TURKEY EPD®
ENVIRONMENTAL PRODUCT DECLARATIONS

EPD®
THE INTERNATIONAL EPD® SYSTEM

Environmental Product Declaration

In accordance with ISO 14025 for:

TAÇ Reborn Yarn (from %50 Re-PET, %50 Re-PES) (Hybrid) from KORTEKS

Programme:	The International EPD® System, www.environdec.com EPD Turkey, www.epdturkey.org
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KORTEKS

Programme	TURKEY EPD® ENVIRONMENTAL PRODUCT DECLARATIONS	EPD® THE INTERNATIONAL EPD® SYSTEM
	EPD Turkey, a fully aligned regional programme. www.epdturkey.org	The International EPD® System www.environdec.com
Programme Operator	EPD Turkey: SÜRATAM – Turkish Centre for Sustainable Production Research & Design Nef 09 B Blok No:7/15 34415 Kagıthane/Istanbul Turkey	The International EPD® System EPD International AB Box 210 60 SE-100 31 Stockholm Sweden
Geographical Scope	Global	

UN CPC Code

(Textile yarn and thread of man-made filaments or staple fibres.)

Programme Information

Programme	EPD International AB Box 210 60 SE-100 31 Stockholm Sweden www.environdec.com info@environdec.com
Product Category Rules (PCR)	PCR 2013:12 Textile yarn and thread of natural fibres, man-made filaments or staple fibres, version 2.11
Independent third-party verification of the declaration and data, according to ISO 14025:2006	EPD process certification ( ) EPD verification (**X**)
Third party verifier	Professor Vladimír Kocí
Approved by	The International EPD® System
Procedure for follow-up of data during EPD validity involves third party verifier	Yes ( ) No (**X**)

The EPD owner has the sole ownership, liability, and responsibility for the EPD. EPDs for textile products are primarily intended for use in B2B communication, but their use in B2C communication under certain conditions is not precluded. For EPDs intended for B2C communication, refer to ISO 14025.

About Company

Established in 1989 to meet the high-quality polyester yarn needs of the Turkish textile industry, Korteks is one of the world's most important, largest, integrated, and innovative polyester yarn production centers. In addition to the domestic market, it exports its products to more than 50 countries including Germany, Italy, England, the USA, Canada, Mexico, China.

Having an annual production capacity of 170,000 tons, Korteks produces thousands of different types of polyester filament yarns and can differentiate itself from the competition with its product variety. Korteks is one of the leading production facilities in Turkey, especially in the field of technical textiles, thanks to its competent and experienced human resources. The factory has been designed to allow for the production of high quality filament yarns and features such as "high count & micro count". These highly competitive products are used in different fields including automotive, health, outdoor, industrial textiles, carpets, fleece, top and sportswear. Korteks offers super-bright, semi-dull polyester textile chips and super-bright/ dull/semi-dull/full dull ecru and polymer-dyed polyester POY, FDY, textured, elasthan, air-textured, plain, bobbin-dyed and twisted, monofilament yarns under the brand name TAÇ.

Having an R&D team that researches and offers new solutions, Korteks has also been a pioneer in many polyester yarn technologies worldwide. As a company that aims to grow through customer-oriented, innovative, and value-added products, Korteks also has intensively invested in R&D. The most prominent products that have been developed are: TAÇ Antistatic, preventing all kinds of static electricity, dust collection and adhesion to the human body; TAÇ UV Resistant, developed for outdoor fabrics such as awnings, tarpaulins, garden furniture; TAÇ Flame Retardant yarns, offering flame retardancy, DRY TOUCH®; a certified performance fabric brand that facilitates moisture management.

Developing many products for the automotive industry, Korteks offers fast, flexible, and reliable service by working in continuous cooperation with customers from the design stage to mass production of automotive fabric projects. Today, the yarns produced in this respect are used in the projects of the world's largest automobile brands by domestic and foreign fabric manufacturers.

Being the technology base in polyester yarn production, Korteks will continue to penetrate into new markets with the yarns it has developed.

CERTIFICATION

IATF 16949
BUREAU VERITAS Certification

K - Q
TSE-ISO-EN
9001

Ç - E
TSE-İSO-EN
14000

M - C
TSE - ISO
10002

SUSTAINABLE

Global Recycled Standard

OEKO-TEX®
CONFIDENCE IN TEXTILES
STANDARD 100
02.T.2483 HOHENSTEIN HTTI
Tested for harmful substances.
www.oeko-tex.com/standard100

CO_2 VERIFIED
ISO 14064

KORTEKS

Product Information

As Korteks, the largest integrated polyester yarn production center in Europe, we dream for a sustainable world and make all endeavors to deliver better tomorrows that rely on innovative and technological advancements in line with Zorlu Holding's vision of "Smart Life 2030". And, accordingly, we take our pride in achieving another breakthrough moment in Turkey with the Polymer Recycling Plant which would allow us to produce Taç Reborn from plastic bottles.

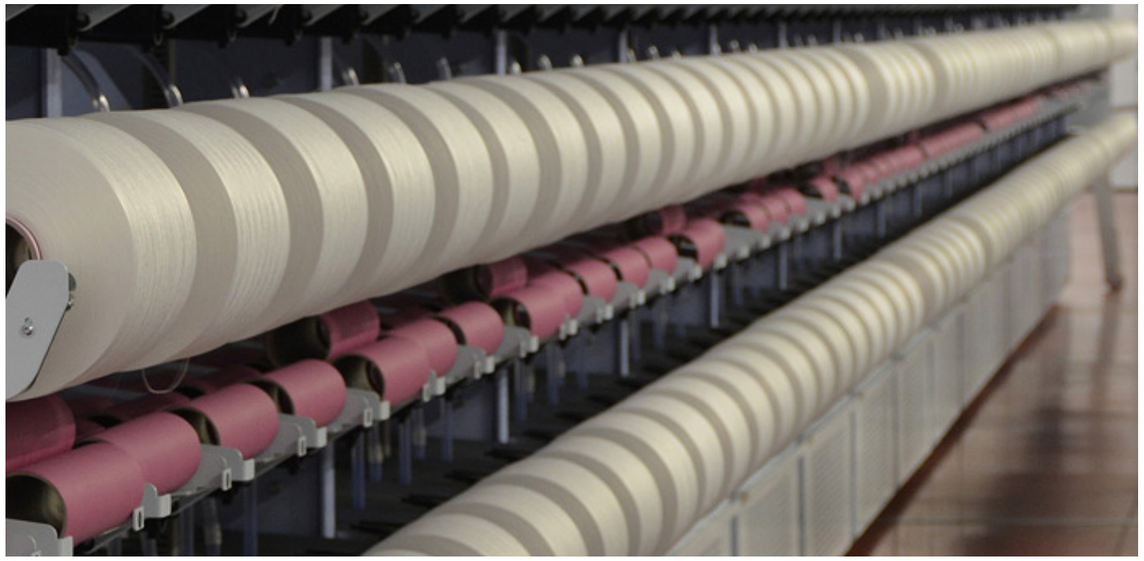
At the Polymer Recycling Plant, we are producing RPET Chips, the raw material of the TAÇ Reborn, extracted from the waste plastic bottles, a non-biodegradable product capable of inducing negative environmental impact by uncontrollably remaining in the nature for prolonged periods, and other yarns discarded as production wastes to obtain a recyclable product, the filament polyester yarn.

Thanks to this innovative recycling process, we not only save energy as the process requires less energy when compared to the traditional production practices, but also endorse reduction of greenhouse gas emissions. Therefore, we support recycling processes through circular economy while also contributing to build a sustainable future in the long run.

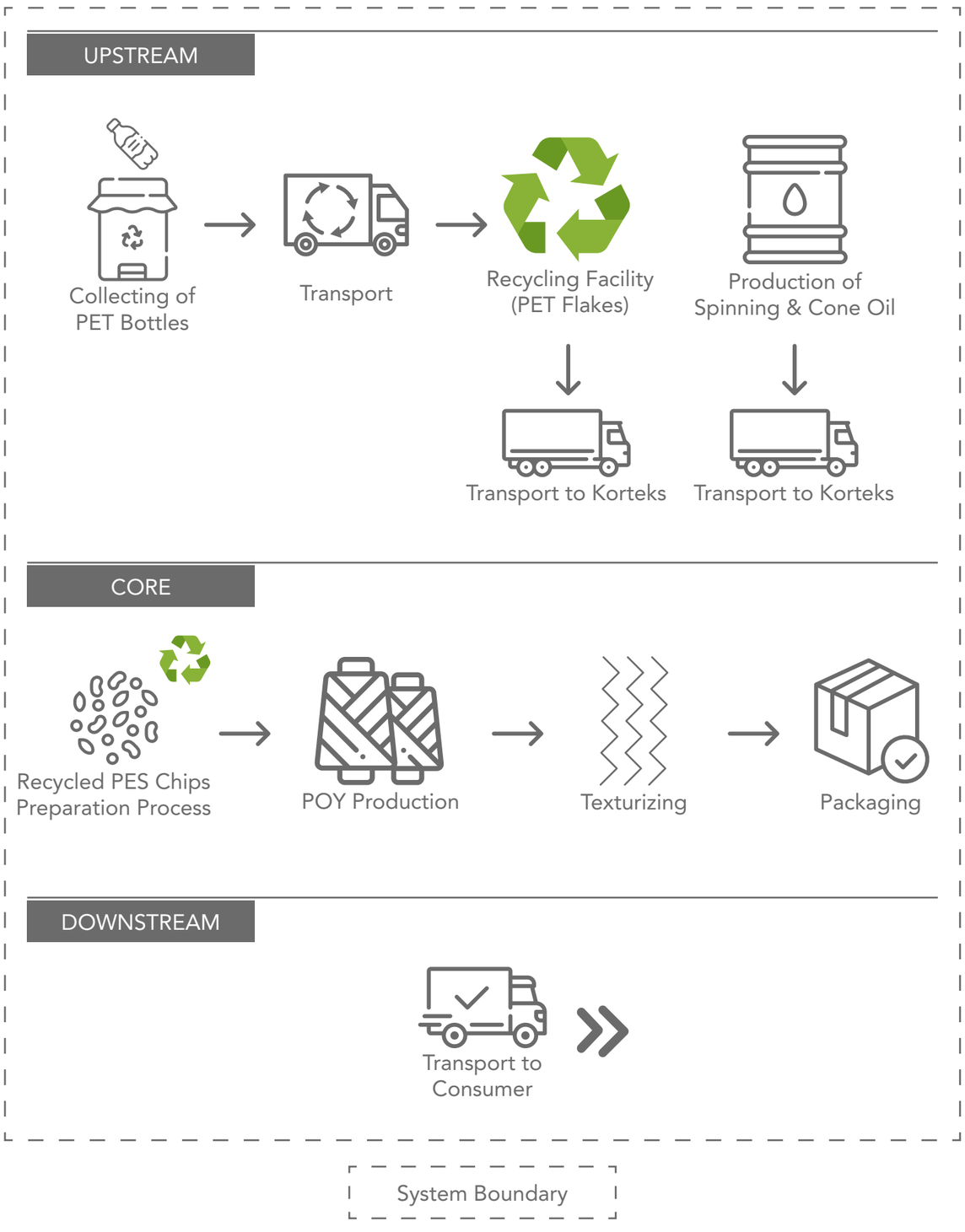
Today for Tomorrow

LCA Information

Functional Unit	1 kg of TAÇ Reborn Yarn (from %50 Re-PET, %50 Re-PES) (Hybrid) / Texturized
Time Representativeness	2021
Database(s) and LCA Software Used	Ecoinvent 3.6, TLCID (Turkish Lifecycle Inventory Database) and SimaPro 9.1
System Boundaries	Craddle to Gate - Production of raw materials - Transport of raw materials - Production - Trnasport of product
Allocation	No allocation performed
Cut-Off Rules	No cut-off rule was applied within the LCA study underlying this EPD.



System Boundary



System Description

UPSTREAM

PET bottles are transported to recycling facility after collection. Water, energy and chemicals (sulfuric acid and sodium hydroxide) are used to get cleaned PET flakes at recycling process. Finally PET flakes are transported to Korteks. Transport distance was assumed as 300 km for the collection PET bottles by truck and, transport of PET flakes to Korteks was assumed as 25 km by truck.

The production of TAÇ Reborn Yarn, for the Re-PES part of the yarn, polyester wastes are used which are occurred Korteks production line.

Spinning oil and titanium dioxide are used as a raw material of yarn spinning. Transportation mix (spinning oils are supplied from several countries) of spinning oil is assumed as following:

- 1300 km by truck

- 16000 km by ship

Titanium dioxide transport:

- 10600 km by ship

- 40 km by truck

CORE

Chips are prepared for the POY spinning plant, after that spinning of the POY and then it is textured.

Chips preparation process consist of two drying step (last one is for the crystallization) and, chips production step.

Yarn form is obtained at POY spinning process. Finally POY is texturized to get natural look. While POY spinning and texturizing process, spin finish oil and cone oil are used.

At the end of the production, TAÇ Reborn yarns are packaged.

DOWNSTREAM

Taç Reborn yarns are transported to numerous customers in Turkey and Europe. Transportation mix is calculated as 500 km in average by truck according to last one year deliveries.

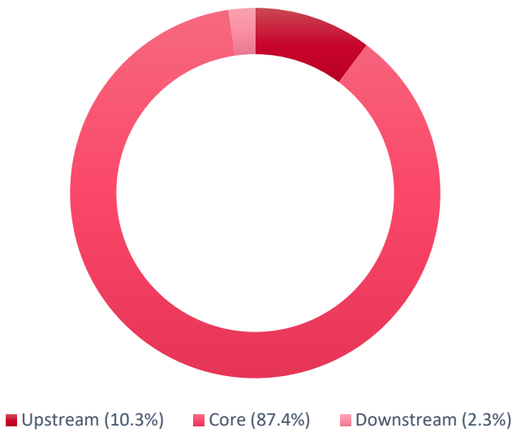
ENVIRONMENTAL PERFORMANCE

POTENTIAL ENVIRONMENTAL IMPACT

Parameter		Unit	Upstream	Core	Downstream	Total
Global warming potential (GWP)	Fossil	kg CO_2 eq.	0.37	3.11	82.7 $x10^{-3}$	3.56
	Biogenic	kg CO_2 eq.	0.45 $x10^{-3}$	6.44 $x10^{-3}$	20 $x10^{-6}$	6.91 $x10^{-3}$
	Land use and transformation	kg CO_2 eq.	0.61 $x10^{-3}$	17.2 $x10^{-3}$	24.3 $x10^{-6}$	17.8 $x10^{-3}$
	Total	kg CO_2 eq.	0.37	3.13	82.8E-03	3.59
Depletion potential of the stratospheric ozone layer (ODP)		kg CFC-11 eq	79.8 $x10^{-9}$	0.11 $x10^{-6}$	15.2 $x10^{-9}$	0.21 $x10^{-6}$
Acidification potential (AP)		kg SO2 eq.	2.04 $x10^{-3}$	15.6 $x10^{-3}$	0.3 $x10^{-3}$	17.9 $x10^{-3}$
Eutrophication potential (EP)		kg PO_4^{3-} eq	1.56 $x10^{-3}$	9.45 $x10^{-3}$	61.8 $x10^{-6}$	11.1 $x10^{-3}$
Photochemical oxidant formation potential (POFP)		kg NMVOC	1.77 $x10^{-3}$	7.67 $x10^{-3}$	0.33 $x10^{-3}$	9.77 $x10^{-3}$
Abiotic depletion potential – Elements		kg Sb eq	3.34 $x10^{-6}$	1 $x10^{-6}$	0.25 $x10^{-6}$	4.58 $x10^{-6}$
Abiotic depletion potential – Fossil resources		MJ, net calorific value	6.08	35.5	1.25	42.9
Water scarcity potential		m^3 eq	0.21	2.32	8.71 $x10^{-3}$	2.53

Global Warming Potential was calculated using IPCC 2013 method with a timeframe of 100 years. Eutrophication, Abiotic Depletion Fossil Fuels and Abiotic Depletion Elements were calculated with CML 2001 baseline method. Acidification was calculated using fate not included version in CML 2001 non-baseline method. Photochemical Oxidant Formation potential was calculated with POFP, LOTOS-EUROS as applied in ReCiPe 2008. Water Scarcity was calculated with AWARE method.

Global Warming Potential
- 10.3% of GWP comes from upstream (raw material production and transport)
- 87.4% of GWP comes from core processes (core production processes)
- 2.3% of GWP comes from downstream (trnasport of end product)

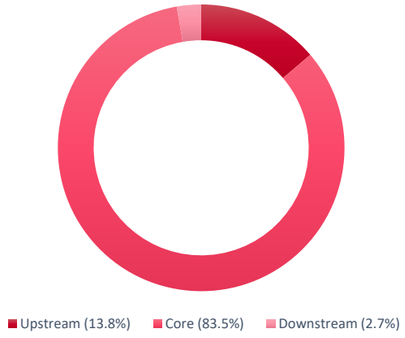


USE OF RESOURCE

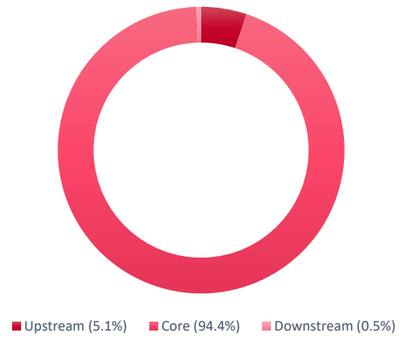
Parameter		Unit	Upstream	Core	Downstream	Total
Primary energy resources – Renewable	**Use as energy carrier**	MJ, net calorific value	94.4 x10^{-3}	2.52	5.22 x10^{-3}	2.62
	Used as raw materials	MJ, net calorific value	0	0	0	0
	Total	MJ, net calorific value	94.4 x10^{-3}	2.52	5.22 x10^{-3}	2.62
Primary energy resources – Non-renewable	**Use as energy carrier**	MJ, net calorific value	6.33	36.4	1.27	44
	Used as raw materials	MJ, net calorific value	0	0	0	0
	Total	MJ, net calorific value	6.33	36.4	1.27	44
Secondary material		kg	1.06	0	0	1.06
Renewable secondary fuels		MJ, net calorific value	0	0	0	0
Non-renewable secondary fuels		MJ, net calorific value	0	0	0	0
Net use of fresh water		m^3	2.19 x10^{-3}	40.3 x10^{-3}	0.22 x10^{-3}	42.7 x10^{-3}

Energy calculations were obtained using Cumulative Energy Demand (LHV) v 1.00, which is present in SimaPro's latest version. Net freshwater used was calculated from the life cycle inventory results.

Primary Energy Resources
- 13.8% of primary energy used at upstream (raw material production and transport)
- 83.5% of primary energy used at core processes (core production processes)
- 2.7% of primary energy used at downstream (tmasport of end product)



Net Use of Fresh Water
- 5.1% of water used at upstream (raw material production and transport)
- 94.4% of water used at core processes (core production processes)
- 0.5% of water used at downstream (tmasport of end product)



WASTE PRODUCTION

Parameter	Unit	Upstream	Core	Downstream	Total
Hazardous waste disposed	kg	0	25.95 x10^{-9}	0	25.95 x10^{-9}
Non-hazardous waste disposed	kg	0.11	0.13	0	0.24
Radioactive waste disposed	kg	0	0	0	0

Hazardous and Non-Hazardous waste amounts are allocated from yearly total waste amounts.

OUTPUT FLOWS

Parameter	Unit	Upstream	Core	Downstream	Total
Components for reuse	kg	0	0	0	0
Material for recycling	kg	0	0	0	0
Materials for energy recovery	kg	0	0	0	0
Exported energy, electricity	MJ	0	0	0	0
Exported energy, thermal	MJ	0	0	0	0

Output flow amounts are allocated from yearly total waste amounts.

TOXICITY IMPACTS

Parameter	Unit	Upstream	Core	Downstream	Total
Human toxicity, cancer	cases	0.62 x10^{-6}	0.22 x10^{-6}	2.30 x10^{-9}	0.84 x10^{-6}
Human toxicity, non-cancer	cases	0.23 x10^{-6}	0.57 x10^{-6}	11.5 x10^{-9}	0.81 x10^{-6}
Freshwater ecotoxicity	PAF.m3.day	15 026	25 512	134.5	40 673

Toxicity impacts were calculated using USEtox v 2.02 recommended + interim.

References

Ecoinvent

Ecoinvent Centre, www.ecoinvent.org

EN 15804:2012+A2:2019

Sustainability of construction works - Environmental Product Declarations — Core rules for the product category of construction products

ELCD Database

European Platform on Life Cycle Assessment, https://eplca.jrc.ec.europa.eu/ELCD3/

EN ISO 9001

Quality Management Systems - Requirements

EN ISO 14001

Environmental Management Systems - Requirements

GPI

General Programme Instructions of the International EPD® System. Version 3.0.

ISO 45001

Occupational Health & Safety Management System - Requirements

ISO 14020:2000

Environmental Labels and Declarations — General principles

ISO 14025 DIN EN ISO 14025:2009-11

Environmental labels and declarations - Type III environmental declarations — Principles and procedures

ISO 14040/44/ DIN EN ISO 14040:2006-10

Environmental management - Life cycle assessment - Principles and framework (ISO14040:2006) and Requirements and guidelines (ISO 14044:2006)

Shen, L., Worrell, E., & Patel, M. K. (2010)

Open-loop recycling: A LCA case study of PET bottle-to-fibre recycling. Resources, conservation and recycling, 55(1), 34-52.

Shen, L., Nieuwlaar, E., Worrell, E., & Patel, M. K. (2011)

Life cycle energy and GHG emissions of PET recycling: change-oriented effects. The International Journal of Life Cycle Assessment, 16(6), 522-536.

SimaPro

SimaPro LCA Software, Pré Consultants, the Netherlands, www.pre-sustainability.com

The International EPD® System

The International EPD® System is a programme for type III environmental declarations, maintaining a system to verify and register EPD®s as well as keeping a library of EPD®s and PCRs in accordance with ISO 14025. www.environdec.com

Contact Information

Programme	TURKEY EPD® ENVIRONMENTAL PRODUCT DECLARATIONS EPD registered through fully aligned regional programme. EPD Turkey www.epdturkey.org	EPD® THE INTERNATIONAL EPD® SYSTEM The International EPD® System www.environdec.com
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