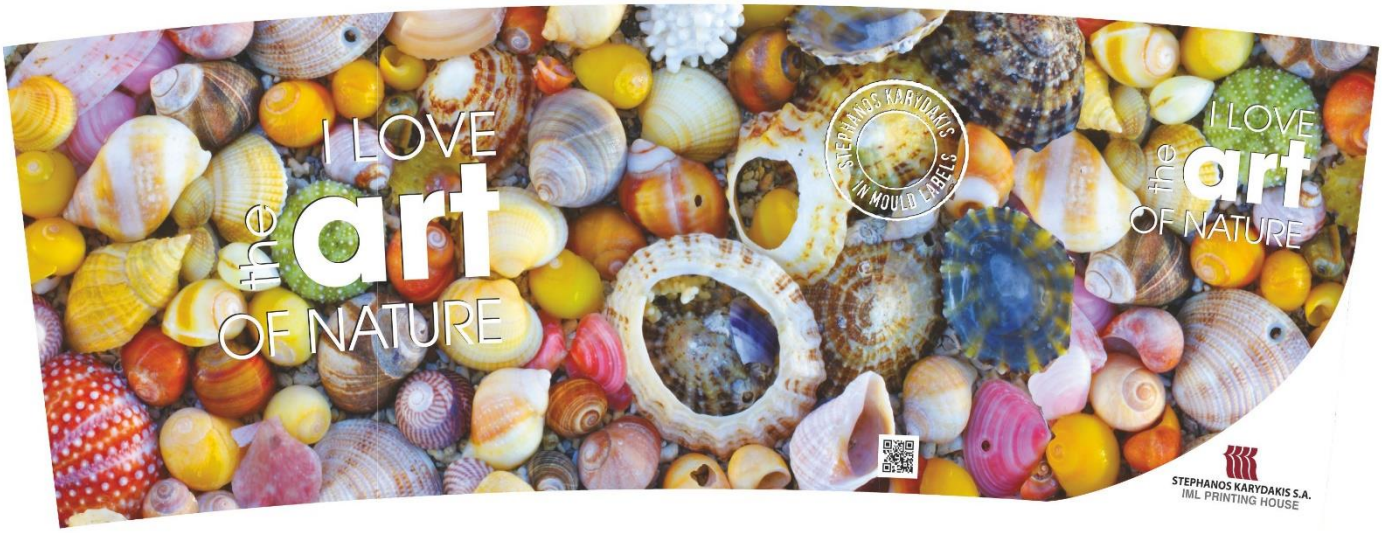



# EPD – Environmental Product Declaration Of In Mould Label

**In accordance with ISO 14025 and PCR 2021:01 Version 1.01 "Multi-Purpose Films" of The International EPD® System.**

## General information

Owner of the EPD:

Stephanos Karydakis S.A.

Location of production site:

Thorikou street

Kalyvia Thorikou, 19010 Greece

| | |
|---|---|
| Programme: | The international EPD® system<br>www.environdec.com |
| Programme operator: | EPD international AB |
| EPD registration number: | S-P-05098 |
| Publication date: | 2021-11-18 |
| Validity date: | 2026-11-17 |
| Geographical scope: | Global |

# PROGRAMME INFORMATION

| | |
|---|---|
| Programme | The International EPD® System<br><br>EPD International AB<br>Box 210 60<br>SE-100 31 Stockholm<br>Sweden<br><br>www.environdec.com<br>info@environdec.com |

EPDs within the same product category but from different programmes may not be comparable.

Product category rules (PCR): 2021:01 Version 1.01 "Multi-Purpose Films" of The International EPD® System.

PCR review was conducted by: The Technical Committee of the International EPD® System; Chair of the PCR review: Maurizio Fieschi, info@environdec.com

Independent third-party verification of the declaration and data, according to ISO 14025:2006:

- EPD process certification
- × EPD verification

Procedure for follow-up of data during EPD validity involves third party verifier:

- Yes
- × No

Third party verifier: Koci Vladimir (Individual verifier) "Approved by the International EPD® System" Contact: vlad.koci@vscht.cz



LCA Developer: ENVIROMETRICS Business Consultants & Engineers www.envirometrics.gr


# Committed

## to sustainability.

The company Stephanos Karydakis S.A. has been operating in Athens, Greece for over 50 years. The company has developed its printing expertise mainly in the areas of labels and advanced advertising and promotional applications. The founder, Stephanos Karydakis, has gained a significant reputation for his high-quality standards and product innovations in the Greek printing market. This quality-oriented mentality kept our company throughout the years at the top of the Greek printing sector and has been recognized with European printing awards.

We gained our first foil printing experience almost 18 years ago, first with promotional and communication applications, such as posters, plastic cards and lenticular films. Not much later we recognized the need for polypropylene labeling applications for the plastic injection and blow-moulding industry. That was the time, at which a new technology has been born, the In-Mould-Labeling – IML.

Intensive research of processes and multiple understanding of the characteristics of the different materials are absolutely essential in order to realize and maintain a high degree of consistency in the production of polypropylene labels. The depth of specialization needed for this production, cannot be compared with simple foil printing applications.

# EPD

Environmental
Product
Declaration

"A long-term, sustainable and transparent measuring tool for environmental impact".

This know-how has now been transformed to a standard process, performed daily by the company's young and enthusiastic staff of 138 specialized members in the 7.800 sqm privately-owned, state-of-the-art printing plant at the industrial area near the Athens international airport, which has been especially designed for the needs of the production of In-Mould-Labels.

The company is certified with ISO 9001, HACCP and BRC.

# Product Information

**In Mould Label** is classified under code 36920 "Self-adhesive plates, sheets, film, foil, tape, strip and other flat shapes, of plastics" in the United Nations Central Product Classification (CPC) System.

In-mould labelling is the use of paper or plastic labels during the manufacturing of containers, lids, etc. by blow moulding, injection moulding, or thermoforming processes. The label serves as the integral part of the final product, which is then delivered as pre-decorated item. IML can provide greater decorating options than other methods.

In mould labels produced by Stephanos Karydakis S.A. are printed on white, clear or metallized PP films with conventional mineral oil free/ cobalt free inks and water-based varnish which are in accordance with the "EuPIA" Guideline on Printing Inks applied to the non-food contact surface of food packaging materials and articles. Furthermore, the inks are especially suitable for printing on polypropylene (PP).

The printing method is conventional offset with oxidative drying and the final product ensures the stable chargeability which is essential for consistent stability of the label positioning during the injection process.

| *Product Identification* | | *IML* |
|---|---|---|
| *Product characteristics* | **Average dimensions of label** | 380,24mm x 131,38mm |
| | **Die cutting tolerance** | ± 0,3 mm |
| | **Print to cut tolerance** | ± 1,0 mm |
| | **Base material of label** | White, clear or metalized PP Film |
| | **Thickness** | 40 - 100 μm |
| | **Color tolerance (DE2000 value)** | DE < 4 |
| | **Average label weight** | 1,01 gr |

# LCA information – Life Cycle assessment

**Life Cycle Assessment is a method for analysing the environmental impact of a product throughout its life-cycle, from the extraction of raw materials (the cradle) to handling the waste (the grave).**

## Goal of the study

An LCA study has been conducted in accordance with ISO 14025 and the requirements stated in the General Programme Instructions by The International EPD® System. Goal of the present LCA study has been to calculate environmental impact values for In Mould Label to create this Environmental Product Declaration, to be used for communicating environmental performance to customers.

## Scope of the study

The scope of the study is cradle to gate, see Figure 1. All material and resource consumption is tracked back to the point of raw material extraction, mainly by using cradle to-gate data from the Ecoinvent database. The declared unit of the study is 1 square meter of film, in accordance with the Product Category Rules (PCR).

## Data collection

The inventory for the LCA study was carried out during 2020. The data for the film processing was provided by Karydakis S.A. staff.

## Allocation

Allocation rules has been performed in accordance with the requirements of ISO 14044:2006. Wherever possible, allocation was avoided by dividing the unit process to be allocated into two or more sub-processes and collecting the input and output data related to these sub-processes. Where allocation cannot be avoided, the inputs and outputs of the system were partitioned between its different products or functions in a way that reflects the underlying physical or economic relationships between them.

## Cut-off rules

Where there is insufficient data or data gaps for a unit process, the cut-off criteria are 1% of the declared environmental impacts.

## Additional information about the LCA study

## Time representativeness:

2020

## Database(s) and LCA software used:

Ecoinvent 3.7.1
OpenLCA Software

## Description of system boundaries:

Cradle-to-gate

## System diagram.

The system boundaries of this EPD are decided by the Product Category Rules (PCR) and illustrated by Figure 1.

**Upstream**
Raw materials

Production of polypropylene film, varnish, ink etc. and packaging materials.

**Core**

Emissions related to the use of fuels, generation of electricity and fuels, transportation of raw materials from suppliers to plant

**Downstream**

Distribution of product and packaging End of Life.

# Environmental performance

## Potential environmental impact

| Parameter | | Unit | UPSTREAM | CORE | DOWNSTREAM | TOTAL |
|---|---|---|---|---|---|---|
| Global warming potential (GWP) | Fossil | kg $CO_2$ eq | 1,33E-01 | 5,88E-02 | 1,49E-02 | 2,07E-01 |
| | Biogenic | kg $CO_2$ eq | 4,71E-04 | 2,35E-03 | 4,23E-03 | 7,04E-03 |
| | Land use and land transformation | kg $CO_2$ eq | 2,90E-03 | 5,52E-05 | 3,98E-06 | 2,96E-03 |
| | TOTAL | kg $CO_2$ eq | 1,36E-01 | 6,12E-02 | 1,91E-02 | 2,17E-01 |
| Acidification potential (AP) | | kg $SO_2$ eq | 5,69E-04 | 3,10E-04 | 9,28E-05 | 9,72E-04 |
| Eutrophication potential (EP) | | kg $PO_4^{-3}$ eq | 1,80E-04 | 2,52E-04 | 2,30E-05 | 4,55E-04 |
| Formation potential of tropospheric ozone (POFP) | | kg NMVOC eq | 5,27E-04 | 2,73E-04 | 1,13E-04 | 9,13E-04 |
| Abiotic depletion potential – Elements | | kg Sb eq | 8,64E-07 | 1,49E-07 | 3,76E-08 | 1,05E-06 |
| Abiotic depletion potential – Fossil resources | | MJ | 3,57E+00 | 9,62E-01 | 2,21E-01 | 4,75E+00 |
| Water scarcity potential | | $m^3$ eq | 1,08E-01 | 1,90E-02 | 8,24E-04 | 1,28E-01 |

# Use of resources

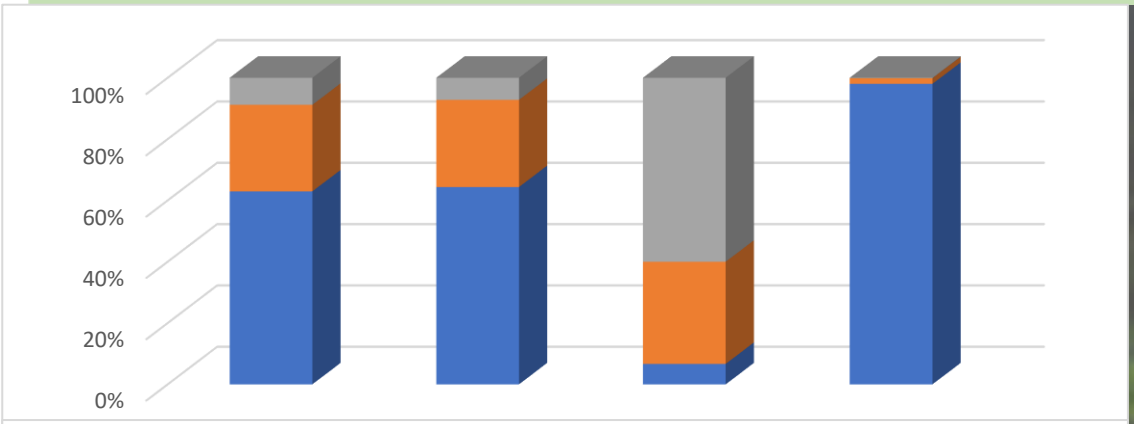
| Parameter | | Unit | UPSTREAM | CORE | DOWNSTREAM | TOTAL |
|---|---|---|---|---|---|---|
| **Primary energy resources – Renewable** | **Use as energy carrier** | MJ | 2,45E-01 | 8,17E-02 | 2,32E-03 | 3,29E-01 |
| | **Used as raw materials** | MJ | 0,00E+00 | 0,00E+00 | 0,00E+00 | 0,00E+00 |
| | **TOTAL** | MJ | 2,45E-01 | 8,17E-02 | 2,32E-03 | 3,29E-01 |
| **Primary energy resources – Nonrenewable** | **Use as energy carrier** | MJ | 3,58E+00 | 9,62E-01 | 2,21E-01 | 4,76E+00 |
| | **Used as raw materials** | MJ | 0,00E+00 | 0,00E+00 | 0,00E+00 | 0,00E+00 |
| | **TOTAL** | MJ | 3,58E+00 | 9,62E-01 | 0,00E+00 | 4,54E+00 |
| **Use of secondary material** | | kg | 0,00E+00 | 0,00E+00 | 0,00E+00 | 0,00E+00 |
| **Use of renewable secondary fuels** | | MJ | 0,00E+00 | 0,00E+00 | 0,00E+00 | 0,00E+00 |
| **Use of non-renewable secondary fuels** | | MJ | 0,00E+00 | 0,00E+00 | 0,00E+00 | 0,00E+00 |
| **Fresh water** | | $m^3$ eq | 2,52E-03 | 4,41E-04 | 1,92E-05 | 2,98E-03 |

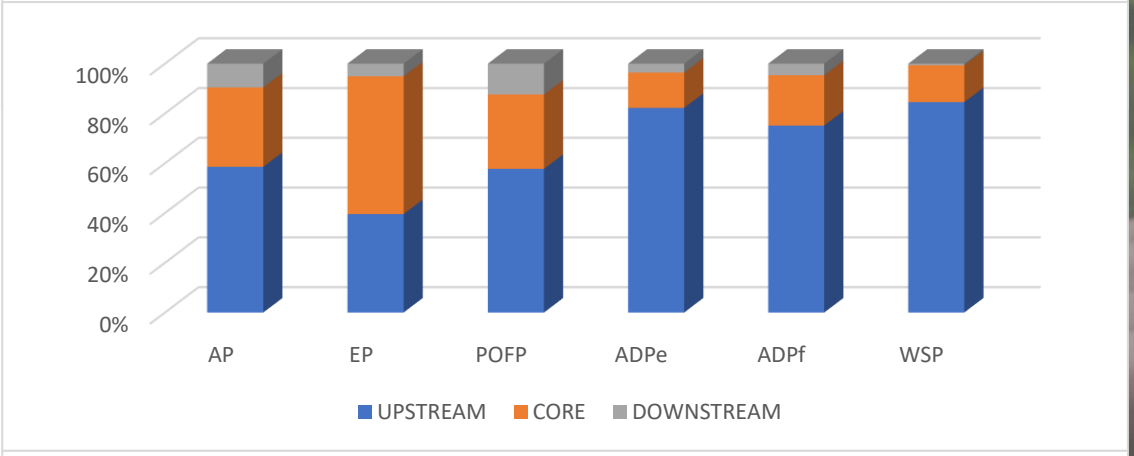
# Waste production

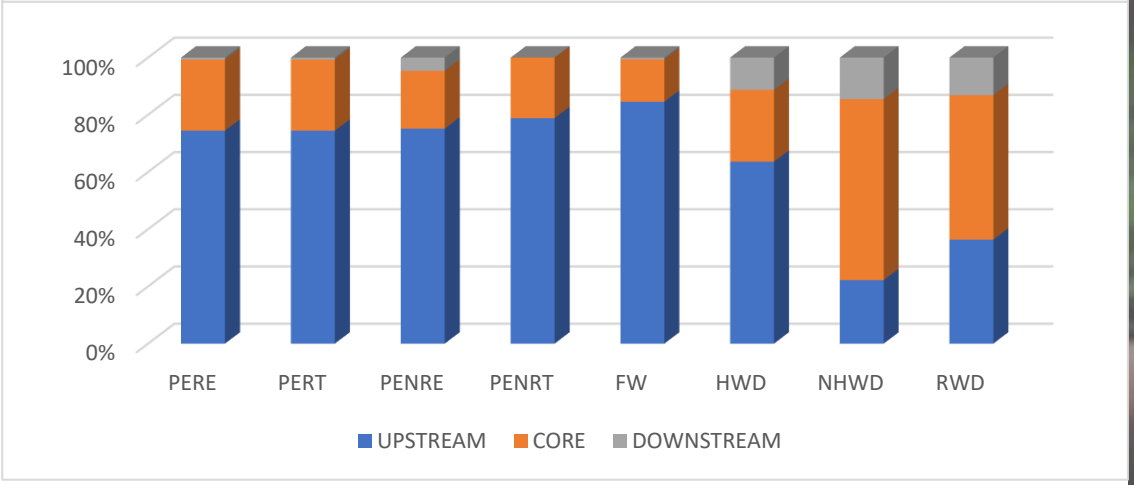
| Parameter | Unit | UPSTREAM | CORE | DOWNSTREAM | TOTAL |
|---|---|---|---|---|---|
| **Hazardous waste disposed** | Kg | 3,19E-06 | 1,26E-06 | 5,68E-07 | 5,02E-06 |
| **Non-hazardous waste disposed** | Kg | 1,44E-02 | 4,09E-02 | 9,42E-03 | 6,47E-02 |
| **Radioactive waste disposed** | Kg | 4,23E-06 | 5,88E-06 | 1,53E-06 | 1,16E-05 |

# Output flows

| Parameter | Unit | UPSTREAM | CORE | DOWNSTREAM | TOTAL |
|---|---|---|---|---|---|
| **Components for reuse** | Kg | 0,00E+00 | 0,00E+00 | 0,00E+00 | 0,00E+00 |
| **Material for recycling** | Kg | 0,00E+00 | 0,00E+00 | 0,00E+00 | 0,00E+00 |
| **Materials for energy recovery** | Kg | 0,00E+00 | 0,00E+00 | 0,00E+00 | 0,00E+00 |
| **Exported energy, electricity** | MJ | 0,00E+00 | 0,00E+00 | 0,00E+00 | 0,00E+00 |
| **Exported energy, thermal** | MJ | 0,00E+00 | 0,00E+00 | 0,00E+00 | 0,00E+00 |




As it is presented in Figures, the upstream activities (raw materials supply) are the ones which contribute the most to almost all impact categories for the production of IML. For Global Warming potential-luluc, Global Warming potential-fossil, Global Warming potential (total) (GWP), upstream activities contribution ranges from 98% to 63%, while in core activities (i.e., the transport of raw materials to production site and the cultivation of the vegetable), the corresponding contribution does not exceed 28%. For Acidification potential (AP), Abiotic depletion potential for non-fossil resources (ADPe), Abiotic depletion potential for fossil resources (ADPf), Use of non-renewable primary energy excluding resources used as raw materials (PENRE), Use of net fresh water (FW), the upstream activities contribution ranges from 59% to 85%, while the corresponding contribution of those indicators in core stage ranges from 14% to 32%. The impact category Non-hazardous waste disposed (NHWD), is contributing the most to the core activities (i.e., the transport of raw materials to production site and the manufacturing process of the product).

# References

**General Programme Instructions** of the International EPD® System. Version 3.01, 2019-09-18

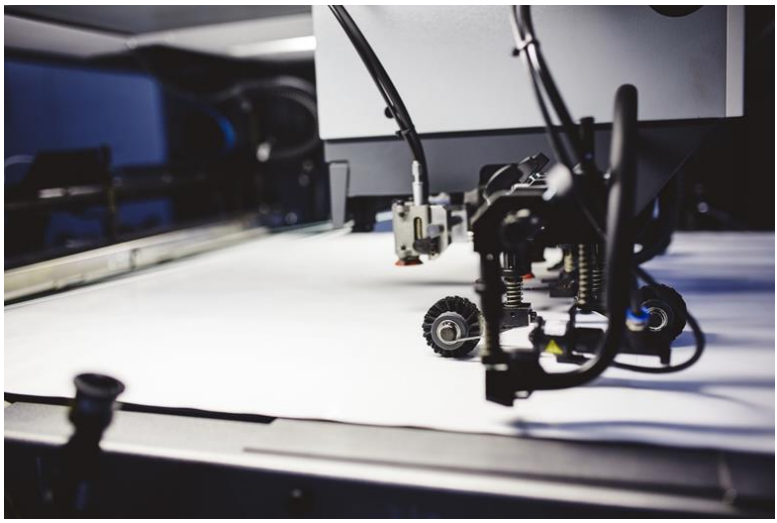
**PCR 2019:13** v.1.1 Packaging. EPD System. Date 2020-12-17. Valid until 2023-11-8

**ISO 14020:2000** Environmental labels and declarations — General principles

**ISO 14025:2006** Environmental labels and declarations - Type III environmental declarations — Principles and procedures

**ISO 14040:2006** Environmental management - Life cycle assessment- Principles and framework

**ISO 14044:2006** Environmental management - Life cycle assessment - Requirements and guidelines



# Contact information

| | |
|---|---|
| EPD owner: | Stephanos Karydakis S.A.<br>Thorikou street<br>Kalyvia Thorikou,<br>19010 Greece<br>Contact person:<br>Apostolos Tsetis<br>Apostolos.Tsetis@karydakis.gr<br>https://www.karydakis.gr/ |
| LCA author: | Envirometrics Ltd.<br>Karea 20, Athens<br>Greece<br>info@envirometrics.gr |
| Programme operator: | EPD International AB<br>info@environdec.com |