle environmental performance to business partners, consumers and other company stakeholders”.10 This pilot-project involves more than 280 volunteering companies and organisations.

The objective of the pilot relative to verification is crucial in many regards. Indeed, certification is necessary to ensure reliability and comparability of the PEF and OEF results. As a result, adequate certification is necessary to ensure the credibility of the environmental claims and is therefore essential to encourage the uptake of resource efficient products. However, certification comes at a certain cost, which can be problematic in particular for Small and Medium Enterprises (SMEs) as well as companies with long supply chain (e.g. 4 or 5 tiers of suppliers). In order to analyse this trade-off, the EC commissioned a first study entitled “Investigating options for different compliance systems for PEF and OEF declarations”11. Building on this first study and on the audit of selected entities involved in the project, the current study presents an analysis of the effectiveness, cost, and credibility of possible options regarding external verification of the PEF and OEF methods.

2.3 Objectives

In line with the broader objective of the Commission regarding improved information for citizens and public authorities to support sustainable consumption and taking into account the importance of verification to ensure credibility of said information, the current study has three main objectives:

- Carrying out of verification inspections on a number of companies participating in the EU PEF/OEF pilot;
- Summarising the level of effectiveness, cost and credibility of various systems for verification;
- Recommending improvements needed to the various verification systems tested in order to improve effectiveness and credibility or reduce costs based on different policy scenarios.

2.4 Organisation of the report

In the first chapter “Main verification methodologies”, we define the various verification methodologies that would fit with EF specificities. These verification methodologies are tested upon a sample of 38 supporting studies and these findings from the testing are introduced in chapter “Verification methodologies testing”. PEF public policies scenarios are introduced in chapter 7, which discusses which is the most appropriate verification approach, depending on the PEF public policy chosen. To conclude, the last chapter “Recommendations to perform verification” provides recommendations on the most suited verification approach per public policy scenario.


11 Investigating options for different compliance systems for PEF and OEF declarations, BIO by Deloitte (BIO), Institute for European Environmental Policy (IEEP) and Ecologic Institute, 21 March 2014
3. Glossary

**BOM**: Bill of materials. List of the materials used to manufacture a product. BOMs are defined in in the PEFCR.

**DNM**: Data Need Matrix. The Guidance for the implementation of the EU Product Environmental Footprint (PEF) during the Environmental Footprint (EF) pilot phase mentions that “Based on the relevance of the processes for each impact category and the level of influence a company applying the PEFCR will have to use for each process data according to one of the options described in [the Data Needs Matrix]”

**Discrepancy**: Discrepancy is to be considered as an inconsistency between what is done in a PEF calculation and what is mentioned in the PEFCR.

**DQR**: Data Quality Rating. Semi-quantitative assessment of the quality criteria of a dataset based on six characteristics, five relating to the data (Technological representativeness, Geographical representativeness, Time-related representativeness, Completeness, Parameter uncertainty) and one to the method (Methodological Appropriateness and Consistency). The data quality shall be considered both as the quality of the dataset as documented and the dataset’s appropriateness and accuracy for the process/product it is intended to represent in the specific case.

**EEA**: European Economic Area

**EPD**: Environment Product Declaration. An EPD is an independently verified and registered document that communicates transparent and comparable information about the life-cycle environmental impact of products.

**LCA**: Life-Cycle Assessment. LCA helps to quantify the environmental pressures related to goods and services (products), the environmental benefits, the trade-offs and areas for achieving improvements taking into account the full life-cycle of the product.

**NDA**: Non-Disclosure Agreement. Confidently agreement, NDAs are traditionally signed between auditors and auditees to ensure that the information will only be used for audit purposes.

**Mistake**: In the report a mistake is an incorrect data used in the framework of PEF.

**Model**: In this report model defines the way a PEF is structured including processes included, datasets used, DNM application, characterization factors used etc.

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12 Guidance for the implementation of the EU Product Environmental Footprint (PEF) during the Environmental Footprint (EF) pilot phase


OEF: Organisation Environmental Footprint: general method to measure and communicate the potential life cycle environmental impact of an organisation (as laid down in Annex III, of recommendation 2013/179/EU).  

OEFSR: Organisation Environmental Footprint Sector Rules: these rules, which are being developed under the three year pilot, aim to provide detailed technical guidance on how to conduct an OEF study for a specific sector.

PEF: Product Environmental Footprint method: general method to measure and communicate the potential life cycle environmental impact of a product (as laid down in Annex II of recommendation 2013/179/EU).

PEFCR: Product Environmental Footprint Category Rules: these rules, which are being developed under the three year pilot, aim to provide detailed technical guidance on how to conduct a PEF study for a specific product category.

Supporting studies: PEFCR/OEFSR supporting studies are the PEF studies done on the basis of a draft PEFCR/OEFSR. Supporting studies are used to confirm the decisions taken in the draft PEFCR/OEFSR before the final PEFCR is released.
4. Main verification methodologies

As mentioned in the Introduction section, a need for EF credibility is to be able to provide assurance that EF results are trustworthy.

An assurance engagement is what defines the practice that consists in providing such trust. It is defined as an engagement in which a practitioner aims to obtain sufficient appropriate evidence in order to express a conclusion designed to enhance the degree of confidence of the intended users other than the responsible party about the outcome of the measurement or evaluation of an underlying subject matter against criteria.

The practitioner is a third party that is independent from the intended users (such as for instance the consumers to which EF results are presented) and the responsible party (which is the company issuing EF results).

The output of an assurance engagement is a conclusion on the results of the verification work performed. This output is generally prepared in the format of a report.

Assurance is performed on a well-defined "subject matter," being the information to be verified. In the EF context "subject matter" is the EF result; its format is not yet clearly defined. Indeed subject matter could be a list of values for over 15 different indicators, a single normalized and weighted value, one or several environmental classes (A, B, C, D, E classes for instance) or the information that the product is below or above an EF value threshold.

An important characteristic for an assurance statement is that it is performed by comparing "subject matter" not only against standard criteria that can be defined by a referential such as the PEFCR (or OEFSR) and EF guidelines in EF context, but also against broader criteria such as the relevance,
completeness, reliability, neutrality, and understandability of information when rules are not clearly stated in the protocol.

Conditions in which an assurance engagement is realized are defined by the nature of the "subject matter" and associated "criteria". Following chapter provides an insight into such conditions in order to define suitable verification approach in the framework of PEF.

### 4.1 Potential verification approaches in EF context

A PEF study is the combination of
- A methodology
- The use of data
  - Datasets and generic data
  - Characterization factors and potentially normalization and weighting factors
  - Primary data
- The calculation involving crossing these two dimensions

Every of these pieces of data and information contributes to the final result of an EF and each of those aspects can be a source of non-compliance in relation to PEFCR, OEFSR and EF guidelines. There is therefore a need to verify all the different elements above to bring trust to a PEF study.

As mentioned in the report "Investigating options for different compliance systems for PEF and OEF declarations," there are three major levers to provide reassurance on the results of a PEF/OEF study, namely via verification
- Of the methodology
- Of the input data
- Of the LCA calculations

As mentioned by this same report, in order to be able to provide assurance on data from an EF study none of these levers is sufficient by itself to provide confidence in the results of an EF study. Therefore, the verification approach shall mix verification of:
- LCA rules and underlying assumptions
- Data reliability and traceability, and
- How these two aspects are transcribed in terms of calculations in the LCA tool

When looking at current verification practices, the closest approach to PEF verification is the LCA critical review / EPD verification (as explained in the paragraph “LCA review”) which is performed in accordance with the ISO 14040 and ISO 14020 standards. The justification of independent verification of LCA data is explained in the 'ISO standard 14040: Life Cycle Assessments - General Principles and Framework', which indicates that the results of any LCA study shall be critically reviewed before the information can be used for comparative purposes.

Such verification is performed by LCA practitioners and mainly focuses on:
- Verifying the methodology
- Verifying datasets used
- Verifying characterization factors

When typical LCA tools are used (e.g. GaBi, SimaPro, EIME...) calculations usually are not verified. The main limit of this kind of verification is that specific data is usually considered as being managed by the company and is not review in detail.

This limit is an important one in the context of PEF deployment since as methodology, datasets and characterization factors should be made common between companies applying a PEFCR, as only specific data will be what differentiates two PEFs.

The most commonly used approach when it comes to verifying specific data, which is data managed by a company, is defined by the ISAE3000 standard. This standard is the standard for assurance over non-financial information issued by the International Federation of Accountants (IFAC). The standard consists of guidelines for the ethical behaviour, quality management and performance of an ISAE 3000 engagement. Generally ISAE 3000 is applied for audits related to internal control, sustainability and compliance with laws and regulations. This standard is usually applied by auditors of non-financial information not typically familiar with LCA practices.
4.1.1 LCA critical review

In order to establish the basis for our work, we investigated existing approaches for the verification of Life Cycle Assessments (LCA). The closest existing approaches to the verification are the critical review, proposed by ISO 14040 LCA, and the verification of EPD® (Environmental Product Declaration) which is based on PCR (product category rules).

The ISO 14000 (and following) broadly define the common rules for the life cycle analysis, the calculation of environmental impacts and provide guidance for those companies who want to share and potentially publish their results, suggesting a critical or a peer review.

A similar type of review is proposed by the EPD, with the difference that it refers to a standard category rules (PCR).

Therefore, the existing verification approaches are based on critical review, with an external expertise on the LCA modelling and the hypotheses. While both approaches refers to an external expert to perform the critical (also peer) review, only the Environmental Product Declaration can be controlled in relation to the standard basis provided by the Product Category Rules – giving a unified standard to the sector (in a similar function as the PEFCR).

In the figure 5, the different methodologies, their standard rules and their verification approaches are presented.

Figure 5 - Link between environmental impact calculation and standards
4.1.1.1 ISO 14040 and ISO 14044 LCA regulations

ISO 14040 covers life cycle analysis (LCA) studies and life cycle inventory (LCI) studies but it does not describe the LCA technique in detail, nor does it specify methodologies for the individual phases of the LCA. It describes the principles and framework for life cycle assessment (LCA) including:

- Definition of the goal and scope of the LCA
- The life cycle inventory analysis (LCI) phase
- The life cycle impact assessment (LCIA) phase
- The life cycle interpretation phase
- Reporting and critical review of the LCA
- Limitations of the LCA
- The relationship between the LCA phases
- Conditions for use of value choices and optional elements

If the results of the LCA are published, or used to support marketing claims or comparative assertions, ISO 14044 requires that ISO 14040 LCA studies undergo a third-party critical review process prior to publication. This critical review is performed by an LCA expert.

LCA has in common with scientific work the difficulty of establishing objective quality criteria. Many of the judgements a practitioner will have to make in the course of a life cycle assessment cannot be said to be true or false, but only more or less justifiable. As specific category rules do not exist within the ISO framework, a significant amount of expertise in Life Cycle Analysis is necessary in order to challenge and verify the study.

This critical review process shall ensure that:

- The methods used to carry out the LCA are consistent with the ISO 14040
- The methods used to carry out the LCA are scientifically and technically valid
- The data used are appropriate and reasonable in relation to the goal of the study
- The interpretations reflect the limitations identified and the goal of the study
- The study report is transparent and consistent

4.1.1.2 EPD Framework

An EPD* (Environmental Product Declaration) is an independently certified and registered document that communicates transparent and comparable information about the life-cycle environmental impact of products in accordance with the international standard ISO 14025.

To create an EPD*, an LCA study is carried out in accordance not only with the general EPD instructions but also according to calculation rules set out in PCRs (Product Category Rules) - in this regard, the approach taken by the EC on PEF is close to the EPD* approach. The results from the study and other information, as required by the general EPD instructions and the PCR, are then compiled into the EPD reporting format. The EPD is then verified by an approved independent third party. Eventually, registration and publication of the EPD is done by contacting the Secretariat at info@environdec.com, who also works as a helpdesk throughout the process.

The EPD verification could be seen as an evolution of the critical review although it remains focused on verifying the conformity of the LCA modelling and hypotheses compared to the PCR as well as the nature of used data, without taking into consideration the validation of raw data and its consistency.
The advantage with respect to the critical review is the existence of the PCR that provides a common framework of rules for the EPD, allowing for a more standardized review of work and leaving less room for subjectivity in the review. The need for in-depth scientific LCA expertise is also less critical in comparison to a LCA critical review.
4.1.2 Non-financial verification

The internationally recognized standard for non-financial verification is the ISAE 3000 – International Standards for Assurance Engagements. The ISAE 3000 defines the basic rules of the verification, the overall methodology and the work to perform in order to deliver the assurance statement. Such standard is applicable to various subject matter such as the verification of company level data and KPIs, reporting procedures, action plans but also KPIs on services and products.

To be verifiable under this standard information shall be:

- Identifiable
- Capable of consistent evaluation or measurement against criteria
- Being subjected to evidence-gathering procedures

Such needs fit with PEF characteristics.

ISAE 3000 recognizes two levels of assurance: reasonable assurance and limited assurance. A limited assurance engagement is one in which the practitioner reduces engagement risk to a level that is acceptable in the circumstances of the engagement but where the risk is greater than for a reasonable assurance engagement. The table 5 illustrates the different objectives and conclusions of the two work approaches.

<table>
<thead>
<tr>
<th>Table 5 - Different conclusions according to ISAE 3000 standard</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Conclusion</strong></td>
</tr>
<tr>
<td>Positive form: “In our opinion the subject matter, in all material respects, is established according to XYZ criteria.”</td>
</tr>
<tr>
<td>Objective</td>
</tr>
</tbody>
</table>

The underlying work involved in delivering reasonable or limited assurance is mainly defined by two characteristics:
4.2 Conclusion on the potential verification approaches in EF context

As explained in this chapter, EF verification relies upon verification of a methodology, input data and LCA calculations. In order to perform such verification, proposed approach is to combine three audit tools in common framework:

- First a risk analysis, supporting the definition of a proper audit strategy by focusing the audit work where the risk is the highest.
- Second a model verification consisting in verifying that PEFCR, OEFSR and EF guidelines are well applied in the EF model
- Finally primary data verification consisting in verifying relevance, completeness, reliability, neutrality and understandability of the data used in the model.

In next chapters various options are proposed on the way to perform a risk analysis, model verification and data verification and those options are tested through the verification of 38 supporting studies.
5. Global scheme for EF verification

Considering the existing verification standards discussed above and the characteristics of the environmental footprint, the verification approach should be developed in three main steps:

1. A risk analysis, aiming at defining a proper audit strategy
2. A compliance audit on the model used
3. An audit of specific data

5.1 Risk analysis

As the audit principle is not to audit every single piece of data and each and every formula used, but rather to ensure that enough tests are made to conclude, either on a limited or reasonable assurance. Therefore, the risk analysis is an important tool for defining the tests to be performed based on a risk approach (see above).

For the EF two pillars shape the level of risk and defines the risk analysis:

- Impact - How influential is a data on the overall EF result?
- Risk - What is the risk of discrepancy on the data?

Based on those two dimensions it is possible to define the sampling approach and the overall audit strategy. The chosen strategy will result in a quantity of tested data and a level of verification for data, which will defines the audit coverage. Finally, the audit coverage directly influences the type of audit conclusion: limited assurance or reasonable assurance.
Given the structure of the Environmental Footprint and the category rules, three main type of risk analysis can be performed:

- Standard risk analysis per PEFCR/OEFSR
- Company risk analysis
- Product specific risk analysis (for PEFCR only)

The table 6 describes the outcomes for each three scenarios.

Table 6 - Outcomes of risk analysis

<table>
<thead>
<tr>
<th>Level of risk analysis</th>
<th>Content</th>
<th>Pros</th>
<th>Cons</th>
</tr>
</thead>
<tbody>
<tr>
<td>PEFCR/OEFSR-level risk analysis</td>
<td><strong>Theoretical</strong> risks are identified considering through an analysis of the PEFCR/OEFSR and considering the most probable situation companies would face when implementing PEFCR/OEFSR. It considers: - On the one hand, the “most relevant processes” - On the other hand, processes potentially relying on specific data for which there is - High probability of data unavailability - High probability of complex data reporting - High data/model complexity</td>
<td>- Define standard risky life cycle stages - Define standard work program - Free</td>
<td>- May not be adapted to products that strongly differ from the reference product - May not be adapted to companies not implementing PEF/OEF in a standard way</td>
</tr>
<tr>
<td>Company-level risk analysis</td>
<td>Risks are identified considering the PEFCR/OEFSR characteristics and the way the company really implements it. It considers: - On the one hand, the “most relevant processes” - On the other hand, processes relying on specific data for which there is - High data reporting complexity - High data definition complexity - High data/model complexity</td>
<td>- Risk analysis adapted to company’s specificities allowing to identify the main risks - Define the specific work program - Cost allocated to all products from a company</td>
<td>- Risk analysis not specific when it comes to defining the most relevant processes and therefore measure the gap between a specific product and the reference product</td>
</tr>
<tr>
<td>Product-level risk analysis</td>
<td>Risks are identified considering the <strong>real product characteristics</strong> and the way the company really made the assessment. It considers: - On the one hand, the processes that contributes the most the product assessment - On the other hand, processes relying on specific data for which there is - High data reporting complexity - High data definition complexity - High data/model complexity An analysis of the deviation between the product and the referent product is used to identify risks.</td>
<td>- Risk analysis adapted to product specificities allowing to clearly identify all the risks - Define the specific work program - Perfectly tailored to the company and its product</td>
<td>- Highest cost</td>
</tr>
</tbody>
</table>
Whatever the type of risk analysis described above, in the framework of this study risks were always assessed over three axis:

- significance of the process,
- ownership and availability of the data and
- complexity of the model.

The first step to produce a risk analysis is based on the analysis of the hotspots which should be detailed in the PEFCR and/or OEFSR. Hotspots are composed of all processes accounting for at least 80% of each impact category. Hotspot is an important dimension as a mistake in a hotspot should have a greater impact on the total impact that a mistake occuring on a minor process in terms of environmental impact.

Second step is to understand for a defined process what is the risk that a mistake in data source quality. To assess this, it what analysed during this study whether the data is easily accessible in the company or not. Indeed data that is also used for business purpose have more chance to be free of mistakes than a data that is specifically consolidated for the purpose of EF assessment (example material composition is more likely to correct than energy consumption from a production line. An other reason for primary data mistake is due to the fact misunderstanding can occur between data provider and data user in charge of EF assessment. Understanding who could own data is therefore a good way to estimate a risk for data consistency.

Finally, when PEFCR/OEFSR relies on complex model (as for instance for End-of-Life calculation) there is also a risk for a wrong model application.

Once the "sector" risk analysis is produced, "company" and “product” can be obtained by adding some level of complementary analysis:

- "Company" risk analysis: the “sector” risk analysis is completed by assessing the real availability and ownership of the data;
- “Product” risk analysis: the “company” risk analysis is completed by producing a gap analysis between the hotspots of the reference product described in the PEFCR and the hotspots of the real product.

5.2 Model compliance audit

Auditing an EF model covers the verification of the following aspects:

- Life cycle stages/processes completeness
- Good implementation of the functional unit
- Use of the right/up-to-date characterization factors
- Use of the right/up-to-date normalization and weighting factors when relevant
- DNM conformity (identification of specific vs. generic data)
- Use of the right/up-to-date datasets
- Right calculation formulas

The first four tests should be performed systematically while the last three could rely on the conclusion of the risk analysis and focus on some processes only.
In the context of EF, four main possibilities are possible for performing a model compliance audit combining the two dimensions that can influence the cost/consistency balance:

- Audit conditions: remote audit vs. "on-site" audit
- Audit timing: in the meantime than data verification vs. once for all products – at the beginning of the verification – through tool accreditation approach

The table 7 describes those scenarios:

<table>
<thead>
<tr>
<th>Framework of product verification</th>
<th>Content</th>
</tr>
</thead>
<tbody>
<tr>
<td>Model is verified in the meantime as data verification while auditing the PEF results</td>
<td></td>
</tr>
</tbody>
</table>

| Tool accreditation approach       | Model verification is separated from data verification and is done globally for a full category of products for a company. The tool performing PEF calculation and its parametering is then "accredited" to be used by the company for a limited time period. |

<table>
<thead>
<tr>
<th>Distance audit</th>
<th>Model is verified at distance through phone calls and screen sharing.</th>
</tr>
</thead>
<tbody>
<tr>
<td>&quot;On-site&quot; audit</td>
<td>Model is verified at company level.</td>
</tr>
</tbody>
</table>

5.3 Specific data audit

Auditing specific data used by the company is a key aspect of verification as specific data is what differentiates two PEF studies and results in a better or worse environmental impact. Specific data verification covers compliance with PEFCR and PEF guidelines considering:

- Data reliability
- Data completeness
- Data representativeness
- Allocation rules application

In order to verify the reliability of the quantitative information used in the calculation, the data reported must be compared with source documentation in order to check the consistency between the two information.

Source documentation may take different forms: invoices, reporting files, SAP extraction, technical specifications, etc. However, all documentation does not ensure the same level of reliability of the data. The following source hierarchy can be established based on the feedback obtained from all the audits...
conducted and on common practices observed in the framework of the verification of non-financial information:

- Internal documentation
- E-mails, written documents (receipts)
- Database extraction (SAP)
- Reporting files
- Third-party verified documentation
- Invoices, contracts

Less reliable

More reliable

The highest level of trust can be obtained by comparing figures with external or official documentation (contracts with suppliers, invoices, technical specifications from suppliers, etc.). On the opposite, documentation having neither external nor internal recognition – such as e-mails or written sheet of paper – will provide only a very limited level of trust in the data.

Globally, it shall be highlighted that company must document their work and always keep a track record of all source documentation justifying the figures used in the calculation.

The table 8 provides a quick overview of the different kind of source documentation that can be used by companies to support the reliability of the data:

**Table 8 - Examples of supporting documentation**

<table>
<thead>
<tr>
<th>Topic</th>
<th>Examples of relevant supporting documentation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Manufactured product composition</td>
<td>• Bill of Materials&lt;br&gt; • Technical specifications</td>
</tr>
<tr>
<td>Purchased ingredients</td>
<td>• Technical specifications from suppliers</td>
</tr>
<tr>
<td>Manufacturing process</td>
<td>• Invoices mentioning inputs consumption&lt;br&gt; • External analysis reports for outputs measurement</td>
</tr>
<tr>
<td>Waste</td>
<td>• Invoices from waste collection and treatment contractor</td>
</tr>
</tbody>
</table>

Two drivers are used to balance cost and consistency for data verification:

- Audit conditions: distance audit vs. "on-site" audit
- Audit coverage: how many % of data are covered through the audit
The table 9 describes those three scenarios:

<table>
<thead>
<tr>
<th>Content</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Distance audit</strong> Model is verified at distance through phone calls and screen sharing.</td>
</tr>
<tr>
<td><strong>&quot;On-site&quot; audit</strong> Model is verified at company level.</td>
</tr>
<tr>
<td><strong>Audit coverage</strong> Audit coverage is defined as a % of overall environmental impact was verified. It is calculated by summing up the impact of processes for which specific and generic data was verified. Audit coverage is a major driver for defining a level of assurance in verification.</td>
</tr>
</tbody>
</table>

As mentioned in the table 9, “audit coverage” is calculated by considering the consolidated impact of the different lifecycle steps for which data is used in the calculation. We consider two types of audit coverage: full coverage which covers all data used in the calculation, and limited coverage, where the audit focuses on data used to calculate the impact of the most relevant processes.

5.4 Conclusion on the global scheme for EF verification

In this section different options for applying risk analysis, model verification and data verification were proposed that differ in the balance between verification cost and the level of assurance brought on the data.

Next chapter describes how verifications were performed on 38 supporting studies and the leanings that were obtained from this testing phase.
6 Verification methodologies testing

6.1 Verification testing approach

With the objective to define the appropriateness of the various verification possibilities over risk analysis, model verification and data verification, 38 audits were performed on existing supporting studies testing different approaches, their benefits and their costs.

Specific objectives set for those audits were to answer the following questions:

- **Risk analysis**
  - To what extent can risk analysis support an audit strategy?
  - What are the benefits of having company or product specific risk analysis compared to standard PEFCR level risk analysis?

- **Model verification**
  - What are the pros/cons of model remote audit?
  - What are the pros/cons of combining model verification with data verification?

- **Data verification**
  - What is the link between data coverage and discrepancies identification?
  - What are the pros/cons of data remote audit?

To bring the material to support answering the above questions while considering the limitations of performing audits on supporting studies (see dedicated chapter below), three types of audits were defined and performed on companies:

<table>
<thead>
<tr>
<th>Description</th>
<th>Red audit</th>
<th>Blue audit</th>
<th>Green audit</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Model and data verification limited to data owned by company</td>
<td>Model and data verification limited to data owned by company</td>
<td>Model and data verification extended to data owned by suppliers</td>
</tr>
<tr>
<td></td>
<td>Data verification limited to data owned by company</td>
<td>Data verification limited to data owned by company</td>
<td>Data verification extended to data owned by suppliers</td>
</tr>
<tr>
<td>Distance audit</td>
<td>Distance audit</td>
<td>Audit on site at the company</td>
<td>Audit on site at the company and remote or on site supplier audit</td>
</tr>
<tr>
<td></td>
<td>In one day</td>
<td>In two days</td>
<td>In two days and half a day with suppliers</td>
</tr>
</tbody>
</table>
The process to perform the audit included three steps, the first one consisting in a risk analysis at PEFCR/OEFSR level.

As described above the audit was split into two main parts:

- First a general review to verify the scope, characterization factors, functional unit and all aspects that are “transversal” to the study, then
- A specific review of all the processes one by one to verify both the model and data used.

Working this way made it possible to track the link between data coverage defined at process level and discrepancies identification.

6.1.1 Selection of audited organizations and sectors

In accordance with the tender specifications provided by the European Commission (EC), audits where conducted on 38 different PEFCR/OEFSR organizations. In order to have a balanced sample while guaranteeing some degree of comparison between auditing methods, it was decided to verify at least one supporting study per pilot group and to verify two supporting studies for 14 of those groups.

Sample of supporting studies was defined with the aim of ensuring a balanced and representative selection considering the following criteria:
• a mix between large Groups and SMEs,
• a mix in terms of LCA tools used,
• a mix in the level of companies with LCA expertise,
• the inclusion of non-European companies

Globally, the following distribution of companies was obtained.

An effort was made to select companies from various activity sectors, and to not only assess large companies. However, due to the composition of the companies’ panel, which took part in the EC PEF pilot phase, large Food & beverage companies remain over-represented compared to other activity sectors.

A large share of the companies selected called upon LCA specialists in order to realize the footprint calculation and to produce the supporting study. This result is closely linked to the fact that companies are participating in a pilot phase and largely chose to work with consultants who were involved in the screening study and in the PEFCR production.
6.2 Verification testing limitations

While the objective of testing supporting studies verification is to provide material to design a relevant and cost efficient verification approach for a public policy embedding EF methodology, it is to be kept in mind that the condition in which verification testing was performed is not representative of future real conditions when EF would be deployed.

The following limitations are indeed to be kept in mind:

- Company performed a EF for the first time therefore:
  - No processes were in place yet to integrate associated data reporting and control
  - Internal contributors are not familiar with the output of the data required to them therefore it can be misunderstandings on data definition
  - Tools and software used by companies to calculate their EF are not appropriate for generating EF studies at a large scale. This may be different if EF is deployed

- Company, or consultants in charge of the supporting study, were usually highly involved in methodological development leading to deeper knowledge of PEFCR/OEFSR and EF guidance than what could be in the future an average company delivering EF results.

- The final output of the supporting study is not defined yet, nor in terms of considered indicators (e.g. 15 indicators, a set of selected indicators, a single aggregated indicator) or in terms of communication format.

Those limitations influence the results of the verification testing phase as some it can be imagined that some discrepancies would not find the same recurrence in an implemented EF approach. At the opposite some other types of discrepancies could be more frequent in normal conditions.

Such limitations were taken into account in the way verification results were analyzed and in the scenarios proposed.
6.3 Verification testing results

6.3.1 Need for verification is confirmed

All audits were realized with the exception of one that ended up with at least one discrepancy identified, which highlights the need for verification in order to ensure the robustness and reliability of the products’ quantitative footprint. This is even more relevant considering that these audits were realized during the pilot phase, with companies investing significant resources and relying on LCA specialists to do the calculation, which might not be the case anymore after the pilot phase.

An average of 8.5 findings (a finding being a discrepancy), per company were identified, having a direct or indirect consequence on the reliability of the calculation made. The number of findings per company ranged from 2 to 19 findings.

More than 75% of the audits conducted ended up with more than 5 findings having a consequence on the reliability of the footprint calculated by the company. Looking at the significant findings, namely findings that can have a significant impact on data reliability, more than 85% of the audits led to the identification of at least one finding having a direct and significant impact on the footprint calculation.

Among all the different findings identified, 71% are direct mistakes in the data used or in the way the model is implemented while the remaining share concerns observation on the level of detail of PEFCR/OEFSR and its auditability.

More details will be provided regarding the different categories of observations in the next sections of the report.
6.3.2 Some limitations to ensure proper verification are identified

The different audits realized highlighted different limits that prevent the verification process to be conducted in a comprehensive way. Three main categories of limits were identified, which are detailed here below.

6.3.2.1 PEFCR/OEFSR need improvements to ensure auditability

The first type of limits identified relates to the content of the category rules. As mentioned previously, 30% of the findings identified during the audits are related to the content of the PEFCR/OEFSR. These findings made the verification work more complex, as information disclosed in the PEFCR/OEFSR did not enable some information to be verified (ex: models defined, dataset used, etc.).

![Detail of PEFCR/OEFSR-related findings](chart)

The chart above shows that more than half of the PEFCR/OEFSR-related findings are linked to missing guidance in the document. This lack of guidance concerns different topics, including: allocation methodologies, functional unit definition, system boundaries, use phase scenario, waste modelling, etc. As a result, it was often not possible to check the relevance of the approach chosen by the company. The success of the PEF calculation is closely related to the PEFCR/OEFSR content, which must be as exhaustive as possible.

In addition, 29% of the findings related to the PEFCR/OEFSR concern the fact that companies voluntarily choose to not comply with the PEFCR/OEFSR, because they challenge its content. Companies disagree mainly on the scope to be considered in the study, especially regarding the inclusion or not of capital goods. These “non-compliances” identified were difficult to assess, given that companies did not consider that there were mistakes.

The list below summarizes the other limits, which made the verification work more complex:

- Missing datasets: Several datasets were not provided in the PEFCR/OEFSR, which forced companies to use proxy. This sometimes did not correspond to the data modelled;
- Discrepancy between the PEFCR/OEFSR and the screening report: In some cases, information provided in the PEFCR (assumptions, datasets, generic data), were not the same as the ones included in the screening study, which were used by the consultants for the impact calculation. Such mistakes is directly linked to being in a pilot phase as it is expected that final PEFCR/OEFSR will be aligned with supporting screening reports;
- Data-need matrix: It was not possible to confirm that companies used correctly the DNM and verify whether companies really did have access to the information or not. As a result, it seemed quite easy for companies to use generic data instead of primary ones, even for significant lifecycle stages. Being able to ensure DNM conformity is important for data verification as it leaves room for defining what data to be used.

6.3.2.2 DNM good application is hardly verifiable

While being an important part of verification since DNM defines what type of data is allowed to be used, DNM is a challenge for a verifier in terms of verification. Only a limited number of supporting studies applied this matrix as some PEFCR/OEFSR were developed prior to it. However, two main limits were identified to consider if it was properly applied or not:

- First a matter of definition: a difference is introduced by the matrix between suppliers and subcontractors; subcontractors being covered by situation 1 and suppliers by situations 2 and 3. The definition between supplier and subcontractor is however not clear and very complex to apply for companies and by consequence for verifiers to control. Besides it can happen that while the situation is clearly a situation of subcontracting, data may still not be available by the company.
- Secondly it is impossible to verify whether a situation 3 should or not be a situation 2 as auditors cannot control the level of availability of suppliers’ data.

Finally, the DNM relies on Data Quality Rating that is currently very subjective in the way it is guided and implemented. DQR is therefore not possible to audit either.

6.3.2.3 Being a pilot phase some information demonstrated a lack of availability and traceability

Performing a proper verification requires to have access to raw information used for the EF. In the context of testing verification on the supporting studies, three main challenges were faced regarding such data accessibility.

Getting access to the data

Some data used to perform the supporting study are particularly sensitive for companies, such as the Bill of Material. Non-disclosure agreements (NDA) were therefore signed for most of the supporting studies prior to verification. This need for confidentiality is to be kept in mind whatever the verification scheme considered.

Even though an NDA was signed by a few companies, some information was not provided to auditors as it was considered as too confidential and critical for the organization. We believe that this is mainly due to the fact verification was performed as a pilot and that this risk for the auditor would be limited in a real verification situation.
Data is not always fully traceable

For several audits some data sources were not traceable, meaning that the data sources and background calculations steps could not be explained; making it impossible to verify some information. This was especially the case for specific data obtained from suppliers, for which no trace of the data provided could be found. This fact is concerning as this lack of information does not enable data verification and thus does not guarantee its reliability.

These limits are likely to be related to the fact that we are in the “pilot” phase of the EF project. As a consequence, companies have not implemented any kind of management system to enable data collection and traceability. In real conditions, most of the limits identified above will no longer be relevant.

Verifying specific data from suppliers is a challenge

For some PEF, specific data provided from suppliers is used and can be highly sensitive over the EF results when used for a most relevant process. This presents a triple challenge for such data.

   Higher level of risk

The level of risk is much higher on such data as the supplier may not have the same level of awareness as the EF responsible company and may not see the importance of such data.

Risk is especially high when it comes to exhaustiveness of the data, time related scope and geographical scope, or regarding the implementation of allocation rules, for instance.

   Number of involved suppliers can be high

For some products the number of suppliers providing specific data is very high, either because several suppliers can provide an article or a material or because the number of components is high.

Therefore, according to the number of suppliers to audit in order to achieve the appropriate data coverage, impact on verification cost can be very high for auditing one product.

If the supplier audit is to be performed, it should be seen as verification for a full range of products in order to limit the cost per product thanks to economies of scale.

   Difficulty to perform an audit

A major risk when it comes to supplier audits is the feasibility to perform the audit. Experience from audit testing shows that it was complicated to get the approval from the company and its supplier to perform verification and it should be anticipated that supplier audits would not be possible on a voluntary bases.

On the other hand, it should be assessed to what extent supplier audits may become compulsory from a legal point of view with the constraint that suppliers are located everywhere in the world. The analysis of this point is not part of this study.

There is a possibility that when supplier data cannot be audited, a commitment letter signed by the supplier would be required, explaining the scope of the provided data as well as a solemn undertaking upon its honesty.
6.3.2.4 Proper PEFCR/OEFSR verification requires a combination of skills

In the framework of the verification testing attention was made to propose audit teams with the right level of expertise, combining experience in both LCA practice and competencies in data verification.

A qualitative conclusion in relation to the effort made to combine such teams is that it was key to ensure proper verification. Findings included:

- Knowledge of LCA tools, datasets, characterization methods from LCA practitioners brought many findings on supporting study models,
- Expertise in non-financial data verification led to more in-depth analysis of data sources and findings on this topic.

A conclusion for the future verification framework is that there is a real benefit to propose an LCA expertise for model verification and a non-financial data verification expertise for data verification.

Another learning of the testing phase is that in some cases, as for instance detergents or paints, additional competencies are needed to really challenge the choices of the company. For instance, for detergents, a chemical expertise would have supported challenging the way chemical reactions affect the chemical composition of a formula for its end-of-life. This additional expertise was only raised on a few sectors.

6.3.3 Performing a risk analysis

6.3.3.1 Work description reminder

Risk analysis is a very important step of the verification process as it enables the definition of the most appropriate work program for the audit by focusing the verification work on the most risky stages.

As described previously, three types of risk analysis could be performed, with the following description:

<table>
<thead>
<tr>
<th>Level of risk analysis</th>
<th>Work performed</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Risk analysis at product category level</strong></td>
<td>Performed by pilots as a part of PEFCR work. No specific work for auditors.</td>
</tr>
<tr>
<td><strong>Company level risk analysis</strong></td>
<td>Auditors update the standard risk analysis (PEFCR level) to adapt it to company specificities. Auditors tasks - Analysis of standard risk analysis - Phone call with the company - Update of the risk analysis</td>
</tr>
<tr>
<td><strong>Product level risk analysis</strong></td>
<td>Auditors update the standard risk analysis (PEFCR level) to adapt it to product specificities. Auditors tasks - Analysis of standard risk analysis - Phone call with the company for each audited product - Update of the risk analysis</td>
</tr>
</tbody>
</table>
Most of the risk analysis was made at product category level using information disclosed in the PEFCR/OEFSR and in some cases in the screening report. After the first audits, given the fact that sometimes the representative product used in the screening report was quite different from the studied product, it was decided to conduct the risk analysis at the product level for some supporting studies, to check whether it would have an influence on the audit results or not.

### 6.3.3.2 Risk analysis benefits are demonstrated even at product category level

The audits realized highlighted the fact that 81% of the findings identified corresponded to a lifecycle stage that had been considered as risky through the category-level risk analysis. This figure shows the importance of the risk analysis in terms of work orientation.

The remaining findings were identified by looking at the less significant lifecycle stages.

The product-level risk analysis realized for 10 supporting studies led to similar conclusions, with 84% of the findings identified corresponding to a stage that had been considered as risky through the product-level risk analysis.

### 6.3.3.3 Risk analysis cost / benefits balance

The table 12 intends to provide an analysis of the different scenarios suggested, including an analysis of costs and outcomes for each scenario to help define the most optimized approach for the verification purpose.
<table>
<thead>
<tr>
<th>Level of risk analysis</th>
<th>Content</th>
<th>Cost</th>
<th>Pros</th>
<th>Cons</th>
</tr>
</thead>
</table>
| PEFCR/OEFSR-level risk analysis | **Theoretical** risks are identified considering through an analysis of the PEFCR/OEFSR and considering the most probable situation companies would face when implementing PEFCR/OEFSR. It considers:  - On the one hand, the "most relevant processes"  - On the other hand, processes potentially relying on specific data for which there is  - High probability of data unavailability  - High probability of complex data reporting  - High data/model complexity | - Risk analysis should be within the PEFCR/OEFSR and it wouldn't imply any cost for the company  
*Estimated cost for the company: NONE* | - Define standard risky life cycle stages  - Define standard work program  - Free | - May not be adapted to products that strongly differ from the reference product  - May not be adapted to companies differing not implementing EF in a standard way |
| Company-level risk analysis | Risks are identified considering the PEFCR/OEFSR characteristics and the way the company really implements it. It considers:  - On the one hand, the "most relevant processes"  - On the other hand, processes relying on specific data for which there is  - High data reporting complexity  - High data definition complexity  - High data/model complexity | - One risk analysis per "company / product" couple  - Around 6 hours should be considered to perform the risk analysis and define the work program  
*An estimated cost for this scenario will be provided in the appropriate section.* | - Risk analysis adapted to company's specificities allowing to identify the main risks  - Define the specific work program  - Cost allocated to all products from a company | - Risk analysis not specific when it comes to defining the most relevant processes and therefore measure the gap between a specific product and the reference product |
| Product-level risk analysis | Risks are identified considering the real product characteristics and the way the company really made the assessment. It considers:  - On the one hand, the processes that contributes the most the product assessment  - On the other hand, processes relying on specific data for which there is  - High data reporting complexity  - High data definition complexity  - High data/model complexity  - An analysis of the deviation between the product and the referent product is used to identify risks. | - Risk analysis is to be performed for each single product  - The most efficient option would be to rely on the basis of a company-level risk analysis that could be updated per product  - In addition to the cost of a company-level risk analysis, two additional hours per product must be considered  
*An estimated cost for this scenario will be provided in the appropriate section.* | - Risk analysis adapted to product specificities allowing to clearly identify all the risks  - Define the specific work program  - Perfectly tailored to the company and its product | - Highest cost |
Whatever the type of risk analysis that is undertaken it is assumed that PEFCR/OEFSR is made available to auditors with:

- an up-to-date screening report, as some discrepancies in terms of hypothesis remain between latest PEFCR/OEFSR versions and their screening reports
- most relevant processes list defined at high precision level being not only at life cycle stage level but at process level
- improvements made to make PEFCR/OEFSR auditable have been initiated (see chapter 6.3.2)
- indicators to be communicated and verified are clearly stated either in the PEFCR/OEFSR or in other policy guidance’s

**6.3.3.4 Conclusion of risk analysis**

As a conclusion of the testing approach the following learnings can be stated:

1. Whatever the verification approach it is recommended to rely on a risk analysis
2. Such risk analysis should be performed at PEFCR/OEFSR level to provide a standard risk analysis for all product categories
3. When the number of products to be audited for a company is high, a “company level risk analysis” is relevant while a product-level risk analysis demonstrates a too high cost compared to the associated benefits
4. When the number of products to be audited for a company is low (less than 10), a product-level risk analysis can be performed as well as a company-level risk analysis

The decision to perform the risk analysis at a more detailed level than PEFCR/OEFSR level would have to be decided by the auditor, based upon its professional judgment if he considers it as necessary.

**6.3.4 Model verification**

**6.3.4.1 Work description reminder**

For each life-cycle stage identified as risky, the verification work is oriented around two axis: the verification of the data used and the verification of the model defined to calculate the impact.

Model verification includes the following areas of work:

- Life-cycle stages/processes completeness
- Good implementation of the functional unit
- Use of the right/up-to-date characterization methods
- Use of the right/up-to-date normalization and weighting methods when relevant
- DNM conformity (identification of specific vs. generic data)
- Use of the right/up-to-date datasets
- Right calculation formulas

Most of the time the model was performed under a standard LCA tool, mainly GaBi and SimaPro and was performed by a consultant and not directly by the company.

Verification was realized by comparing the modeling tool settings with PEFCR and PEF guidance through settings controls and discussion with people in charge of the model.
6.3.4.2 A large spectrum of discrepancies type was identified

The following charts provide insights on the nature of findings that were identified during the model verification part of the audit work. Two main audit findings categories were identified: model mistakes and non-compliance with the PEFCR/OEFSR.

Categories of model-related findings

![Chart showing categories of model-related findings]

- Model mistake: 35%
- Non-compliance with PEFCR: 65%

Detail of "model mistake" findings

- Inappropriate dataset: 13%
- Inappropriate model: 23%
- Non existing dataset: 64%

Detail of "non-compliance" findings

- System boundaries: 19%
- Functional unit: 19%
- EoL formula: 75%

Model mistakes include three different findings:

- Inappropriate model: the model defined by the company or the consultant did not reflect the reality of the process (e.g. absence of the waste produced by wastewater treatment plant in the manufacturing process model; wrong application of the DNM);
- Inappropriate dataset: the datasets selected by the companies did not reflect the reality of the activity data flow, even though a more precise dataset was available in the tool (e.g. using EU-energy mix instead of country-specific for electricity);
- Non existing dataset: the finding is similar to the one just above, except that in this case, the dataset reflecting the reality of the activity data did not exist in the tool (e.g. dataset for organic wheat seed production).
“Non-compliance” findings corresponds to the difference between the content of the PEFCR/OEFSR and the models defined by consultants. In most cases, the findings are related to the system boundaries, which did not correspond exactly to the one required in the PEFCR/OEFSR. Two points of attention could be raised from the different audits conducted:

- **End-of-life formula**: 19% of all findings related to a “non-compliance with the PEFCR/OEFSR” are linked to the fact that companies and consultants were not at ease with the use of the End-of-life formula provided in the PEFCR/OEFSR, which often led to approximations in the use of the formula (voluntary absence of the formula, missing terms, etc.);
- **Capital goods inclusion**: 14% of all findings related to a “non-compliance with the PEFCR/OEFSR” are linked to the inclusion or not of capital goods in the system boundaries. As the guidelines did seem to vary between the different versions of the PEFCR/OEFSR, and between the different product categories, it was not rare to find out that companies and consultants did not comply with the guidelines provided in the PEFCR/OEFSR version that was used to produce the supporting study.

### 6.3.4.3 Model verification shall be performed on-site

As it was mentioned in a previous section of this report, remote audits were conducted in order to compare the results with on-site audits. In order to get representative data for comparison purpose, 12 remote audits were realized compared to 26 on-site audits.

![Chart](chart.png)

As it can be observed in the chart above, the efficiency of remote audits appears to be quite limited compared to on-site audits, as on-site audits approximately enabled the identification of 50% much findings per hour than remote audits. Furthermore, qualitative feedback from the auditor tends to reinforce this message: globally at the end of remote audits, auditors reported to have had no confidence in the accuracy of the model they verified.

This observation can be linked to one principal reason, the fact that it was difficult to access the models during remote audits:

- **Consultants** – who were in charge of most of the models definition – were not always available during remote audits, which prevented the model to be audited in some cases;
- **Q&A calls** are less efficient than real-time discussions to understand choices and assumptions made by consultants for model definition.
As a conclusion of the audit testing it was raised that remote audit does not allow the provision of any level of assurance. Model verification shall be performed physically with the model responsible.

6.3.4.4 Model verification cost / benefits balance

Table 13 intends to provide an analysis of the 2 different kind of audits realized on site, including an analysis of costs and outcomes for each scenario to help define the most optimized approach for verification purpose.

It relies on the following assumptions regarding the conditions in which the audit is performed:

- Model is made fully accessible to the auditors.
- Model verification is performed locally with the one responsible for the model, therefore auditor transport is to be expected.
- Datasets are standardized so a specific dataset is clearly defined once technical and geographical aspects are defined.
- Datasets are in conformity with EF guidance and are not under the scope of verification. The way they are implemented in the study is however verified.
- No other referential than EF guidance and PEFCR/OEFSR are to be known to perform the audit.
- It is considered that the tool used does not need technical/IT verification (e.g. no need to verify that GaBi or SimaPro works properly).

Both verification methodology would imply the verification of the modelling made for the most relevant processes identified in the risk analysis and the verification of the datasets used to calculate the impact of the most relevant processes.
Table 13 - Outcomes of model verification scenarios

<table>
<thead>
<tr>
<th>Model verification</th>
<th>Content</th>
<th>Cost</th>
<th>Outcome</th>
</tr>
</thead>
<tbody>
<tr>
<td>Verification at category level</td>
<td>- Verification made once for the whole category</td>
<td>- Verification can be made at PEFCR/OEFSR level and it would imply a limited cost for the company</td>
<td>Same level of verification is brought to the model</td>
</tr>
<tr>
<td></td>
<td>- Only possible in case of a common tool used by companies for one category of the products</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>- Tool parameters shall not be modifiable during its accreditation in order to ensure verified model is systematically used</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>- Verification is performed by auditors that bring LCA expertise</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Verification at product-level</td>
<td>- Verification made for all audited products in the meantime as data verification (similar to the condition in which supporting studies verification was performed)</td>
<td>If the company works on multiple products it should be considered around 8 hours to perform the verification for each product</td>
<td>An estimated cost for this scenario will be provided in the appropriate section.</td>
</tr>
<tr>
<td></td>
<td>- Verification done by data auditors</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Model verification is something that must be done together with data verification. The only case where it can be separated is if a common tool is to be provided to the companies for a same category of products where parameter cannot be modified by user (except specific data) to ensure tool can be “accredited”.

6.3.4.5 Conclusion over model review

As a conclusion of the testing approach the following learnings can be stated:

1. Model verification shall be performed physically with the model owner
2. When the number of products is high, verification can be made for at category-level (tool accreditation)
3. Elsewhere model verification should be performed together with data verification
4. A Life Cycle Analysis expertise is needed in order to be able to challenge the model
6.3.5 Data verification

6.3.5.1 Work description reminder

Data verification includes the verification of all the specific data that was used to fill in the models in order to calculate the specific impact of the company’s product. As an illustration, the following aspects are covered:

- Data reliability
- Data completeness
- Data representativeness
- Relevance of allocation rules

6.3.5.2 Reporting mistakes represent a large share of the identified discrepancies

The following charts provide insights on the nature of findings that were identified during the data verification part of the audit work. Three main audit findings were identified: mistakes in data collection, impossibility to verify the data used, and non-compliance with the PEFCR/OEFSR.

Categories of data-related findings

Detail of "data mistake" findings

Detail of "non-compliance" findings

Data mistakes were mainly due to classic reporting mistakes, corresponding to discrepancies between the value entered in the LCA tool and the value included in the source documentation (e.g.: conversion
mistake, wrong unit, etc.). This is a classic audit observation, and its frequency highlights the legitimacy of the verification work in order to have reliable results. Other observed information includes mistakes in inputs/outputs allocation methodologies, missing data and misunderstanding by the person in charge of data providing.

“Non-compliance” mistakes mainly correspond to the cases when companies used generic data when specific data was required in the PEFCR/OEFSR. These observations are linked to the fact that most of the time, PEFCR/OEFSR did not comply with the “data-need” matrix, and companies did not have access to various specific data required, for instance regarding transportation information.

Lastly, part of the observations was simply linked to the fact that the activity data used in the calculation could not be verified during the audit. This fact is mostly related to the lack of traceability of data collection, which can be explained by the fact that companies did the supporting as a “one-shot” project, not involving sufficient resources enabling a complete data traceability process.

6.3.5.3 Having access to data owner at Company is critical for proper verification

Such verification relies on the ISAE 3000 principles and consists in verifying the above mentioned aspects of the data in regards to the PEFCR/OEFSR. Such verification requires identifying data sources, to understand their scope and definition, and to look for audit evidences. It requires getting extraction of data from company information systems as well as interviewing related experts within the company.

One learning of the audit testing is that having access to internal experts in charge of the verified data in the company is essential to ensure proper verification.

6.3.5.4 Remote audit is an option for data verification under certain conditions

The same comparison as for the model verification work was made between remote and on-site audits. The conclusion is similar, and even more favorable to on-site audits, as shown in the chart below.

![](chart.png)

Indeed, on-site audits led to approximately twice as many findings per hour than remote audits. The difference between remote audits and on-site audits is different than for model verification. While the problem for model verification was more related to the limited access to the model, the problem for data verification is more time-related.
Remote audits could be considered as relevant for data verification as it is still possible to review the reliability of the data used at a distance, the limited efficiency being offset by the absence of travel costs. However, we believe such verification approach can be appropriate under certain conditions only:

- Quantity of data to be verified and data complexity shall be low
- Proofs shall exist in a format adapted to be shared through a screen or sent by e-mails
- Auditor needs to have previously experienced companies’ information system

Remote audits could also be considered as relevant in the framework of “follow-up” audits where no major changes have been occurring in the calculation.

6.3.5.5 A high data coverage is needed but can be reached with a limited number of data

The different audits made highlighted the fact that for 74% of the products audited, it was required to cover 80% of the total lifecycle contribution to reach 80% of the identified number of significant findings during data verification work.

This means a high level of coverage is required to ensure a good enough level of assurance on an EF. However, this does not mean that 80% of primary data needs to be verified as for some product categories; only a few data are required to reach 80% coverage.

Indeed as described in the graph below, only a few hours were necessary to perform the verification that allowed addressing the findings, as 80% of the findings were identified with less than 11 hours of work for 88% of the audits. Furthermore, this 11 hour duration is clearly overestimated as it covers both data and model verification.
As a conclusion in one day, we estimated it was possible to verify all specific data required for an EF and that a limited assurance could be provided when all specific data used for the most relevant processes are reviewed, while a reasonable assurance could be provided when all specific data are verified.

6.3.5.6 Data verification cost / benefits balance

Table 14 intents to provide an analysis of the 4 different kind of data verification, including an analysis of costs and outcomes for each scenario to help define the most optimized approach for verification purpose.

It considers data verification is performed under the following conditions:

- Data is made fully accessible to the auditors
- Companies recorded data sources used to perform calculation
- People responsible for the various types of data are available to the auditors
- When manufacturing is a hotspot a site visit may be performed
- It can be ensured during data verification that the model has not been modified following the model verification
- The scope of product to be verified is clear: product at SKU level, SKU for a specific market, range of products, etc.

Table 14 - Outcomes of data verification scenarios

<table>
<thead>
<tr>
<th>Data verification scenario</th>
<th>Content</th>
<th>Cost</th>
<th>Outcome</th>
</tr>
</thead>
</table>
| Remote audit              | - Verification of the specific data collection for the most relevant processes identified in the risk analysis  
- Verification of the compliance of the generic data used  
- Verification of the appropriate use of the data-need matrix  
- Remote interviews with the person in charge of the data collection  

An estimated cost for this scenario will be provided in the appropriate section. | - No "travel-related" costs  
- Around 10 hours should be considered to perform the verification | - Possible to obtain the required evidences to check specific data, although efficiency is limited by the remote aspect of the audit  
- Risk of not being able to see the generic data used in the LCA software  
- Significance of gaps difficult to assess at a distance |
On-site audit – limited coverage
- Verification of the specific data collection for the most relevant processes identified in the risk analysis
- Verification of the compliance of the generic data used
- Verification of the appropriate use of the data-need matrix
- Direct access to the data collection system
- "Travel-related" costs
- Around 1 day should be considered to perform the verification
- Review of the traceability of data contributing to 80% of the total lifecycle impact
- Efficiency improved compared to remote audits (nearly thrice as much findings identified per hour) leading to less time needed

On-site audit – full coverage
- Verification of the specific data collection for all specific data used by the company
- Verification of the compliance of the generic data used
- Verification of the appropriate use of the data-need matrix
- Direct access to the data collection system
- "Travel-related" costs
- Around 2 days should be considered to perform the verification
- Complete review of the traceability of all primary data used by the company
- Efficiency improved compared to remote audits (nearly thrice as much findings identified per hour) leading to less time needed

Several supplier audits were conducted in order to review specific data obtained from external sources. The limited number of supplier audits made did not allow for a quantitative analysis of its outcomes. However, the following conclusions can be summarized:

- A remote exchange seems to be sufficient to gather source documentation enabling data verification
- Suppliers must be notified and remain available during the audit day in case of need
- About 2 hours seems to be required to perform the verification

The main limitation regarding supplier audit was related to the fact that no engagement letter was signed by the supplier, hence a limited availability for the audit.

6.3.5.7 Conclusion over data review

As a conclusion of the testing approach, the following learnings can be stated:

1. Data verification could be performed remotely even though the efficiency is limited compared to on-site audits
2. The amount of time spent should depend on the coverage expected (hotspots only or full coverage)

Supplier audit may be necessary to review data provided externally
6.4 Conclusion over verification methodology

Testing verification on real supporting studies confirmed the need for verification and brought interesting learnings both on the conditions in which verification can be performed and on the limitations that need to be tackled to make verification possible.

While performing verification on supporting studies several limitations were identified that need to be tackled in order to make EF auditable.

A first limitation to be tackled concerns the level of precision of current PEFCR/OEFSR that in some cases sometimes too limited to ensure verification to make EF verifiable or that leave a room for interpretation that is too high.

A second limitation is the limited possibility to ensure DNM is properly applied. DNM brings two main limits for verification. First one is about definition used: difference between suppliers and subcontractors is not clear which leave a room for interpretation. Second reason is that it is impossible for a verifier to ensure that while a company states that they cannot get specific information from a supplier, this is true. That kind of information is indeed not formalized within a company.

Finally one of the most important limitations is on regard of supplier audit. Supplier specific data is at high risk as the level of understanding and control is much more limited as for company data. However it is likely that in many cases suppliers will not be willing to be audited on a data provided to their customers. Therefore it should be studied further what solutions are legally possible when it comes to mandatory verification.

Concerning the conditions of execution of the audit, verification testing demonstrated first of all a need to mix specific competencies to ensure valuable verification. Such competencies is in most of the case a combination of LCA expertise that is needed when it comes to verify proper EF model implementation and data verification expertise bringing both the audit methodology to the team as well as the knowledge of companies reporting systems. In some cases however additional expertise is needed to be able to challenge companies on some of the information they provide such as for instance chemical expertise when it comes to challenge to way chemicals interacts in a formula. Such additional expertise should be defined per PEFCR/OEFSR.

When it comes to risk analysis, the verification testing demonstrated a strong link between processes with the highest identified risk and findings identified during the audit reinforcing the need for a risk analysis. Recommendation would be at minimum to develop a standard risk analysis for each PEFCR/OEFSR. Such risk analysis could then be used by auditors to be adapted to company specificities and in some cases to product specificities.

Regarding model verification, verification testing demonstrates that such verification cannot be performed through remote audit. Being together with the one in charge of the model allows to understand the way product was modeled which much more detail and give more hand to verifier to dig into the model.
When it comes to data verification, main learning is that to reach a certain level of assurance it is needed to reach high verification coverage (80%). However such coverage can most of the time be reached with a limited number of specific data as usually a few data lead to a large part of total footprint. This is confirmed by the fact time needed to get most of the audit findings is limited to about one day.

Other conclusions on the way verification can be performed are relying on the public policy embedding EF. Indeed, according to the level of assurance needed for a public policy, the number and the type of indicators to be communicated and therefore verified, and the quantity of products that would be concerned within a company, the conditions for verification may be different when it comes to optimizing the cost/benefits balance of verification.

Regarding the number of indicators to be communicated, it must be noted that the magnitude of the audit work and thus its cost may depend on the number of impact categories as shown in figure 9.

Besides according to the way EF would be integrated by the company and what tools and procedures would be implemented very important economies of scale can be foreseen.

Next chapter will therefore define various scenarios for EF implementation that will be the basis for defining more precisely relevant and cost efficient verification scenarios.

Figure 9 - Link between impact categories and audit work

In order to cover the 80% of the total EF, only the primary data from this particular phase would be enough.

In order to cover the 80% of every EF impact category, primary data covering 80% of every impact category would be needed.
7 Scenarios for EF implementation

Testing verification approaches on supporting studies allowed to defined benefits and limits for all components of a verification approach but did not allow defining a generic optimum verification approach. Indeed in order to define an appropriate approach for EF verification leading to a right balance between costs and benefits a set of scenarios are to be defined as this appropriate approach will depends upon:

- The level of assurance needed for a defined public policy
- The number and type of indicators to be published and verified
- The number of products for which a company is publishing EF
- The way the company implemented EF production

The following approach has been developed in this chapter to define scenarios to be assessed:

- A scenario is based upon a public policy scenario as defined in the following chapter.
- For each scenario two sub-scenarios are developed:
  - A case where the EF approach is fully integrated and automated in the company in order to illustrate economy of scale
  - The case where several indicators are expected to be communicated to illustrate the impact on cost of communicating single indicator vs. multiple indicators

7.1 Public policy scenarios

Environmental Footprint (EF) is a new framework of environmental impact measurement, that is:

- Holistic, through a life cycle approach
- Multi-indicator
- Sector-specific

It is a methodological improvement compared to previously existing methodologies and as a consequence of this progress, EF methodology could strengthen existing public policies or lead to the development of new ones.

According to the context in which EF methodology is used, the need for verification will differ. Therefore it is important in the context of this study to understand the main public policies scenarios in order to propose the most suitable verification approach for each one of them.
7.1.1 Definition of public policies scenarios

7.1.1.1 Typology used

The following typology classifies environmental claims in general by crossing two dimensions: the format in which the environmental information is delivered and the voluntary/mandatory aspect of the policy. The result of this typology is then applied to PEF and OEF in particular, in order to define six main policy types. Those two dimensions were chosen because they have a significant impact on what certification methodologies are the most relevant.

Voluntary/mandatory aspect of the policy

Policies relative to environmental claims can be separated into two categories: policies based on voluntary participation and policies based on mandatory participation.

Policies based on voluntary and mandatory participation differ in the level of external certification required. Indeed, policies based on mandatory participation require a higher level of certainty and therefore a higher level of external certification as decisions made by administrative authorities in the framework of a mandatory system, such as validation of a CE marking if such a scenario is chosen, are much more likely to get challenged in courts than decisions made in the framework of a voluntary system, such as attribution of an ecolabel. More generally, by their very nature, mandatory policies are likely to fall under the scope of stricter legal rules. Therefore it is to be expected that the level of certification attached to those policies will be higher.

Eventually, the role of the EU is wider than environmental protection and encompasses many dimensions among which guaranteeing a level playing field for economic actors, fostering effective competition and ensuring consumer protection. As a result mandatory policies, for which the EU is more engaged, need to be subject to a higher level of external certification.

Policies based on voluntary participation

Voluntary participation in environmental claims systems can and do exist without public intervention. For example, private labels are always based on voluntary participation: organizations are not legally obliged to use such or such label, and if they decide to do so, their action are often not regulated by a specific set of laws. While this private system can be efficient in many regards, it creates the risk of a proliferation of labels and environmental claims, thus harming the readability of the system.

Public policies based on voluntary participation, especially if they are applied throughout the EEA, are a way to avoid this problem of readability. In addition, they allow for an important flexibility in the market and come at a low cost. Indeed, only those organizations that believe that they will benefit from the label will apply for it and incur the associated cost. The downside of such policies is their reduced scope. By definition, if a scheme is voluntary, some organizations will choose not to participate in it, which means that the overall environmental impact of the policy is limited. The European Ecolabel is a good example of public policies based on voluntary participation.

It should be noted that public and private voluntary schemes often coexist, in particular when some actors feel that the criteria applied by the public system are not strict enough. This is for example the...

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20 Given the specific efforts and expertise of the EC on energy products as well as the proximity of energy performance analysis and LCA analysis, many of the examples are taken from EU policies on energy products.
case in the field of organic agriculture in France, where the label Bio Cohérence is awarded to products that go beyond the standard requirements of the European AB certification. While such a coexistence increases the amount of information provided to consumers, it can go against the European Commission’s objective of readability.

It should be noted that when such systems are in place organizations can freely choose to participate only for a small share of their products, or for a larger share, or even for all of the products they offer.

**Policies based on mandatory participation**

Policies based on mandatory participation are used to ensure that all organizations within a given sector are subjected to the same rules.

In this second approach companies have to provide and substantiate environmental claims for all of the products they manufacture or sell (or services they render) in a given category. This is for example the case for the energy labelling directive which requires companies to produce and substantiate environmental claims for all the products they manufacture in some product categories such as lamps and luminaires or tumble driers.

A potential effect of this approach is that companies are likely to find it less expensive to automatize the environmental impact assessment of their products and to integrate this assessment within their information systems than to conduct a case by case analysis for every product concerned.

**Format of the Environmental information**

The second dimension of the typology is the format in which the environmental information is delivered. This format is directly dependent upon the policy chosen and is often clearly and precisely defined in the policy.

According to the way EF is to be integrated in public policies, the EF result format may be different. As described later in the chapter three main types of format were delineated here:

- Communicating over numerical value such as a carbon footprint
- Communicating over an environmental class such as A/B/C/D/E classification
- Or communicating on the fact a product/company is above or below a threshold value

*Note: in this report verification of an EF report could be considered as the “Communicating over numerical value” case. However this does not include verification of other information that the EF results (for instances considered hypothesis, or other environmental information such as recyclability rate, formaldehyde emissions of the product…)*

The main impact of choosing one specific type of environmental information format is the precision of the claim and therefore how credible this claim needs to be. For example, for a threshold system, the required precision is limited as the margin of error (see figure 10) is very large. As a result, the level of external certification required is low. On the contrary, in a range system the level of precision required is higher, because the margin of error is lower (see figure 10), and as a result the level of external certification required is higher.
Customers, investors and other potential recipients of precise value claims expect those claims to be as accurate as possible. However, those claims are usually compared to one another and not compared to a preset threshold or range boundary, and as a result the precision of the claim has to be set in terms of interval of confidence. This interval of confidence of + or - x% needs to be defined beforehand in the regulation. This choice of the interval of confidence has to balance two pieces of contradictory information. On the one hand, a small interval means that the information provided is accurate; on the other hand a small interval also implies higher costs including external verification costs.

Below are described the three types of communication format that are used to define public policies in this report.

**Threshold system**

The first category of policies regroups policies where the environmental claims are delivered by referring to a threshold. Whether or not the product (or organization) can make that specific environmental claim is determined by comparing its environmental characteristics (be it an LCA or usage characteristics) with a pre-set specified standard. If the product is above the threshold then the claim can be made. If not, the claim cannot be made. A clear example of this are labels such as the European Ecolabel: products that fit some, but not all the requirements cannot use the label.

Policies using thresholds have historically taken two forms; an inclusive one and an exclusive one. The inclusive form aims at selecting the best in class in a given sector. Recipient of the environmental claim - be it final consumers, B2B consumers, public institutions or else - expect that only a small portion of the actors or products in a given sector will be awarded the label. The European Ecolabel is a good example of inclusive threshold-based policy. However, the exclusive form aims at selecting out the worst in class in a given sector, often by imposing a minimum standard. This type of policy is, for example, used in the
European CE certification system and the Ecodesign directive\(^\text{21}\): companies that do not meet the minimum standard are simply not allowed to sell their product in Europe.

**Figure 11 - Description of two different "threshold-related" systems**

The main advantage of this system is its simplicity. However it is often considered that it does not provide sufficient incentives for companies to improve their environmental performance. While this is very clear for the exclusive form of threshold policies: companies that have a CE certification are not encouraged to do anything more than the bare minimum under this policy; it is also true for the inclusive form. Indeed, a company that has environmental practices that are far from the specified standards necessary to obtain an inclusive label can act in two ways: 1) improve drastically its environmental performance in order to obtain the label or 2) do nothing as improving only partially its environmental performance will not be recognized and will not give it any competitive advantage. If solution 1 is too expensive, the company will not be incentivized to improve its performance at all.

**Range system**

The second category of format of environmental information is the class or range system. Companies or products are classified on a scale, often going from A to G with A comprising only the best in class and G

the worst in class. In this system, there are multiple thresholds, one for each class. A clear example of the class or range system is the European labeling system for energy products.

While this system comes at a certain cost, it is easily readable without any prior technical knowledge required and provides clear incentives for companies to improve their environmental performance in order to pass from a low range to a higher one.

It should be noted that this system can and is often combined with the threshold system in order to create a so-called push and pull system. This is the case, for example, for energy products in the EU where the Ecodesign directive selects out the worst performing products. The “push” part, and the energy labeling system gives incentives to improve environmental performance, the “pull” part, as illustrated in figure 12.

Figure 12 - Description of European Ecolabel (Source: EC, Ecodesign your future brochure)

Precise value system
The third and last category of environmental information format is the precise value system. In this system, the environmental claim is communicated through precise figures, which often refer to

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scientific measurements or composite indexes of various scientific measurements. Examples of precise value systems can be found in direct advertising to consumers (with often a restricted set of indicators) and CSR reports such as EMAS reports that include a diversity of indicators. For instance, the Commission Decision 2016/611 of 15 April 2016 on EMAS reports for the tourism industries lists 13 such indicators for accommodation (percentage of final energy use met by renewable energy generated on site, installed lighting capacity in W/m²; percentage of ISO Type I eco-labelled chemicals and textiles; water consumption per guest-night, etc.) As discussed later, communicating directly with the precise value entails some specific costs as credibility requirements are higher.

This system can easily coexist with the two other systems mentioned above as the precise indicators used are often the basis of the range classifications and of the threshold systems (see figure 13).

![Figure 13 - Example of cumulative use of the three information format systems](image)

7.1.1.2 Result of the typology

Crossing the two dimensions of voluntary/mandatory participation and environmental information format gives the following result when applied to PEF and OEF: six policy types can be described with various examples of corresponding policy scenarios.

25 Note that as no scenario for EF implementation have be released, scenario proposed in the document are EY propositions
Table 15 – Overview of public policies considered

<table>
<thead>
<tr>
<th>Voluntary participation</th>
<th>Policy type A: Integrate PEF in the Ecolabel framework / Create a new EU label / Integrate PEFCR and OEF within national label frameworks</th>
<th>Policy type C: Mandatory use of a range system for all companies wishing to disclose environmental footprint information</th>
<th>Policy type E: EPD-like use of PEF / Voluntary disclosure of precise value of some indicators / Inclusion of OEF in EMAS</th>
</tr>
</thead>
<tbody>
<tr>
<td>Policy type B: PEF in the CE marking system / Shaming – reward system</td>
<td>Policy type D: Mandatory use of the range system</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Policy type F: Mandatory disclosure of indicators on products / Mandatory inclusion in annual reports / Inclusion of OEF in non-financial reporting directive</td>
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<td></td>
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</tbody>
</table>

**Policy type A: individual label scenarios**

Type A policies are based on a threshold system and on voluntary participation.

The voluntary aspect of type A policies implies that no organizations with a particularly low performance in terms of PEF will participate. As a result, an exclusive form of threshold based policies makes little sense. Therefore type A policies correspond to inclusive threshold based policies where only the best in class products are awarded a label based on their performance measured against a given threshold. This type of policy is similar to the one used for labels such as the European Ecolabel and a variety of national or private labels such as Blue Angel (Blaue Engel, Germany) or the Nordic Swan Ecolabel.
The following three examples give an illustration of how type A policies could be applied for PEF within a European framework:

- **Include PEF requirements in the existing European Ecolabel framework**
- **Encourage the integration of PEFCR within national label frameworks.** While this approach is less effective in terms of harmonization it has two advantages. The Commission would share the burden of establishing and running an instrument which requires a high level of flexibility. In addition, this would allow to overcome potential resistance of organizations and national authorities to "give up" pre-existing labels.26
- **Creating a new EU label.** Cumulative with the existing system, this label would be focused exclusively on lifecycle impact. It should be noted that this option goes partially against the aim of the Commission to improve the readability of environmental claims in Europe as many consumers might not understand the differences between the two European labels.

Type A policies could easily be integrated within the Green Public Procurement initiative, the same way the Ecolabel and other national labels are27.

It should be noted that the voluntary aspect of type A policies means that organizations might choose to have only a few of their products labeled and to assess only the detailed environmental impact of those specific products. Organizations that chose to do so are likely not to automatize the computation of the PEF within their information system, but rather to conduct studies on a case by case basis for the few products concerned.

The exact distribution between companies that will decide to conduct PEF assessments on a case by case basis and of companies that will decide to automate those assessments is hard to anticipate. Various factors are likely to impact this distribution and in particular how high the threshold is and how many synergies exist between PEFCRs for different products that might be produced/ distributed by a single organization.

**Policy type B**

Type B policies are based on a threshold system and on mandatory participation.

The following two examples give an illustration of how type B policies could be applied for PEF within a European framework:

- **Include the use of the PEF method as a required standard in order to get the CE marking** for some chosen sectors: only products/organizations that meet the minimum threshold would be authorized for sale in the EEA. Such a policy could be inspired by the Ecodesign directive on energy related products.
- **Create a shaming-reward system.** In such a system, all products would be authorized for sale in the EEA, however organizations selling those products would have to communicate clearly whether or not they meet the preset PEF/OEF threshold. As a result organizations falling short of the threshold would have to communicate on this low performance which is a strong

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26 For more information on the pros and cons of direct involvement by the Commission (with the example of EPDs), see [http://ec.europa.eu/environment/ipp/pdf/epdstudy.pdf](http://ec.europa.eu/environment/ipp/pdf/epdstudy.pdf), page 9 and 10, and pages 98 to 119

incentive for them to improve their performance. On the other hand, high performing organizations would benefit from communicating on the fact that they meet the threshold.

A likely effect of this policy type is that companies will probably find it less expensive to automatize the assessment of the PEF of all their products than to conduct a case by case PEF assessment for every product concerned.

Policy type C
Type C policies are based on a range system and on voluntary participation.

While it seems that there is no existing environmental policy fitting those criteria at the moment, it is possible to imagine one. For example, the EU could create a range system and require all organizations that wish to communicate on the environmental impact of their products to do so by using this reference system. In other words, while companies would not be obliged to communicate on the Life-Cycle Environmental impact of their products, those that want to communicate on this impact would have to conduct PEF assessments and to publish the results through an A-B-C-D-E-F-G system. Going even further, the EU could prohibit any environmental claims that is not accompanied by a PEF assessment communicated through this A-B-C-D-E-F-G system.

It should be mentioned that this policy type poses important misinformation risks. Indeed, the main aim of a range system is to classify products from the worst to the best, in order to incentivize organizations to go from one class to the other. If organizations can freely decide to participate in the system or not, only those with particularly good environmental footprints would participate while all the others would not. As a result, the market would be filled entirely with products with top grades, thus giving the illusion that all companies have a high level of performance.

Depending on the exact modalities of the policy chosen, the distribution between organizations that will decide to conduct PEF assessments on a case by case basis and of companies that will decide to automate those assessments will vary.

Policy type D
Type D policies are based on a range of information format and on mandatory participation.

The following two examples give an illustration of how type D policies could be applied for PEF within a European framework:

- Include PEF as one of the criteria in pre-existing range systems. This would include for example amending the energy labelling directive to include the PEF methods.
- Create new range systems based on the PEF and OEF method.

Similarly to type C policies, type D policies are likely to lead most companies to automate the assessment of their PEF.

Policy Type E
Type E policies are based on a precise-value information format and on voluntary participation.

The following two examples illustrate ways in which the EC could develop type F polices for PEF/OEF:
• Allow organizations to publish their PEF results in a way broadly similar to EPDs.
• Allow companies to communicate more freely (with less constraints than in the EPD framework) about a few or all the indicators of the PEF. This could be inspired by the way some private actors such as the French retail group Casino decided to communicate the carbon footprint of some of their products.28
• Integrate the OEF into the EMAS framework.

Type E policies can easily accommodate differences in the amount of information delivered to different stakeholders. For example, public authorities could ask for extensive precise value information (e.g. the precise value of the 15 indicators) during their procurement process, while in parallel BtoC consumers would have access to less detailed information.

It should be noted that similarly to type A policies, type E policies will lead some organizations to conduct product by product life-cycle analysis, while other organizations will decide to automate the assessment of their PEF within their information system.

Policy type F

Type F policies are based on a precise-value information format and on mandatory participation.

The following two examples illustrate ways in which the EC could develop type F polices for PEF/OEF:

• Mandatory disclosure of PEF results on products for a few sectors. This could take a form similar to the way the precise value of grams of CO$_2$ per kilometer is disclosed for cars under the “car labelling” directive29.
• The legislative package concerning the disclosure of non-financial information for large undertakings and groups20 could be amended to take into account the OEF. For example, companies falling under the scope of this legislative package could be required to mention the value of their OEF. This could also take the form of “comply or explain”, where companies that decide not to use the OEFSR would need to justify it.

Similarly to type C and type D policies, type F policies are likely to lead most companies to automate the assessment of their PEF within their information system.

Combination of scenarios

It should be noted that the typology used aims at giving a framework of analysis concerning external verification of PEFCR/OEFSR. Therefore, the six policy types are not exclusive to one another in their application. For example, different policy types can be combined to create a “push-and-pull” system similar to the one existing for energy related products. In this case the verification cost per product will


correspond to the verification cost of the policy with the highest requirement. For example, in a “push
and pull” system once it is certified that a product is in a given category, for example in category C,
there is no need to verify that this product fits the minimum standard. Therefore, the verification cost
will be the cost associated with verification in a range scenario (and not the cumulative cost of
verification in a range scenario and in a threshold scenario).

7.2 Sub-scenarios tested for all public policies

As mentioned at the beginning of this chapter, while the level of accuracy expected from EF verification
is fully defined by public policy scenario, its cost depends also on two other main parameters, being:
- the way EF is implemented at company level and the extent to which EF is automated and
  integrated and
- the number of indicators to be communicated.

7.2.1 Verification need based on the way
PEFCR/OEFSR is implemented

As noted earlier, an important parameter that may influence verification is the way EF is implemented
in the organization.

Indeed, while for companies issuing EF studies on a case by case basis (as it was done in the context of
the supporting studies and their verification), verification is to be performed product per product. Other
ways of verification to be performed can be imagined in cases where PEF is largely integrated in
the company.

In case PEF are to be done on a large scale of products, it can be foreseen that the conditions in which
PEF are to be performed will largely differ from the current situation. Indeed, to limit PEF costs, it can
be imagined that companies will automate PEF calculation by developing tools highly integrated with
other Information Systems used across the company, such as PLM software to get all specific
information automatically.

In such a context, a ‘product per product’ PEF verification no longer makes sense. Instead, the
following should be done:
- When it comes to model verification, the same approach as for a ‘case per case’ verification
can be performed
- When it comes to data verification, verification should be performed as a tool verification to
  ensure that it is parametrized the right way to get the right data. A sample of products should
  then be audited to ensure correct data is obtained throughout the tool.

As the way EF will be integrated by companies does not only rely on a public policy decision, cost
verification will be assessed in the next chapter for each of the 6 public policy scenarios, both for a case
per case verification and an integrated tool verification.
7.2.2 Verification need based on the number of indicators to be communicated

Whatever the public policy scenario that could embed EF, it is possible that the environmental claim could rely on only one or on a set of indicators.

One indicator could be the selection of one relevant indicator over the set of 15 indicators, or the aggregation on a single indicator using normalization and weighting of the 15 indicators, while multiple indicators could be the list of 15 indicators, or a selection of several ones.

Depending on the number of indicators finally selected, the quantity of information to verify to reach the targeted level of assurance can vary. Indeed, in order to reach a defined audit coverage for an indicator, the set of processes to be verified can vary from one indicator to another. Therefore the more environmental indicators are to be verified the bigger the list of data to be verified can be (e.g. for some indicators like ecotoxicity a transport process may not be necessary to be verified to reach an expected coverage while for some others, as global warming, it can be necessary).

To deal with the influence of the number of indicators on verification cost, each public policy scenario will also be tested on a multi-indicators sub-scenario.
8 Recommendations to perform verification

This chapter is split into three parts. All scenarios described in previous chapter are detailed and the most appropriate verification approach for the scenario is described. In a second section the proposed approach for modelling verification cost is described. Finally verification cost for each of the scenario is provided.

Note that no major differences were raised through this study between performing verification for a large Company or SME and it is considered that same costs per product would apply in both cases. Main difference is that it can be imagined that economy of scale would be hardly reachable for SMEs.

8.1 Most appropriate verification per public scenario

In this chapter will be discussed the most suitable verification approach (in terms of risk analysis, model and data verification) per type of suggested public policy.

<table>
<thead>
<tr>
<th>Threshold</th>
<th>Range system</th>
<th>Precise value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Voluntary participation</td>
<td><strong>Policy type A:</strong> Integrate PEF in the Ecolabel framework</td>
<td><strong>Policy type C:</strong> Mandatory use of a range system for all companies wishing to disclose environmental footprint information</td>
</tr>
<tr>
<td></td>
<td>/ Create a new EU label</td>
<td><strong>Policy type E:</strong> EPD-like use of PEF</td>
</tr>
<tr>
<td></td>
<td>/ Integrate PEFCR and OEFSR within national label frameworks</td>
<td>/ Voluntary disclosure of precise value of some indicators</td>
</tr>
<tr>
<td></td>
<td></td>
<td>/ Inclusion of OEF in EMAS</td>
</tr>
<tr>
<td>Mandatory participation</td>
<td><strong>Policy type B:</strong> PEF in the CE marking system</td>
<td><strong>Policy type D:</strong> Mandatory use of the range system</td>
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<td></td>
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<tr>
<td></td>
<td></td>
<td><strong>Policy type F:</strong> Mandatory disclosure of indicators on products</td>
</tr>
<tr>
<td></td>
<td></td>
<td>/ Mandatory inclusion in annual reports</td>
</tr>
<tr>
<td></td>
<td></td>
<td>/ Inclusion of OEF in non-financial reporting directive</td>
</tr>
</tbody>
</table>
8.1.1 Policy type A

Main scenario
Type A policies are based on a threshold system and on voluntary participation. The most likely scenario when it comes to PEF implementation is that:

- A limited data coverage may be enough since the approach is voluntary and that data level of precision is limited based upon a threshold approach
- Being a voluntary scenario, it is assumed that conditions are not met to allow for a supplier audit
- Annually, PEF studies should be performed only on a limited number of products (<1031)

Based upon such characteristics, the following verification approach is recommended:

- Risk analysis done at PEFCR level, except when products demonstrate a major difference with “standard product” where a product risk analysis should be performed;
- Model verification is combined with data verification into a single PEF verification;
- Only most relevant processes are verified, except if risk analysis requires extending to other processes.

Sub-scenario – several indicators
In the case where several indicators would need to be verified leading to a higher coverage need, verification approach would be similar with more time dedicated to data verification. Verification cost would raise too.

Sub-scenario – Large number of products
For organizations demonstrating a large number of products to be subject to a PEF study annually (>10), the proposed verification approach is different:

- Risk analysis done at PEFCR level;
- Model verification is done through an annual tool/model accreditation;
- Data verification is performed on most relevant processes with large economy of scale linked to a verification of all products in parallel.

8.1.2 Policy type B

Main scenario
Type B policies are based on a threshold system and on mandatory participation. The most likely scenario when it comes to PEF implementation is that:

31 The threshold to distinguish between a limited number and a large number of products was fixed to 10 as an order of magnitude. Below this order of magnitude, it is possible for companies to make the impact calculation for each product separately, while above it, company would be more inclined to standardize the way PEF are calculated (through procedures and tools).
• A large data coverage will be needed as the approach is compulsory
• Being mandatory it is assumed here that supplier audit would be possible
• Annually, PEF studies should be performed on a large portfolio of products within the company

Based upon such characteristics **the following verification approach is recommended**:

• Risk analysis done at PEFCR level;
• Model verification is done through an annual tool/model accreditation;
• All primary data are verified to ensure large coverage. Supplier audit is performed.

**Sub-scenario – Limited number of product**

In the case where only a limited number of products within an organization would be covered (<10 products), the proposed **verification approach is different**:

• Risk analysis done at PEFCR level, except when products demonstrate a major difference with “standard product” where a product risk analysis should be performed;
• Model verification is combined with data verification into a single PEF verification;
• All primary data are verified to ensure large coverage. Supplier audit is performed.

**Sub-scenario – PEF integration**

In the case when the organization would fully integrate PEF calculator in its Information System to automate PEF generation, the proposed **verification approach is different**:

• Risk analysis done at PEFCR level,
• Model verification is done through an annual tool/model accreditation. Accreditation is extended to the verification of the right interfaces between the calculation tool and the various Information Systems and databases used within the company.
• Data verification is performed on a sample of products within the company to ensure that figures that go out of the tool are aligned with what is expected.

8.1.3 Policy type C

**Main scenario**

Type C policies are based on a range system and on voluntary participation. The most likely scenario when it comes to PEF implementation is that:

• A limited data coverage may be enough since the approach is voluntary and that data level of precision is limited based upon a range system
• Being a voluntary scenario, it is assumed that conditions are not met to allow for a supplier audit
• Annually, PEF studies should be performed only on a limited number of products (<10) as only best in class would probably be communicated

Based upon such characteristics **the following verification approach is recommended**:

• Risk analysis done at PEFCR level, except when products demonstrate a major difference with “standard product” where a product risk analysis should be performed;
• Model verification is combined with data verification into a single PEF verification;
Only most relevant processes are verified except if risk analysis requires extending to other processes.

Sub-scenario – several indicators

In the case where several indicators would need to be verified leading to a higher coverage need, the verification approach would be similar with more time dedicated to data verification. Verification cost would raise too.

Sub-scenario – Large number of products

For organizations demonstrating a large number of products to be subject to a PEF study annually (>10), the proposed verification approach is different:

- Risk analysis done at PEFCR level;
- Model verification is done through an annual tool/model accreditation;
- Data verification is performed on most relevant processes with large economy of scale linked to a verification of all products in parallel.

8.1.4 Policy type D

Main scenario

Type D policies are based on a range system and on mandatory participation. The most likely scenario when it comes to PEF implementation is that:

- A large data coverage will be needed as the approach is compulsory
- Being mandatory it is assumed here that supplier audit would be possible
- Annually, PEF studies should be performed on a large portfolio of products within the company

Based upon such characteristics the following verification approach is recommended:

- Risk analysis done at PEFCR level;
- Model verification is done through an annual tool/model accreditation;
- All primary data are verified to ensure large coverage
- Supplier audit is performed

Sub-scenario – Limited number of product

In the case where only a limited number of products within an organization would be covered (<10 products, the proposed verification approach is different:

- Risk analysis done at PEFCR level, except when products demonstrate a major difference with "standard product" where a product risk analysis should be performed;
- Model verification is combined with data verification into a single PEF verification;
- All primary data are verified to ensure large coverage. Supplier audit is performed.

Sub-scenario – PEF integration

In the case when the organization would fully integrate PEF calculator in its Information System to automate PEF generation, the proposed verification approach is different:
• Risk analysis done at PEFCR level,
• Model verification is done through an annual tool/model accreditation. Accreditation is extended to the verification of the right interfaces between the calculation tool and the various Information Systems and databases used within the company.
• Data verification is performed on a sample of products within the company to ensure that figures that go out of the tool are aligned with what is expected.

8.1.5 Policy type E

Main scenario

Type E policies are based on a precise-value information format and on voluntary participation. The most likely scenario when it comes to PEF implementation is that:

• A large data coverage will be needed as the level of precision is important to compare two products
• Being a voluntary scenario, it is assumed that conditions are not met to allow for a supplier audit
• It can be expected that companies entering this framework would extend it to a large part of their product portfolio leading to high number of products

Based upon such characteristics the following verification approach is recommended:

• Risk analysis done at PEFCR level;
• Model verification is done through an annual tool/model accreditation;
• All primary data are verified to ensure large coverage.

Sub-scenario – Limited number of product

In the case where only a limited number of products within an organization would be covered (<10 products, the proposed verification approach is different:

• Risk analysis done at PEFCR level, except when products demonstrate a major difference with "standard product" where a product risk analysis should be performed;
• Model verification is combined with data verification into a single PEF verification;
• All primary data are verified to ensure large coverage.

Sub-scenario – PEF integration

In the case when the organization would fully integrate PEF calculator in its Information System to automate PEF generation, the proposed verification approach is different:

• Risk analysis done at PEFCR level,
• Model verification is done through an annual tool/model accreditation. Accreditation is extended to the verification of the right interfaces between the calculation tool and the various Information Systems and databases used within the company.
• Data verification is performed on a sample of products within the company to ensure that figures that go out of the tool are aligned with what is expected.
Sub-scenario – OEF

In the case where verification is about the whole organization (OEF), verification is very similar to current practices existing on companies’ environmental verification as set by French Grenelle art. 225 regulation in France or made possible in the framework of European Directive 2014/95/UE on non-financial reporting, with the only exception to complete with a verification of companies’ inputs (procurement of goods and services, transport) and outputs (use of products and services). Considering current practices for companies reporting verification practices it could be assumed that limited assurance would be satisfying in most cases.

Therefore following hypothesis are considered for such verification:

- Risk analysis is company specific;
- Verification is performed annually targeting a limited assurance for data coverage. This means both data reporting and model are verified annually.
- It is assumed that conditions are not met to allow for a supplier audit

8.1.6 Policy type F

Main scenario

Type F policies are based on a precise-value information format and on mandatory participation. The most likely scenario when it comes to PEF implementation is that:

- A large data coverage will be needed as the level of precision is important to compare two products
- Being mandatory it is assumed here that supplier audit would be possible
- It can be expected that companies entering this framework would extend it to a large part of their product portfolio leading to high number of products

Based upon such characteristics the following verification approach is recommended:

- Risk analysis done at PEFCR level;
- Model verification is done through an annual tool/model accreditation;
- All primary data are verified to ensure large coverage.
- Supplier audit is performed.

Sub-scenario – Limited number of product

In case where only a limited number of products within an organization would be covered (<10 products, proposed verification approach is different):

- Risk analysis done at PEFCR level, except when products demonstrate a major difference with "standard product" where a product risk analysis should be performed;
- Model verification is combined with data verification into a single PEF verification;
- All primary data are verified to ensure large coverage.
- Supplier audit is performed.
Sub-scenario – PEF integration

In case when the organization would fully integrate PEF calculator in its Information System to automatize PEF generation, proposed verification approach is different:

- Risk analysis done at PEFCR level,
- Model verification is done through an annual tool/model accreditation. Accreditation is extended to the verification of the right interfaces between the calculation tool and the various Information Systems and databases used within the company.
- Data verification is performed on a sample of products within the company to ensure that figures that go out of the tool are aligned with what is expected.

Supplier audit is performed.

Sub-scenario – OEF

In the case where verification is about the whole organization (OEF), verification is very similar to current practices existing on companies' environmental verification as set by French Grenelle art. 225 regulation in France or made possible in the framework of European Directive 2014/95/UE on non-financial reporting, with the only exception to complete with a verification of companies inputs (procurement of goods and services, transport) and outputs (use of products and services). Considering current practices for companies reporting verification practices it could be assumed that limited assurance would be satisfying in most cases.

Therefore following hypothesis are considered for such verification:

- Risk analysis is company specific;
- Verification is performed annually targeting a limited assurance for data coverage. This means both data reporting and model are verified annually.

It is assumed that conditions are not met to allow for a supplier audit
8.2 Cost modelling approach

The section below describes the different assumptions and models that have been used to estimate the costs associated with the different audit scenario that will be introduced later in the report. Hypothesis made cover the three different parts of the audit: costs related to the risk analysis made before the audit; costs related to the verification of the model used by companies to calculate the impact; and costs related to the verification of the data collected and used by companies.

Main costs elements include:

- Time spent by auditors to realize the risk analysis and the verification work
- Travel-related expenses

Costs related to the time spent by auditors are calculated by assuming a standard daily rate representative of standard auditor cost in Europe. Costs ranges will be provided later in the report to take into account the variability of auditor cost.

Time spent includes audit preparation, verification work (remote or on-site), and the formalization of the audit report.

Regarding travel-related expenses, an extrapolation formula was defined to adapt travel costs to the number of products audited. Indeed, the higher the number of products to be audited, the lower the amount of time needed to perform the audit, which has a direct impact on travelling daily costs. It must be noted that the assumption made could not reflect the situation where local auditors would not be available for companies located outside of Europe.

The different parts below provide more insight with regard to the different assumptions made for the three verification parts: risk analysis, model verification and data verification.

8.2.1 Risk analysis

Risk analysis can be realized following three different approaches: PEFCR/OEFSR level, company level or product level. Except for PEFCR/OEFSR level risk analysis, a total of 6 hours was considered for risk analysis realization. This number of hours was defined based on the conclusions of the different analysis realized during the project. The time difference between company- and product-level risk analysis is deemed negligible.

For company-level risk analysis, an economy of scale can be observed for the companies, as the total amount of time will be 6 hours regardless of the number of products to be audited. This is however not the case anymore shall the product to be audited be too different from the reference product that was assessed during the screening study. In that case, the 6 hours will need to be spent for each product.

No travel-related costs have been assumed for the risk analysis work as all work can be done remotely before the audit.

8.2.2 Model verification

As mentioned previously, two different scenarios were considered for model verification: a verification performed annually to validate the model that will be used by companies for all its products (accreditation approach), or a verification performed each time a data verification is realized.
In case of annual verification, the amount of time needed to perform the verification was assumed equals to 12 hours, based on the feedback we obtained from the different audits conducted. As this verification is only made once per year for a specific product category, the more products will be audited, the lower the cost of model verification per product for the company.

When model verification is to be conducted specifically for each product, a lower number of time was assumed (8 hours). This difference is explained as the amount of specific cases will be higher when the verification is made only once for a large range of products (even inside one unique product category).

In addition, a formula - representing the learning curve – was applied to the total number of hours for all products, in order to adapt this time to the amount of products audited. Considering that auditors will be more efficient after a few model verifications lead to an amount of time per product reduced when dealing with a high number of products.

Travel-related costs were fixed at 400 € for the annual model verification approach, which corresponds to a standard travel expense for two audit days. In the case of model verification combined with data verification, costs are integrated in the data verification costs that will be described below.

8.2.3 Data verification

Different scenarios were considered for data verification:

- Limited coverage of data verified leading to limited assurance: only a part of specific data used in hotspot is verified. In this framework and based upon current situation and verification feedback it is assumed that such level of assurance can be reached when 80% of the total impact is covered by verified data. Such coverage shall be based upon results from risk analysis.
- Full coverage of data verified leading to reasonable assurance: in this framework and based upon current situation and verification feedback it is assumed that such level of assurance can be reached when all specific data is verified.

The number of time to be spent for one product was fixed at:

- 10 hours for a limited coverage
- 18 hours for a full coverage

These amounts of hours were defined based on the feedback from the different audits conducted during the project. It must be noted that these amounts include audit preparation time as well report production in addition to the effective verification work.

The total amount of time for all products was calculated using a formula – representing the learning curve – as the same amount of time will not be needed to audit a small amount of products than to audit a large amount of products. Considering that auditors will be more efficient after a few data verifications will accordingly decrease the amount of time per product needed when dealing with a high number of products.

Travel-related costs were fixed at 400 € for the verification of one product, which corresponds to a standard travel expense for two audit days. As mentioned previously, a formula was defined to adapt travel costs to the number of products audited. Indeed, the higher the number of products to be audited, the lower the amount of time needed to perform the audit, which has a direct impact on travelling daily costs.
An additional assumption was also made to take into account the scenario where data collection would be ensured through a dedicated collection tool, which would be integrated to the company’s system information. Such assumption was assumed for companies which would need to have a large number of products audited, in order to avoid paying one full audit for each product.

As a result, costs related to this “Integrated data collection” scenario are estimated as follows:

- Model verification: verification will be conducted only once for all products, leading to a fixed amount of time of 12 hours for all products
- Tool and data verification: a fixed amount of time is considered to verify the tool used for data collection. We assumed that this task would take up to 50 days as an order of magnitude that may vary depending on the total number of products concerned and on the complexity of the tool. The different verification tasks would cover:
  - Process verification: review of the process and related documentation;
  - Tool configuration, interfaces with other systems, integration of PEFCR methodology including special cases
  - Data collection: review of the actual data collection step, from the initial database or file to the calculation;
  - Sampling: the reliability of the calculation will be tested for a sample of products (between 10% and 1% of the total amount of products, depending on the number of products and quantity of specific cases).

8.2.4 Supplier audit

In some cases, specific data may be received by an external provider (supplier, sub-contracted company, etc.), which makes data verification more complex, and may require exchanges with the data provider in order to be able to review the data. This additional verification would be needed when:

- Data has a significant influence on one specific process
- The concerned lifecycle stage is an hotspot for the product

When these conditions are met, a supplier’s audit should be considered.

Since many uncertainties remain both on the possibility to perform suppliers’ audits, on the share of PEF that will rely on suppliers’ data and on the average number of suppliers per product assumptions had to be made to assess a cost for supplier audit. Based on the feedback from the 38 audits the following gross assumptions are made:

- Suppliers audit would concern about 20% of the products
- An average of 5 suppliers would need to be audited
- One verification would last 2 hours

This is the scenario that was used to estimate the costs related to supplier audits (it must be noted that uncertainties related to those assumptions remain high). In the reality, a sampling may need to be done according to the kind of requested assurance level. Based upon current situation and audit feedback, for a limited assurance level, coverage of 20% for supplier related specific data should be relevant. When it comes to reasonable assurance the coverage should raise to 50%. The sampling may be adjusted based on the number of suppliers and on the impact of suppliers’ data over the total impact of the audited product.
8.2.5 Follow-up audit

Once a product has been verified, it may happen that changes happen on the product that may require modifications in the PEF results. Two scenarios may occur:

- The product undergoes a significant change in its composition / packaging which leads to a new SKU classification: in that case, the verification would not cover the new product and a complete audit should be conducted again, to certify the new product;
- Some changes occur on the product leading to changes in PEF results with no/limited changes on the product design that therefore do not modify SKU classification (e.g. change of supplier, change in the environmental impact from manufacturing etc.): in this case there is a risk as the company could rely on verification conclusion while such conclusion should not be valid anymore.

For this latest case it is proposed to make follow-up audit with a defined frequency (one year is taken arbitrarily for cost assumptions) in order to verify both if changes occurred to previously verified products leading to a need for updated figure and in such case also verify this new figure. This follow-up audit would not represent the same nature and thus amount of work than regular initial audits. Two situations can actually occur, based on the policies defined in the previous section of the report:

- If the company assesses the products on an ad-hoc basis (usually in the case where there is only a limited number of products under review), the follow-up work will be conducted for all products. Audit time is estimated to be around 2 hours in average, given that there is no need to verify the complete calculation again.
- If the company uses an integrated tool (this will be the case if a large number of products are concerned), then the follow-up is already integrated in the previously defined work as verified procedures also include verifying how calculation are kept up-to-date.

8.3 Conclusion

The following table shows the different cost range estimated for every scenario. For every public policy are detailed the expected conditions given by the policy and the audit approach that would best fit the regulations.

The price range per product is a result of the variation of the auditor cost, the audit time and the number of product (other factor are modeled as explained above).

<table>
<thead>
<tr>
<th>Public Policy</th>
<th>Sub Policy</th>
<th>Expected Conditions</th>
<th>Audit Approach</th>
<th>Price range per product</th>
</tr>
</thead>
<tbody>
<tr>
<td>Scenario A Voluntary participation Threshold</td>
<td>Main Scenario</td>
<td>• A limited data coverage • Supplier audit may not be possible • Annually, PEF studies should be performed only on a</td>
<td>• Risk analysis done at PEFCR level • Model verification is combined with data verification into a single PEF verification</td>
<td>1 000 € (+ 250 € / year for follow-up)</td>
</tr>
<tr>
<td>Sub Scenario 1: Several indicators</td>
<td>Sub Scenario 2: Large number of products</td>
<td>Main Scenario</td>
<td>Scenario B Mandatory participation - Threshold PEF in the CE marking system/Shaming - reward system</td>
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<tr>
<td>A limited data coverage</td>
<td>A limited data coverage</td>
<td>A large data coverage</td>
<td>A large data coverage</td>
<td></td>
</tr>
<tr>
<td>Supplier audit may not be possible</td>
<td>Supplier audit may not be possible</td>
<td>Being mandatory it is assumed here that supplier audit would be possible</td>
<td>Being mandatory it is assumed here that supplier audit would be possible</td>
<td></td>
</tr>
<tr>
<td>Annually, PEF studies should be performed only on a limited number of products (&lt;10)</td>
<td>Annually, PEF performed on a large number of products (&gt;10)</td>
<td>Annually, PEF studies should be performed on a large portfolio of products</td>
<td>Annually, PEF studies should be performed on a large portfolio of products</td>
<td></td>
</tr>
<tr>
<td>Only most relevant processes are verified</td>
<td>Risk analysis done at PEFCR level</td>
<td>Risk analysis done at PEFCR level</td>
<td>Risk analysis done at PEFCR level</td>
<td></td>
</tr>
<tr>
<td>Model verification is combined with data verification into a single PEF verification</td>
<td>Model verification is done through an annual tool/model accreditation</td>
<td>Model verification is combined with data verification into a single PEF verification</td>
<td>Model verification is combined with data verification into a single PEF verification</td>
<td></td>
</tr>
<tr>
<td>Full data coverage - due to the multiple indicators verification</td>
<td>Data verification is performed on most relevant processes with large economy of scale linked to a verification of all products in parallel</td>
<td>All primary data are verified to ensure large coverage</td>
<td>All primary data are verified to ensure large coverage</td>
<td></td>
</tr>
<tr>
<td>1 500 € (+ 250 € / year for follow-up)</td>
<td>500 € (+ 250 € / year for follow-up)</td>
<td>1 000 € (+ 250 € / year for follow-up)</td>
<td>1 000 € (+ 250 € / year for follow-up)</td>
<td></td>
</tr>
</tbody>
</table>

### Sub Scenario 1

**Limited number of product**

- A large data coverage
- Being mandatory it is assumed here that supplier audit would be possible
- Annually, PEF studies should be performed on a
- Risk analysis done at PEFCR level
- Model verification is combined with data verification into a single PEF verification
- All primary data are verified to
- Supplier audit is performed
- 2 000 € (+ 250 € / year for follow-up)

### Sub Scenario 2

**Large number of products**

- A large data coverage
- Being mandatory it is assumed here that supplier audit would be possible
- Annually, PEF studies should be performed on a
- Risk analysis done at PEFCR level
- Model verification is combined with data verification into a single PEF verification
- All primary data are verified to
- 2 000 € (+ 250 € / year for follow-up)

### Main Scenario

- A large data coverage
- Being mandatory it is assumed here that supplier audit would be possible
- Annually, PEF studies should be performed on a
- Risk analysis done at PEFCR level
- Model verification is combined with data verification into a single PEF verification
- All primary data are verified to
- 1 000 € (+ 250 € / year for follow-up)

### Scenario B

Mandatory participation - Threshold PEF in the CE marking system/Shaming - reward system

- A large data coverage
- Being mandatory it is assumed here that supplier audit would be possible
- Annually, PEF studies should be performed on a
- Risk analysis done at PEFCR level
- Model verification is combined with data verification into a single PEF verification
- All primary data are verified to
- 1 000 € (+ 250 € / year for follow-up)

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<table>
<thead>
<tr>
<th>Scenario C</th>
<th>Voluntary participation - Range system</th>
<th>Mandatory use of a range system for all companies wishing to disclose environmental footprint information</th>
</tr>
</thead>
</table>
| Sub Scenario 1: Several indicators | A limited data coverage  
Supplier audit may not be possible  
Annually, PEF studies should be performed only on a limited number of products (<10) as only best in class would probably be communicated. | Risk analysis done at PEFCR level  
Model verification is combined with data verification into a single PEF verification  
Only most relevant processes are verified except if risk analysis requires extending to other processes |
| Sub Scenario 2: Large number of products | A limited data coverage  
Supplier audit may not be possible  
Annually, PEF studies should be | Risk analysis done at PEFCR level  
Model verification is done through an annual tool/model accreditation |

| Main Scenario | Scenario 2 PEF integration | The PEF procedure is integrated for all company products:  
A large data coverage  
Being mandatory it is assumed here that supplier audit would be possible  
Annually, PEF studies should be performed on a sample of products | Risk analysis done at PEFCR level  
Model verification is done through an annual tool/model accreditation  
Data verification is performed on a sample of products within the company  
250 € (includes follow-up costs)  
750 € (includes follow-up costs) |
|-------------|--------------------------------------|--------------------------------------------------------------------------------------------------|
| Sub Scenario 1: Several indicators | A limited data coverage  
Supplier audit may not be possible  
Annually, PEF studies should be performed only on a limited number of products (<10) as only best in class would probably be communicated. | Risk analysis done at PEFCR level  
Model verification is combined with data verification into a single PEF verification  
Only most relevant processes are verified except if risk analysis requires extending to other processes |
| Sub Scenario 2: Large number of products | A limited data coverage  
Supplier audit may not be possible  
Annually, PEF studies should be | Risk analysis done at PEFCR level  
Model verification is done through an annual tool/model accreditation |

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performed on a large number of products (>10).  

- Data verification is performed on most relevant processes with large economy of scale linked to a verification of all products in parallel.

### Scenario D

**Mandatory participation - Range system**  
Mandatory use of the range system

<table>
<thead>
<tr>
<th>Main Scenario</th>
<th>Sub Scenario 1</th>
<th>Sub Scenario 2</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Limited number of product</strong></td>
<td><strong>Limited number of product</strong></td>
<td><strong>2PEF integration</strong></td>
</tr>
</tbody>
</table>
| • A large data coverage  
• It is assumed here that supplier audit would be possible  
• Annually, PEF studies should be performed on a large portfolio of products | • A large data coverage  
• It is assumed here that supplier audit would be possible  
• Annually, PEF studies should be performed on a limited portfolio of products | • A large data coverage  
• It is assumed here that supplier audit would be possible  
• Annually, PEF studies should be performed on a sample of products |
| • Risk analysis done at PEFCR level  
• Model verification is done through an annual tool/model accreditation  
• All primary data are verified to ensure large coverage  
• Supplier audit is performed | • Risk analysis done at PEFCR level  
• Model verification is combined with data verification into a single PEF verification  
• All primary data are verified to ensure large coverage  
• Supplier audit is performed | • Risk analysis done at PEFCR level  
• Model verification is done through an annual tool/model accreditation  
• Data verification is performed on a sample of products |
| 1 500 €  
(+ 250 € / year for follow-up) | 2 000 €  
(+ 250 € / year for follow-up) | 250 €  
(includes follow-up costs) |
| 2 500 €  
(+ 250 € / year for follow-up) | 7 000 €  
(+ 250 € / year for follow-up) | 750 €  
(includes follow-up costs) |
**Scenario E**

**Voluntary participation - Exact value**

PED-like use of PEF/Voluntary disclosure of precise value of some indicators/Inclusion of OEF in EMAS

<table>
<thead>
<tr>
<th>Scenario</th>
<th>Description</th>
<th>Risk analysis</th>
<th>Model verification</th>
<th>Other remarks</th>
<th>Cost Basis</th>
</tr>
</thead>
<tbody>
<tr>
<td>Main Scenario</td>
<td>A large data coverage • Supplier audit may not be possible • It can be expected that companies entering this framework would extend it to a large part of their product portfolio leading to high number of products</td>
<td>Risk analysis done at PEFCR level • Model verification is done through an annual tool/model accreditation • All primary data are verified to ensure large coverage.</td>
<td></td>
<td></td>
<td>1 000 € (+ 250 € / year for follow-up)</td>
</tr>
<tr>
<td>Sub Scenario 1</td>
<td>A large data coverage • Supplier audit may not be possible • PEF performed on a limited number of products</td>
<td>Risk analysis done at PEFCR level • Model verification is combined with data verification into a single PEF verification • All primary data are verified to ensure large coverage.</td>
<td></td>
<td></td>
<td>1 500 € (+ 250 € / year for follow-up)</td>
</tr>
<tr>
<td>Sub Scenario 2</td>
<td>A large data coverage • Supplier audit may not be possible • PEF performed on a sample of products</td>
<td>Risk analysis done at PEFCR level • Model verification is done through an annual tool/model accreditation • All primary data are verified to ensure large coverage.</td>
<td></td>
<td></td>
<td>20 € (includes follow-up costs)</td>
</tr>
<tr>
<td>Sub Scenario 3</td>
<td>limited assurance • It is assumed that conditions are not met to allow for a supplier audit</td>
<td>Risk analysis is company specific; • Verification is performed annually targeting a limited assurance for data coverage. This means both data reporting and model are verified annually.</td>
<td></td>
<td></td>
<td>10 k€ (the price refers to the full verification of the organisation depending on its size)</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>500 k€ (the price refers to the full verification of the organisation depending on its size)</td>
</tr>
</tbody>
</table>
### Scenario F

**Mandatory participation - Exact value**

Mandatory disclosure of indicators on products/Mandatory inclusion in annual reports

<table>
<thead>
<tr>
<th>Main Scenario</th>
<th>Sub Scenario 1 Limited number of product</th>
<th>Sub Scenario 2 PEF integration</th>
<th>Sub Scenario 3 OEF verification</th>
</tr>
</thead>
</table>
| • A large data coverage  
• It is assumed here that supplier audit would be possible  
• It can be expected that companies entering this framework would extend it to a large part of their product portfolio leading to high number of products | • A large data coverage  
• It is assumed here that supplier audit would be possible  
• PEF performed on a limited number of products | • A large data coverage  
• It is assumed here that supplier audit would be possible  
• PEF performed on a sample of products | • limited assurance  
• It is assumed that conditions are not met to allow for a supplier audit |
| • Risk analysis done at PEFCR level  
• Model verification is done through an annual tool/model accreditation  
• All primary data are verified to ensure large coverage  
• Supplier audit is performed | • Risk analysis done at PEFCR level  
• Model verification is combined with data verification into a single PEF verification  
• All primary data are verified to ensure large coverage.  
• Supplier audit is performed | • Risk analysis done at PEFCR level  
• Model verification is done through an annual tool/model accreditation  
• All primary data are verified to ensure large coverage  
• Supplier audit is performed | • Risk analysis is company specific;  
• Verification is performed annually targeting a limited assurance for data coverage. This means both data reporting and model are verified annually. |
| 1 500 € (+ 250 € / year for follow-up) | 2 000 € (+ 250 € / year for follow-up) | 250 € (includes follow-up costs) | 10 k€ (the price refers to the full verification of the organisation depending on its size) |
| 2 500 € (+ 250 € / year for follow-up) | 7 000 € (+ 250 € / year for follow-up) | 750 € (includes follow-up costs) | 500 k€ (the price refers to the full verification of the organisation depending on its size) |
In the presented cost analysis, certain factors influence greatly the final cost of the audit:

- The number of product
- The supplier audit
- The integration of PEF studies

The number of product could produce a scale effect, which would result in low verification cost per product. If the scenario consider a limited number of product (<10) the lower the number of product the lower the scale effect and the higher the verification cost.

The supplier audit has a fixed cost per audit that can influence greatly the final verification cost per product.

In the “PEF integrated approach” the company’s processes are highly automatized for all its product. This translate into a higher need of accuracy in terms of data treatment and calculation which, from an audit prospective, means a higher level of confidence in the information given by the company – and a lower need to perform an extended verification. For instance, the cost per product of a sampling approach verification is the lower among the presented scenario.