Passion for packaging

Rigid thermoformed PET punnet

for heat sealing packaging of fresh fruit & vegetable

Environmental Product Declaration

EPD®

THE INTERNATIONAL EPD® SYSTEM

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Geographical scope	Global	Document in accordance with ISO 14025	

An EPD should provide current information and may be updated if conditions change.
The stated validity is therefore subject to the continued registration and publication at www.environdec.com.

1. COMPANY INFORMATION

1a. Description of the organisation

Established in 1962, ILIP is a key member of the ILPA Group, which also controls the companies MP3, specialised in the production of intermediate plastic films and sheets and AMP Recycling, specialized in post-consumer PET bottles recycling. ILIP is a leading European plastic and bioplastic raw materials converter operating with three business units, Foodservice Packaging, Fresh Produce Packaging, Fresh Food Packaging, and serving different market segments such as retail, foodservice and the agri-food industry, in over 58 countries on the 5 continents.

With its thermoformed plastic and bioplastic food packaging solutions ILIP aims to add value to the packaged product, extend its shelf life, offer to its clients tailor-made and certified packaging and ultimately improve the consumer experience.

1b. ILIP and the ILPA Group's closed loop of recycled PET

In line with ILIP's Sustainability Policy and a pioneer in the vision of a circular economy for plastic packaging, in 2012 ILPA Group made the strategic acquisition of AMP Recycling in order to vertically integrate the recycling of post-consumer PET in its supply chain.
ILPA Group is among the very few European certified plastic recyclers, converters and packaging manufacturers to boast this integration[1] and since then ILPA Group can ensure total direct intra-group closed loop and control on PET recycling, including all the different production stages: from post-consumer material selection, to the washing, grinding, extruding and thermoforming operations required to produce new food packaging containing R-PET. Thanks to the EFSA Scientific Opinion[2] on the safety assessment of the process "'ILPA", based on Starlinger Decon technology, ILPA Group can produce food grade R-PET to be used in the production of ILIP packaging and guarantees the food safety and compliance to the relevant EU Regulations. Furthermore, ILPA Group actively participates to Italian and European working groups and trials aimed to achieve a tray-to-tray recycling[3].

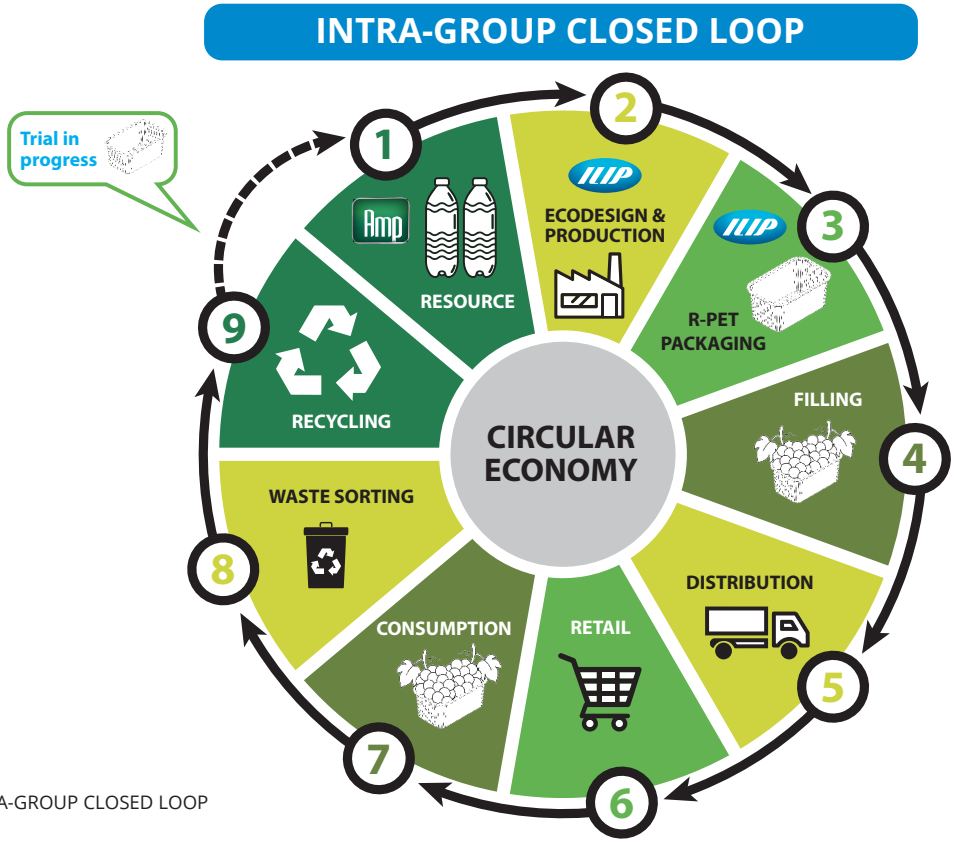


Figure 1 INTRA-GROUP CLOSED LOOP

1 https://www.eucertplast.eu/certified-recyclers
2 https://www.efsa.europa.eu/en/efsajournal/pub/3633
3 https://www.petcore-europe.org/working-groups/working-group-recycling-pet-thermoforms.html

ILPA GROUP'S PET RECYCLING AT A GLANCE

- Intra-group closed loop and control on PET recycling
- Vertically integrated R-PET supply chain, from post-consumer bottles to new food packaging, guaranteeing origin and complete traceability complying to Reg. 282/2008
- EFSA approved production of food grade R-PET (EU register No RECYC105)
- Possibility to increase the recyclate content of its packaging up to 100%
- Example of a Circular Economy
- Promoting the recycling culture towards an accomplished Circular Economy thanks to its participation to Italian and European working groups and trials aimed to achieve a tray-to-tray recycling

Because of this intra-group vertical integration and closed loop approach, in order not to burden the waste management of Emilia Romagna Region, accordingly to the Regional Council Resolution n°2260/2016 and in compliance with article n°180 of Legislative Decree 152/2006 "Prevenzione della produzione di rifiuti" (Waste Production Prevention), ILPA Group decided to follow the guidelines of Ministerial Decree n°264 dated 13/10/2016 and get the production scraps qualified as by-products rather than production waste in compliance also with article n°184-bis of Legislative Decree 152/2006 .
The Emilia Romagna Region, with its Regional Council Resolution DPG/2019/23958 dated 19/12/2019, has approved the technical data sheet presented by ILPA. In this way, all the scraps from the production of articles made also from post-consumer recycled PET have been considered by-products and reused in a closed loop in its production process, thus avoiding the use of new virgin raw materials and triggering a circular and virtuous cycle based on the concepts of waste reduction and non-renewable resources use prevention.
From this point of view, the item 22061, subject of the EPD's first edition and current update; and 22544 its eco-design evolution and item of the same punnets family, the subject of this EPD, are made from recycled PET and intra-group closed loop by-products that contain only a residual quantity of virgin PET.

1c. Market needs and ILIP Sustainability policy

Improving food packaging sustainability, considered in its broadest sense and including food waste reduction, today is the priority of the whole food and packaging value chain.

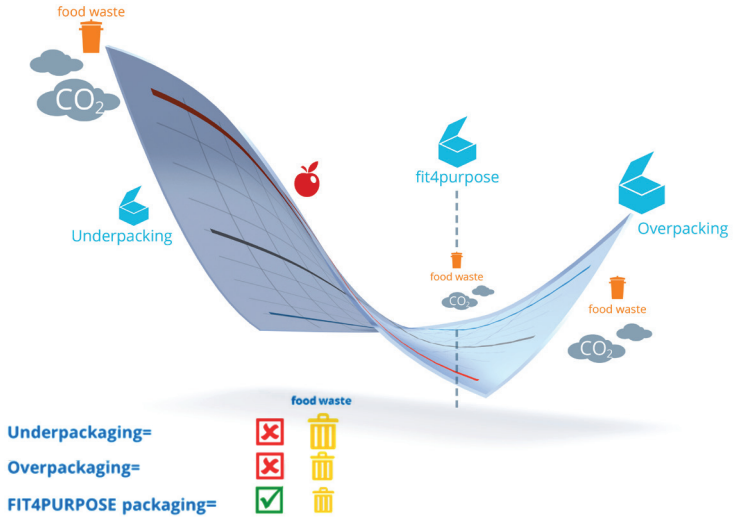


Figure 2 FIT4PURPOSE
https://www.ilip.it/en/sustainability/#reduce

As one of the world's leading supplier of fresh produce packaging, with its almost sixty year experience in food packaging, sustainability and circular economy, ILIP can support this value chain targeting this priority and provides a global answer to the most responsive and responsible customers worldwide.

In its Sustainability Policy[4], set forth in 2019 with the publication of its Sustainability Pledge, ILIP pursues a holistic approach to sustainability and packaging the Fit4Purpose approach, a balance between packaging weight, performance, intended use and food protection, where "packaging sustainability" is intended in a broader sense, also including **food waste reduction**. For this reason,

4 https://www.ilip.it/en/sustainability/#sustainability

since 2012, ILIP is a proud member of Save Food, the initiative launched by F.A.O. and Interpack-Messe Düsseldorf to tackle food losses and waste where packaging is key to approach this issue.

ILIP's **Sustainability policy** is based on three R's, **three pillars** that stand for: Reduction in the packaging weight without compromising the safety and shelf life of the packaged products, thus reducing also food waste; **Recycling** in a closed loop system thanks to I.L.P.A. Group vertical integration of the R-PET supply chain; **Renewable resources** such as bioplastics.

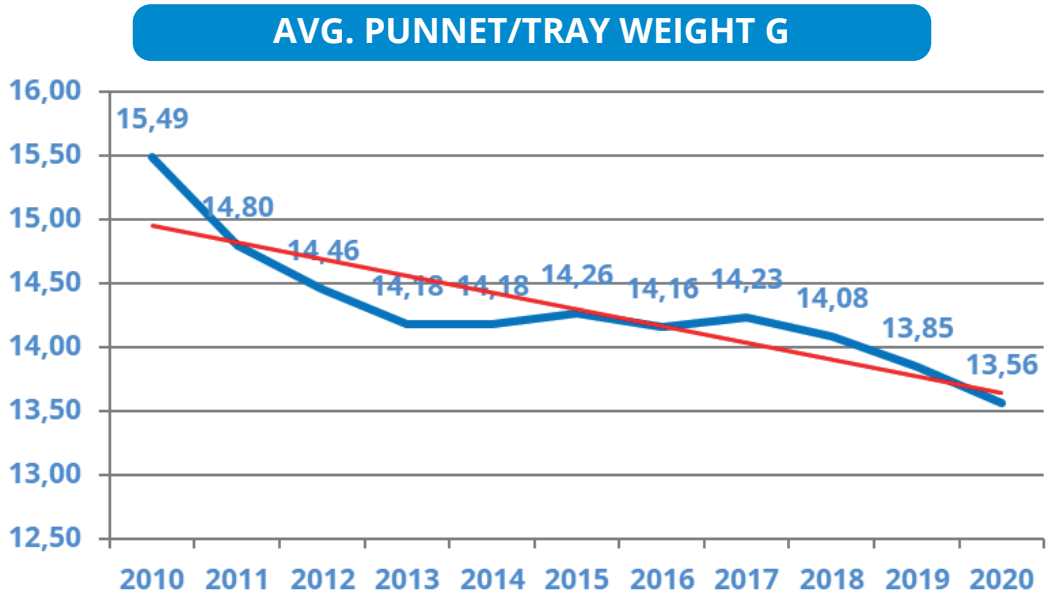


Figure 3 AVERAGE PUNNET WEIGHT/g;
Source: data processing from Ilip ERP

As explicated in Figure 3, which shows the average weight reduction of ILIP packaging from 2010 to 2020, while lightweighting for eco-design is something that ILIP has been pursuing for a decade with its Fit4Purpose packaging approach, now in its sustainability strategy it is focusing more on eco-design for an accomplished closed loop recyclability and on product's certifications according to programme for Type III environmental declarations.

One important step towards the achievement of an enhanced environmental sustainability of ILIP's products, is to perform Life Cycle Assessment Studies on selected products, not only to provide approved product data and to share them with the customer but also to identify **optimization potential**. By adopting the LCA and the relevant certified EPD approach in its marketing strategy and through a sincere and effective stakeholder engagement, ILIP provides the players of the fresh produce packaging value chain, growers, packers, retailers, with the tools to meet the above mentioned market needs and trends, such as:

- certified information on the real environmental performance of a product,
- environmental footprint data related to the Ecodesign of a product range or custom-tailored products
- environmental footprint data on product constituents and contents giving a specific packaging system
- the possibility for its customers to promote their environmental credentials, improve their environmental performance and provide sound environmental information by offering certified products with type III environmental declaration to "green-minded" or "eco-conscious" consumers.

The B40RPET85FP – 22061 and its natural evolution, item B40RPET85ECO - 22544, subject of this EPD, were designed taking into consideration all the above-mentioned drivers, with the aim to match market, regulators and customer's needs and to bring these products to a higher sustainability level targeting the maximum recyclate content of 100% thanks to our already installed production capability.
Therefore, the concept of an EPD serves the purpose of an eco-aware fresh produce punnet design.
The company's vision is to ensure an accomplished transition to a **circular economy** for plastic packaging from the current linear format, which is based only on finite fossil resources.

The timeline (figure 4) depicts ILIP's commitment to sustainability, the path, started almost 20 years ago, towards more sustainable packaging and better environmental credentials.

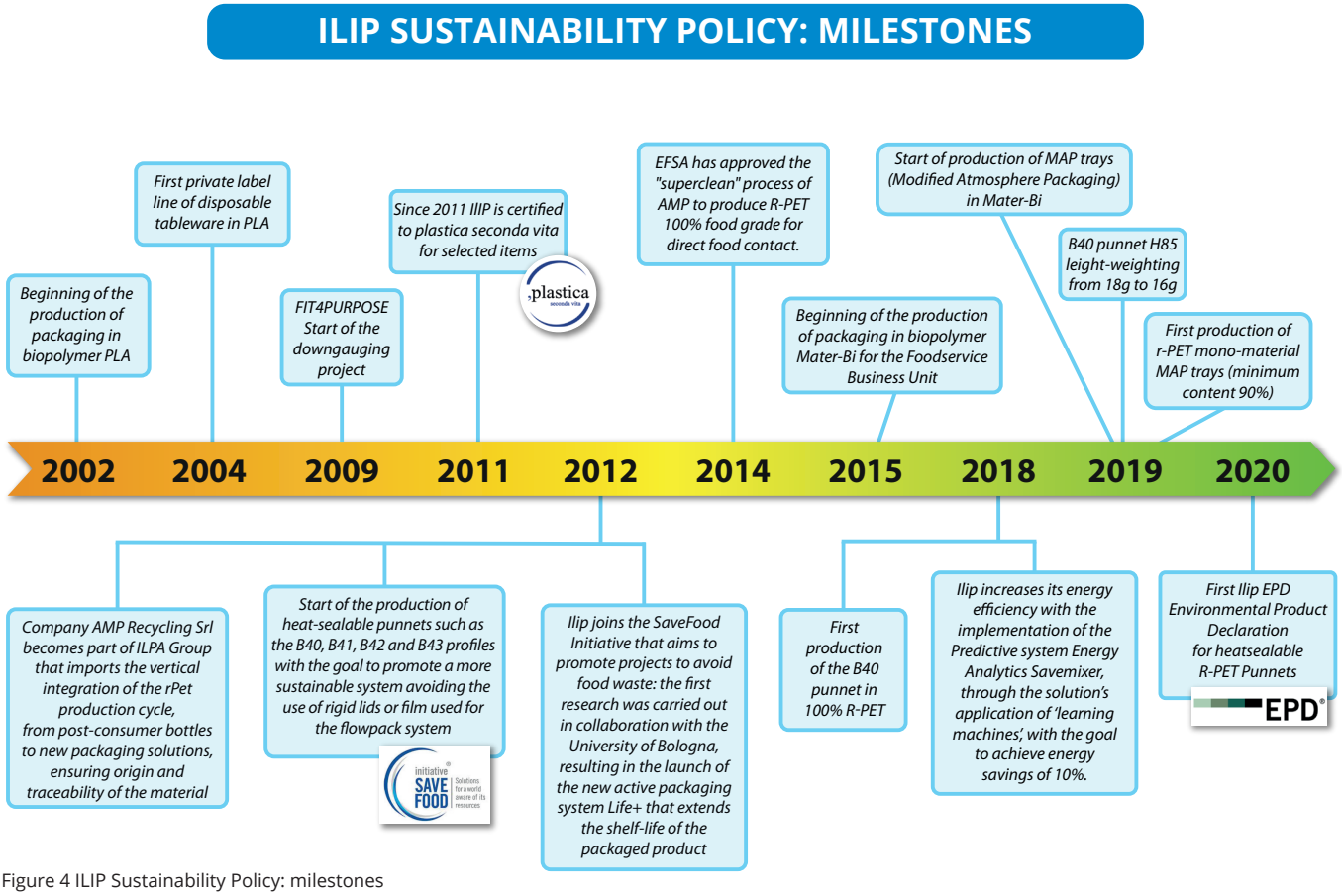


Figure 4 ILIP Sustainability Policy: milestones

With reference to product certifications, in order to guarantee the standardisation of quality, safety and operational criteria, ensure the fulfilment of the legal obligations and provide protection for the end consumer, all the items produced by ILIP, including the item subject of this EPD, are BRC (Global Standard for Packaging and Packaging Materials Issue 5: July 2015; Packaging Category: High hygiene certified)[5].

Further information about ILIP commitment to environmental sustainability and the recycling process, please visit our web site or follow the below mentioned links:

https://www.ilip.it/en/sustainability/ https://www.ilip.it/en/video/

5 https://www.ilip.it/wp-content/uploads/2020/03/Signed-Cert-35186-2008-ABRC-IOP-ITA-ACCREDIA_Rev11.pdf

2. PRODUCT INFORMATION

2a. Product description

Product Name	B40 rigid thermoformed PET punnet with top film suitable for the heat-sealing packaging of fresh fruit & vegetable specifically designed for automated tray sealing packing lines
Product classification	The article examined in this study has a commercial function and falls into the category of "consumer packaging" since it forms, once filled and sealed, a sales unit for the final consumer at the Point Of Sale (POS).
Product Identification	B40RPET85FP – 22061, 18g and B40RPET85ECO – 22544, 16g made from 92% R-PET, 8% PET(*); (*)= see the detailed composition in chapter 3a; see detailed information on 22544 in chapter XYZ
Application & intended use	These fresh produce punnets are generally used for the packaging of approx. 500g of strawberries, grapes, cherries, stone fruits and soft fruits. Once fil- led and packed, the punnets is are a sales unit at the POS. These punnets not only protect the packed product but also can be used, along with specific com- ponents such as film and pad, to extend shelf life of fresh produce during transport and storing on the POS and at consumers' houses. The punnets can be closed in different ways, with a heat sealable film, but also with flow wrapping film or with rigid thermoformed plastic lids, depending on the packed fruit and the necessity of the customer. The closure option foreseen for the punnets object of this EPD is the heat-sealable film.

2b. LCA information

This environmental product declaration – EPD – reports the quantification of environmental data for the items 22061 and 22544 belonging to the B40 range of rigid thermoformed PET punnets suitable for the heat-sealing packaging of fresh produce. In the reference year the B40 range has been the bestselling range in terms of turn-over, number of units, volumes in tonnes and boxes of the whole (domestic market + export) ILIP Fresh Produce Packaging Business Unit.
For this EPD we have selected the 2018 best-selling item of the B40 range, the B40RPET85FP – 22061 of 18g, to evaluate its environmental footprint. The present EPD updated version takes into consideration item code 22061 as well as item B40RPET85ECO – 22544 of 16g, which is the eco-design evolution of the former and that took over it as the 2019 best-selling item of the B40 range.

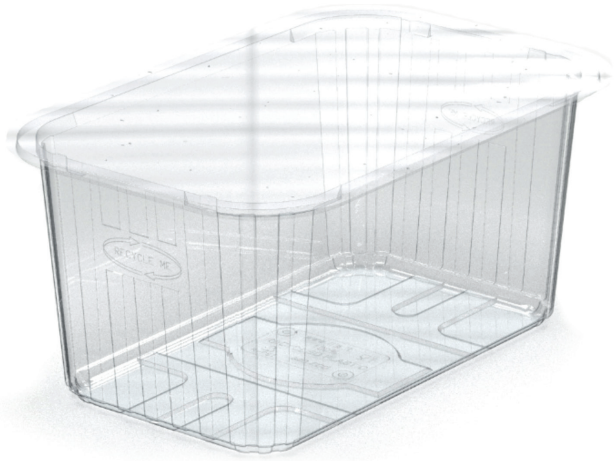
The ILIP B40 range of fresh produce punnets is composed of many items. As it is mainly used with heat-sealing packaging system, the main and common feature of this range is the sealing footprint given by the sealing rims dimensions in the upper part of the punnets. Therefore, all the B40 items have the same sizes, 184x117mm, and by changing their depths, it is possible to pack different fresh produce categories and weights per pack, such as from 250g up to 750g or even more.

The ILIP B40 range is the most requested and promising punnet range of the Fresh Produce Packaging Business Unit for this kind of applications and ILIP is investing on it in order to improve the production capacity, but also in order to improve its technical and environmental performance.

According to the PCR Packaging, as the product selected for this EPD is considered a consumer packaging, a cradle-to-grave LCA has been performed with a functional unit. In its life cycle impact assessment also the heat sealable film and the packing processes on a heat-sealing machine have been considered.
The top film, whose thickness is 0.025mm, is made from virgin PET.
The heat-sealing process yield has been calculated considering a standard tray sealing machine with a 4-cavity tool considered as representative of the machines installed at the pack houses of the packers using the concerned punnet[6].

6 The data for modelling the impact assessment of the packing process has been provided by an experienced professional of the packaging sector. A standard, medium-output tray sealer was considered, as representative of the machines used by the packers of the fresh produce market, such as ILPRA FOODPACK SPEEDY, ProSeal GT0, TopLid of Fabbri Group.

2c. Functional unit



FUNCTIONAL UNIT	1 unit of B40RPET85FP – 22061 and B40RPET85ECO – 22544 in PET (polyethylene terephthalate) with PET top film. The reference flow associated with the functional unit is the weight of the article (18g for item 22061 and 16g for item 22544).
MATERIAL	PET
WEIGHT	18g (22061) and 16g (22544)
INTERNAL VOLUME	0.00176m^3
CAPACITY	approx. 0.500kg of fresh produce
SIZES	184mm x 117mm - h85mm
PACKAGING SYSTEM	HEAT SEALING – the B40 was specifically designed to run on automated tray sealing packing lines
OTHER CHARACTERISTICS	Different voluntary and compulsory logotypes are embossed onto the bottom of the punnet in order to provide users and consumers with relevant information about: • identification of the manufacturer, a first step to communication and traceability • compulsory symbol of conformity for materials that come into contact with foodstuff • type of raw material and recycling category as a Type II environmental labelling • identification of the product
CONFORMITY DECLARATION FOR THE MATERIALS AND OBJECTS INTENDED TO COME INTO CONTACT WITH FOODSTUFF	IILIP declares that the a.m. punnets are suitable for coming into contact with the following foodstuff: **Fresh or chilled whole fruits and vegetables – fresh fruits and vegetables peeled or cut** – at room temperature or below, and complies with all the regulations in force, with particular reference to the following European Community legislation: Reg. (EC) no. 1935/2004; Reg. (EU) no. 10/2011; Reg. (EC) no. 282/2008
COMPRESSION AND DESTACKING VALUES	Compression and stacking values required by the reference PCR are not shown in the table because they are not considered relevant by the market/customers to define the function of the product subject of this EPD. Product's compliance to technical sheets is checked by weighing and measuring samples for each production batch, by the shift supervisor during thermoforming process.

2d. Methodology of calculation

The applied LCA (Life Cycle Assessment) methodology complies with ISO 14025: 2006, ISO 14040:2006/Amd 1:2020, ISO 14044:2006/Amd 2:2020 and the instructions of the General Program Instructions For Environmental Product Declarations, EPD, Version 3.01 of 2019-09- 18 (www.environdec.com).

DATABASE(s) and LCA SOFTWARE USED	For the life cycle analysis, the SimaPro v9 software and the Ecoinvent v3.5 database have been used. Primary data have been used for the washing, selection, decontamination processes and flake reduction of bottle bales, extrusion of the R-PET semi-finished product in reels, thermoforming and distribution of the punnet, acquired directly in the production facilities of A.M.P. Recycling Srl and ILIP Srl.
DESCRIPTION OF SYSTEM BOUNDARIES	In accordance with the reference PCR, the system boundaries include all the phases of the life cycle of the products considered from the cradle to the grave (LCA cradle-to-grave).
EXCLUDED LIFECYCLE STAGES	The life cycle phases included in the study are those indicated in table 2, paragraph 4.3.1 of the PCR, except for phases A5, B3, B4 and B5. The fact is that phase A5 for the product subject of the study is not present, punnet thermoforming is made in-house and is a Core production process (A3). As the product subject of the study is not reusable, phases B3, B4 and B5 don't apply. Punnet filling operations with fruits are made manually at customer's premise and their value is 0, whilst, according to the PCR, in the study, the heat-sealing packing process with a lidding PET film has been considered. Other impacts linked to filling operations are below the cut-off threshold.
CUT OFF RULES	As provided by the reference PCR, a cut-off lower than 1% in terms of environmental relevance has been considered.
Product Category Rules	PCR 2019:13; Version 1.0; Packaging - CPC: MULTIPLE CPC
Product category classification UN CPC vers. 2.1	36490 Packaging products of plastics Other articles for the conveyance or packaging of goods, of plastics; stoppers, lids, caps and other closures, made of plastic
TIME REPRESENTATIVENESS	June 1st 2019 – May 31st, 2020
NAME & LOCATION OF THE THERMOFORMING PRODUCTION SITE	ILIP Srl - Via Castelfranco 52 - 40053 Valsamoggia (BO), Italy Tel.: +39 051 6715411 - info@ilip.it – www.ilip.it

DATA QUALITY

Thanks to its PET recycling vertical integration, ILPA Group can ensure the total control and full traceability of all its R-PET production and the quality of the primary data used for this EPD.
Therefore, besides the specific (or primary) data, as requested by the PCR, considered for the core processes related to thermoforming operations, raw material transportation, waste treatment and maintenance, specific (or primary) data are being used also for upstream processes related to washing, selection and grinding to flakes of the bottles to get R-PET, to the decontamination process to get R-PET suitable to direct food contact and to the sheet extrusion used as raw material for the thermoforming process.

SYSTEM DIAGRAM

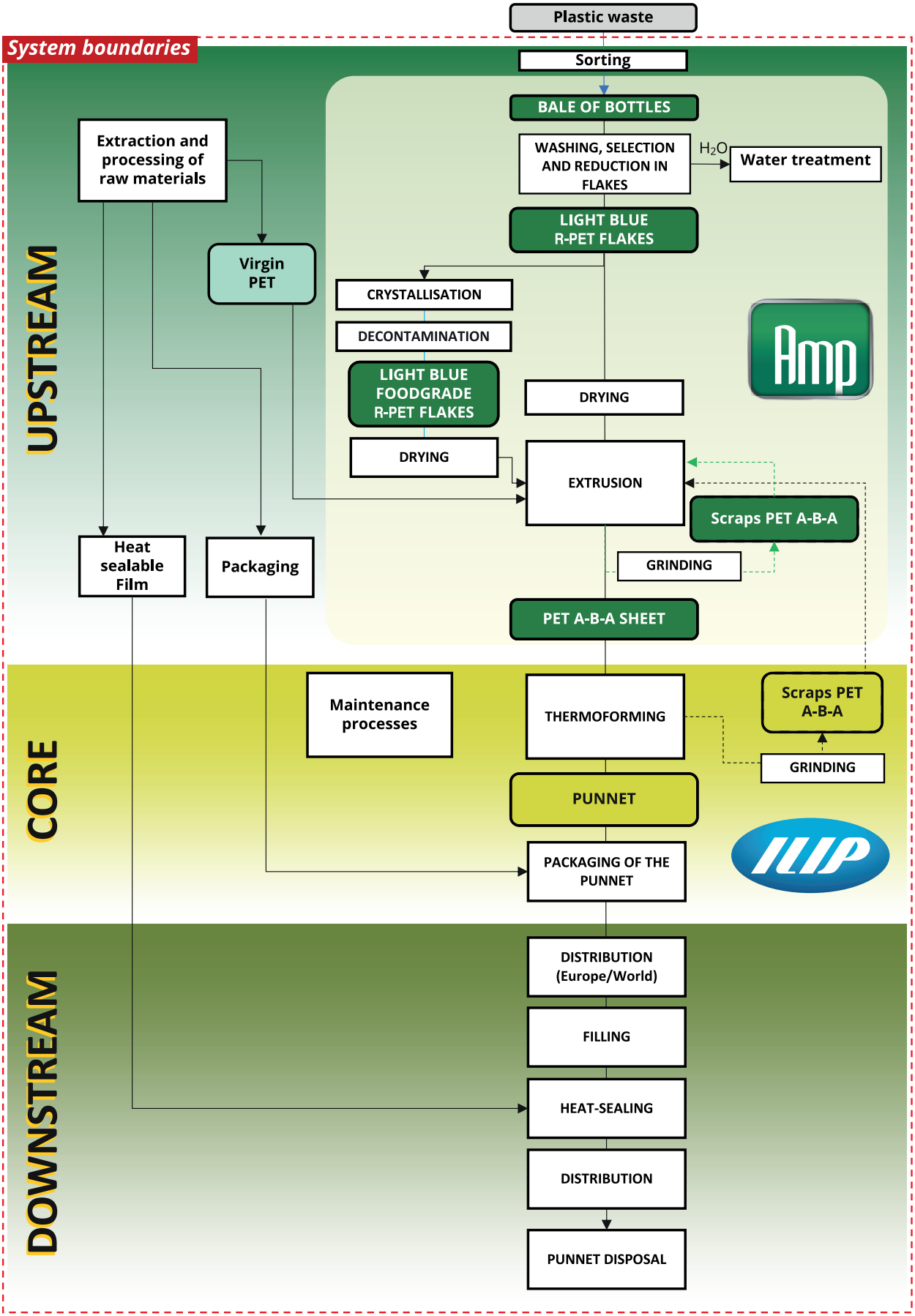


Figure 5 SYSTEM DIAGRAM

2e. The Production Process

The product declared as functional unit is produced at Ilip's production site located in 40053 Valsamogggia (BO), Italy, Via Castelfranco, 52 and made by means of extrusion and thermoforming technology, which consists of the following phases:

EXTRUSION: transformation process of a plastic material suitable for production of films and sheets;

CALENDERING: the process is carried out by calendering rolls that cool down the sheet after extrusion and determine its flatness and thickness gauging;

THERMOFORMING: the process involves heating a plastic sheet until soft and modelling it on mould and counter-mould.
The residual sheet skeleton after the product forming is called scrap.

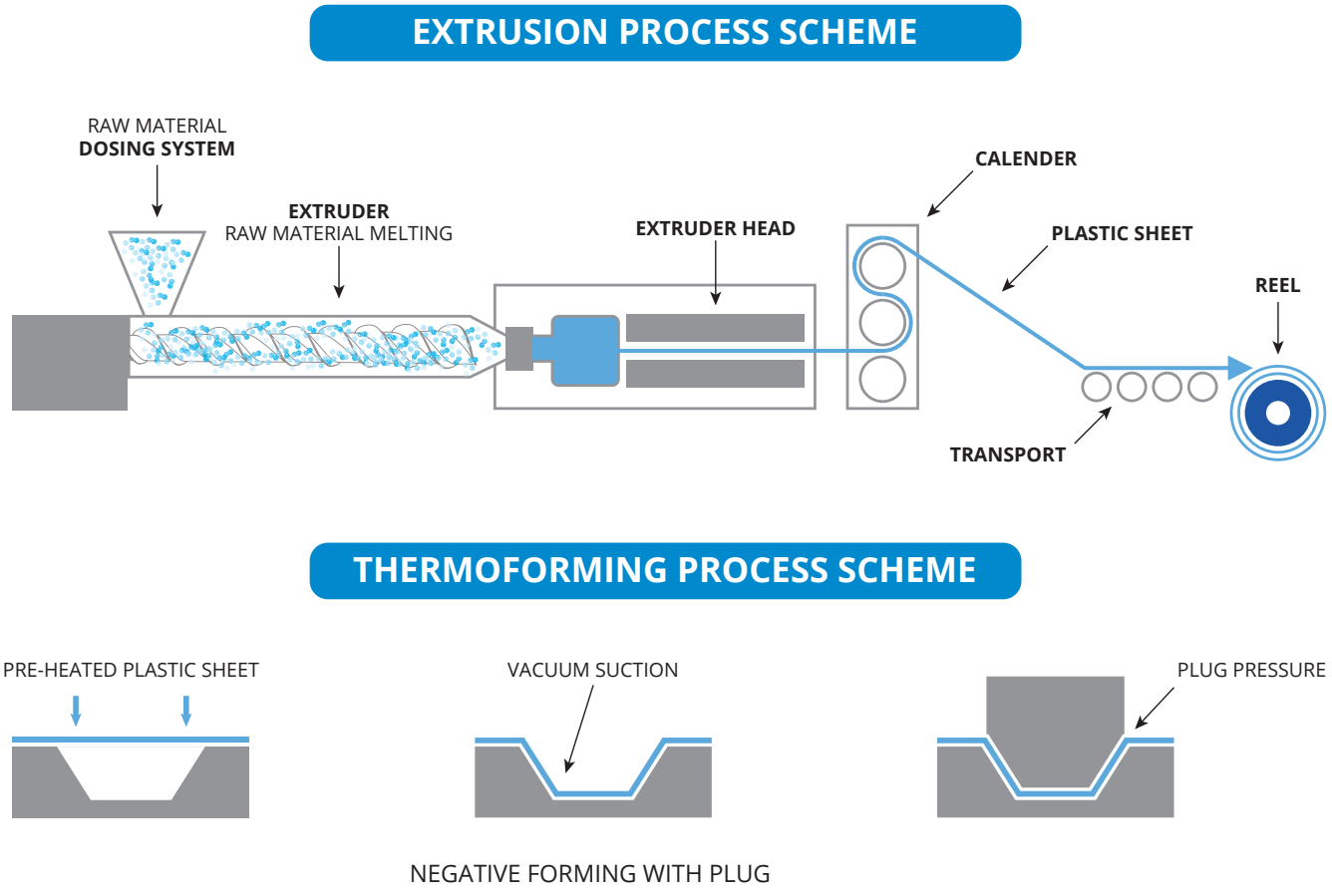


Figure 6 Production process

3. CONTENT DECLARATION

CONTENT DECLARATION	B40RPET85FP – 22061, 18g and and B40RPET85ECO – 22544, 16g made from 92% R-PET, 8% PET, additives: N/A

3a. Origin of recycled materials

The punnets presented in this EPD are made up of the following recyclate content:

B40RPET85FP – 22061 B40RPET85ECO – 22544	Sheet with A/B/A structure, where "B" core layer (80% w/w) is made from 50% post-consumer recycled PET and from 50% internal recovery of production scraps from extrusion and thermoforming processes. "A" outer layers (20% w/w) are made from food grade post-consumer recycled PET, suitable for direct food contact and acting as functional barriers.
REACH DECLARATION	Compliance to Regulation (EC) no. 1907/2006 of 18/12/2006 (REACH) and to Regulation (EC) no. 1272/2008 of 16/12/2018 (CLP): the materials used for the punnet item no. 22061 don't contain • Restricted substances designated in Annex XVII of REACH Regulation, • substances designated in REACH candidate list, • substances listed in Annex XIV of REACH Regulation
PRODUCTION SITE	ILIP Srl Via Castelfranco 52 - 40053 Valsamoggia (BO), Italy Tel.: +39 051 6715411 - info@ilip.it – www.ilip.it

Thanks to its PET recycling vertical integration, ILPA Group can ensure the total control and full traceability of all its R-PET production. Therefore, according also to the EFSA Scientific Opinion on the safety assessment of the process "'ILPA" (EU register NO. RECYC105)[7], based on Starlinger Decon technology used to recycle post-consumer PET into food contact materials and where the amount of non-food containers in the input materials is below 5%, ILIP guarantees the food safety and compliance to the relevant EU Regulations of all its R-PET food packaging production.

3b. Packaging

DISTRIBUTION PACKAGING	The punnet is packed in cardboard boxes made from recycled paper (900 pieces per box) and 18 boxes are stacked on a wooden pallet. The shipping unit is then covered with an LDPE stretch film.

7 EFSA CEF Panel (EFSA Panel on Food Contact Materials, Enzymes, Flavourings and Processing Aids), 2014. Scientific Opinion on the safety assessment of the process "ILPA", based on Starlinger Decon technology used to recycle post-consumer PET into food contact materials. EFSA Journal 2014;12(4):3633, 14 pp.

4. ENVIRONMENTAL PERFORMANCE

In the following tables, the results, related to the impacts calculated for the whole life cycle of 1 punnet B40RPET-85FP – 22061 and 1 punnet B40RPET85ECO – 22544, are set forth in absolute values of the impact categories, according to the standard unit of measurement of the specific characterisation method.
For the convenience of the different stakeholders, which can focus on different phases, the environmental performance is presented to the gate, considering just upstream and core stages, and to the grave as well (column "Total") considering also the downstream stage.
The distribution of the punnet to the filling sites has been calculated from primary data, considering the weighted average of the transport to the most representative European and Overseas sites.
For the distribution of the punnet once filled with fruits, refrigerated trucks have been considered from European sites, whilst refrigerated containers have been considered from Overseas sites.
The consumer packaging is delivered empty overseas to be filled with fresh produce and returns back to Europe where it is consumed and disposed of.
The end of life scenario considered is the average European data, reported in the Plastics Europe report referring to 2018 data[8]: 42% recycling, 39.5% energy recovery, 18.5% landfill.

4a. Potential Environmental Impact

PUNNET B40RPET85FP – 22061

PARAMETER		UNIT	Upstream	Core	TOTAL at gate	Downstream	TOTAL
Global warming potential (GWP)	Fossil	kg CO_2 eq.	$3{,}39*10^{-2}$	$4{,}63*10^{-3}$	$3{,}86*10^{-2}$	$3{,}17*10^{-2}$	$7{,}03*10^{-2}$
	Biogenic	kg CO_2 eq.	$1{,}15*10^{-3}$	$4{,}32*10^{-5}$	$1{,}19*10^{-3}$	$5{,}42*10^{-6}$	$1{,}20*10^{-3}$
	Land use and land transformation	kg CO_2 eq.	$2{,}35*10^{-5}$	$8{,}66*10^{-7}$	$2{,}44*10^{-5}$	$4{,}98*10^{-6}$	$2{,}94*10^{-5}$
	TOTAL	kg CO_2 eq.	$3{,}51*10^{-2}$	$4{,}68*10^{-3}$	$3{,}98*10^{-2}$	$3{,}17*10^{-2}$	$7{,}15*10^{-2}$
Acidification potential (AP)		kg SO_2 eq.	$1{,}19*10^{-4}$	$1{,}74*10^{-5}$	$1{,}36*10^{-4}$	$7{,}38*10^{-5}$	$2{,}10*10^{-4}$
Eutrophication potential (EP)		kg PO_4^{3-} eq.	$6{,}70*10^{-5}$	$7{,}23*10^{-6}$	$7{,}42*10^{-5}$	$3{,}19*10^{-5}$	$1{,}06*10^{-4}$
Formation potential of tropospheric ozone (POCP)		kg NMVOC eq.	$9{,}42*10^{-5}$	$1{,}25*10^{-5}$	$1{,}07*10^{-4}$	$7{,}88*10^{-5}$	$1{,}86*10^{-4}$
Abiotic depletion potential – Elements		kg Sb eq.	$6{,}49*10^{-8}$	$6{,}45*10^{-9}$	$7{,}14*10^{-8}$	$4{,}67*10^{-8}$	$1{,}18*10^{-7}$
Abiotic depletion potential Fossil resources		MJ, net calorific value	0,443	0,065	0,508	0,205	0,712
Water scarcity potential		m3 eq.	$8{,}32*10^{-3}$	$9{,}45*10^{-4}$	$9{,}27*10^{-3}$	$2{,}34*10^{-3}$	$1{,}16*10^{-2}$

8 https://www.plasticseurope.org/it/resources/publications/1804-plastics-facts-2019

PUNNET B40RPET85ECOFP – 22544

PARAMETER		UNIT	Upstream	Core	TOTAL at gate	Downstream	TOTAL
Global warming potential (GWP)	Fossil	kg CO_2 eq.	3,30*10^{-2}	4,58*10^{-3}	3,76*10^{-2}	9,89*10^{-3}	4,75*10^{-2}
	Biogenic	kg CO_2 eq.	1,08*10^{-3}	3,86*10^{-5}	1,12*10^{-3}	4,86*10^{-6}	1,12*10^{-3}
	Land use and land transformation	kg CO_2 eq.	2,34*10^{-5}	8,54*10^{-7}	2,42*10^{-5}	4,06*10^{-6}	2,83*10^{-5}
	TOTAL	kg CO_2 eq.	3,41*10^{-2}	4,62*10^{-3}	3,88*10^{-2}	9,90*10^{-3}	4,87*10^{-2}
Acidification potential (AP)		kg SO_2 eq.	1,17*10^{-4}	1,74*10^{-5}	1,34*10^{-4}	1,06*10^{-4}	2,39*10^{-4}
Eutrophication potential (EP)		kg PO_4^{3-} eq.	6,55*10^{-5}	7,09*10^{-6}	7,25*10^{-5}	1,53*10^{-5}	8,79*10^{-5}
Formation potential of tropospheric ozone (POCP)		kg NMVOC eq.	9,06*10^{-5}	1,28*10^{-5}	1,03*10^{-4}	9,3*10^{-5}	1,96*10^{-4}
Abiotic depletion potential – Elements		kg Sb eq.	6,12*10^{-8}	6,63*10^{-9}	6,79*10^{-8}	2,71*10^{-8}	9,5*10^{-8}
Abiotic depletion potential Fossil resources		MJ, net calorific value	0,430	0,064	0,494	0,136	0,630
Water scarcity potential		m3 eq.	7,86*10^{-3}	9,13*10^{-4}	8,77*10^{-3}	8,99*10^{-4}	9,67*10^{-3}

4b. Use of resources

PUNNET B40RPET85FP – 22061

PARAMETER		UNIT	Upstream	Core	TOTAL at gate	Downstream	TOTAL
Primary energy resources – Renewable	Use as energy carrier	MJ, net calorific value	7,93*10^{-2}	6,02*10^{-3}	8,53*10^{-2}	4,47*10^{-3}	8,98*10^{-2}
	Used as raw materials	MJ, net calorific value	0	0	0	0	0
	TOTAL	MJ, net calorific value	7,93*10^{-2}	6,02*10^{-3}	8,53*10^{-2}	4,47*10^{-3}	8,98*10^{-2}
Primary energy resources – Non-renewable	Use as energy carrier	MJ, net calorific value	0,548	0,083	0,631	0,227	0,858
	Used as raw materials	MJ, net calorific value	0	0	0	0	0
	TOTAL	MJ, net calorific value	0,548	0,083	0,631	0,227	0,858
Secondary material		kg	0,017	0	0,017	0	0,017
Renewable secondary fuels		MJ, net calorific value	0	0	0	0	0
Non-renewable secondary fuels		MJ, net calorific value	0	0	0	0	0
Net use of fresh water		m3	2,37*10^{-4}	2,51*10^{-5}	2,62*10^{-4}	6,37*10^{-5}	3,26*10^{-4}

PUNNET B40RPET85ECOFP– 22544

PARAMETER		UNIT	Upstream	Core	TOTAL at gate	Downstream	TOTAL
Primary energy resources – Renewable	Use as energy carrier	MJ, net calorific value	$7,99*10^{-2}$	$5,70*10^{-3}$	$8,56*10^{-2}$	$4,10*10^{-3}$	$8,968*10^{-2}$
	Used as raw materials	MJ, net calorific value	0	0	0	0	0
	TOTAL	MJ, net calorific value	$7,99*10^{-2}$	$5,70*10^{-3}$	$8,56*10^{-2}$	$4,10*10^{-3}$	$8,97*10^{-2}$
Primary energy resources – Non-renewable	Use as energy carrier	MJ, net calorific value	0,535	0,082	0,617	0,154	0,771
	Used as raw materials	MJ, net calorific value	0	0	0	0	0
	TOTAL	MJ, net calorific value	0,535	0,082	0,617	0,154	0,771
Secondary material		kg	0,015	0	0,015	0	0,015
Renewable secondary fuels		MJ, net calorific value	0	0	0	0	0
Non-renewable secondary fuels		MJ, net calorific value	0	0	0	0	0
Net use of fresh water		m3	$2,27*10^{-4}$	$2,43*10^{-5}$	$252*10^{-4}$	$2,7*10^{-5}$	$2,79*10^{-4}$

4c. Waste Production

PUNNET B40RPET85FP – 22061

PARAMETER	UNIT	Upstream	Core	TOTAL at gate	Downstream	TOTAL
Hazardous waste disposed	kg	$1,22*10^{-6}$	$1,04*10^{-6}$	$2,26*10^{-6}$	$1,54*10^{-7}$	$2,41*10^{-6}$
Non-hazardous waste disposed	kg	$1,37*10^{-2}$	$1,03*10^{-3}$	$1,48*10^{-2}$	$1,15*10^{-2}$	$2,62*10^{-2}$
Radioactive waste disposed	kg	$1,62*10^{-6}$	$2,4*10^{-7}$	$1,86*10^{-6}$	$1,42*10^{-6}$	$3,28*10^{-6}$

PUNNET B40RPET85ECOFP – 22544

PARAMETER	UNIT	Upstream	Core	TOTAL at gate	Downstream	TOTAL
Hazardous waste disposed	kg	$1,2*10^{-6}$	$9,42*10^{-7}$	$2,14*10^{-6}$	$9,81*10^{-8}$	$2,24*10^{-6}$
Non-hazardous waste disposed	kg	$1,26*10^{-2}$	$1,07*10^{-3}$	$1,36*10^{-2}$	$3,02*10^{-3}$	$1,67*10^{-2}$
Radioactive waste disposed	kg	$1,59*10^{-6}$	$2,48*10^{-7}$	$1,84*10^{-6}$	$9,66*10^{-7}$	$2,8*10^{-6}$

4d. Output Flows

PUNNET B40RPET85FP – 22061

PARAMETER	UNIT	Upstream	Core	TOTAL at gate	Downstream	TOTAL
Components for reuse	Kg	0	0	0	0	0
Material for recycling	Kg	$1{,}10*10^{-4}$	$1{,}46*10^{-4}$	$2{,}56*10^{-4}$	0	$2{,}56*10^{-4}$
Materials for energy recovery	Kg	0	0	0	0	0
Exported energy, electricity	MJ	0	0	0	0	0
Exported energy, thermal	MJ	0	0	0	0	0

PUNNET B40RPET85ECOFP – 22544

PARAMETER	UNIT	Upstream	Core	TOTAL at gate	Downstream	TOTAL
Components for reuse	Kg	0	0	0	0	0
Material for recycling	Kg	$9{,}82*10^{-5}$	$1{,}3*10^{-4}$	$2{,}28*10^{-4}$	0	$2{,}28*10^{-4}$
Materials for energy recovery	Kg	0	0	0	0	0
Exported energy, electricity	MJ	0	0	0	0	0
Exported energy, thermal	MJ	0	0	0	0	0

5. OTHER ENVIRONMENTAL INDICATORS

5a. Different waste disposal scenarios

To calculate the environmental performances of the punnet subject of the present EPD, the average European data are being considered which are reported in the Plastics Europe report referring to 2018 data (Plastics - the Facts 2019).
The punnet disposal processes make a significant contribution to the impact of the concerned products, under investigation, acting more on some impact categories (GWP, Eutrophication, Water Scarcity).
To date, it is known that food containers similar to the punnet under study are sent for recovery through system of waste separation for plastic packaging: therefore, only data relating to the recycling, energy recovery and disposal of the generic plastic packaging waste deriving from separate collection are currently available.
Not knowing what the actual scenario of disposal of PET trays is and in line with the ILIP's Sustainability Policy and vision to ensure an accomplished transition to a circular economy for plastic packaging from the current linear format, it was decided to evaluate the variations that different scenarios could induce to the main impact categories.
The results are in percentage assuming 100% Scenario 1 that has a higher environmental footprint and has been used in the downstream modelling.

Scenario 1 is the one considered in the model used for the calculation of the environmental impacts of the punnet under study and uses average European data, reported in the Plastics Europe report referring to 2018 data (Plastics - the Facts 2019).

Scenario 2 was created taking as reference the objectives defined by the European Union strategy on the circular economy[9] for the recycling of some materials and the landfilling of waste, reported respectively in Directive (EU) 2018/852 of 30 May 2018, on packaging and packaging waste[10] and in Directive (EU) 2018/850 of 30 May 2018 on waste landfills[11]. The recycling target is set at 55% (by 2030) for plastic packaging waste, while the maximum delivery target of 10% (by 2035) in landfills concerns all urban collection materials. The percentage of waste-to-energy start considered in scenario 2 was calculated by difference from the two previous targets.

Scenario 3 takes into consideration as reference the new trials, currently underway in Italy, on the recycling of PET punnets. In fact, at the end of 2018, the companies associated with Pro Food and COREPLA[12] established a worktable for the development of a national recycling chain for PET[13] containers in order to define their technological feasibility on existing selection and recycling plants. To date, the selection and recycling tests of PET containers by COREPLA are still in the trial phase. The product analysis has shown the correct selection of PET containers at a Corepla[14] consortium selection centre and the possibility of recycling on a PET washing and grinding plant; ongoing trials are also verifying the possibility of producing new products through existing extrusion and thermoforming plants[15].

THE IMPACT CATEGORIES FOR THE PUNNET CONSIDERING THE THREE DIFFERENT SCENARIOS

Scenario	% recycling	% energy recovery	% landfill
1	42	39.5	18.5
2	55	35	10
3	83	14	3

Figure 7: Scenarios of waste disposal / waste management

9 A European Strategy for Plastics in a Circular Economy - COM/2018/028 final
10 Directive (EU) 2018/852 of 30 May 2018, on packaging and packaging waste
11 Directive (EU) 2018/850 of 30 May 2018 on landfills of waste
12 COREPLA: National Consortium for the Collection and Recycling of Plastic packages https://www.corepla.it/en/company-profile
13 Conai, contribution diversification for plastic packaging - experimental activity http://www.conai.org/wp-content/uploads/2019/12/Sperimentazioni_in_corso_26_11_2019-1.pdf
14 Test report COREPLA affiliated selection centre
15 Report "Experimentation of recycling PET PROFOOD transparent trays"

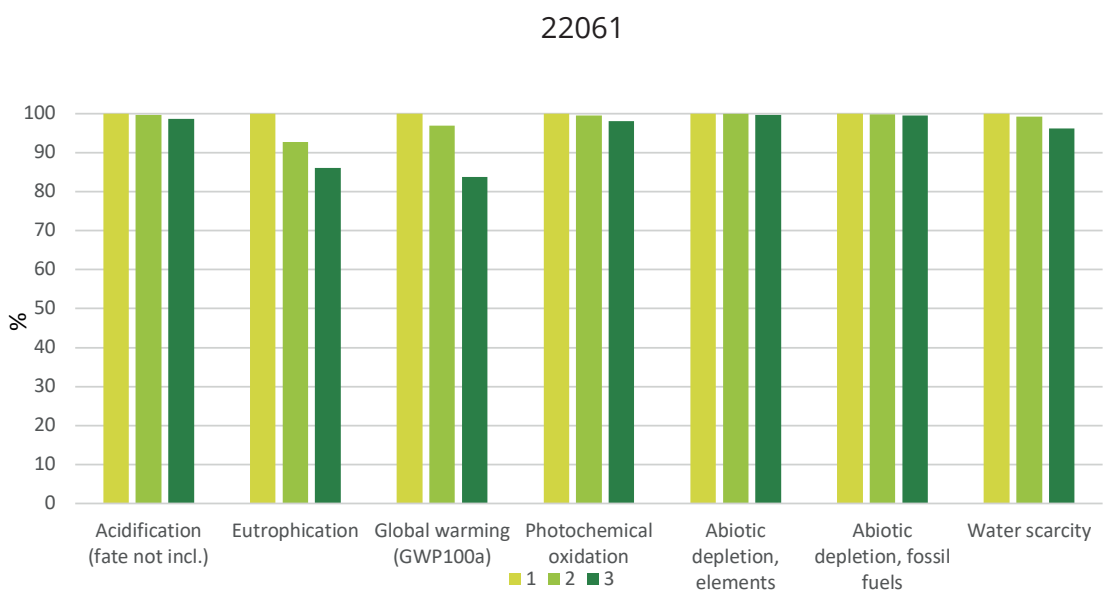


Figure 8 Results of the impact categories for the punnet B40RPET85FP– 22061 considering the three different scenarios

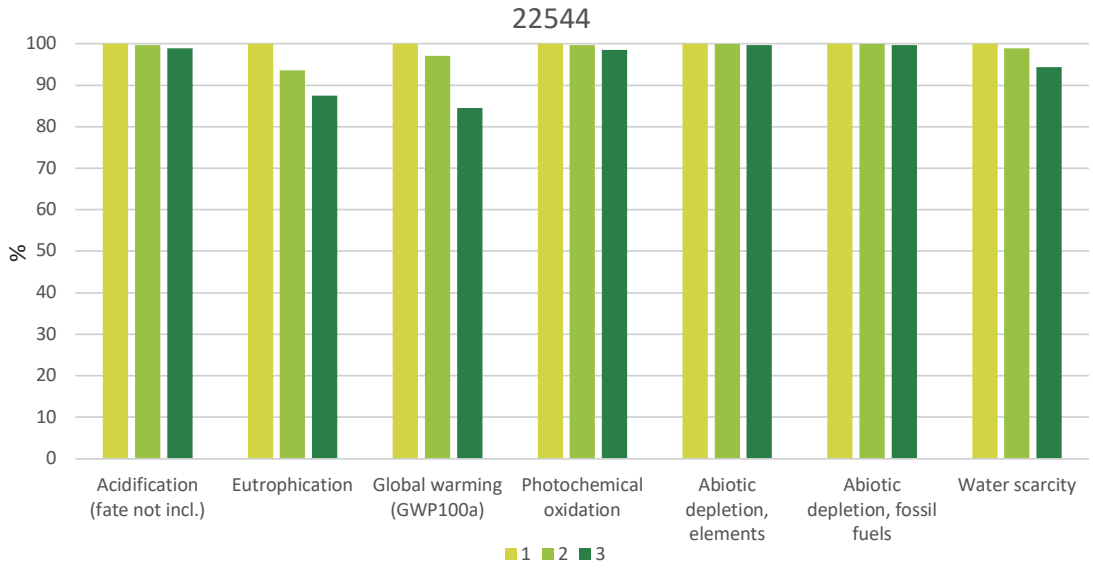


Figure 9 Results of the impact categories for the punnet B40RPET85ECOFP – 22544 considering the three different scenarios

Taking into consideration the three different scenarios, the variation of the impact categories can sometimes be substantial, as in the case of the "eutrophication" and "GWP" categories, but in all cases the increasing rates of recycling and decreasing rates of landfilling result in better environmental performance of the considered punnet. This analysis confirms that the transition to a Circular Economy for plastic packaging, specifically for R-PET punnets, with increasing rates of recycling, brings plastic packaging to a higher sustainability level.

5b. ILIP Eco-design project

Considering an Eco-design approach and according to one of the pillars of ILIP's sustainability policy, which is also one of the trends that are influencing food packaging (i.e. packaging weight reduction) it was decided to investigate the **effect of lightweighting for an item with high content of recyclate** and how the punnet weight reduction of approx. 6% impacts on environmental indicators.

The following graph shows the results of the relative variation of the main impact categories due to the punnet weight reduction starting from item 22061, 18g, through 22544, 16g to investigate a 15g punnet .

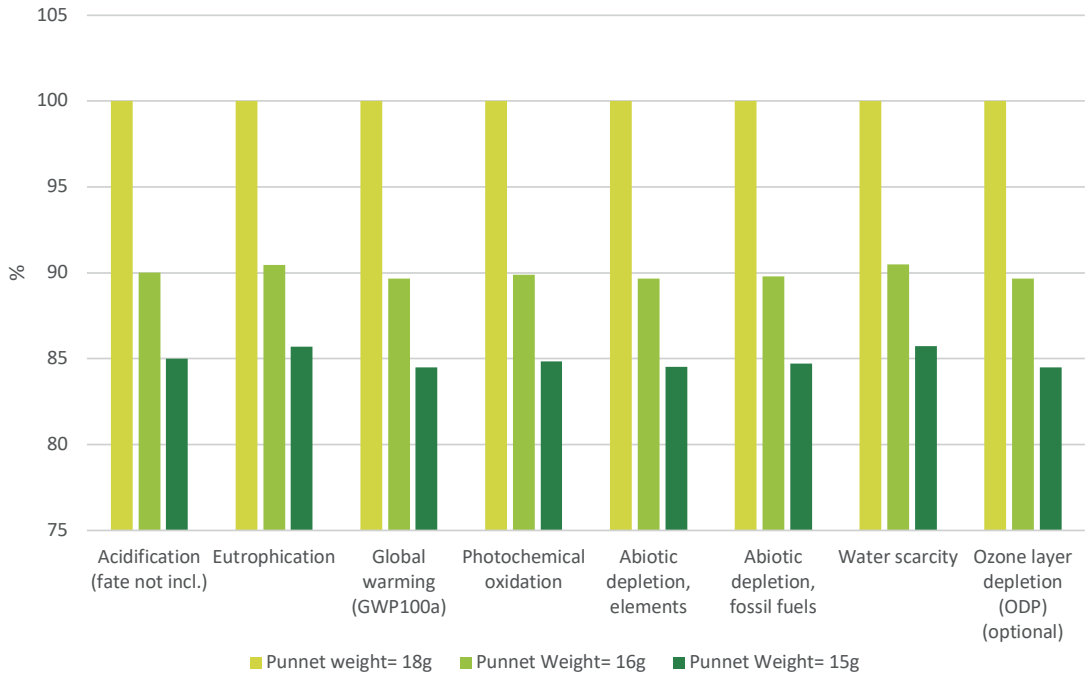


Figure 10 Results on environmental impacts to the gate

While lightweighting for eco-design is something that ILIP has been pursuing for a decade in its sustainability strategy, the already mentioned Fit4Purpose concept guides ILIP in determining the best solution in terms of packaging performance. It's significant that also the lightweighting of a punnet with high content of recyclate reduces the environmental impacts; however, this process makes sense only if the weight reduction doesn't affect the overall quality and the functions (i.e. but not limited to consumer safety, food protection and shelf life, packing line efficiency, etc.) for which such packaging has been designed.

6. DIFFERENCES VERSUS PREVIOUS VERSION

According to GPI, the EPD has been updated. The environmental performance and the impacts of the item 22061 in 18g have been recalculated. Furthermore, given the fact that in reference year 2019 the item 22544 in 16g, which is the eco-design evolution of the 22061, become the best-selling item of B40 family and replaced the former, we included it in the EPD update.

In the current updated EPD version the item 22544 is mentioned in:

- Chapter 1b. ILIP and the ILPA Group's closed loop of recycled PET, 4th paragraph
- Chapter 1c. Market needs and ILIP Sustainability policy, 7th paragraph
- Chapter 2a. Product description, Product Identification cell
- Chapter 2b. LCA information, 1st paragraph
- Chapter 2c. Functional unit, Functional Unit cell, Weight cell
- Chapter 3. Content declaration
- Chapter 3a. Origin of recycled materials
- Chapter 4. Environmental performance, 1st paragraph
- Chapter 5b. ILIP Eco-design project
- Chapter 6. Differences versus previous version

In chapter 4 the Environmental performances of both items 22061 and 22544 are presented according to the different impact categories.

In chapter 5b, according to our eco-design approach, we investigate the impacts of a 15g punnet as we did in the previous EPD version with a 16g punnet. This approach helps us to evaluate the impacts of the products that undergo an eco-design evolution in an objective manner.

7. GLOSSARY

ABIOTIC DEPLETION – ELEMENTS AND FOSSIL FUELS	Abiotic impoverishment represents the use of abiotic resources, defined as "non living" natural sources (energy sources, soil and subsoil, rocks, water, air, climatic factors etc.
ACIDIFICATION	Acidification is the process determined by the emission of compounds which, with the intervention of catalysts, generate hydrogen ions causing the pH of agricultural land, aquifers, lakes and forests to drop, with serious consequences on living organisms; also constructions, monuments and materials in general get damaged due to acid deposits.
CIRCULAR ECONOMY	A circular economy is based on the principles of designing out waste and pollution, keeping products and materials in use, and regenerating natural systems. https://www.ellenmacarthurfoundation.org/circular-economy/what-is-the-circular-economy
CLOSED LOOP SUPPLY CHAIN	Closed-loop supply chains (CLSC) are supply chain networks that "include the return processes and where the manufacturer has the intent of capturing additional value and further integrating all supplychain activities" (Guide et al., 2003). https://www.kbmanage.com/concept/closed-loop-supply-chain-clsc
ECODESIGN	It means the integration of environmental aspects into the product design with the aim of improving the environmental performance of the product throughout its whole life cycle; [DIRECTIVE 2009/125/EC]
ENVIRONMENTAL IMPACT	Any modification of the environment, negative or beneficial, caused totally or partially by the environmental aspects of an organization. [ISO 14001:2004] - [ISO 14025:2010]
ENVIRONMENTAL SUSTAINABILITY	Sustainability is the capacity to improve the quality of human life while living within the carrying capacity of the Earth's supporting eco-systems. . [IUCN/UNEP/WWF. Caring for the Earth: A Strategy for Sustainable Living. (Gland, Switzerland: 1991)]
EUTROPHICATION	Eutrophication is the phenomenon caused by an excessive supply of nutrients like nitrogen, phosphorus and sulphur in an aquatic ecosystem, which determines the proliferation of microscopic algae and increased bacterial activity. The consequent lowering of oxygen in water surface and in the soil causes degradation of the environment which becomes asphyxiated and, in the long run, leads to death of aquatic creatures.
FUNCTIONAL UNIT	Quantified performance of a product system to be used as a reference unit. [ISO 14044:2006/ Amd 2:2020]
GLOBAL WARMING	Global warming is the phenomenon of raising the surface temperature of the planet, with particular reference to the Earth's atmosphere and the waters of the oceans.
GREENWASH	Disinformation disseminated by an organization to present an environmentally responsible public image. (Concise Oxford Dictionary)
LCA - LIFE CYCLE ASSESSMENT	Compilation and evaluation of the inputs, outputs and the potential environmental impacts of a product system throughout its life cycle. (ISO 14040:2006/Amd 1:2020)
LIFE CYCLE	Consecutive and interconnected phases of a product system, from the acquisition of raw materials or from the generation of natural resources to the final disposal. [ISO 14044:2006/ Amd 2:2020]
PHOTOCHEMICAL OXIDANT FORMATION	The photochemical formation of tropospheric ozone due to some volatile organic substances in the presence of solar radiation.
POST-CONSUMER RECYCLATE	Secondary raw material (End of waste) resulting from post-consumer plastic waste recycling operations
SHELF LIFE OF FOOD	The period of time that corresponds in certain storage and distribution conditions to a tolerable decrease in the quality of a packaged food product. [Piergiovanni L., Limbo S., Squarzoni M., Linee guida al confezionamento in atmosfera protettiva, Istituto Italiano Imballaggio, 2002]
SYSTEM BOUNDARIES	Set of criteria that specifies which unit processes are part of a product system. [ISO 14044:2006/Amd 2:2020]
WATER SCARCITY FOOTPRINT (WSF)	It assesses the potential for water deprivation, both for humans and for ecosystems.

8. EPD PROGRAMME INFORMATION

Programme Operator	The International EPD® System EPD International AB Box 210 60 SE-100 31 Stockholm - Sweden info@environdec.com
Owner of the EPD	ILIP S.r.l.
Registered office, administration and production site	Via Castelfranco 52 - 40053 Valsamoggia (BO), Italy Tel.: +39 051 6715411 - info@ilip.it
Name and location of the thermoforming production site	ILIP Srl Via Castelfranco 52 - 40053 Valsamoggia (BO), Italy Tel.: +39 051 6715411 - info@ilip.it – www.ilip.it
Name and location of PET recycling and sheet extrusion production site	AMP Recycling S.r.l. Via Giovanni Finati 11 - 44124 Ferrara, Italy info@ilpa-amp.it - www.ilpa-amp.it/

ILIP Srl, as the EPD owner, has the sole ownership, liability, and responsibility for the EPD.

This declaration has been developed in accordance with the standards of the International EPD-Progamme, a global programme for type III environmental declarations operating in accordance with ISO 14025:2006.

The content reported in this EPD refers to verified life-cycle analysis (LCA) data, conducted in conformity with ISO 4040 standard series and based on the product category rules PCR 2019:13; Version 1.0 concerning packaging of multiple CPC. The product category corresponds to UN CPC version 2.1:UN CPC 36490.

Product category rules (PCR):	PCR 2019:13; Version 1.0; Packaging - CPC: MULTIPLE CPC
Product category classification UN CPC vers. 2.1:	36490 Packaging products of plastics Other articles for the conveyance or packaging of goods made of plastic; stoppers, lids, caps and other closures made of plastic
PCR review was conducted by:	The PCR review was performed by the technical committee of the international EPD® System, Maurizio Fieschi (chair), who can be contacted through the Programme Operator: info@environdec.com
Independent third-party verification of the declaration and data, according to ISO 14025:2006:	☐ **EPD process certification** ☒ **EPD verification**
Third party verifier:	SGS ITALIA SPA, Via Caldera, 21 20153 MILANO (MI) – ITALY
In case of accredited certification bodies:	Accredited by: ACCREDIA – No. of accreditation 006H
Procedure for follow-up of data during EPD validity involves third party verifier:	☒ **Yes** ☐ **No**
Technical support:	QUOTA SETTE S.R.L., Milano, Italy

EPDs within the same product category but from different programmes may not be comparable.
"The environmental impacts of different EPDs can be compared only taking into account all the technical information supporting the declared/functional unit definition as requested by the PCR."

9. BIBLIOGRAPHY AND NORMATIVE REFERENCES

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- General Programme Instructions for the International EPD System, version 3.0.1, dated 2019-09-18, www.environdec.com
- ISO 14063:2006, Environmental management -- Environmental communication -- Guidelines and examples
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- ISO 14044:2006/Amd 2:2020, Environmental management – Life cycle assessment – Requirements and guidelines
- ILCD handbook, International Reference Life Data System, General guide for Life Cycle Assessment – Detailed guidance, JRC European Commission
- PCR 2019:13 "Packaging" version 1.0 dated 2019-11-18, www.environdec.com
- Central Product Classification (CPC)
- Central Product Classification (CPC) Series M No. 77, Ver.2.1