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Rules for developing PEP for refurbished products

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TABLE OF CONTENTS

1. CONTEXT AND PURPOSE OF THE DOCUMENT

In the context of the development of the circular economy, manufacturers are increasingly producing refurbished products or seeking to recondition their products at end of life.
However, the methodological rules followed in the E&E and HVAC sector, namely PEP ecopassport® program, are currently not well suited to the specificities of these products.
The purpose of this document is therefore to propose harmonized and robust methodological rules for the preparation of reliable PEPs for refurbished products.

2. DEFINITIONS

Note: the identification of regulatory and normative definitions of circularity concepts is evolving and not harmonized at international level. These definitions are based on a French and European approach, but local regulations or standards, or those after this document, may conflict with these definitions.

The definitions are as follows:

Concept	Definition	Source
Refurbished Product	A product or spare part that is **second-hand**, within the meaning of Article L. 321-1 of the Code de commerce (French Commercial Code), may be described as "refurbished product" or be accompanied by the term "refurbished", provided that the following conditions are met: « 1° The product or spare part has undergone **tests covering all its functionalities** to establish that it meets the **legal safety obligations and fitness for use** that the consumer can legitimately expect. « 2° If necessary, the product or spare part has undergone one or more **interventions to restore its functionalities**. This intervention includes the deletion of all data recorded or stored in connection with a previous use or a previous user, before the product or part changes ownership.	Article L122-21-1 of the French Consumer Code **Article R122-4**
Reference service life	Service life that may be expected for a product and/or product system according to a particular set, i.e., a reference set, of ambient and operating conditions during use stage and that may be used to estimate the service life under other conditions during the use stage.	EN 50693:2019, 3.35
Service life	Period that begins when an item is put into service and ends when it is withdrawn from service.	ISO 15663 / IEC 60300 (reliability and life cycle management)
Durability	Ability to function as required, under defined conditions of use, maintenance and repair, until a limiting state is reached (EN 45552:2020). Alternatively said: **the time during which a product can perform the function for which it was designed under given conditions.** Ability of a product to maintain over time its function and performance under specified conditions of use, maintenance and repair	EN 45552:2020 ESPR REGULATION 2024/1781 - ART.2 – definition 22

New product	A new product is a product that has just been made and has not yet been used	Adapted from the Le Robert French dictionary
End-of-waste status	ıste ceases to be waste after it has been treated and has undergone a recovery operation, including recycling or preparing for reuse, if it fulfils all the following conditions: the substance or object is used for specific purpose, there is a demand for such a substance or object, or it meets a market need, the substance or object fulfils the technical requirements for the specific purposes and complies with the legislation and standards applicable to products, its use will not lead to overall adverse environmental or human health impacts.	Article L541-4-3 of the French Environmental Code
Refurbishment	Actions carried out to prepare, clean, test, service and, where necessary, repair a product or a discarded product in order **to restore its performance or functionality** within the intended use and **range of performance originally conceived** at the design stage at the time of the placing of the product on the market. *Note: « in compliance with the use and range of performance levels originally intended and defined at the design stage when the product was placed on the market » directly from the New Blue Guide* Industrial process to restore or improve a used product or part within the limits of its original or predetermined design *Note 1 to entry: Original or predetermined design includes form, functionality, performance and safety aspects. 2477* *Note 2 to entry: Refurbishment can extend the remaining lifetime of the product. 2478* *Note 3 to entry: The identity of the product or part shall be maintained (e.g. serial or type number).*	ESPR REGULATION 2024/1781 - ART.2 – definition 18 IEC FDIS 60050 193-06-03
Independent operator	A natural or legal person that is independent of the manufacturer and is directly or indirectly involved in the refurbishment, repair, maintenance or repurposing of a product, and includes waste management operators, refurbishers, repairers, manufacturers or distributors of repair equipment, tools or spare parts, as well as publishers of technical information, operators offering inspection and testing services and operators offering training for installers, manufacturers and repairers of equipment.	ESPR REGULATION 2024/1781 - ART.2 – definition 47
Waste	Any substance or object which the holder discards or intends or is required to discard.	Directive 2008/98/EC Transposed in France in Article L.541-1-1 of French Environmental Code Article L541-1-1 - French Environmental Code
Reuse	Any operation by which substances, materials or products that are not waste are used again for the same purpose for which they were conceived.	Directive 2008/98/EC

		Transposed in France in Article L.541-1-1 of French Environmental Code Article L541-1-1 - Code de l'environnement (French Environmental Code)
Preparing for reuse	Any checking, cleaning or repairing recovery operation by which products or components of products that have not become waste are prepared so that they can be reused without any other pre-processing.	Directive 2008/98/EC Transposed in France in Article L.541-1-1 of French Environmental Code Article L541-1-1 - Code de l'environnement (French Environmental Code)
"Réutilisation"[1]	Any operation by which substances, materials or products that have become waste are used again.	Article L541-1-1 - Code de l'environnement (French Environmental Code)
Remanufacturing	Actions through which a new product is produced from objects that are waste, products or components and through which at least one change is made that substantially affects the safety, performance, purpose or type of the product. *ADEME (remanufacturing study)* Rigorous and standardised industrial process that restores a used part or product to a state of performance and functionality equivalent to or even superior to the original and for the same use, differs from refurbishment in that it results in the restoration to new condition of used components or products with a uniform quality grade and performance. Remanufacturing is the most complete value retention process, which extends the service life and use life of products by one to several additional life cycles while retaining more value (energy, materials and knowledge) than recycling.	ESPR REGULATION 2024/1781 - ART.2 ADEME
Unsold product	Any consumer product that has not been sold including surplus stock, excess inventory and deadstock and products returned by a consumer on the basis of their right of withdrawal in accordance with Article 9 of Directive 2011/83/EU or, where applicable, during any longer withdrawal period provided by the trade.	ESPR REGULATION 2024/1781 - ART.2 – definition 37
Repair	One or more actions carried out to return a defective product or waste to a condition where it fulfils its intended purpose. Direct action taken to effect restoration. *Note 1: Repair includes fault localization, fault diagnosis, fault correction and function checkout.*	ESPR REGULATION 2024/1781 - ART.2 – definition 20 IEC FDIS 60050 IEV 193-06-16
Professional repairer	A natural or legal person that provides professional repair or maintenance services for a product, irrespective of whether that	ESPR REGULATION 2024/1781 - ART.2 – definition 48

[1] The term "Réutilisation" is left in French because it is specific to French regulations and has no equivalent in English.

	person acts within the manufacturer's distribution system or independently.	
Maintenance	Set of all technical, administrative and management actions during the life cycle of an asset, intended to maintain it or restore it to a condition in which it can perform the required function	EN 13306 (janvier 2018)
Second-hand product	Good which, at any stage of production or distribution, has come into the **possession of a person for their own use**, as a result of any act for consideration or free of charge, **or has undergone alterations that do not allow them to be sold as new.**	Article L.321-1, paragraph 2 of the French Commercial Code
Premature obsolescence	A product design feature or subsequent action or omission resulting in the product becoming non-functional or performing less well without such changes of functionality or performance being the result of normal wear and tear.	ESPR REGULATION 2024/1781 - ART.2 - definition 21
General Product Safety Obligation (GPSR)	**Art.2 paragraph 3** This Regulation applies to products placed or made available on the market whether new, used, repaired or refurbished. It does not apply to products to be repaired or refurbished prior to being used where those products are placed or made available on the market and are clearly marked as such. **Art.5 General safety requirement** Economic operators shall place or make available on the market only safe products. **Art.7 Presumption of conformity with the general safety requirement** 1. For the purpose of this Regulation, a product shall be presumed to be in conformity with the general safety requirement laid down in Article 5 of this Regulation in the following cases: (a) it conforms to relevant European standards or parts thereof as far as the risks and risk categories covered by those standards are concerned, the references of which have been published in the Official Journal of the European Union in accordance with Article 10(7) of Regulation (EU) No 1025/2012; or (b) in the absence of any relevant European standards as referred to in point (a) of this paragraph, the product conforms to national requirements, as regards the risks and risk categories covered by health and safety requirements laid down in the national law of the Member State in which it is made available on the market, provided that such law is in compliance with Union law.	Amendment of the General Product Safety Regulation to extend to refurbished and/or second-hand products

From these definitions, a form of hierarchy emerges, ranging from least to most qualitative, based essentially on the degree of intervention performed on the product and its level of quality expected by customers.

	Outside the scope of this document		Within the scope of this document	
Criterion	**Reuse <**	**< "Réutilisation"[2] <**	**< Refurbishment <**	**Remanufacturing**
Initial status / Framework	Product (outside waste stream)	Waste	Waste	Waste
Technical intervention	None or minimal (cleaning)	Possible (cleaning, inspection)	Systematic (testing and refurbishment) but still poorly regulated *« the worst as well as the best »*	Very high and according to auditable industrial processes
Purpose	Made available for a second life	Made available for a second life	Refurbished to restore its functionalities with similar performance (mainly B2B approach) or not (mainly B2C approach)	Restored to new condition with identical or superior performances
Compliance	General safety obligation	General safety obligation	With the regulations and standards in force at the time of the 1st placing on the market	With the regulations and standards in force at the time of resale (very restrictive)
Commercial warranty	No	Variable	Yes	Yes, with duration equivalent to new

3. SCOPE – INCLUSIONS AND EXCLUSIONS

This document covers the last two elements: refurbishment and remanufacturing. The other elements (repairs, maintenance, "réutilisation"[2] and reuse) are not covered by these rules.
Refurbishment is the core subject addressed by this document.
Remanufacturing is addressed as a supplementary topic, as a more advanced process than refurbishment, enabling identical or superior product quality in terms of functionality, performance or service life.
Remanufacturing is refurbishment, but refurbishment is not necessarily remanufacturing.
Specifically, this document excludes the following cases:

- Products that have not had a first life / have not been energised (products purchased defective).
- Use of production waste or products identified as defective during production without the product having been placed on the market. In this case, this is production optimisation and not refurbishment.
- Returns of unsold product stocks (unused, not energised).

Application example:

Considering a SCELL (self-contained emergency lighting luminaire). Included within the scope of these rules:

- *Refurbishment: used tested SCELL, cleaned, and replacement of components that contribute to maintaining the key functional and safety characteristics of the product, such as autonomy, lumen output, IP, IK, etc. throughout the duration of the second use*

[2] The term "Réutilisation" is left in French because it is specific to French regulations and has no equivalent in English.

- *Remanufacturing: same, but covers all characteristics, key or not, and may present superior characteristics in terms of functionality, safety, environment, aesthetics, etc. (replacement of the lighting source with a higher efficiency source, battery replacement with a less polluting technology, etc.)*

Excluded from the rules:
- *A SCELL delivered defective, repaired and placed back on the market (no first life).*
- *An unsold SCELL, returned to the logistics platform and put back on sale.*

4. GENERAL PRINCIPLES

Refurbishment extends the total use duration of a product by enabling a second use similar to the first, following operations necessary to restore it to compliance with the expected condition.
In an LCA perspective based on the complete life cycle of the product, two use phases must therefore be considered, interspersed with a refurbishment phase including manufacturing and distribution.
In an LCA perspective based on a defined use, as is the case for declarations under the PEP ecopassport® program, the use considered precedes the refurbishment (new product that will be refurbished at end of life), or follows it (use of a refurbished product). This document considers both approaches.

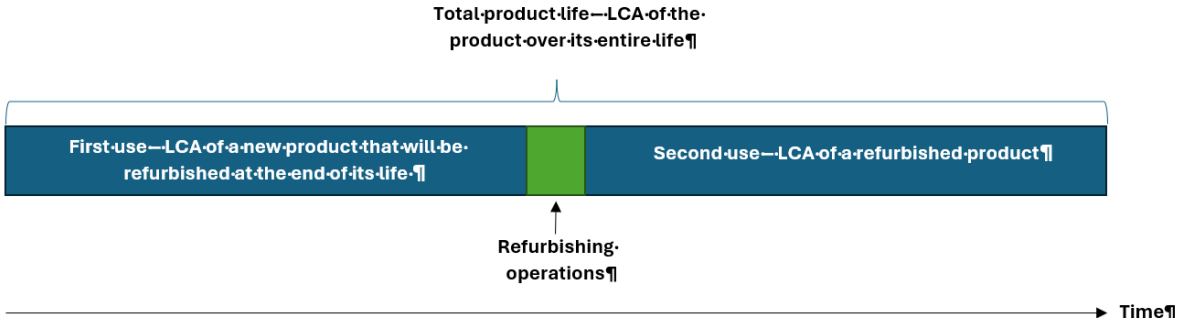

Figure 1 - Distinction between life cycle and use cycle

Breaking down the life cycle according to the different life cycle phases makes it possible to identify the similar and different elements of the LCA of a new product:

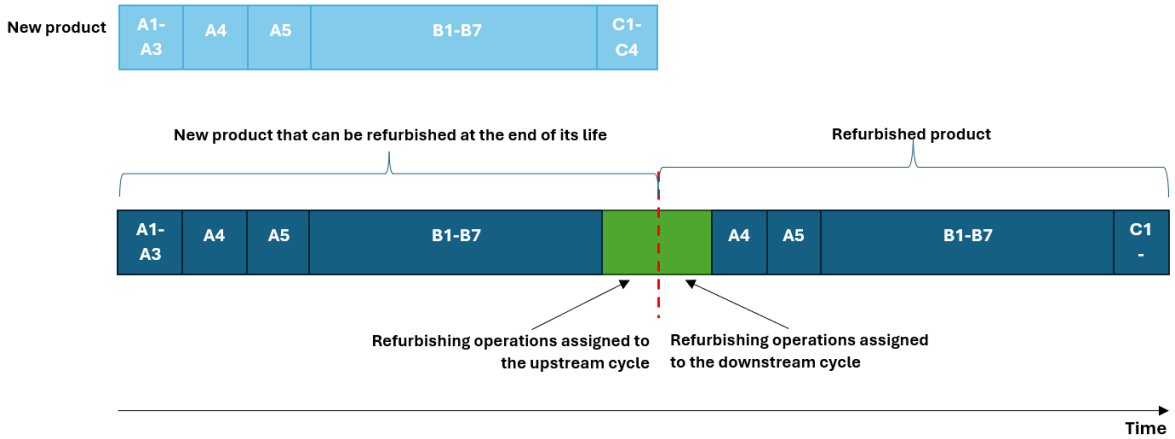

Figure 2 – Breakdown of cycles according to modules

Thus, certain life cycle phases are similar for new products and refurbished products (stages B1-B7). The differences relate to:
- For LCAs of a new product that will be refurbished at end of life: on the end of life (stages C1, C2, C3 and C4)
- For LCAs of a refurbished product: on the manufacturing phase (stages A1, A2 and A3).

Regarding the benefits and loads beyond the life cycle:

- For both LCAs: the benefits and loads beyond the system boundary (stage D)

These two stages (end of life and manufacturing) are partially replaced by refurbishment operations. In order to avoid both double counting and the non-accounting of impacts, the impacts of these operations must be allocated between the two uses of the product (new product and refurbished product) according to common, precise and transparent rules.

This document specifies these rules.

5. MODELLING RULES FOR REFURBISHED PRODUCTS

5.1 System boundaries

The objective of refurbishment operations is the transformation of a used product before it reaches its potential end of life, into a product intended to be placed back on the market for the purpose of providing a service equivalent to the new product.
These operations are multiple and diverse depending on:

- The actors performing these operations
- The type of product concerned
- The nature and quality of end-of-life product flows

They may cover, but are not limited to:

- Logistics (transport of products to be refurbished, intermediate transport steps between actors or between refurbishment steps, transport of products to their pre-sale logistics warehouse)
- Control and sorting steps (data erasure, product identity verification)
- Diagnostics (detailed analysis of product malfunctions)
- Components repair
- Replacement of damaged or missing components
    - *Note: this replacement is commonly carried out using components extracted from products entering the refurbishment stream[3] but not recoverable.*
- Cleaning
- Final control to ensure the proper functioning of the products under the conditions set by regulations, product standards, and the relevant manufacturers.
    - *Note 1: this step may generate losses, which must be considered.*
    - *Note 2: this control operation is mandatory for a refurbished product, and must therefore always be present.*
- Preparation for sale (additional packaging in particular)

Note: each step may result in product or component losses, which must therefore be treated at end of life.

[3] All stakeholders involved in the reconditioning of a product (e.g.: diagnostician, cleaner, logistics operator, manufacturer, producer responsibility organisation (PRO), reconditioning specialist, organization in the social and solidarity economy, installer, etc.)

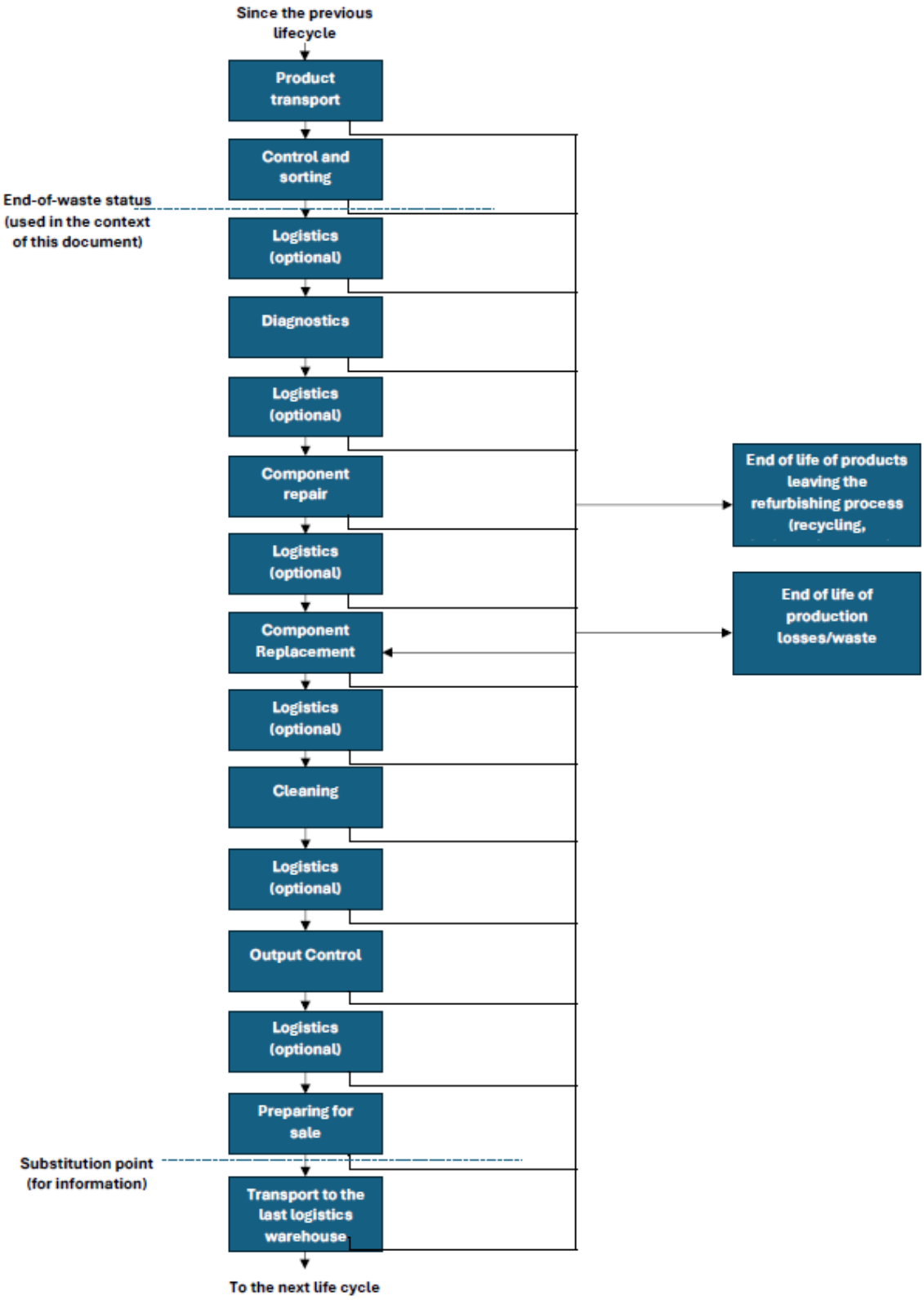

Figure 3 - Illustration of refurbishment steps

Note: Some products do not pass through waste status. In this case, it is necessary to determine a boundary as close as possible to that of an end-of-waste status, and to justify it in the LCA report.
Refurbishment taking place at the boundary between the upstream and downstream life cycles (C1-C4 of the upstream cycle and A1-A3 of the downstream cycle), the distribution of the various refurbishment stages between these two life cycles must avoid double-counting as well as the omission of refurbishment steps.

However, the specificity of refurbished products on the one hand (not all refurbished products exit waste status), and the probable evolutions of the program on the other, lean towards taking into account the end-of-waste status as the boundary rather than the substitution point.
Therefore, everything upstream of the end-of-waste status level is associated with the end of life of the upstream cycle, and everything downstream of the end-of-waste status level is associated with the manufacturing of the downstream cycle.

5.2 Modelling of a new product that will be refurbished at end of life

In order to consider refurbishment at end of life, it is necessary to provide proof of the existence of the pathway at the given time T based on the existing situation, and not the ongoing establishment of a pathway.
This sector may be either a national sector run by producer responsibility organisations (PROs), or an internal sector of the manufacturer.
Similarly, there are currently no average statistical data for product refurbishment; proof of a product-specific situation must be provided.
The modules affected by rule changes compared to the PCR are modules C and D. The other modules are unchanged.

Modelling of module C

The modelling of module C includes the following steps (non-exhaustively), up to end-of-waste status:

- Transportation of products
    - Key parameters: Distance in km between the collection point and the treatment facilities; collection and transport means, Capacity and load rate for road transport, The empty return rate
- Control and sorting
    - Key parameters: Type and quantity of energy, other services, Direct emissions of pollutants and particles, Emissions to air or water (including releases).

Note 1: a product can be only partially refurbished at end of life (for example 20% by mass is refurbished, and the rest goes through the standard end-of-life pathway). In this case the present rules only concern the fraction of products actually refurbished at end of life. The remaining proportion is modelled in accordance with the applicable PCR.
For example, a product where 20% by mass is refurbished will see the remaining 80% go to recycling (50%), incineration (30%) and landfill (20%), i.e. overall 20% to refurbishment, 40% to recycling, 24% to incineration and 16% to landfill.
Note 2: in the absence of information on transport scenarios, the rule of PCR-ed4-FR-2021 09 06 chapter 2.5.6 applies: 1,000 km by truck with a load rate of 85%. This point may be specified in the PSR depending on the pathways.
Note 3: the refurbishment scenario must be representative of the geographical area in which the product is treated, and any deviation must be justified.

Modelling of module D

Refurbishment at end of life avoids the placing on the market of an equivalent new product. In the case under consideration, module D accounts for the non-production of elements not manufactured, i.e. the new product minus any remanufactured elements.
This translates into accounting for the opposite of the value of the impact indicators of modules A1-A3 of a life cycle of an equivalent new product, established according to the same rules (PCR and PSR version) of the PEP ecopassport® program.
This accounting is added to the other net avoided impacts as indicated in annex D of PCR-ed4-FR-2021 09 06.
Note 1: it is possible that the life cycle phases of the refurbished product and the new product may not be equivalent, particularly with regard to energy consumption during the use phase. However, these

aspects are not considered in module D, and can be addressed through the comparison of 2 PEP between a new product and an equivalent refurbished product (see chapter 8.2 "Comparison with a non-refurbished product").
Note 2: a product can be only partially refurbished at end of life (for example 20% is refurbished, and the rest goes through the standard end-of-life channel). In this case the present rules only concern the fraction of the product actually refurbished at end of life. The remaining proportion is modelled in accordance with the applicable PCR.
For example, a product of which 20% is refurbished will see the remaining 80% go to recycling (50%), incineration (30%) and landfill (20%), i.e. overall 20% to refurbishment, 40% to recycling, 24% to incineration and 16% to landfill.

Application example:

Considering a new refurbished SCELL (self-contained emergency lighting luminaire) at the end of its life.

Module C:
- *Refurbished share (e.g. 20%): transportation of products (product transport) + inspection and sorting steps (energy consumption, direct emissions, etc.)*
- *Non-refurbished share (e.g. 80%): standard end of life (recycling, incineration, landfill)*

Module D:
- *On the refurbished share (20%), accounting for the negative impacts of the non-production of a new product (-20% of the production of an equivalent new SCELL)*
- *On the non-refurbished share: classic module D*

Note: the benefits should be specifically linked to the production of the parts which are refurbished. 20% of the mass of a product does not necessarily represent 20% of the impacts - for example if the casing of a product represents the majority of the mass, and it is only the casing which is sent for refurbishment, the benefits will be far less than the total impacts of the product allocated proportionally to mass of the casing.

5.3 Modelling of a refurbished product

The modules affected by rule changes compared to the PCR are modules A and D. The other modules are unchanged.

Modelling of module A

The modelling of module A includes the following steps (non-exhaustively), after end-of-waste status (no accounting of the impacts before this point, module A considers the impacts after the end-of-waste status of the new product (see fig.3)):

- Diagnostics
    - Key parameters: Type and quantity of energy, Other services and consumables (e.g.: nitrogen), Direct emissions of pollutants and particles, Emissions to air or water (including releases).
- Component repair
    - Key parameters: Type and quantity of energy, Other services and consumables (e.g.: nitrogen), Direct emissions of pollutants and particles, Emissions to air or water (including releases).
- Component replacement
    - Key parameters: Type and quantity of energy, Other services and consumables (e.g.: nitrogen), Direct emissions of pollutants and particles, Emissions to air or water (including releases).

    - *Note: this replacement is for example carried out from products entering the refurbishment pathway but not recoverable, whose components have been extracted*
- Cleaning
    - Key parameters: Type and quantity of energy, Other services and consumables (e.g.: nitrogen), Direct emissions of pollutants and particles, Emissions to air or water (including releases).
- Output control
    - Key parameters: Type and quantity of energy, Other services and consumables (e.g.: nitrogen), Direct emissions of pollutants and particles, Emissions to air or water (including releases). *Note: this test is mandatory for refurbished products*
- Preparation for sale
    - Key parameters: Type and quantity of energy, Other services and consumables (e.g.: nitrogen), Direct emissions of pollutants and particles, Emissions to air or water (including releases).
- End-of-life treatment of component and product losses
    - Key parameters: Type and quantity of energy, Other services and consumables (e.g.: nitrogen), Direct emissions of pollutants and particles, Emissions to air or water (including releases).
- As well as all intermediate logistics steps
    - Key parameters: Distance in km between the collection point and the treatment facilities; collection and transport means, Capacity and load rate for road transport, The empty return rate, Direct emissions caused by product degradation.
- Transport to the last logistics warehouse
    - Key parameters: Distance in km between the collection point and the treatment facilities; collection and transport means, Capacity and load rate for road transport, The empty return rate, Direct emissions caused by product degradation.

Note: in the absence of information on transport scenarios, the rule of PCR-ed4-FR-2021 09 06 chapter 2.5.6 applies: 1,000 km by truck with a load rate of 85%.

Modelling of module C

By convention, a refurbished product cannot be refurbished at end of life.

Modelling of module D

This translates into accounting for the value of the impact indicators of modules A1-A3 of a life cycle of an equivalent new product, established according to the same rules (PCR and PSR version) of the PEP ecopassport® program.

Note 1: given that the total mass of end-of-life products entering the refurbishment process (prior to any process losses) was used to determine the impacts of the refurbishment process, this mass must be accounted for in module D. Consequently, the percentage of product loss during refurbishment must be taken into account (i.e., the ratio of products exiting the refurbishment process to those entering it and deemed eligible for refurbishment).

Note 2: this may result in a module D value that is positive across all environmental impacts.

This accounting is added to the other net avoided impacts as indicated in annex D of PCR-ed4-FR-2021 09 06.

Application example:

Considering a SCELL (self-contained emergency lighting luminaire) refurbished.

Module A
- *Accounting for the impacts related to all refurbishment steps after the end-of-waste status. E.g. diagnosis, replacement of the cover glass (or other components, such as the light sources, the battery, etc.), cleaning, new packaging, product testing*
- *Transport to the logistic center*

Module B
- *Unchanged (electricity consumption, maintenance)*

Module C
- *Unchanged, but no accounting for refurbishment (a refurbished product is considered as not being able to be refurbished again)*

Module D
- *Accounting for the impacts of modules A1-A3 of an equivalent new product from a PEP*

6. LCA REPORT

This chapter supplements Chapter 3 of the general rules of PCR-ed4-FR-2021 09 06 of the PEP ecopassport® program.

6.1 General information

Clearly indicate the refurbishment or remanufacturing category in the PEP, in relation to the definitions (see chapter 1).
Indicate whether the refurbishment operations take place upstream (refurbished product declaration) and/or downstream (declaration of a new product that will be refurbished at end of life) of the product studied.

6.2 Reference flow and functional unit

Justify that the functionalities fulfilled by a refurbished product are like an equivalent new product (or improved in the case of remanufacturing). Define how the differences in functionality still allow remaining in similar functionalities.

Management of the service life and reference service life (RSL)

The use period of the reference new product must be used for refurbished products. Refurbished products have variable use periods depending on each refurbishment channel. This point is addressed as follows:

- The RSL is set by default as that of the new product (unless stated otherwise in the PSR)
- The effective service life must be justified. It cannot exceed the RSL[4]
- The reference flow must correspond to the functional unit. In other words, the product impacts are multiplied by a ratio between the RSL and the service life:

$$Impact\ PEP = Reconditioned\ product\ life\ cycle\ impact \times \frac{RSL}{Effective\ service\ life\ of\ the\ product}$$

[4] Except in the case of remanufacturing

Application example:

- *A new SCELL (self-contained emergency lighting luminaire) has a service life (RSL) of 10 years*
- *Considering a refurbished self-contained emergency luminaire with an effective service life of 8 years*
- *Then, the total impacts of the PEP ecopassport of the refurbished product will be:*

  *Impacts of the refurbished product over 8 years (1 product) * 10 / 8, i.e. 1.25 times the impacts of the refurbished product over 8 years*

6.3 Life cycle inventory

Regarding the manufacturing stages (modules A1-A3) and end of life (modules C1-C4) stages, when covered by refurbishment operations, the LCA report must:

- Indicate, describe and justify the refurbishment scenarios, the operations performed and the corresponding modules used, as well as the components recovered from the old product and those replaced (new)
- Indicate the loss percentage of refurbished products (ratio of the number of products exiting the refurbishment process to the incoming products considered eligible for refurbishment)
- Describe the end-of-life scenario for losses from refurbishment operations and the corresponding modules used,
- Identify and justify any approximation or exclusion of any step in the refurbishment scenario.

Regarding the net benefits and loads beyond the system boundaries stage (module D), the supporting report must:

- For products refurbished at end of life:
  - Refurbishment a product at end of life avoids the production of an equivalent new product. In order to account for the avoided impacts of the non-production of a new product (see chapter 5.3 Modelling of a refurbished product), it is necessary to have the environmental declaration according to the PEP ecopassport® program rules for the relevant new product.
- For refurbished products:
  - The use of refurbished products involving the deduction of substitution benefits associated with the integration of refurbished products in the production stage (see chapter 5.3 Modelling of a refurbished product), it is necessary to have the environmental declaration according to the PEP ecopassport programme rules for the relevant new product, or the specific refurbished element if a detailed BOM is provided.
  - No modification. For the calculation rules, see chapter 5.3 Modelling of a refurbished product.

6.4 List of elementary flows

No modification.

6.5 Environmental impacts

No modification.

6.6 Additional information and Eco solutions

No modifications.

6.7 Extrapolation rules

See chapter 8.5 « Extrapolation rules ».

7. DRAWING UP THE PRODUCT ENVIRONMENTAL PROFILE

7.1 General information

Document name

Clearly indicate the refurbishment category in the PEP, in relation to the definitions (see chapter 1 Context and purpose of the document).

Indicate whether the refurbishment operations take place upstream (refurbished product declaration) and/or downstream (declaration of a new product that will be refurbished at end of life) of the product studied.

Information about the PEP ecopassport® programme

No modification.

Company information

No modification.

Reference product and methodology

The PEP must also contain the following elements:

- A description and definition of the refurbishment actions performed on the product.
  For example, « Battery replacement », « Cleaning », « Functional test »

Homogeneous environmental families

The extrapolation rules may also cover the refurbishment operations performed on the products, in case of variability between different commercial references.

7.2 Constituent materials

No modification.

7.3 Additional environmental information

No modification.

7.4 Environmental impacts

The PEP must include:

- The product use category and scenario, specifying:
  - The service life and its justification (this justification may be specified by the PSR)
  - The description of the refurbishment scenario(s) for the product upstream (A1-A3) or downstream (C1-C4),
  - The product maintenance scenario and consumables used during the reference service life of the product category,
- Where applicable, the regulations and standards applicable to refurbishment elements for the product.

Add a common sentence for all PEPs stating that the manufacturer commits that the product has undergone the necessary tests to be considered refurbished (refer to the definition of refurbished

products: original performance and functionality and compliance with safety requirements).

8. ANNEXES

8.1 Update of Annex D of PCR-ed4-FR-2021 09 06

This chapter supplements annex D of the PCR by specifying the overall calculation formulas. The changes compared to annex D are indicated **in bold and in green**.

tages	Formulas		Comment
Production	Impacts relating to input primary materials	$\sum_{i=1}^{n}(1 - R_{1(i)}) \times M_i \times E_{PM(i)}$	Excluding refurbished elements from the upstream system
	Impacts relating to input secondary materials	$\sum_{i=1}^{n} R_{1i} \times M_i \times E_{MR\ after\ PS\ i}$	Excluding refurbished elements from the upstream system
	Impacts relating to input refurbished products	$\sum_{i=1}^{n} \boldsymbol{R_{i5} \times E_{PRupstream}}$	**If the product is not made from refurbished elements, then this term does not exist (R5 = 0)**
	Impacts relating to materials of input refurbished elements	**= 0**	**The material of refurbished elements has no impact**
End of life	**Impacts relating to end-of-life product refurbishment operations**	$\boldsymbol{R_4 \times E_{PReol}}$	**Dismantling, transportation and sorting operations**
	Impacts relating to end-of-life material recovery operations	$\sum_{i=1}^{n} R_{2i} \times M_i \times \boldsymbol{(1 - R_4)} \times E_{MR\ including\ PS\ i}$	Standard operations on the product except on elements intended for refurbishment
	Impacts relating to end-of-life energy recovery operations	$\sum_{i=1}^{n} R_{3i} \times M_i \times \boldsymbol{(1 - R_4)} \times E_{ER\ including\ PS\ i}$	
	Impacts relating to end-of-life disposal operations	$\sum_{i=1}^{n}(1 - R_{2i} - R_{3i}) \times M_i \times \boldsymbol{(1 - R_4)} \times E_{Di}$	
Module D	Recycled material integration charges	$\sum_{i=1}^{n} +R_{1i} \times M_i \times E_{PM(i)}$	Excluding refurbished elements from the upstream system, their charges are counted in the upstream system.
	Charges new product production	$\boldsymbol{+R_5 \times E_{new}}$	**Impact of new product production + sorting and dismantling**
	Recycling benefit	$\sum_{i=1}^{n} -R_{2i} \times M_i \times \boldsymbol{(1 - R_4)} \times E_{PM\ i}$	
	Energy recovery benefits	$\sum_{i=1}^{n} -R_{3i} \times M_i \times \boldsymbol{(1 - R_4)} \times E_{SE\ i}$	

	Refurbishment benefits	$-R_4 \times E_{new}$	**What was reused from the upstream system is precisely subtracted in module D of the downstream system, as this is what will not need to be produced new**

With:

- R_4: percentage of new product that will be refurbished at end of life
- R_{i5}: percentage of refurbished sub-assembly I of the upstream refurbished product (R5 is necessarily = 0% or 100%)
- E_{PRfdv}: impact of refurbishment of product at end of life
- $E_{PRamont}$: impact of upstream product refurbishment (including logistics, diagnostics, repair and component replacement, cleaning, control and preparation for sale)
- E_{new}: impact of modules A1, A2 and A3 of an equivalent new product or the specific sub-assembly concerned

Application examples:

Case 1: SCELL with replacement of a glass from a SCELL at the end of its life

Stages	Formulas		Application example
Production	Impacts relating to input primary materials	$\sum_{i=1}^{n}(1 - R_{1(i)}) \times M_i \times E_{PM(i)}$	0: no incoming primary material
	Impacts relating to input secondary materials	$\sum_{i=1}^{n} R_{1i} \times M_i \times E_{MR\ after\ PS\ i}$	0: no incoming secondary material (the cover glass is a refurbished component, not a material)
	Impacts relating to input refurbished products	$\sum_{i=1}^{n} R_{i5} \times E_{PRupstream}$	**Non-zero, corresponds to refurbishment operations (diagnosis, cleaning, etc.) as well as the end of life of the product from which the cover glass originates**
	Impacts relating to materials of input refurbished elements	**= 0**	**0: corresponds to the cover glass, has no impact**
End of life	**Impacts relating to end-of-life product refurbishment operations**	$R_4 \times E_{PRfdv}$	**Non-zero, corresponds to the dismantling, transportation and sorting operations of the refurbished SCELL**

	Impacts relating to end-of-life material recovery operations	$\sum_{i=1}^{n} R_{2i} \times M_i \times (\mathbf{1} - \boldsymbol{R_4}) \times E_{MR\ including\ PS\ i}$	Non-zero, but R4 = 0 (a refurbished product cannot be refurbished at end of life). Corresponds to standard operations on the product except on elements intended for refurbishment
	Impacts relating to end-of-life energy recovery operations	$\sum_{i=1}^{n} R_{3i} \times M_i \times (\mathbf{1} - \boldsymbol{R_4}) \times E_{ER\ including\ PS\ i}$	
	Impacts relating to end-of-life disposal operations	$\sum_{i=1}^{n} (1 - R_{2i} - R_{3i}) \times M_i \times (\mathbf{1} - \boldsymbol{R_4}) \times E_{Di}$	
Module D	Recycled material integration charges	$\sum_{i=1}^{n} +R_{1i} \times M_i \times E_{PM(i)}$	= 0 (no recycled material)
	Charges new product production	$+\boldsymbol{R_5} \times \boldsymbol{E_{new}}$	**Non-zero (R5 = 100%): impact of new product production + sorting and dismantling**
	Recycling benefit	$\sum_{i=1}^{n} -R_{2i} \times M_i \times (\mathbf{1} - \boldsymbol{R_4}) \times E_{PM\ i}$	Non-zero, corresponds to the benefits of recycling the materials of the refurbished SCELL (non-production of virgin material)
	Energy recovery benefits	$\sum_{i=1}^{n} -R_{3i} \times M_i \times (\mathbf{1} - \boldsymbol{R_4}) \times E^*_{PM\ i}$	Non-zero, corresponds to the benefits of energy recovery from the materials of the refurbished SCELL (non-production of primary energy)
	Refurbishment benefits	$-\boldsymbol{R_4} \times \boldsymbol{E_{new}}$	**= 0: the product is not refurbished at end of life**

Case 2: SCELL with replacement of a glass with a new one

Stages	Formulas		Application example
Production	Impacts relating to input primary materials	$\sum_{i=1}^{n} \left(1 - R_{1(i)}\right) \times M_i \times E_{PM(i)}$	Non-zero: impact of the primary material portion of the new cover glass
	Impacts relating to input secondary materials	$\sum_{i=1}^{n} R_{1i} \times M_i \times E_{MR\ after\ PS\ i}$	Non-zero: impact of the secondary material portion of the new cover glass
	Impacts relating to input refurbished products	$\sum_{i=1}^{n} \boldsymbol{R_{i5}} \times \boldsymbol{E_{PRupstream}}$	**Non-zero, corresponds to refurbishment operations (diagnosis, cleaning, etc.) as well as the end of life of the product from which the cover glass originates**

	Impacts relating to materials of input refurbished elements	**= 0**	**0**
End of life	**Impacts relating to end-of-life product refurbishment operations**	$\boldsymbol{R_4 \times E_{PReol}}$	**Non-zero, corresponds to the dismantling, transportation and sorting operations of the refurbished SCELL**
	Impacts relating to end-of-life material recovery operations	$\sum_{i=1}^{n} R_{2i} \times M_i \times (\mathbf{1} - \boldsymbol{R_4}) \times E_{MR\ including\ PS\ i}$	Non-zero, but R4 = 0 (a refurbished product cannot be refurbished at end of life). Corresponds to standard operations on the product except on elements intended for refurbishment
	Impacts relating to energy recovery operations at end of life	$\sum_{i=1}^{n} R_{3i} \times M_i \times (\mathbf{1} - \boldsymbol{R_4}) \times E_{ER\ including\ PS\ i}$	
	Impacts relating to end-of-life disposal operations	$\sum_{i=1}^{n} (1 - R_{2i} - R_{3i}) \times M_i \times (\mathbf{1} - \boldsymbol{R_4}) \times E_{Di}$	
Module D	Recycled material integration charges	$\sum_{i=1}^{n} +R_{1i} \times M_i \times E_{PM(i)}$	Non-zero, corresponds to the charge of the secondary material portion of the cover glass
	Charges new product production	$\boldsymbol{+R_5 \times E_{new}}$	**Non-zero (R5 = 100%): impact of new product production + sorting and dismantling**
	Recycling benefit	$\sum_{i=1}^{n} -R_{2i} \times M_i \times (\mathbf{1} - \boldsymbol{R_4}) \times E_{PM\ i}$	Non-zero, corresponds to the benefits of recycling the materials of the refurbished SCELL (non-production of virgin material)
	Energy recovery benefits	$\sum_{i=1}^{n} -R_{3i} \times M_i \times (\mathbf{1} - \boldsymbol{R_4}) \times E^*_{PM\ i}$	Non-zero, corresponds to the benefits of energy recovery from the materials of the refurbished SCELL (non-production of primary energy)
	Refurbishment benefits	$\boldsymbol{-R_4 \times E_{new}}$	**= 0: the product is not refurbished at end of life**

Cas 3 : self-contained emergency luminaire neuf refurbished en fin de vie

Stages	Formulas		Application example
Production	Impacts relating to input primary materials	$\sum_{i=1}^{n} \left(1 - R_{1(i)}\right) \times M_i \times E_{PM(i)}$	Non-zero: standard modelling of a self-contained emergency luminaire

	Impacts relating to input secondary materials	$\sum_{i=1}^{n} R_{1i} \times M_i \times E_{MR\ after\ PS\ i}$	Non-zero: standard modelling of a self-contained emergency luminaire
	Impacts relating to input refurbished products	$\sum_{i=1}^{n} \boldsymbol{R_{i5} \times E_{PRupstream}}$	0: not applicable as not from a refurbishment channel
	Impacts relating to materials of input refurbished elements	**= 0**	**0: not applicable as not from a refurbishment channel**
End of life	End of life	$\boldsymbol{R_4 \times E_{PReol}}$	**Non-zero, corresponds to the dismantling, transportation and sorting operations of the refurbished SCELL**
	Impacts relating to material recovery operations at end of life	$\sum_{i=1}^{n} R_{2i} \times M_i \times \boldsymbol{(1 - R_4)} \times E_{MR\ including\ PS\ i}$	Non-zero, and R4 non-zero. Corresponds to standard operations on the product except on elements intended for refurbishment plus the refurbishment operations before end-of-waste status (transport, inspection and sorting)
	Impacts relating to energy recovery operations at end of life	$\sum_{i=1}^{n} R_{3i} \times M_i \times \boldsymbol{(1 - R_4)} \times E_{ER\ including\ PS\ i}$	
	Impacts relating to disposal operations at end of life	$\sum_{i=1}^{n} (1 - R_{2i} - R_{3i}) \times M_i \times \boldsymbol{(1 - R_4)} \times E_{Di}$	
Module D	Recycled material integration charges	$\sum_{i=1}^{n} +R_{1i} \times M_i \times E_{PM(i)}$	Non-zero, corresponds to the charge of the secondary material portion of the SCELL
	Charges new product production	$\boldsymbol{+R_5 \times E_{new}}$	**= 0 (R5 = 0%): not applicable as not from a refurbishment channel**
	Recycling benefit	$\sum_{i=1}^{n} -R_{2i} \times M_i \times \boldsymbol{(1 - R_4)} \times E_{PM\ i}$	Non-zero, corresponds to the benefits of recycling the materials of the refurbished SCELL (non-production of virgin material)
	Energy recovery benefits	$\sum_{i=1}^{n} -R_{3i} \times M_i \times \boldsymbol{(1 - R_4)} \times E^*_{PM\ i}$	Non-zero, corresponds to the benefits of energy recovery from the materials of the refurbished SCELL (non-production of primary energy)
	Refurbishment benefits	$\boldsymbol{-R_4 \times E_{new}}$	**Non-zero, corresponds to the non-production of a new SCELL on the portion that is refurbished**

8.2 Comparison with a non-refurbished product

The PEP ecopassport® program enables the preparation of environmental declarations for products or product ranges but is not intended to make comparisons between products.
However, through the use made of declarations, particularly in the context of product selection by customers, or the RE2020 regulation in France, users will be led to compare notably refurbished products with non-refurbished products.
This chapter is intended to recall the essential elements enabling an unbiased comparison.
To enable this comparison, the compared PEP declarations must:

- Cover the same functionality (same functional unit)
- Have the same main product characteristics
- Be based on the same rules (PCR and PSR) in the same version
- Calculate the same impact indicators, in the same version
- Be based on the same database, in the same version
- Have identical scenarios, particularly for the use phase.

Two types of comparisons are possible:

- The comparison of a refurbished PEP and an equivalent new product, over an identical use period;
- The comparison of a new then refurbished product and a new product replaced over their entire service life (multiple consecutive uses).

8.3 Collective declarations

Collective declarations must be based « on the homogeneity of parameters that significantly influence the value of each of the environmental indicators »[5].
Among these parameters, refurbishment operations are included. The homogeneity of the parameters relating to these operations must be ensured.
Similarly, the determination of the validity framework must consider, where relevant, the refurbishment operations.

8.4 Information to be addressed at PSR level

Refurbishment operations are specific to each product type. This document is intended to be generic and does not cover all specific cases.
Each PSR must therefore, where relevant, establish the list of usual and/or mandatory refurbishment operations to ensure the proper refurbishment of products covered by the PSR.
Each PSR must also define the key parameters (functional, safety, environmental, aesthetic characteristics, etc.) to be met by refurbished products.
The PSR shall also define the tests to be carried out at the end of production and the evidence to justify the service life of refurbished products, in the absence of a normative framework.
The PSR may establish specific extrapolation rules for refurbished products.
They may also add additional rules related to refurbishment or refurbished products.

8.5 Extrapolation rules

In addition to the criteria of same main functionality, same product standards and similar manufacturing technology, the homogeneous environmental family of an environmental declaration must ensure the homogeneity of the refurbishment typology (or non-refurbishment), in relation to the established definitions in chapter 1 of this document.

[5] PCR-ed4-FR-2021 09 06, chapter 2.7

As a reminder, the PSR may establish specific extrapolation rules for refurbished products.