Product Category Rules

TRANSPORT

services of general cargo

UN CPC code: 6511, 6512, 6521, 6522, 6531

PCR-2021-0001
Valid until: 2026-11-17
Date 2021-11-18
Version 1.00

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PRODUCT CATEGORY

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1. Product category definition

This document provides Product Category Rules (PCR) for the assessment of the impact on climate change of Transport services of general cargo and the declaration of this performance by a CFP. The product category corresponds to UN CPC 65 Freight transport services.

The product category is defined under UNSD-CPC Ver 2.1 classification:
Division 65: Freight transport services.

- 651: Land transport services of freight
  - 6511: Road transport services of freight
  - 6512: Railway transport services of freight
- 652: Water transport services of freight
  - 6521: Coastal and transoceanic water transport services of freight
  - 6522: Inland water transport services of freight
- 653: Air and space transport services of freight
  - 6531: Air transport services of freight

The transport of food products or meal is excluded from the scope of the present PCR, since this service is covered by the specific PCR "Road transport services of freight of food products and meals" of International EPD® System.

Within the present PCR, the following terminology is adopted:

- The term "shall" is used to indicate what is obligatory.
- The term "should" is used to indicate a recommendation, rather than a requirement.
- The term "may" or "can" is used to indicate an option that is permissible.

For the definition of terms used in the document, see the normative standards.

2. Product category description

According to ISO standard 14083, *transport service* refers to the full service provided by a transport operator or service organizer to a user, whereby cargo is transported from one point to another along a transport chain; hence the service would include non-operational aspects such as marketing, ticketing, reporting etc., whilst the emissions calculated according to this standard would not include emissions associated with these non-operational aspects. A transport service may, but does not have to, consist of multiple transport chain elements (TCEs).

This PCR can be used by transport service organizers and by transport operators. These two actors, as described in the mentioned standard, are:

- **Transport service organizer**: entity that provides transport services which are subcontracted to another entity (transport operator) which operates them, or that acts as an intermediary between the transport operator and the transport service user. A transport service organizer can be, for example, a freight forwarder.
- **Transport operator**: entity that carries out transport operations. It can be freight carrier (acting directly for shippers or as sub- contractor of a transport service organizer)
- **Transport service user**: entity that buys and/or uses a transport service. It can be a shipper, or a transport service organizer (for the transport operations it subcontracts on behalf of its customers).

The product category includes the transport of any type of cargo by means of different type of transport means, including but not limited to trucks, freight trains, ships and planes. This list is not to be considered complete; in fact, any type of vehicle can be used, if dedicated to the transportation of freight (therefore, transport of persons is excluded).
The service of transport encompassed in this PCR considers the products transported, including its packaging.
It should be noted that the freight transport services considered in this PCR are professional services, and not private/domestic services.
It is highlighted that, in this document, both terms good and products are used to refer to the **cargo transported**.
In addition, when this PCR was developed, the ISO 14083 standard on GHG emissions from transport operation was under development. Even though the scope of the mentioned ISO standard is broader than in this PCR, the document was used as reference for some considerations and definitions.

3. Functional Unit

The functional unit shall be 1 kg of delivered goods transported from the loading site(s) to the unloading site(s).

The product packaging, provided together with the product by the producer, is to be included in the evaluation of the total transported weight.

Potential additional packaging, added by external companies who take care of the transportation, is not included in the total transported weight.

4. Declared Unit

As additional information, it is possible to report the declared unit, namely the information related to the whole shipping transported from the loading site(s) to the unloading site(s).

The product packaging, provided together with the product by the producer, is to be included in the evaluation of the total transported weight.

Potential additional packaging, added by external companies who take care of the transportation, is not included in the total transported weight.

5. Product lifetime

Not applicable for this product category.

SYSTEM BOUNDARIES

1. Diagram
2. Upstream
3. Core
4. Downstream

Carbon Footprint Italy follows an approach that include all attributional processes from "cradle to grave", using the "limited loss of information at the final product" principle. This is especially important in the case of business-to-consumer communication.

The scope of this PCR and of CFPs based on this document is cradle to grave.

For the purpose of different data quality rules and for the presentation of results, the life cycle of products is split into three different life cycle stages:

- Upstream processes (from cradle-to-gate);
- Core processes (from gate-to-gate);
- Downstream processes (from gate-to-grave).

In the CFP, the impact on climate change associated to each of the three life-cycle stages mentioned above shall be reported separately.
Depending on the type of organization taking care of the transport service (e.g. a transport service organizer or a transport operator), some of the processes listed below can be treated differently (see also section 3.1 for details).

1. Diagram

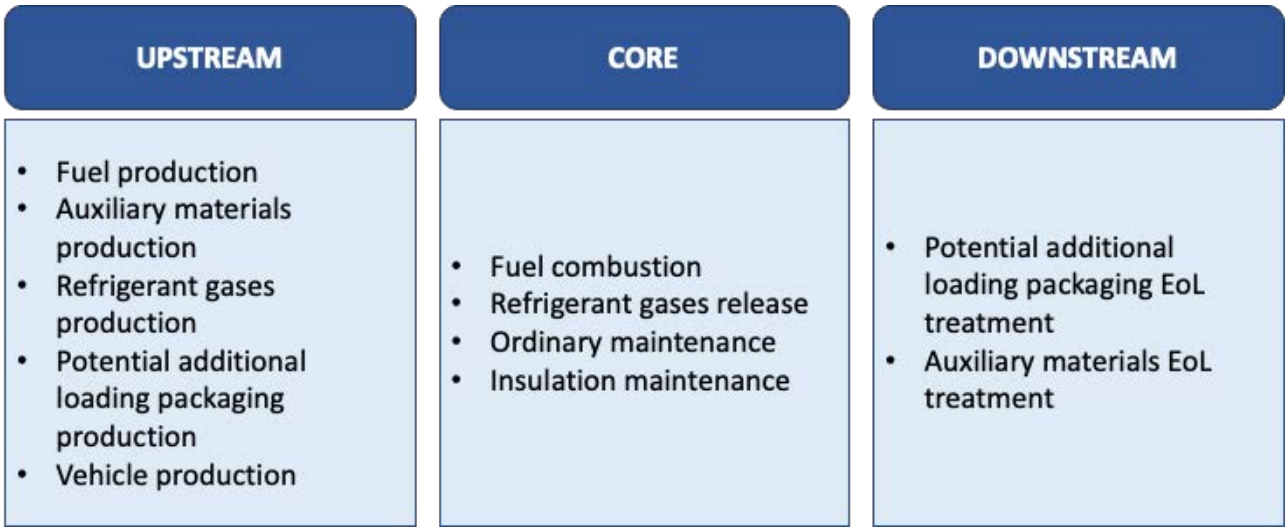

Figure 1 - System diagram illustrating the processes that are included in the product system, divided into upstream, core and downstream processes.

2. Upstream

The following attributional processes are part of the product system and classified as upstream processes:

- Production of the fuel used by the vehicles
- Production of electricity used by electric vehicles (including shore power)
- Production of auxiliary materials for maintenance and sanitation activities (appropriate hygienic detergents)
- Production of refrigerant gas topped up during the logistic service
- Production of loading packaging. This is to be intended as the potential additional packaging that is used by the transportation organization for the transportation service, in addition to the packaging that is provided together with the goods to be transported (that shall not be accounted).
- The construction of the vehicles and other means of transport[1].

The system shall not include:

- indirect GHG emissions of the production and supply processes of refrigerants.

Upstream processes not listed may also be included. All elementary flows at resource extraction shall be included, except for the flows that fall under the general cut-off rule in Section "Cut-off rules".

3. Core

The following attributional processes are part of the product system and classified as core processes:

- Vehicle use[2]:
    - emissions from fuel combustion during the transport of the products (including means operated by sub-contractors);
    - emissions from the release of refrigerant gas topped up during the logistic service.

[1] These processes represent a limited contribute of the emission factor of a vehicle on the transported kgkm (for example, in the dataset of trucks, the construction of the vehicle represents less around 2% of the total impact). Anyway, the use of datasets covering these stages is required. If in the future the international community will agree on moving towards the exclusion of these stages, as it is currently occurring during the development of specific ISO standards on these topics (ISO 14083), it will be possible to exclude these contributions from the analysis, but it will have to be clearly specified in the CFP report.

[2] Many emission factors (from recognized databases) are based on statistical analysis of relevant factors, as empty return rates, considering vehicles' average load factors, as well as load mass, cargo density and cargo capacity. The suggestion is thus to select datasets with this level of detail. In case specific and accurate data are available (for example in case of transport operators), these can be used instead than the average values provided by the datasets.

- Vehicle Maintenance:
    - ordinary maintenance related to tyre substitution, oil change, filter substitution, brake fluid and pad substitution, topping up of heat transferring fluid and gear oil substitution;
    - maintenance of insulation of the loading space used to create thermal insulation from outside (if applied within the service).

The technical system shall not include:

- Manufacturing of production equipment, buildings and other capital goods.
- Travel to and from work by personnel.
- Research and development activities.
- Direct GHG emissions (other than refrigerants) released from leakage (as for example of natural gas) at the vehicle level.
- Additional impacts of combustion of aviation fuel in high atmosphere, like contrails, cirrus, etc.
- Processes at the administrative (overhead) level of the organizations involved in the transport services.
- Processes of construction, service, maintenance, and dismantling of transport infrastructures used by vehicles or transshipment and (de)boarding infrastructure.
- Independent businesses located within a transport hub such as retail and hospitality services, whose functions are severable and incidental to the transportation operation of the transport hub.
- Processes at transport hubs for storage of goods for the purpose of warehousing.
- Operations for goods loading/unloading on the vehicles.
- Vehicle maintenance activities, performed every 3 years or more.

4. Downstream

The following attributional processes are part of the product system and classified as downstream processes:

- The treatment of the potential additional packaging for the loading of the products, once the products are delivered. As previously specified, the loading packaging does not include the primary packaging of the goods, but only the additional packaging introduced by the transportation organization.
- End-of-life treatment of auxiliary materials.

DATA AND RULES FOR THE CFP STUDIES

1. Specific data or calculation rules
2. Cut-off rules
3. Allocation rules

1. Specific data or calculation rules

1.1 Specific data

A CFP calculation requires two different kinds of information:

- data related to the environmental aspects of the considered system (such materials or energy flows that enter the production system). These data shall come from the company that is performing the CFP calculation.
- data related to the life cycle impacts of the material or energy flows that enter the production system. Generic data can be used if specific data are not available.

Data on environmental aspects shall be as specific as possible and shall be representative of the studied process.

Data on the life cycle of materials or energy inputs are classified into three categories – specific data, selected generic data, and proxy data, defined as follows:

- **primary data** (also referred to as "site-specific data") – data gathered from the actual manufacturing plant where product-specific processes are carried out, and data from other parts of the life cycle traced to the specific product system under study, e.g. materials or electricity provided by a contracted supplier that is able to provide data for the actual delivered services, transportation that takes place based on actual fuel consumption, and related emissions, etc.
- **secondary data** - data from commonly available data sources (e.g. commercial databases and free databases) that fulfill prescribed data quality characteristics for precision, completeness, and, proxy data from commonly available data sources (e.g. commercial databases and free databases) that do not fulfill all of the data quality characteristics of "selected generic data".

As a general rule, specific data shall always be used, if available, after performing a data quality assessment.

The availability of direct data highly depends on the type of organization providing the service:

- **Transport service organizer**: since there is no direct control on the vehicles used, they can only employ datasets from databases. These usually include several lifecycle stages (from either upstream, core and downstream). Consequently, in this case the results obtained can be reported as a comprehensive value, not split into the upstream, core and downstream processes.
- **Transport operator**: in this case, the organization has direct control on the vehicles used for the transportation service. Therefore, all the specific data related to the service provided shall be collected (as for example the type of vehicles used, the type and amount of fuel, load factors, considering potential empty return trips, etc).

In this case, it is required that the results are reported split into the three main processes (upstream, core and downstream).

- **Courier**: there is also the possibility that the organization taking care of the service relies on an external company, namely a courier, for all or part of the service. In this case, it is no possible for the organization that develops the CFP study to know the details of the transportation realized by the courier. Therefore, the following assumptions shall be made:
  - Intracontinental transportation: if the trip is realized within a continent, and without crossing any ocean/sea, it can be assumed that trucks are used for the whole route;
  - Intercontinental transportation: if the products are transported overseas, it can be assumed that the whole route is realized by means of plane. In addition, a default of 300 km by truck is considered, to cover the distance from the airport to the final destination.

Also in this case, the organization realizing the study has no control over the vehicles used, so datasets from databases can be used. Therefore, the results can be reported as a comprehensive value, not split into the upstream, core and downstream processes.

In case the data to be collected for the upstream and core stages are under direct control of the transportation company offering the service (for example, if the company owns the means of transportations used), specific data shall be used.

If the company offering the transportation service has no control on the required data, as in the case of transport service organizers, it is possible to use data from database, that cover all the required aspects (e.g. datasets from Ecoinvent database).

Any data used should preferably represent average values for a specific reference year. However, how these data are generated could vary, e.g. over time, and in such cases they should be presented under the form of a representative annual average value for a specified reference period. Such deviations should be declared.

The attributional LCA approach in Carbon Footprint Italy forms the basic prerequisites for selecting generic data. To allow the classification of generic data as “selected generic data”, they shall fulfill selected prescribed characteristics for precision, completeness, and representativeness (temporal, geographical, and technological), such as:

- the reference year must be as current as possible and preferably assessed to be representative for at least the validity period of the CFP,
- the cut-off criteria to be met on the level of the modelled product system are the qualitative coverage of at least 99% of energy, mass, and overall environmental relevance of the flows,

- completeness in which the inventory data set should, in principle, cover all elementary flows that contribute to a relevant degree of GHG emissions.

1.2 Calculation rules

The following requirements apply to the study:

- Data referring to processes and activities upstream in a supply chain over which an organisation has direct management control shall be specific and collected on site.
- Data referring to contractors that supply main parts, packaging, or main auxiliaries should be requested from the contractor as specific data, as well as infrastructure, where relevant.
- In case specific data is lacking, selected generic data may be used. If this is also lacking, proxy data may be used.
- For the electricity used in the processes, electricity production impacts shall be accounted for in this priority when specific data are used in the processes:
  1. Specific electricity mix as generated, or purchased, from an electricity supplier, demonstrated by a Guarantee of Origin (or similar, where reliability, traceability, and the avoidance of double-counting are ensured) as provided by the electricity supplier. If no specific mix is purchased, the residual electricity mix from the electricity supplier shall be used[3].
  2. National residual electricity mix or residual electricity mix on the market
  3. National electricity production mix or electricity mix on the market.

  The mix of electricity used in upstream processes shall be documented in the CFP study report, where relevant.
- Transport from the final delivery point of raw materials, chemicals, main parts, and components (see above regarding upstream processes) to the manufacturing plant/ place of service provision should be based on the actual transportation mode, distance from the supplier, and vehicle load, if available.
- Waste treatment processes of manufacturing waste should be based on specific data, if available.
- In case some transportation routes are covered by means of an external courier, it could happen that no information is available on the type of transportation means used.
- In this case a separate scenario shall be assumed: the intra-continental routes should be considered as realised by truck, while the transcontinental ones by airplane. The distances shall be calculated by means of reliable tools.

[3] The residual electricity mix is the mix when all contract-specific electricity that has been sold to other customers has been subtracted from the total production mix of the electricity supplier.

- Scenarios for the end-of-life stage shall be technically and economically practicable and compliant with current regulations in the relevant geographical region based on the geographical scope of the CFP. Key assumptions regarding the end-of-life stage scenario shall be documented.

2. Cut-off rules

Data for elementary flows to and from the product system contributing to a minimum of 99% of the declared environmental impacts shall be included (not including processes that are explicitly outside the system boundary as described in Section 4.3).

The check for cut-off rules in a satisfactory way is through the combination of expert judgment based on experience of similar product systems and a sensitivity analysis in which it is possible to understand how the un-investigated input or output could affect the final results.

3. Allocation rules

The following stepwise procedure shall be applied for multifunctional products and multiproduct processes:

1. Allocation shall be avoided, if possible, by dividing the unit process into two or more sub-processes and collecting the environmental data related to these sub-processes.
2. If allocation cannot be avoided, the inputs and outputs of the system shall be partitioned between its different products or functions in a way that reflects the underlying physical relationships between them; i.e. they should reflect the way in which the inputs and outputs are changed by quantitative changes in the products or functions delivered by the system.
3. Where physical relationships alone cannot be established or used as the basis for allocation (or they are too time consuming), the most suitable allocation procedure shall be used and documented.

In accordance with other existing programme operators, the methodological choices for allocation for reuse, recycling and recovery have been set according to the polluter pays principle (PPP). This means that the generator of the waste shall carry the full climate impact until the point in the product's life cycle at which the waste is transported to a scrapyard or gate of a waste processing plant (collection site). The subsequent user of the waste shall carry the climate impact from the processing and refinement of the waste but not the impact caused in the "earlier" life cycles.

PCR APPLICABILITY

1. Impact category indicator results
2. PCR use for EPD purpose

This document constitutes the Product Category Rules (PCR[4]) developed by Carbon Footprint Italy.

The requirements described in this Product Category Rules (PCR) are specified in addition to the ones indicated in the ISO standard 14067. Therefore, both the PCR and the ISO 14067 requirements shall be fulfilled in order to register to Carbon Footprint Italy.

In fact, this PCR was conceived and developed for CFP studies. Anyway, it can also be used for EPD (Environmental Product Declaration); to do this, the additional specific regulations required by the programme operator selected for the EPD registration should be followed as well (see Section 4.2).

So, in this PCR only the parameter reported in Section "Impact category indicator results" shall be included.

1. Impact category indicator results

The present PCR is aimed at the development of CFP. Therefore, a special focus is on the "Global Warming Potential" indicator.

The specific GHG emissions and removals treatment in the CFP or partial CFP that shall be quantified and documented separately in the CFP study report are reported in the ISO 14067:2018, Table 1 of chapter 6.4.9.8.

Four GWP indicators shall be declared, which differentiates greenhouse gases depending on their origin: GWP-fossil, GWP-biogenic emissions, GWP-land use and land use change (dLuc), and GWP-biogenic removals, in accordance with the mentioned ISO 14067:2018 standard.

As mentioned in section 3.1, the data should be reported, depending on the type of organization realizing the study, as follows:

- **Transport service organizer:** since there is no direct control on the vehicles used and data come from datasets that are comprehensive of several processes, the results obtained can be reported as a comprehensive value, not split into the upstream, core and downstream processes.
- **Transport operator**: since specific data are collected and used, it is required that the results are reported split into the three main processes (upstream, core and downstream).

[4] Product Category Rules (PCRs) are documents that provide the rules, requirements and guidelines for developing a CFP study for a specific product category. PCRs are necessary to ensure uniformity of methodological approach to studies and to allow comparability between CFP studies related to products of the same category. The PCR development process is described in the "PQ04 PCR development" procedure, which can be downloaded in the dedicated section of the website.
This PCR follows the requirements of ISO/TS 14027, ISO 14067 and ISO 14025.

- **Courier**: as for transport service organizers, data come from datasets, so the results can be reported as a comprehensive value, not split into the upstream, core and downstream processes.

It should be noted that other impact categories can be relevant for the product category under assessment, other than the "Global Warming Potential" category. Therefore, in order to integrate the CFP results and to provide a broader view of the product environmental impacts, more impact categories shall be evaluated. The detail of this option are outlined In the following sections.

2. PCR use for EPD purpose

This PCR was conceived and developed for CFP studies. Anyway, it can also be used for EPD (Environmental Product Declaration); to do this, other predetermined parameters required by the programme operator selected for the EPD registration shall be followed. These parameters are:

- other impact category indicator results;
- inventory results that are elementary flows;
- data that do not represent elementary flows;
- additional environmental information.

COMPLEMENTARY INFORMATION

1. PCR use within other programme operators
2. Glossary
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5. Other existing PCR

1. PCR use within other programme operators

Carbon Footprint Italy believes in the importance of sharing different existing experiences, and considers the different Programme Operators as organizations that cooperate for a global climate transition.

CFI maintains the copyright of the document to ensure that it is possible to publish, update when necessary, and available to all organisations to develop and register CFPs. Stakeholders participating in PCR development should be acknowledged in the final document and on the website.

This PCR can be openly used by each CFP or EPD Programme Operator, if the original source of the know-how is mentioned (namely, the "PCR 2021-0001", developed by Carbon Footprint Italy).

2. Glossary

CO_2	Carbon dioxide
CPC	Central product classification
CFI	Carbon Footprint Italy
CFP	Carbon Footprint of Products
GHG	Greenhouse gases
ISO	International Organization for Standardization
kg	kilogram
LCA	Life cycle assessment
PCR	Product Category Rules
UN	United Nations

3. Bibliography

ISO (2000), ISO 14020:2000, Environmental labels and declarations – General principles
ISO (2017), ISO 14026:2017, Environmental labels and declarations – Principles, requirements and guidelines for communication of footprint information
ISO (2006b), ISO 14040:2006, Environmental management – Life cycle assessment – Principles and framework
ISO (2006c), ISO 14044: 2006, Environmental management – Life cycle assessment – Requirements and guidelines

ISO (2018), ISO 14067:2018, Greenhouse gases – Carbon footprint of products – Requirements and guidelines for quantification
PCR Basic Module for "Transport Equipment", UN CPC 49, v.3.02, published on 2019-07-26
PCR 2005:15 for "Road Transport Service of freight of foof products and meals", UN CPC 6511, v.4.11, valid until 2022-02-15.
PQ 04 PCR Development, Carbon Footprint Italy

4. Underlying studies

The methodological choices made during the development of this PCR (functional unit/ declared unit, system boundary, allocation methods, impact categories, data quality rules, etc.) in this PCR were primarily based on the following underlying studies:

- *CFP Systematic Approach of the transport services offered by OLG International SA,* Aequilibria Srl – SB, 2021
- *Convenzione tra il Ministero dell'Ambiente e della Tutela del Territorio e del Mare ed il Politecnico di Milano del 24 marzo 2014 per l'attuazione delle metodologie di calcolo dell'impronta di carbonio e di compensazione delle emissioni di CO2 di EXPO 2015 - D.1.2 Approfondimento metodologico: viaggi,* Dipartimento di Energia, Politecnico di Milano, 2014
- *Comparative Life Cycle Assessment of road and multimodal transportation options - a case study of copper wood project*, Sumanth Kalluri, Michigan Technological University, 2016
- *Cost and environmental impacts of a mixed fleet of vehicles*, Fraselle et al., 2021

5. Other existing PCR

As part of the development of this PCR, existing PCRs were considered in order to avoid overlaps in scope. The existence of such documents was checked in the public PCR listings of the following programmes based on ISO 14025 or similar:

- International EPD® System. www.environdec.com

The following existing PCRs were identified:

PCR name	Programme	Registration number	Scope	Motivation for exclusion
ROAD TRANSPORT SERVICES OF FREIGHT OF FOOD: PRODUCTS AND MEALS	International EPD® System	2005:15	UN CPC 6511, transport of food products or meals	The scope is limited to the transport of food products and meals. The present PCR covers a broader scope, namely the transport of general cargo products. The scope does not include the transport of food products and meals, so that there is no overlapping between the scopes of the two PCRs.
ROLLING STOCK	International EPD® System	2009:05	UN CPC 495, rolling stocks	The scope is limited to rail transport, while the need is to provide a comprehensive option for intermodal transportation. In addition, the core process is focused on the train construction, and not on the transport services (this is confirmed by the fact that the UN CPC code is different from the one proposed in the present PCR).
PASSENGER COMMERCIAL AEROPLANES	International EPD® System	2015:02	UN CPC 49623, Aeroplanes and other powered aircraft of an unladen weight exceeding 2000 kg	The scope of the PCR covers on the transport of passengers by means of commercial airplanes. The present PCR covers, instead, the transportation of freight through multiple vehicles.
BUSINESS JETS	International EPD® System	2018:09	UN CPC 49623, Aeroplanes and other powered aircraft of an unladen weight exceeding 2000 kg	The PCR is focused on business flights, and it doesn't thus cover the same scope as the present PCR.

Programme operator:	**Carbon Footprint Italy** P.le Martiri delle Foibe 5, 30175 Venezia Marghera, Venezia, Italy Website: www.carbonfootprintitaly.it/en/ E-mail: info@carbonfootprintitaly.it
Product category:	Transport services of general cargo
Registration number and version:	2021-0001, version 1.0
CPC classification code:	6511, 6512, 6521, 6522, 6531
Geographical scope:	Global
PCR moderator:	Marta Mancin, Aequilibria Srl – SB, mmancin@aequilibria.com
PCR Committee:	OLG International SA; Aequilibria Srl – SB
PCR Review panel	The Technical-Scientific Committee of Carbon Footprint Italy. The review panel may be contacted via info@carbonfootprintitaly.it
PCR initiation phase:	2021-06-29
Open consultation:	2021-08-12 – 2021-09-12
Publication:	2021-11-18
Valid until:	2026-11-17