

SARAY®

ENVIRONMENTAL PRODUCT DECLARATION

In accordance
with ISO 14025 and EN 15804:2012+A2:2019 for

White PVC Profiles

Programme:

The International EPD® System
www.environdec.com

Programme Operator:

EPD International AB

Local Operator:

EPD Turkey

S-P Code:

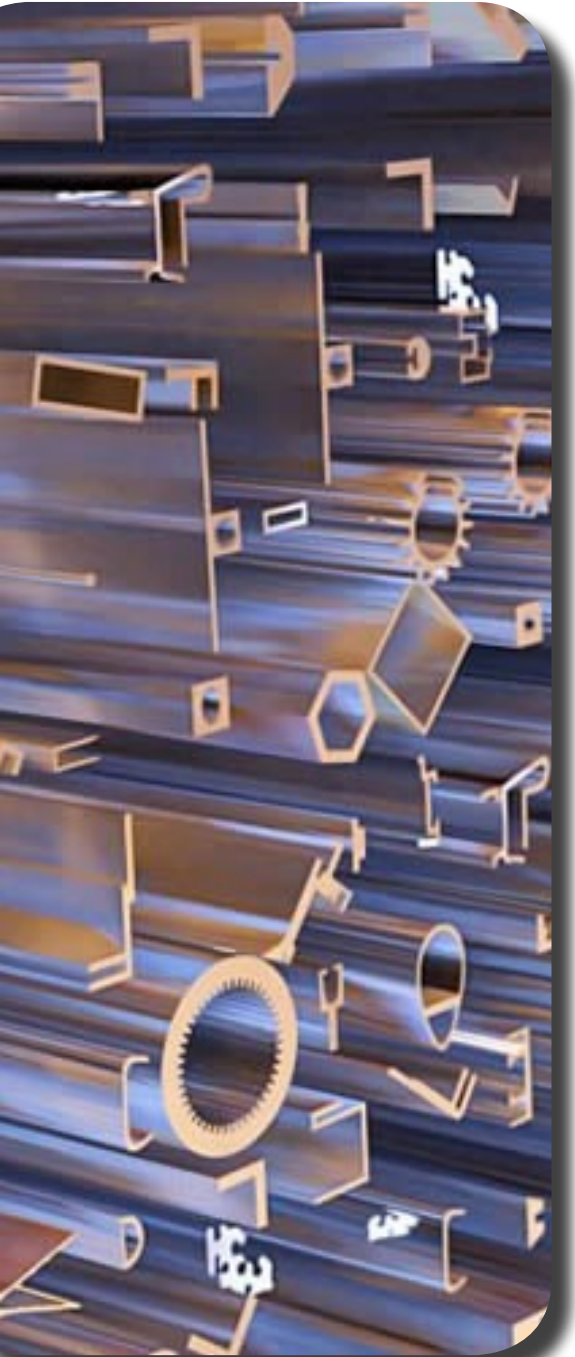
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Programme Information

Programme

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Product Category Rules (PCR): 2019:14 Version 1.11, 2021-02-05, Construction Products and CPC 54 Construction Services, EN 15804:2012 + A2:2019 Sustainability of Construction Works

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

EPD process certification

EPD verification

Third party verifier: Prof. Vladimír Kocí

Approved by: The International EPD® System

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

Yes

No

The EPD owner has the sole ownership, liability, and responsibility for the EPD. EPDs within the same product category but from different programmes may not be comparable. EPDs of construction products may not be comparable if they do not comply with EN 15804.

About the Company

Since 1980, Saray Aluminium has been playing a major role in the construction of future architectural buildings with its leading and innovative interior & exterior construction solutions.

Saray manufactures aluminium door&window, curtain wall (facade) and handrail systems, aluminium composite panel, PVC door&window systems, shutter systems, various types of industrial profiles for the sectors such as machinery, lighting, elevator etc. and standard section profiles in various shapes and sizes.

Saray is among the first Turkey's Top 200 Industrial Enterprises and exports %55 of total production more than 60 countries in Europe,Asia, Africa; with its high export amounts Saray receives the "Export Stars of Turkey" award in every year.

Saray Aluminium has CE, ISO 9001, ISO 14001 Qualanod, Qualicoat, TS EN 755, TS EN 12020, SEPRO and GOST-R quality certificates. Saray is a fully integrated enterprise with its aluminium powder coating, aluminium anodizing, extrusion, casting, aluminium composite panel and pvc extrusion, shutter production facilities. With a total of 100.000 sqm covered area, production facilities are located in Cerkezkoy/Tekirdag and Gunesli/Istanbul.



Product Information

LCA Study presented in this report assesses the potential environmental impacts of PVC Profiles process during their life cycle from raw material supply to disposal.

PVC Profiles are mainly made of Polyvinyl Chloride (PVC) known as the most valuable raw material within the chemical industry. Products may also contain other raw materials such as calcite, titanium, stambran, impact, and stabilizers.

The production of PVC profiles begins with mixing the raw materials. A certain percentage depending on the formulation of raw materials are fed into the extruder hopper by an automation system mixer. Raw materials are moved to the moulding section with screws and heated up to the melting temperature with heating elements simultaneously. The melting temperature differs according to the raw materials and the products.

Desired shapes are obtained by moulding the melted raw materials. The products that are melted physically and moulded in fully enclosed system come into the cooling pond. Completely cooled products are cut into the desired length by saw and packaged for dispatch as an alternative to heavier, more expensive substrates.

The UN CPC code of the product is 363, semi-manufactures of plastics.

Raw Material	%
PVC Granule	70-80
Calcite	10-20
Titanium	2-6
Stabran	2-6
Others	2-6

Technical Specifications

Propoerties	Unit	Value
Density	gr/m ³	1.3-1.4
Air Diffusion Ability	kg/m ²	4
Sound Isolation	dB	34
Profile Heat Isolation Coefficient	W/m 20 K	1.4

LCA Informations

Declared Unit 1 kg of White PVC Profile

Time Representativeness 2020

Database(s) and LCA Software Used Ecoinvent 3.6, SimaPro 9.1

The inventory for the LCA study is based on the 2020 production figures for PVC Profile by SARAY production plants in Çerkezköy, Turkey.

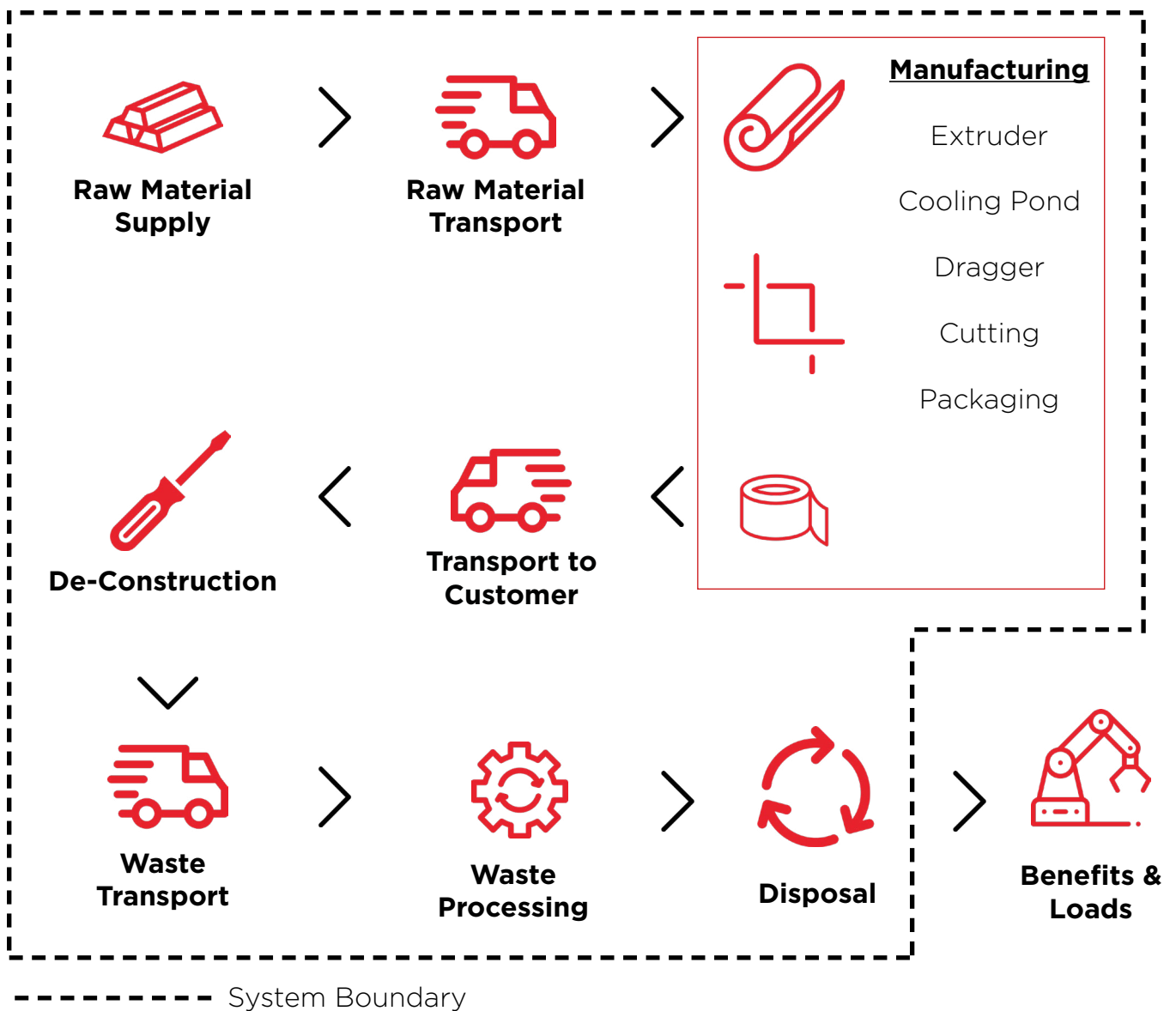
This EPD's system boundary is cradle to grave. The results of the LCA with the indicators as per EPD requirement are given in the following tables for product manufacture (A1, A2, A3), construction process stage (A4), end of life stage (C1, C2, C3, C4) and benefits and load stage (D).

The system boundaries in tabular form for all modules are shown in the table above.

Product Stage			Construction Process Stage		Use Stage							End of Life Stage				Benefits and Loads
Raw Material Supply	Transport	Manufacturing	Transport	Construction Installation	Use	Maintenance	Repair	Replacement	Refurbishment	Operational Energy Use	Operational Water Use	Deconstruction, demolition	Transport	Waste Processing	Disposal	Future reuse, recycling or energy recovery potentials
A1	A2	A3	A4	A5	B1	B2	B3	B4	B5	B6	B7	C1	C2	C3	C4	D
X	X	X	X	ND	ND	ND	ND	ND	ND	ND	ND	X	X	X	X	X

X = Included in LCA, ND = Not Declared

System Boundary



A1: Raw Material Supply

Production for each product starts with mainly locally sourced but some transported from other parts of the world. ‘Raw material supply’ includes raw material extraction and pretreatment processes before production.

A2: Raw Material Transport

Transport is relevant for delivery of raw materials and other materials to the plant and the transport of materials within the plant. Transport of raw materials to production site is taken as the weight average values for transport from raw materials supplier in 2020.

A3: Manufacturing

Production stage for PVC profile production starts with extrusion of PVC and continues with cooling, dragging and continues with cutting for the desired length. Electricity and natural gas are consumed during the manufacturing.

A4: Transport to Customer

Transport of final product to construction site is taken as the weight average values for transport to customers in 2020. The product shipment distance is calculated according to the domestic and international sales rates over the assumed distances. It has been accepted as an average of 500 km by road for domestic and 2000 km by sea for abroad.

C1 : Deconstruction and Demolition

For deconstruction stage, 0.239 MJ electricity use per kg of material was assumed (Gervasio et al., 2018).

C2 : Transport

This stage includes the transportation of the discarded conductors to final disposal. Average distance from demolition site to waste processing site for final disposal is assumed to be 100 km.

C3 : Waste Processing

Wastes can be recycled directly or disposed of according to different scenarios. No process is needed.

C4 : Disposal

It is assumed that about 11% of PVC Products are collected for recycling and the rest of is sent to the landfill for their final fate as such modelled in the LCA.

D : Benefits and Loads

It is assumed that about 11% of PVC materials are recycled in related facilities. The secondary material resource was modeled as benefit in the LCA study.

More Information

Allocations

Water consumption, energy consumption and raw material transportation were weighted according to 2020 production figures.

In addition, hazardous and non-hazardous waste amounts were also allocated from the 2020 total waste generation.

Cut-Off Criteria

1% cut-off applied. Data for elementary flows to and from the product system contributing to a minimum of 99% of the declared environmental impacts have been included.

REACH Regulation

No substances included in the Candidate List of Substances of Very High Concern for authorization under the REACH regulations are present in this product either above the threshold for registration with the European Chemicals Agency or above 0.1% (wt/wt).

LCA Modelling, Calculation and Data Quality

The results of the LCA with the indicators as per EPD requirement are given in the LCA result tables. All energy calculations were obtained using Cumulative Energy Demand (LHV) methodology, while fresh water use is calculated with selected inventory flows in SimaPro according to the PCR.

There are no co-product allocations within the LCA study underlying this EPD.

The SimaPro 9.1 LCA software and the Ecoinvent 3.6 LCA database were used to calculate the environmental impacts. The regional energy datasets were used for all energy calculations.

Geographical Scope

The geographical scope of this EPD is global.



LCA Results

Environmental Impacts

Impact Category	Unit	A1-A3	A4	C1	C2	C3	C4	D
GWP - Fossil	kg CO ₂ eq	4.72	0.019	0.039	0.009	0	0	-0.434
GWP - Biogenic	kg CO ₂ eq	0.026	-4.93E-6	357E-6	6.60E-6	0	0	-0.002
GWP - Luluc	kg CO ₂ eq	326E-6	13.02E-6	373E-6	2.65E-6	0	0	-7.76E-6
GWP - Total	kg CO ₂ eq	4.75	0.019	0.040	0.009	0	0	-0.436
ODP	kg CFC-11 eq	78.2E-9	3.92E-9	1.10E-9	2.14E-9	0	0	-3.16E-9
AP	mol H+ eq	0.033	0.001	257E-6	28.0E-6	0	0	-0.003
EP - Freshwater	kg P eq	0.001	788E-9	41.2E-6	644E-9	0	0	-39.0E-6
*EP - Freshwater	kg PO ₄ eq	0.002	2.41E-6	126E-6	1.97E-6	0	0	-119E-6
EP - Marine	kg N eq	0.004	148E-6	41.8E-6	6.26E-6	0	0	-320E-6
EP - Terrestrial	mol N eq	0.044	0.002	379E-6	68.5E-6	0	0	-0.003
POCP	kg NMVOC	0.016	428E-6	104E-6	26.9E-6	0	0	-0.001
ADPE	kg Sb eq	0.001	153E-9	94.2E-9	155E-9	0	0	-218E-9
ADPF	MJ	70.8	0.250	0.430	0.141	0	0	-6.14
WDP	m ³ depriv.	2.25	390E-6	0.018	459E-6	0	0	-0.200
PM	disease inc.	575E-9	645E-12	1.10E-9	766E-12	0	0	-57.4E-9
IR	kBq U-235 eq	0.050	0.001	0.001	0.001	0	0	-0.001
ETP - FW	CTUe	161	0.163	0.376	0.113	0	0	-16
HTTP - C	CTUh	26.3E-9	10.7E-12	6.90E-12	2.73E-12	0	0	-2.77E-9
HTTP - NC	CTUh	244E-9	134E-12	330E-12	123E-12	0	0	-22.3E-9
SQP	Pt	3.14	0.048	0.025	0.162	0	0	-0.100
Acronyms	GWP-total: Climate change, GWP-fossil: Climate change- fossil, GWP-biogenic: Climate change - biogenic, GWP-luluc: Climate change - land use and transformation, ODP: Ozone layer depletion, AP: Acidification terrestrial and freshwater, EP-freshwater: Eutrophication freshwater, EP-marine: Eutrophication marine, EP-terrestrial: Eutrophication terrestrial, POCP: Photochemical oxidation, ADPE: Abiotic depletion - elements, ADPF: Abiotic depletion - fossil resources, WDP: Water scarcity, PM: Respiratory inorganics - particulate matter, IR: Ionising radiation, ETP-FW: Ecotoxicity freshwater, HTP-c: Cancer human health effects, HTP-nc: Non-cancer human health effects, SQP: Land use related impacts, soil quality.							
Legend	A1: Raw Material Supply, A2: Transport, A3: Manufacturing, A1-A3: Sum of A1, A2, and A3, A4: Transport to Site, C1: De-Construction, C2: Waste Transport, C3: Waste Processing, C4: Disposal, D: Benefits and Loads Beyond the System Boundary.							
Disclaimer 1	This impact category deals mainly with the eventual impact of low dose ionizing radiation on human health of the nuclear fuel cycle. It does not consider effects due to possible nuclear accidents, occupational exposure nor due to radioactive waste disposal in underground facilities. Potential ionizing radiation from the soil, from radon and from some construction materials is also not measured by this indicator.							
Disclaimer 2	The results of this environmental impact indicator shall be used with care as the uncertainties on these results are high or as there is limited experienced with the indicator.							
*Disclaimer 3	EP-freshwater: This indicator has been calculated as "kg P eq" as required in the characterization model. (EUTREND model, Struijs et al, 2009b, as implemented in ReCiPe; http://eplca.jrc.ec.europa.eu/LCDN/developerEF.xhtml)							
					0,000			
					0,000			

Resource Use

Impact Category	Unit	A1-A3	A4	C1	C2	C3	C4	D
PERE	MJ	1.93	0.002	0.103	0.002	0	0	-0.161
PERM	MJ	0	0	0	0	0	0	0
PERT	MJ	1.93	0.002	0.103	0.002	0	0	-0.161
PENRE	MJ	70.8	0.250	0.430	0.141	0	0	-6.14
PENRM	MJ	0	0	0	0	0	0	0
PENRT	MJ	70.8	0.250	0.430	0.141	0	0	-6.14
SM	kg	0	0	0	0	0	0	0
RSF	MJ	0	0	0	0	0	0	0
NRSF	MJ	0	0	0	0	0	0	0
FW	m ³	0.028	25.1E-6	164E-6	29.4E-6	0	0	-0.002
Acronyms	PERE: Use of renewable primary energy excluding resources used as raw materials, PERM: Use of renewable primary energy resources used as raw materials, PERT: Total use of renewable primary energy, PENRE: Use of non-renewable primary energy excluding resources used as raw materials, PENRM: Use of non-renewable primary energy resources used as raw materials, PENRT: Total use of non-renewable primary energy, SM: Secondary material, RSF: Renewable secondary fuels, NRSF: Non-renewable secondary fuels, FW: Net use of fresh water.							
Legend	A1: Raw Material Supply, A2: Transport, A3: Manufacturing, A1-A3: Sum of A1, A2, and A3, A4: Transport to Site, C1: De-Construction, C2: Waste Transport, C3: Waste Processing, C4: Disposal, D: Benefits and Loads Beyond the System Boundary.							

Output Flows

Impact Category	Unit	A1-A3	A4	C1	C2	C3	C4	D
HWD	kg	0.013	0	0	0	0	0	0
NHWD	kg	0.061	0	0	0	0	0	0
RWD	kg	0	0	0	0	0	0	0
CRU	kg	0	0	0	0	0	0	0
MFR	kg	0	0	0	0	0	0	0
MER	kg	0	0	0	0	0	0	0
EE (Electrical)	MJ	0	0	0	0	0	0	0
EE (Thermal)	MJ	0	0	0	0	0	0	0
Acronyms	HWD: Hazardous waste disposed, NHWD: Non-hazardous waste disposed, RWD: Radioactive waste disposed, CRU: Components for reuse, MFR: Material for recycling, MER: Materials for energy recovery, EE (Electrical): Exported energy electrical, EE (Thermal): Exported energy, Thermal.							
Legend	A1: Raw Material Supply, A2: Transport, A3: Manufacturing, A1-A3: Sum of A1, A2, and A3, A4: Transport to Site, C1: De-Construction, C2: Waste Transport, C3: Waste Processing, C4: Disposal, D: Benefits and Loads Beyond the System Boundary.							

References

/GPI/ General Programme Instructions of the International EPD® System. Version 4.0.

/EN ISO 9001/ Quality Management Systems - Requirements

/EN ISO 14001/ Environmental Management Systems - Requirements

/EN ISO 50001/ Energy Management Systems - Requirements

/ISO 14020:2000/ Environmental Labels and Declarations — General principles

/EN 15804:2012+A2:2019/ Sustainability of construction works - Environmental Product Declarations — Core rules for the product category of construction products

/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)



/PCR for Construction Products and CPC 54 Construction Services/ Prepared by IVL Swedish Environmental Research Institute, Swedish Environmental Protection Agency, SP Trä, Swedish Wood Preservation Institute, Swedisol, SCDA, Svenskt Limträ AB, SSAB, The International EPD System, 2019:14 Version 1.11 DATE 2019-12-20

/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

/Ecoinvent / Ecoinvent Centre, www.ecoinvent.org


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

Contact Informations

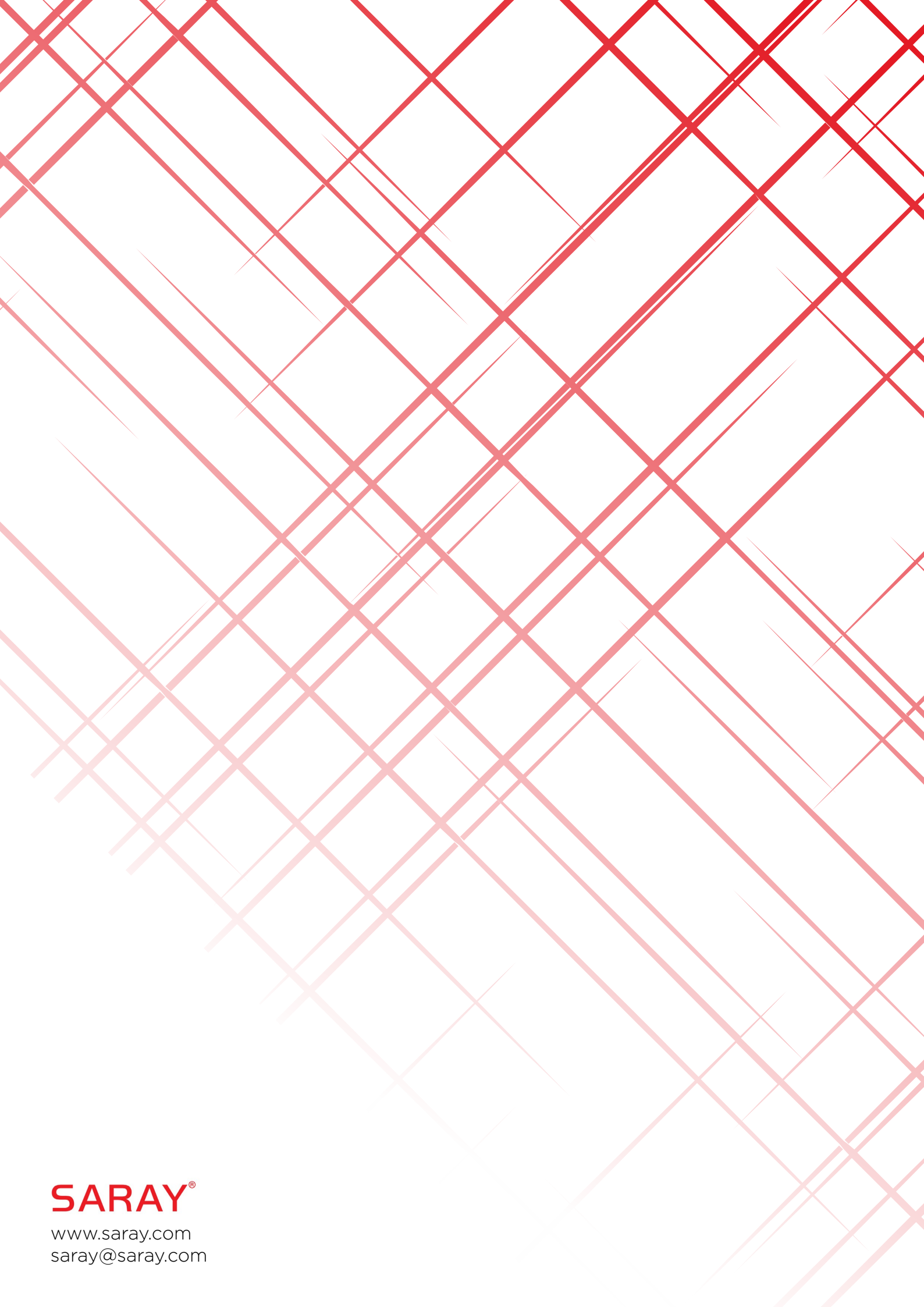
Programme	EPD registered through fully aligned regional programme: EPD Turkey: www.epdturkey.org	The International EPD® System www.environdec.com
	 ENVIRONMENTAL PRODUCT DECLARATIONS	 THE INTERNATIONAL EPD® SYSTEM

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